



Universiteit
Antwerpen

FACULTY OF APPLIED ECONOMIC SCIENCES

**ESSAYS ON THE MATCH BETWEEN
HIGHER EDUCATION AND WORK**

by

SANA SELLAMI

Doctoral dissertation submitted to obtain
the degree of doctor of Social Economic Sciences
17 December 2015

PROMOTER(S):

PROF. DR. WALTER NONNEMAN

Faculty of Applied Economic Sciences
Universiteit Antwerpen

PROF. DR. DIETER VERHAEST

Research Centre for Work and Organisation Studies, Campus Brussels
KU Leuven, Campus Brussels

Essays on the match between higher education and work

ISBN: 978-90-8994-135-0

Printed by Universitas Antwerpen

© Sana Sellami – 2015

All rights reserved. No part of this publication may be reproduced or transmitted in any form of by any means electronic or mechanical, including photocopying, recording, or by any information storage or retrieval system, without permission in writing from the author.

D O C T O R A L J U R Y

Prof. dr. Walter Nonneman (promoter)

Universiteit Antwerpen

Prof. dr. Dieter Verhaest (promoter)

KU Leuven

Prof. dr. Pierre Coppieters (chairman)

Universiteit Antwerpen

Prof. dr. Walter Van Trier

Universiteit Gent

Prof. dr. Rolf van der Velden

Universiteit Maastricht

Prof. dr. Karel Neels

Universiteit Antwerpen

UNIVERSITEIT ANTWERPEN

Essays on the match between higher education and work

by

Sana Sellami

ABSTRACT

In this thesis I focus on the match between higher education and work. Two forms of mismatches are the main subjects within this thesis, these are overeducation and horizontal mismatch. Within this thesis we focus on three main objectives: (1) the measurement methods of field of study mismatch and the impact of the use of different measurement approaches on the determinants of mismatch, (2) determinants of the alternative combinations of educational mismatch and (3) consequences of the combinations of mismatch on wages and job satisfaction. For the analyses the SONAR data and the REFLEX and HEGESCO data have been used. Different techniques are used to analyze the abovementioned topics, such as panel data techniques to control for unobserved heterogeneity and IV analysis to account for measurement error.

V O O R W O O R D

Dan zijn we uiteindelijk aangekomen bij het schrijven van dit ‘voorwoord’. Ik denk niet dat ik de enige PhD student was/ben/ zal zijn die toch wel opgelucht is dat deze reis eindelijk achter de rug is. Bij deze ‘journey’ had ik graag een aantal mensen willen bedanken.

Allereerst wil ik Allah (swt) bedanken voor alle zaken waarmee ik gezegend ben; mijn echtgenoot, mijn kinderen, mijn familie, mijn kennissen, Ten tweede wil ik heel graag mijn man, Mohamed Sellami, bedanken. Zonder zijn steun doorheen de jaren had ik hoogstwaarschijnlijk mijn thesis niet tot een goed einde gebracht. Door zijn hulp, geduld en mij telkens te laten inzien om door te zetten, raakte ik telkens uit de put en ging ik er altijd weer met volle moed tegenaan. Niemand kan de plaats van mijn *soulmate* vervangen. Mijn dank is zo ontzettend groot, dat het gewoonweg niet te beschrijven valt.

Daarnaast wil ik mijn promotor, Dieter Verhaest, bedanken. Toen ik pas met hem begon samen te werken, verliep onze relatie redelijk stroef. Maar dat is doorheen de jaren (gelukkig) veranderd. Ik zou mij geen andere leermeester kunnen wensen, ik heb enorm veel van hem geleerd: als Sociologe hadden we niet altijd dezelfde beweegredenen, maar door zijn bijsturingen is daar in de loop van de jaren veel verandering in gekomen. Ook hebben zijn kritische bedenkingen en bijsturingen mij geholpen om zaken tot een nog beter einde te brengen. Soms leek het alsof het nooit echt goed genoeg was voor Dieter, maar integendeel, zijn bedenkingen hebben vaak bijgedragen tot betere versies van de studies. Ook in moeilijkeren tijden stond Dieter voor mij klaar! Er zijn momenten geweest dat ik het echt niet meer zag zitten om mijn doctoraatstraject verder af te maken, maar Dieter vertelde mij dat ik niet de eerste doctoraatstudente ben of zal zijn die wil stoppen met het onderzoek. Dat hoort er wellicht wel gewoon bij het verrichten van doctoraal onderzoek. Echter zonder de openheid over dit soort onderwerpen, begrip en begeleiding zou ik het hebben opgegeven. Niettemin, heeft Dieter ook altijd veel begrip gehad voor mijn thuissituatie.

Ook wil ik Walter Nonneman bedanken voor zijn enorme hulp en grote steun. Doorheen de gesprekken die ik met hem had, ben ik steeds meer en meer naar hem gaan opkijken, niet alleen op het vlak van werk maar ook op privé-vlak. Ik moet eigenlijk toegeven dat ik mezelf in hem terugzag, dan wel als vrouwelijke versie. Één van de overeenkomsten tussen ons, was dat hij ook een kind had gekregen tijdens zijn studies, dus hij wist heel goed hoe moeilijk het soms kan zijn om studies en gezin met elkaar te combineren. Dit gaf mij een extra steuntje in de rug. Ik was er nog meer van overtuigd dat een ‘gezinnetje’ hebben, zeker geen belemmering hoeft te vormen om je

studies of je doctoraatstraject af te maken. Ook zijn begrip en betrokkenheid, zorgde er voor dat ik heel gemakkelijk werk en gezin kon combineren zonder het gevoel te hebben dat dit een belemmering vormt voor mijn werk. Mocht ik een promotor hebben gehad die hier weinig of geen begrip voor had, dan had ik allang mijn doctoraatsstudie opgegeven. Verder zag ik niet alleen iemand die begripvol was, maar ook iemand die zich werkelijk zorgen maakte over zijn student. Niet alleen op het vlak van werk, maar ook wat naast het werk gebeurde. Ik ben Walter erg dankbaar, ik denk dat heel weinig promotoren zo betrokken zijn bij hun PhD-studenten.

Naast Walter en Dieter, is ook Walter van Trier een enorme steun geweest. Walter van Trier is eigenlijk het brein achter SONAR (echter wil hij dit niet altijd toegeven). Walter vertelde met veel passie over SONAR, over de vele mogelijkheden en (eventuele) moeilijkheden. Dit sprak mij enorm aan en motiveerde mij ook om aan het project te starten en te doorlopen. Zijn enorme literatuurkennis over de transitie van onderwijs naar de arbeidsmarkt, passioneerde mij niet alleen, maar zorgde er ook voor dat ik op het juiste spoor werd gezet wanneer het niet zo duidelijk was. Ook heeft Walter altijd veel begrip gehad voor mijn thuissituatie en hebben zijn motivatiegesprekken mij geholpen om zeker niet op te geven. Ik wil hem hiervoor bedanken, als voor de discussies die we hadden over bepaalde onderwerpen in de thesis, voor de kritische opmerkingen, bedenkingen en reviews van de teksten. Zowel Dieter, Walter Nonneman als Walter van Trier zijn voor mij meer dan alleen promotoren/ collega's/ leden van de commissie!! Ik wil hen hartelijk bedanken voor de kans om dit traject te kunnen doorlopen.

Daarnaast wil ik ook leden van mijn doctoraal commissie bedanken voor hun opmerkingen, kritische bedenkingen en hulp.

Verder wil ik mijn ouders bedanken, voor al hun liefde en steun gedurende mijn loopbaan. Zij stonden er altijd op om mijn opleiding verder te zetten, ook toen ik naar Antwerpen verhuisde. Ik vermoed dat als mijn vader niet de aanzet had gegeven om aan de universiteit verder te studeren, ik niet zou staan waar ik momenteel sta. Mijn ouders hebben verder studeren altijd heel belangrijk gevonden, door hun motivatie over het onderwijs, groeide mijn wilskracht om door te zetten. Ondanks de afstand, zijn mijn ouders altijd betrokken geweest bij mijn studies en stonden zij mij bij, bijvoorbeeld bij een moeilijk examen, een writersblock, etc. Ook bij het krijgen van mijn kinderen, hebben zij een steentje bijgedragen zodat ik mijn studies zeker niet op gaf. Ik zou mij geen betere ouders kunnen wensen (Al hamdoellilah!). Tot slot wil ik mijn (schoon)familie bedanken voor al hun hulp met de kinderen, steun om toch door te zetten en het feit dat ze er altijd voor mij waren. Ook wil ik iedereen bedanken die mij telkens de moed hebben ingepraat om toch door te zetten en gelukt is om mij hier doorheen te slepen.

TABLE OF CONTENTS

Nederlandstalige samenvatting.....	13
Meetmethoden van horizontale mismatch.....	14
Determinanten van horizontale mismatch en overscholing.....	14
Effecten van overscholing en horizontale mismatch op arbeidsuitkomsten.....	20
Algemene conclusie.....	23
I n t r o d u c t i o n	24
Educational mismatch.....	25
Theoretical framework.....	26
Field of study mismatch or horizontal mismatch.....	30
Research questions.....	32
Outline of the different Chapters	33
Data and methodology	35
Structure of the thesis	36
References.....	37
C h a p t e r 1	42
Abstract.....	42
Introduction	43
Conceptual clarifications.....	44
Literature review.....	47
The worker self-assessment approach (WA).....	54
The Job analysis approach (JA).....	56
The realized matches approach (RM).....	58
Evaluation of the different measurement approaches	58
New evidence.....	62
Data and measurement	63
The incidence of horizontal mismatch	65
Correspondence between the different measures	66
Field of study mismatch and overeducation.....	68
The determinants of field of study mismatch	68
Conclusion of the measuring section.....	71
Discussion and conclusion.....	75

References.....	76
Appendix.....	80
C h a p t e r 2	90
Abstract.....	90
Inleiding	91
Hypothesen	93
Data en methode.....	95
Overscholing.....	96
Inhoudelijke aansluiting.....	97
Arbeidstevredenheid en loon.....	99
Kwaliteit van menselijk kapitaal	99
Onderwijsdomeinen	99
Werkervaring.....	100
Werkloosheid	100
Controle variabelen.....	100
Resultaten.....	100
Discussie	108
Conclusie.....	110
Referenties	110
C h a p t e r 3	114
Abstract.....	114
Introduction	115
Data and methodology	117
Measurement of overeducation.....	119
Measurement of horizontal mismatch.....	121
Wages.....	123
Control variables	123
Estimation results.....	124
Standard panel-data results.....	124
IV panel-data results	127
Sensitivity analyses	130

Discussion.....	132
Conclusion.....	134
References.....	134
Appendix.....	138
C h a p t e r 4	149
Abstract.....	149
Introduction.....	150
Theoretical framework and hypotheses	152
Educational motives	153
Academic choices	155
Academic performance	156
Job search and job choice behavior.....	156
Overeducation	157
Wages and job satisfaction	158
Data and methodology	159
Data.....	159
Educational motives	159
Overeducation	160
Academic choices and performance	162
Wages and Job Satisfaction	163
Control variables	163
Results	164
Academic choices.....	164
Academic performance	167
Overeducation	167
Wages and job satisfaction	170
Discussion.....	172
Conclusion.....	176
References.....	176
Appendix.....	180
C h a p t e r 5	188

Abstract	188
Introduction	189
Theoretical framework and hypotheses	191
Demand and supply context.....	191
Educational institutions	192
Labor market institutions	194
Methodology.....	195
Data and mismatch measurement	195
Estimation and model specification	197
Estimation results.....	199
Variance decomposition	199
Main estimation results	200
Sensitivity and robustness analyses.....	203
Discussion and conclusion.....	205
References.....	209
Appendix.....	212
C o n c l u s i o n	217
Conceptualisation and measurement of mismatch	218
Determinants of mismatch	220
Consequences of mismatch	221
Reflection and policy recommendations.....	223
Directions for further research.....	227
References.....	228

LIST OF FIGURES

<i>Number</i>	<i>Page</i>
TABLE 1-1 REVIEW OF THE STUDIES ABOUT HORIZONTAL MISMATCH	49
TABLE 1-2 THE INCIDENCE OF HORIZONTAL MISMATCH (BY LEVEL OF AGGREGATION)	66
TABLE 1-3 THE INCIDENCE OF HORIZONTAL MISMATCH (MATCH VS. MISMATCH)	66
TABLE 1-4 CORRELATIONS BETWEEN THE DIFFERENT MISMATCH MEASURES	67
TABLE 1-5 NUMBER OF MEASURES OF FIELD OF STUDY (MIS)MATCH	67
TABLE 1-6 INCIDENCE OF FIELD OF STUDY AND OVEREDUCATION	68
TABLE 1-7 THE PROBABILITY OF FIELD OF STUDY MISMATCH	72
TABLE 1-8 THE PROBABILITY OF FIELD OF STUDY MISMATCH (USING DIFFERENT DEFINITIONS)	74
TABEL 2-1 AANDEEL VAN VERSCHILLENDE VORMEN VAN AANSLUITING TUSSEN ONDERWIJS EN ARBEIDSMARKT IN DE EERSTE BAAN VOLGENS TWEE MAATSTAVEN VAN OVERSCHOLING	98
TABEL 2-2 RELATIE TUSSEN DE TWEE MAATSTAVEN VOOR AANSLUITING	98
TABEL 2-3 INVLOED VAN AANSLUITINGSVORM OP LOON (LN(REËEL UURLOON) - LINEAIRE REGRESSIE)	101
TABEL 2-4 INVLOED VAN AANSLUITINGSVORM OP ARBEIDSTEVREDENHEID (ORDINAAL PROBIT MODEL)	101
TABEL 2-5 DETERMINANTEN VAN AANSLUITING TUSSEN OPLEIDING EN EERSTE JOB (OBJECTIEVE MAATSTAF): MULTINOMIAAL LOGIT MODEL	103
TABEL 2-6 DETERMINANTEN VAN AANSLUITING TUSSEN OPLEIDING EN EERSTE JOB (SUBJECTIEVE MAATSTAF): MULTINOMIAAL LOGIT MODEL	105
TABLE 3-1 DESCRIPTIVE STATISTICS ON HORIZONTAL AND VERTICAL MISMATCH (AVERAGE VALUES)	120
TABLE 3-2 CORRELATIONS BETWEEN THE TWO MEASURES OF MISMATCH	123
TABLE 3-3 THE IMPACT OF EDUCATIONAL MISMATCH ON LN WAGES (BENCHMARK ANALYSIS WITH JA MEASURE)	126
TABLE 3-4 WAGE EFFECTS FOR AVERAGE OVEREDUCATED WORKERS(\$)	127
TABLE 3-5 TEST STATISTICS ON THE VALIDITY AND RELIABILITY OF THE IV FIXED-EFFECTS ESTIMATES (P VALUES IN PARENTHESES)	130
TABLE 3-6 WAGE EFFECTS FOR OVEREDUCATED WORKERS	131
TABLE 4-1 PRINCIPAL COMPONENT ANALYSIS OF THE EDUCATIONAL MOTIVES – FACTOR LOADINGS	160
TABLE 4-2 THE EFFECT OF THE STUDY MOTIVES ON ACADEMIC CHOICES – LOGIT COEFFICIENTS	166
TABLE 4-3 THE IMPACT OF THE STUDENT MOTIVES ON ACADEMIC PERFORMANCE – POISSON OR ORDERED PROBIT REGRESSION COEFFICIENTS	167

TABLE 4-4 THE IMPACT OF THE STUDENT MOTIVES ON YEARS OF OVEREDUCATION- TOBIT REGRESSION COEFFICIENTS _____	169
TABLE 4-5 THE IMPACT OF THE STUDENT MOTIVES AND OVEREDUCATION (JOB ANALYSIS) ON THE NATURAL LOG OF WAGES – LINEAR REGRESSION COEFFICIENTS _____	171
TABLE 4-6 THE IMPACT OF THE STUDENT MOTIVES AND OVEREDUCATION (JOB ANALYSIS) ON JOB SATISFACTION – LINEAR REGRESSION COEFFICIENTS _____	172
TABLE 5-1 THE INCIDENCE OF MISMATCH FIVE YEARS AFTER GRADUATION _____	197
TABLE 5-2 VARIANCE DECOMPOSITION FOR ALTERNATIVE MODEL SPECIFICATIONS _____	200
TABLE 5-3 THE PROBABILITY TO HAVE A MISMATCH FIVE YEARS AFTER GRADUATION - MULTINOMIAL LOGIT MULTILEVEL COEFFICIENT ESTIMATES – FULL MODEL SPECIFICATION (REFERENCE = FULL MATCH) _____	202
TABLE 5-4 THE PROBABILITY TO HAVE A MISMATCH FIVE YEARS AFTER GRADUATION - MULTINOMIAL LOGIT MULTILEVEL COEFFICIENT ESTIMATES – REDUCED MODEL SPECIFICATION (REF = FULL MATCH) _____	204
TABLE 5-5 THE PROBABILITY TO HAVE A MISMATCH FIVE YEARS AFTER GRADUATION - MULTINOMIAL LOGIT MULTILEVEL COEFFICIENT ESTIMATES – MODEL WITHOUT JAPAN (REF = FULL MATCH) _____	204
TABLE 5-6 THE PROBABILITY TO HAVE A MISMATCH AT THE START OF THE CAREER - MULTINOMIAL LOGIT MULTILEVEL COEFFICIENT ESTIMATES – FULL MODEL SPECIFICATION (REF = FULL MATCH) (SELECTED RESULTS) _____	205

N E D E R L A N D S T A L I G E S A M E N V A T T I N G

De aansluiting tussen onderwijs en arbeidsmarkt staat hoog op de nationale en internationale beleidsagenda. Het blijkt dat het voor individuen niet altijd even gemakkelijk is om een passende aansluiting te realiseren tussen onderwijs en arbeidsmarkt. De afgelopen decennia is uitgebreid onderzoek verricht naar de arbeidsmarktintrede van schoolverlaters en jongeren. Hierbij ging de aandacht vooral uit naar zogenoemde overscholing (Groot en Maassen van den Brink, 2000; McGuinness, 2006), dit impliceert dat het niveau van de opleiding het vereiste niveau voor de uitoefening van de baan overstijgt. Een omvangrijk gedeelte van de jongeren begint zijn carrière overgeschoold (Battu, Belfield en Sloane, 1999; Büchel, de Grip en Mertens, 2003; Verhaest en Van der Velden, 2013).

Als jongeren werken in een job waarin ze gemismatcht zijn, blijkt dat negatieve effecten teweeg te brengen. Uit onderzoek blijkt dat jongeren die overgeschoold zijn vaak niet tevreden zijn met hun baan en minder verdienen dan adequaat geschoolde individuen (Hartog, 2000). Verder blijkt dat voor sommige jongeren overscholing een langer durende toestand, die dreigt hen voor de rest van hun loopbaan te tekenen (Baert, Cockx & Verhaest, 2013). Recent focust een aantal onderzoekers ook op horizontale mismatch en dan voornamelijk op de determinanten daarvan (Robst, 2007; Wolbers, 2003). Horizontale mismatch is een gebrekkige aansluiting tussen de gevolgde studierichting en gevraagde studierichting. Ook is onderzocht wat voor effect horizontale mismatch en overscholing hebben op lonen en arbeidstevredenheid (Béduwe & Giret, 2011; Verhaest, Van Trier & Sellami, 2011). Echter, in vergelijking met onderzoek naar overscholing zijn studies naar horizontale mismatch eerder beperkt. In deze thesis worden enkele lacunes binnen het onderzoek naar horizontale mismatch opgevuld.

In deze thesis richten wij ons op een drietal topics: (1) de meetmethodes van horizontale mismatch, (2) de determinanten van verschillende combinaties van onderwijsmismatch en (3) de gevolgen van onderwijsmismatch.

Om dit te onderzoeken, focussen wij enkel op de hogeropgeleiden. We maken gebruik van gegevens uit de SONAR-databank, de REFLEX- en de HEGESCO-databank. De SONAR-databank bevat gedetailleerde informatie over de onderwijsloopbaan en de beginnende arbeidsloopbaan van Vlaamse jongeren. De databank is het resultaat van een representatieve bevraging op de leeftijd van 23 jaar van 9000 Vlaamse jongeren, geboren in 1976, 1978 of 1980. Onder de cohorten 1976 en 1978 vonden ook vervolgenquêtes plaats op de leeftijd van 26 jaar; voor de cohorten 1976 en 1980 ook nog eens op 29-jarige leeftijd. In onze analyses maken we gebruik van

informatie over de aansluiting van de job op de opleiding op vier verschillende meetmomenten: (1) bij de start van de eerste geregistreerde job, (2) de job op de leeftijd van 23 jaar, (3) de job op de leeftijd van 26 jaar, (4) de job op de leeftijd van 29 jaar. In hoofdstuk 1 en hoofdstuk 2 kijken wij enkel naar de eerste geregistreerde job; in hoofdstuk 3 en 4 maken we ook gebruik van de informatie over de andere jobs. Voor de analyse in hoofdstuk 5 maken we gebruik van de REFLEX- en HEGESCO-data. Deze databanken beschikken over informatie over zeventien Europese landen (inclusief Vlaanderen) en Japan.

Meetmethoden van horizontale mismatch

Om horizontale mismatch te meten worden in de literatuur drie verschillende meetmethoden gebruikt, die tevens worden gebruikt om overscholing te meten. De drie meetmethodes zijn: (1) subjectieve maatstaf, (2) objectieve maatstaf en de (3) statistische maatstaf. In de literatuur is de directe subjectieve maatstaf de meest gehanteerde maatstaf om horizontale mismatch te meten. Een aantal studies maakt gebruik van de objectieve maatstaf en slechts één studie maakt gebruik van de statistische maatstaf. In deze thesis wordt aan de horizontale-mismatchliteratuur bijgedragen door horizontale mismatch met behulp van alle drie de maatstaven te meten (cf. Hoofdstuk 1). Tevens wordt gebruik gemaakt van zowel de directe als de indirecte subjectieve maatstaf. Tot nu toe is er geen enkele studie die de indirecte subjectieve maatstaf heeft gehanteerd om horizontale mismatch te meten.

Door het gebruik van verschillende maatstaven wordt geprobeerd te achterhalen of de incidentie en de determinanten van horizontale mismatch verschillen naargelang de toegepaste maatstaf. Uit de analyse blijkt dat de incidentie van horizontale mismatch verschilt naargelang de toegepaste meetmethode. We vinden een incidentie die ligt tussen 15% en 40%. Ook de correlatie tussen de maatstaven is niet echt sterk te noemen, deze varieert tussen 0.18 en 0.19. Ook verschillen de determinanten van horizontale mismatch afhankelijk van de toegepaste meetmethode. Daarnaast blijken ook het classificatieniveau en de categorisering van de mismatch een impact te hebben. Bij een eventuele vergelijking tussen ons onderzoek en andere onderzoeken moet dus rekening worden gehouden met al deze factoren.

Determinanten van horizontale mismatch en overscholing.

In de literatuur zijn er tal van studies uitgevoerd naar de determinanten van overscholing. Ook zijn een aantal studies gericht op horizontale mismatch. Slechts een beperkt aantal studies heeft evenwel onderzocht welke

factoren de combinatie van overscholing en horizontale mismatch beïnvloeden. Wij trachten met deze thesis twee studies hieraan toe te voegen (Hoofdstuk 2 en Hoofdstuk 5).

Wij onderscheiden determinanten op zowel het individueel niveau (in de hoofdstukken 2 en 5), als op het niveau van de studiegebieden binnen de landen en op landenniveau (hoofdstuk 5). In hoofdstuk 2 focussen we enkel op determinanten op individueel niveau. We onderscheiden de volgende factoren: (1) de kwaliteit van het menselijk kapitaal, (2) onderwijsdomeinen, (3) werkervaring en (4) de werkloosheidsgraad bij arbeidsmarktintrede. We voeren een multinomiale logistische regressie uit om de effecten van deze determinanten te achterhalen. In hoofdstuk 5 wordt een multilevel analyse uitgevoerd waarbij we bovenstaande drie analyseniveaus onderscheiden. We onderscheiden telkens vier (mis)matchcategorieën: volledige match, pure verticale mismatch, pure horizontale mismatch en volledige mismatch.

Op individueel niveau vinden we dat vrouwen en oudere individuen een grotere kans hebben om overgeschoold te zijn en een volledige mismatch te hebben (cf. Hoofdstuk 5). Daarnaast vinden we dat de kwaliteit van het menselijk kapitaal de mismatch bepaalt. Zowel overscholing met horizontale mismatch als overscholing zonder horizontale mismatch wordt negatief beïnvloed door de kwaliteit van het menselijk kapitaal (cf. Hoofdstuk 2 en Hoofdstuk 5). Ook de gevolgde studierichting is sterk bepalend voor de aansluiting. Echter, beide vormen van overscholing worden bepaald door verschillende studierichtingen, bijvoorbeeld studenten uit het domein 'economie en bedrijfskunde' hebben een relatief hoge kans op overscholing met inhoudelijke aansluiting en een relatief lage kans op overscholing zonder inhoudelijke aansluiting (cf. Hoofdstuk 2).

Verder bepalen de regionale arbeidsmarktcondities vooral pure verticale mismatch. Een mogelijke verklaring is dat in tijden van hoge werkloosheid werkgevers selectiever kunnen zijn en dus minder geneigd zijn om werkzoekenden zonder inhoudelijke aansluiting in dienst te nemen. Ook vinden we dat werkervaring de kans op overscholing buiten het domein verhoogt. Mogelijk is participatie in studentenwerk een teken van een grotere bereidheid om een baan aan te nemen. Een andere verklaring is dat de aansluiting van deze werkervaring op de gevolgde opleiding relatief beperkt is.

Verder blijkt uit onze landenanalyse dat de verschillen in mismatch tussen landen en tussen studiegebieden binnen landen veroorzaakt worden door een breed scala van mechanismen. Allereerst blijkt dat zowel een cyclische als een structurele onbalans de incidentie van verticale en volledige mismatch bepaalt, terwijl geen van beide een effect

heeft op horizontale mismatch. Dit ligt in lijn met eerdere uitkomsten in de literatuur en geeft aan dat afgestudeerden bereid zijn om functies op een lager niveau te aanvaarden wanneer ze het moeilijk vinden om een baan te vinden die aansluit bij hun opleidingsniveau. De uitkomst voor horizontale mismatch is het resultaat van twee tegengestelde effecten (Bowlus, 1995). Enerzijds zijn individuen bereid om een baan aan te nemen die niet aansluit bij hun studierichting indien er minder vraag is naar hogeropgeleiden. Anderzijds biedt dit overaanbod aan hogeropgeleiden de kans aan werkgevers om kieskeuriger te zijn. Verder lijken vraag- en aanbodomstandigheden ook de verschillen in mismatches tussen studiegebieden te kunnen verklaren. Zo blijkt dat afgestudeerden met een diploma humane wetenschappen meer kans hebben op elk type mismatch. Een mogelijke verklaring hiervoor is dat voor dit studiedomein het arbeidsaanbod de vraag overtreft. Tevens vinden we bewijs dat afgestudeerden met een technische opleiding minder kans hebben op horizontale en volledige mismatch. Dit sluit aan bij onze verwachtingen.

Verder blijkt dat de kwaliteit en de selectiviteit van de opleidingen een belangrijke rol spelen bij het verklaren van de verschillen in mismatch, zowel tussen als binnen de landen. Binnen de landen vinden we dat een lagere kwaliteit en een lagere selectiviteit van de opleiding de kans op elk type van mismatch vergroten. Voor overscholing hadden wij dit resultaat verwacht en sluit dit aan bij de resultaten van andere studies. Wij werden verrast door het gelijkaardige effect op horizontale mismatch. Ook voor de verklaring van mismatchverschillen tussen de landen blijken de kwaliteit en de selectiviteit van het onderwijssysteem belangrijk. We vonden echter geen significant effect voor verticale mismatch. Wat de oriëntatie van de studieprogramma's betreft, vonden we dat – binnen de landen – jongeren met een meer algemene opleiding een grotere kans hebben op een horizontale mismatch. Verder blijken landen met een eerder algemeen onderwijssysteem een hogere incidentie van volledige mismatches te hebben. Deze resultaten liggen in lijn met onze verwachtingen, aangezien algemeen opgeleiden over een breder palet aan vaardigheden beschikken, zodat ze relatief productiever zijn in een baan die niet aansluit op de studierichting dan eerder specifiek opgeleiden. Enigszins onverwacht vonden we ook dat algemeen opgeleiden minder kans hebben op overscholing in combinatie met een horizontale aansluiting. We hadden eerder een positief effect verwacht; werkervaring opdoen op een lager functieniveau kan immers een manier zijn om een aantal noodzakelijke specifieke vaardigheden op te bouwen (Sicherman en Galor, 1990). Mogelijk wordt de nood aan extra ervaring niet zozeer bepaald door de breedte van de opleiding als wel door een gebrek aan praktijkoriëntatie. In die zin levert een algemeen studieprogramma mogelijk zelfs een extra voordeel op indien het toelaat dat mensen zich gemakkelijker aanpassen aan veranderingen op de arbeidsmarkt.

Tot slot blijken ook arbeidsmarktinstituties van belang te zijn. Allereerst vonden we dat een sterke werknemersbescherming de kans op horizontale mismatch doet afnemen. Dit sluit aan bij de veronderstelling dat, in het geval van hoge ontslagkosten, werkgevers terughoudend zijn om individuen aan te nemen die een opleiding hebben gevolgd die inhoudelijk niet aansluit bij de baan. De reden hiervoor is dat deze individuen geen betrouwbaar signaal kunnen geven omtrent hun beroepsspecifieke productiviteit. Hen aanwerven houdt voor de werkgever bijgevolg een groot risico in. Ten tweede vonden we dat ook een hoge vervangingsratio de kans op horizontale mismatch in een land verlaagt. Dit suggereert dat lage werkloosheidsuitkeringen werkzoekenden minder kieskeurig maakt. We vonden echter geen effect op overscholing, wat aansluit bij de bevindingen van Croce en Ghighnoni (2012). Een mogelijke verklaring is de sterke persistentie van overscholing over de carrière (zie bijvoorbeeld Baert, Cockx en Verhaest, 2013). Vermits schoolverlaters vaak geen of slechts in beperkte mate recht hebben op een werkloosheidsuitkering kan de hoogte van de uitkeringen niet bepalend zijn voor de mate van overscholing in de eerste baan en, gegeven deze persistentie, ook niet voor overscholing op latere tijdstippen. Tot slot, voor wat de collectieve onderhandelingsmacht betreft, vonden we een positief effect op de incidentie van volledige mismatches. Dit kan zowel verklaard worden door neerwaartse loonrigiditeit in geschoolde betrekkingen als door looncompressie, waardoor de opportuniteitskost van het aannemen van betrekkingen op lagere niveaus kleiner wordt.

In hoofdstuk 4 komt enkel overscholing aan bod. Zoals reeds is vermeld, blijkt uit verschillende studies dat een significant deel van de afgestudeerden tewerkgesteld is onder zijn niveau. Onderzoek wijst uit dat deze zogenoemde overgeschoolde individuen gemiddeld een lager loon verdienen en ook minder tevreden zijn met hun baan dan individuen met een adequate job. Daarnaast blijken de arbeidsmarktuitskomsten sterk te verschillen tussen de studiegebieden binnen het hoger onderwijs. Zo hebben afgestudeerden binnen de sociale wetenschappen een grotere kans op overscholing dan afgestudeerden uit domeinen zoals gezondheidszorg of natuurwetenschappen. Ook in termen van lonen zijn er substantiële verschillen tussen bovengenoemde domeinen.

Gegeven de grotere kans op overscholing binnen bepaalde studierichtingen en -niveaus kunnen we ons afvragen waarom studenten toch blijven kiezen voor deze opleidingen. Een aannemelijke verklaring is dat studenten het volgen van hoger onderwijs niet alleen zien als een investering in de toekomst, maar ook als iets wat een onmiddellijk nut oplevert. Ze kiezen ervoor om verder te studeren uit persoonlijke interesse, omdat ze een aversie voor werk hebben of omdat ze nog willen genieten van het studentenleven. Participeren in het hoger onderwijs is

met andere woorden ook een *consumptiegoed*¹. Verschillende onderzoeken hebben in elk geval aangetoond dat een groot deel van de studenten deelneemt aan het hoger onderwijs vanwege de niet-monetaire opbrengsten. Deze studenten blijken bovendien eerder te kiezen voor opleidingen met kleinere arbeidsmarktkansen, zoals de gedrags- en sociale wetenschappen. De vakken binnen deze richtingen lijken studenten meer te enthousiasmeren en lijken ook minder inspanning van hen te vergen. Een andere mogelijke verklaring voor de keuze voor bepaalde opleidingen is dat jongeren zich bij hun keuze veeleer laten leiden door *sociale normen*. Jongeren studeren in dat geval verder binnen een bepaalde richting omdat dit binnen hun sociale context van hen wordt verwacht.

In de literatuur zijn de motieven om te participeren in het hoger onderwijs reeds uitgebreid onderzocht. Onderzoek dat focust op de relatie tussen de onderwijskeuzemotieven en de kans op overscholing ontbreekt evenwel. In dit onderzoek richten wij ons op deze kwestie en behandelen we de volgende onderzoeksvraag: 'In welke mate beïnvloeden de verschillende motieven om verder te studeren de kans op overscholing en het effect van overscholing?'. We onderscheiden in ons onderzoek de volgende vier motieven²: (1) het investeringsmotief, (2) het onderwijsconsumptiemotief, (3) het studentenlevenconsumptiemotief en (4) het motief gerelateerd aan sociale normen.

Individueen die verder studeren op grond van het *investeringsmotief* doen dat vanwege de verwachte opbrengsten (de verwachte lonen en arbeidsmarktkansen). De beslissing om verder te studeren zal afhangen van de afweging tussen de kosten en de verwachte opbrengsten. Verder onderscheiden we twee verschillende consumptiemotieven. Het *onderwijsconsumptiemotief* duidt erop dat individuen verder studeren uit interesse of om zich persoonlijk te vormen. In het geval van het *studentenlevenconsumptiemotief* studeren jongeren eerder verder omdat ze willen genieten van het studentenleven en/of een aversie hebben tegen werk. Wanneer jongeren verder studeren vanuit het *sociale-normenmotief* betekent dit dat ze dit doen vanwege bepaalde verwachtingen binnen de sociale omgeving (ouders, familie, leerkrachten, peers etc.). Wij verwachten dat deze vier motieven via verschillende kanalen de latere kans op overscholing mede bepalen (zie hoofdstuk 4 voor gedetailleerde uitleg). In deze studie gaan we dus na in welke mate de verschillende studiemotieven de kans op overscholing bepalen via de verschillende kanalen.

1 Onderwijs is in die context een consumptiegoed omdat het op zichzelf leidt tot een groter nut bij participanten. Het consumptiemotief heeft in de economische literatuur dus geen betrekking op de eventuele consumptie die men kan realiseren door het hogere inkomen later.

2 Deze verschillende motieven kunnen gecombineerd worden. Bijvoorbeeld, sommige individuen met een investeringsmotief zullen ook verder studeren vanwege sociale normen of uit consumptieve motieven.

Een eerste bevinding is dat jongeren die verder studeren vanuit het investeringsmotief vaker kiezen voor een Bachelor opleiding. Dit resultaat was verwacht omdat eerder onderzoek heeft aangetoond dat deze opleidingen minder vaak gepaard gaan met overscholing dan Master opleidingen. Verder vinden we dat diegenen die verder studeren vanwege onderwijs- of studentenlevenconsumptie vaker kiezen voor masterprogramma's. Bovendien kiezen studenten voor wie het studentenleven een motief is minder vaak richtingen die gepaard gaan met een kleine kans op overscholing, zoals de domeinen 'gezondheidszorg' en 'natuurwetenschappen en techniek'. In het geval van jongeren die verder studeren vanwege sociale normen vinden we dat zij vaker kiezen voor een masteropleiding, mogelijk om reden van de gepercipieerde status die verbonden is aan een hoger diplomaniveau of omdat bepaalde beroepen soms van vader op zoon overgaan.

Een tweede kanaal waarlangs de motieven de kans op overscholing kunnen bepalen, is via hun effect op de studieresultaten. We vinden inderdaad dat de studiemotieven gecorreleerd zijn met de studieprestaties. Studenten die verder studeren vanuit het onderwijsconsumptiemotief studeren, zoals verwacht, af met hogere graden (bijvoorbeeld 'grote onderscheiding') en hebben minder bijzaken. Studenten die gemotiveerd zijn door investering behalen minder vaak hoge graden.

Ook na controle voor de studiekeuze en de studieresultaten blijven de motieven gerelateerd aan de kans op overscholing. Een mogelijke verklaring voor dit residuele effect is dat de motieven om hoger onderwijs te volgen ook een invloed hebben op het zoekgedrag bij de intrede op de arbeidsmarkt en/of het aanwervingsgedrag van werkgevers. Wie verder studeert om reden van onderwijsconsumptie blijkt, in vergelijking met iemand die hetzelfde programma volgde en gelijkaardige resultaten behaalde, minder vaak overgeschoold te zijn. Hiervoor kunnen verschillende verklaringen naar voren worden gebracht. Zo is een job die aansluit bij de gevolgde opleiding voor deze studenten ook een job die meer aansluit bij de interesses dan dit het geval is bij studenten met andere studiemotieven. Daarnaast zijn zij mogelijk ook meer gemotiveerd, waardoor werkgevers meer geneigd zijn om hen te selecteren. Wat de individuen die verder studeren vanwege het studentenleven betreft, blijkt dat ze vaker overgeschoold zijn dan anderen met een gelijkaardige richting en gelijkaardige studieresultaten. Dit effect was verwacht en suggereert dat deze individuen minder loopbaan georiënteerd zijn dan anderen.

De studieresultaten, studiekeuzes en zoekgedrag verklaren de globale relatie tussen de motieven en de kans op overscholing. Enigszins onverwachts suggereren sommige resultaten dat jongeren die verder studeren vanuit het investeringsmotief later iets vaker overgeschoold zijn. Dit wordt verklaard door hun relatief hoge mate van

participatie in het domein 'Economie, Bedrijfskunde en Rechten' dat in Vlaanderen gemiddeld vaker gepaard gaat met werken onder het niveau. Mogelijk verdienen deze overgeschoolden gemiddeld meer dan adequaat geschoolden binnen andere domeinen. Anderzijds bevestigt dit onderzoek de verwachting dat wie verder studeert vanwege het studentenleven globaal een groter risico op overscholing loopt. Interessant is ook de bevinding dat voor degene die verder studeert vanwege onderwijsconsumptie het risico op overscholing kleiner is. Deze globale relatie wordt verklaard door tegengestelde relaties. Enerzijds kiezen deze individuen vaker voor programma's met een grotere kans op overscholing, anderzijds behalen ze betere studieresultaten en vinden ze, gegeven hun programma en studieresultaten, vaker jobs op hun niveau. Deze laatste effecten domineren het positieve effect van hun programmakeuze op de kans op overscholing.

Samenvattend tonen deze studies aan dat mismatch onder hoger opgeleiden door verschillende mechanismen verklaard kan worden. Determinanten op micro-, meso- en macro level kunnen de kans op overscholing met inhoudelijke aansluiting en overscholing zonder inhoudelijke overscholing verklaren. Dit suggereert dat een combinatie van maatregelen, op het vlak van zowel het onderwijs-, arbeidsmarkt- als het economisch beleid allicht de meest succesvolle strategie is om het mismatchprobleem onder jongeren aan te pakken. Dit is in het bijzonder het geval voor het aanpakken van volledige mismatches, die als het meest problematisch kunnen worden beschouwd. Echter, zijn er nog maar weinig andere studies uitgevoerd naar de determinanten van mismatch op macro niveau. Verder onderzoek, gebaseerd op andere datasets en een grotere steekproef van landen, is dan ook zeker aangewezen.

Effecten van overscholing en horizontale mismatch op arbeidsuitkomsten

In onze analyse staan we ook stil bij de mogelijke effecten van overscholing en horizontale mismatch op lonen en arbeidstevredenheid. Wij vragen ons af of de combinatie van beide vormen van mismatch negatievere effecten heeft op deze arbeidsmarktuitskomsten dan andere combinaties van mismatch. Ons onderzoek uit Hoofdstuk 2 bevestigt wat reeds in de literatuur werd gevonden: jongeren die zowel overgeschoold zijn als buiten hun studiedomein werken, verdienen minder en zijn minder tevreden met hun job dan andere gemismatchte individuen. Doordat individuen geen baan vinden die aansluit bij hun opleidingsniveau en/of studiedomein accepteren zij wellicht een job die onder hun opleidingsniveau ligt en eventueel ook niet aansluit op hun studiegebied; op die manier vermijden ze werkloosheid. Deze negatieve keuze leidt niet alleen tot een groter loonverlies maar ook tot productiviteitsverlies. De verworven vaardigheden worden niet optimaal gebruikt in de job, waardoor de opleidingsinvestering voor een deel verloren gaat. Met andere woorden, de competenties blijven

in dit geval onderbenut, er wordt niet optimaal gebruikgemaakt van de aangeleerde kennis en vaardigheden. Mismatch op beide dimensies lijkt dus de meest ongunstige aansluitingsvorm. Verder vinden we geen loonverlies voor individuen die geen inhoudelijke aansluiting hebben, maar niet overgeschoold zijn. Een mogelijke verklaring is dat deze individuen wellicht werken in sectoren of beroepen met substantiële arbeidstekorten, wat zorgt voor een opwaartse druk op de lonen. Hierdoor ervaren zij geen loonverlies.

Echter, individuen kunnen ook 'schijnbaar overgeschoold' zijn en/of een 'schijnbare horizontale mismatch' hebben. Zij hebben bijvoorbeeld een gebrek aan menselijk kapitaal waardoor zij niet in staat zijn om een job uit te oefenen die aansluit bij hun opleiding. Ook kunnen individuen gebrek aan opleidingsspecifieke competenties compenseren door aangeboren en/of elders verworven talenten. Soms kunnen zij ten onrechte worden gezien als vallend in de categorie van horizontale of van verticale mismatch. In dat geval zijn er meetfouten gemaakt bij het meten van de vereiste opleiding of studierichting voor de job.

Er is een groot aantal studies dat de rol van niet-observeerbare kenmerken (zoals niet-gemeten talenten en vaardigheden) heeft onderzocht voor het effect van overscholing op lonen. Zo vond een aantal studies dat het effect van overscholing op lonen verklaard kon worden door niet-observeerbare verschillen, zoals gebrek aan talent of motivatie (Bauer, 2002; Frenette, 2004). Andere studies vonden dat slechts een deel van het effect verklaard kan worden door niet-observeerbare factoren (Verhaest & Omey, 2012; Mavromaras et al, 2012; Dolton & Silles, 2008). Studies die hebben onderzocht in hoeverre meetfouten het effect van overscholing op lonen beïnvloeden, is eerder beperkt. In dit onderzoek bouwen wij verder op deze studies en onderzoeken we in hoeverre de geschatte effecten van verschillende combinaties van mismatch op lonen beïnvloed worden door niet-observeerbare kenmerken en meetfouten. Om te corrigeren voor niet-observeerbare kenmerken maken we gebruik van paneldata-technieken. Om te controleren op meetfouten passen we een zogenaamde instrumentele-variabele-analyse toe. Als instrumenten voor de objectieve maatstaf van overscholing en horizontale mismatch maken we gebruik van de directe en indirecte maatstaf. We voeren twee instrumentele-variabele-analyses uit, in de eerste analyse controleren we enkel op meetfouten in overscholing en in de tweede op beide vormen van mismatch.

Als we niet controleren voor bovenstaande vertekeningen, komen de resultaten overeen met de resultaten in eerdere studies. Controleren we voor niet-observeerbare kenmerken en meetfouten in beide vormen van mismatch, dan vinden we dat overgeschoolden loonverlies hebben, dit komt overeen met eerder geschatte resultaten. Verder vinden we niet dat individuen die zowel overgeschoold als horizontaal gemismatcht zijn een

groter loonverlies leiden. Zij verdienen niet minder dan anderen met een bepaalde vorm van mismatch. Ook vinden we dat op basis van onze sensitiviteitsanalyse jongeren met horizontale mismatch meer verdienen dan jongeren met een andere vorm van mismatch. Een mogelijke verklaring is dat zij werken in segmenten met arbeidstekorten, die hogere lonen bieden.

De verschillen in onze standaardpanelresultaten en instrumentele variabelen-resultaten (IV-resultaten) kunnen toegewezen worden aan drie vormen van vertekeningen. Allereerst vonden we wanneer we controleren voor niet-observeerbare kenmerken een lager loonverlies voor individuen die beide vormen van mismatch combineren dan wanneer we niet controleren voor deze kenmerken. Dit suggereert dat deze individuen onvoldoende bekwaam of minder gemotiveerd zijn. Ten tweede verklaren meetfouten in overscholing ook de verschillen tussen de standaardpanelresultaten en de IV-resultaten. Indien we controleren voor deze vorm van meetfouten wordt het interactie-effect positief. Een mogelijke verklaring is dat horizontale mismatch mogelijk een deel van het effect van overscholing opneemt vanwege de correlatie tussen beide vormen van mismatch. Ten derde spelen meetfouten in horizontale mismatch ook een rol. We vinden namelijk een grotere bonus van horizontale mismatch indien we controleren voor meetfouten bij beide vormen van mismatch dan wanneer we enkel controleren voor meetfouten in overscholing.

Verder onderzoeken we in het hoofdstuk 4 ook of het effect van overscholing op het loon en de verschillen in arbeidstevredenheid tussen jongeren met verschillende motieven. Om te controleren voor bovenvermelde vertekeningen maken we ook in deze studie gebruik van paneldata-technieken en passen we een instrumentele-variabele-analyse toe. We vinden dat het loonverlies vanwege overscholing groter is voor studenten die verder hebben gestudeerd vanwege het onderwijsconsumptiemotief, vanwege het investeringsmotief of vanwege sociale normen. Ook blijkt overscholing een groter negatief effect te hebben op de arbeidstevredenheid indien individuen verder hebben gestudeerd vanwege het onderwijsconsumptiemotief. Dit wordt mogelijk verklaard door hun grotere aversie tegen jobs die niet aansluiten bij hun interesses. Niettemin blijven deze individuen in het geval van een beperkte mate van overscholing minstens even tevreden met hun job als adequaat geschoolden die verder gestudeerd hebben vanuit andere beweegredenen.

Kortom, we kunnen dus concluderen dat het effect van overscholing op lonen consistent is met eerdere studies, ook na controleren voor vertekeningen. Echter vinden we verschillen in resultaten voor het effect van horizontale

mismatch op lonen, naargelang de toegepaste methode. Tot slot bevestigen onze resultaten niet dat een combinatie van overscholing en horizontale mismatch tot een groter loonverlies leidt dan andere vormen van mismatch.

Algemene conclusie

Uit de studies binnen deze thesis kunnen we allereerst concluderen dat het gebruik van een bepaalde maatstaf gemotiveerd dient te worden. Er bestaat niet zoiets als de 'beste maatstaf', er zijn betere en minder goede maatstaven. Uit deze studie (cf. hoofdstuk 1) zien we dat het gebruik van de verschillende maatstaven, verschillen in de uitkomsten. Afhankelijk van wat de onderzoeker acht te willen onderzoeken, zijn sommige maatstaven beter als andere. Zo wijzen wij er bijvoorbeeld op dat de objectieve maatstaf wellicht geschikter is bij het meten van de effecten van lonen en een subjectieve maatstaf beter is bij het nagaan van de effecten op arbeidstevredenheid. De reden hiervoor is dat de arbeidstevredenheid gedreven wordt door subjectieve kenmerken.

Ten tweede kunnen we concluderen dat er breed scala aan mechanismen de kans op overscholing en inhoudelijke mismatch kunnen verklaren. Niettemin, verschillen de factoren die de kans op pure inhoudelijke mismatch vergroten van de factoren die overscholing bepalen. Daarnaast hebben we ook kunnen vaststellen dat onderwijsmotieven de kans op overscholing bepalen, naargelang het studiemotief kan een individu een grotere (kleinere) kans hebben op overscholing. Het is daarom van belang dat hier ook rekening mee wordt gehouden en jongeren te motiveren om te kiezen voor studierichtingen die hun passioneren. Dit zou de kans op een betere arbeidsmarktloopbaan kunnen vergroten. Om de verschillende vormen van mismatch te vermijden, is het van belang om met het bovenstaande rekening te houden. Een combinatie van verschillende maatregelen op het vlak van dit vlak via verschillende maatregelen, zowel op het vlak van onderwijsbeleid, het arbeidsmarktbeleid als het economisch beleid, zou allicht de meest succesvolle strategie zijn.

Tot slot hebben we getracht de effecten van overscholing en inhoudelijke mismatch te achterhalen. We vinden dat overscholing leidt tot een groter loonverlies, echter vinden we geen bewijs dat de combinatie van overscholing en inhoudelijke mismatch tot een groter loonverlies leidt dan overscholing. Wat inhoudelijke mismatch betreft, vinden we geen effect op lonen (en in sommige gevallen een positief effect).

INTRODUCTION

A common phenomenon in the past decades is the rapid expansion of tertiary education. After finishing secondary education, more and more individuals choose to enter higher education rather than the labour market. In 1980 the attainment in tertiary education was equal to 11.2% in Europe and Central Asia (Barro & Lee, 2013). Nowadays, it equals 35.2%, an increase to which the Bologna process has played a significant role. There are several reasons why individuals attend higher education. A key reason is that education is considered as a form of profitable investment in human capital. Individuals expect that higher education offers them a better chance to a good job and improves the likelihood of earning higher wages. But is a higher educational attainment really a guarantee for a successful job?

It is a fact that individuals with a higher education level have higher employment rates. As reported by OECD (2013), in Belgium more than 80% of individuals with a tertiary education degree have a paid job compared with less than 40% for those without an upper secondary education. However, even if a higher educational degree improves the likelihood of having a job, this is not guaranteed for every tertiary education graduate. For some individuals, it is quite difficult to find a job after graduating: the average unemployment rate of young higher educated individuals between 2003 and 2012 was 12.7% in Belgium (Cockx, 2013). Additionally, some individuals face difficulties to find a job that matches with their educational attainment (Wolbers, 2003; Robst, 2007a; Leuven & Oosterbeek, 2011; Verhaest & van der Velden, 2013). More than 30 percent of the Flemish higher educated graduates started their career in a job that is below their attained educational level and can be deemed overeducated (cf. Chapter 3). Moreover, 7.2% of the Flemish graduates work in a job in which they have a field of study mismatch. 18.1% of the graduates work in a job in which they are both overeducated and have a field of study mismatch. Thereby, the probability of having a mismatch is higher for graduates from Arts, Humanities and Linguistics than for graduates from Sciences or Engineering.

These problems regarding the transition from education to work have been the topic of extensive policy discussions. It has been argued that a substantial cause of educational mismatches is inadequacies in the education and training systems (see Desjardins & Rubenson, 2011). It is claimed that these systems prepare individuals insufficiently for changing demands on the labour market or that they fail in preparing students with the required basic skills. Employers also regularly report that academic achievements are inadequate or that too few graduate choose for fields of study such as Science and Engineering (Capelli, 2014). Therefore, one of the Lisbon Process (Dion,

2005) goals was to encourage students to choose for these fields of study, so that the supply can meet the changing demands.

Also in the scientific literature the transition from education to work has been a well discussed topic. Several researchers have focused on overeducation in the labour market. They focused on the determinants and consequences of overeducation (see Battu, Belfield & Sloane, 1999; Groot & Maassen van den Brink, 2000; Hartog, 2000; Allen & Van der Velden, 2001). Although it is an important issue whether or not individuals have the right field of study to perform their job, research that concentrates on this type of mismatch is quite limited. The main subject of this dissertation is field of study mismatch or horizontal mismatch (see *infra*). We will focus on educational mismatch, i.e. overeducation and field of study mismatch, under higher education graduates i.e. individuals with a college degree or higher.

In the remaining part of this introduction, we discuss the term ‘educational mismatch’, provide a brief overview of the theories that explain educational mismatch and review the main findings regarding overeducation. Moreover, we specifically discuss field of study mismatch and formulate the research questions that will be addressed in this dissertation. Research in the field of educational mismatch has not treated horizontal mismatch in as much detail as the issue of overeducation. Therefore, this study aims to make a significant contribution to the existing research by focusing on field of study mismatch. The areas where this study makes a contribution are discussed more in depth in the next part of this introduction. Further, we provide more information about the used data in this thesis. We conclude this introduction with the outline of the thesis.

E D U C A T I O N A L M I S M A T C H

Educational mismatch refers to an imperfect match between graduate educational attainment and the educational requirements of a job. This mismatch can be divided in two sub dimensions of mismatch, one that focuses on the vertical dimension and another one that focuses on the horizontal dimension. The first form consists of two parts: overeducation and undereducation. Overeducation has already been mentioned. Undereducation refers to working in a job which requires a higher education level. Freeman (1976), who discussed the declining returns to education in the US in the early seventies, was one of the first to stimulate the discussion about overeducation. He was followed by Duncan and Hoffman (1981), who found that monetary returns to education were lower for

overeducated workers compared to adequately educated workers. Several studies have built on the study of Duncan and Hoffman (1981) and confirmed these negative wage effects of being overeducated (see Hartog, 2000; Ng, 2001; McGuinness & Sloane, 2011; Verhaest & Omeij, 2012; Mavromaras, McGuinness, O’Leary, Sloane & Wei, 2013). Recently, the focus has also been on field of study mismatch or horizontal mismatch (see Wolbers, 2003; Robst, 2007a). Field of study mismatch is generally viewed as a mismatch between the attained field of study and the field of study required for a job.

Besides educational mismatch, several researchers have also focused on skill mismatch. Skill mismatch is being defined as working in a job where the required skills of the job do not match the acquired skills (Allen & van der Velden, 2001). Different concepts have been used that are closely tied to concept of skill mismatch, such as underskilling and overskilling or skill deficit and skill underutilization (see Ryan & Sinning, 2009; Mavromaras *et al.*, 2013). Similarly to educational mismatch, a few studies have focused on the effects of skill mismatch (Allen & van der Weert, 2007; Bennett & McGuinness, 2009; Mavromaras *et al.*, 2013; Sutherland, 2012). Furthermore, skill mismatch and educational mismatch have sometimes also been used as interchangeable terms. In fact they are two different concepts (see discussion in Desjardins & Rubenson, 2011). Being educationally mismatched does not need to imply skill mismatch, as has been found by several researchers (see Allen & van der Velden, 2001; Di Pietro & Urwin, 2006; Allen & van der Weert, 2007; Mavromaras *et al.*, 2013). The main reason of the limited amount of research about skill mismatch is the difficulty of measuring skills and assessing specific job skills requirements (see discussion Desjardins & Rubenson, 2011; Ramos, 2014). In this dissertation, skill mismatch will not be investigated directly.

T H E O R E T I C A L F R A M E W O R K

To explain educational mismatch, especially overeducation, several studies have used different labour market theories. These theories include human capital theory, career mobility theory, signaling theory, job search and matching theory, job assignment theory, dual labour market theory and job competition theory. These theoretical frameworks have also been used to explain field of study mismatch and skill mismatch.

Human capital theory presumes that individuals invest in education because it will increase their marginal productivity and, hence, will result in a higher pay in the labour market (Becker, 1964). Individuals will continue investing as long as the marginal revenue, the wage increase, exceeds the cost of an additional year of schooling. This theory

assumes that, in a perfect clearing market, there are no structural mismatches. Within this model overeducation is a temporary phenomenon that will resolve itself in the long run. An increase in the supply of highly educated workers relative to demand should lead to a reduction in the relative wage. Employers will be more inclined to hire the cheaper but more educated workers and substitute them for less educated workers. The lower returns of additional investments in education will encourage individuals to invest less in education, resulting again in an increase of the relative wage and restoring equilibrium. These adjustments through flexible wages and changes in educational investments imply that overeducation is a temporary phenomenon. In the long run, adjusted wages will signal the proper information about productivity and guide the investment in schooling appropriately. Therefore, in the long run, mismatch will not exist. This theory also argues that overeducation exists because overeducated workers may substitute weaknesses in other areas of human capital by having a higher education level than required. If so, overeducation is not a real problem.

Alternatively, being overeducated may also be the outcome of a deliberate worker decision to invest in training and experience. This explanation is known as the *career mobility theory* (see Sicherman & Galor, 1990). This model, which is imbedded in human capital theory, assumes that individuals choose to perform a job below their own educational level, so that they gain more experience and skills. Through their acquired skills and experience, individuals will try to move into higher level occupations.

Signaling theory has also been used to explain mismatch. According to signaling theory, education increases wages not because of its intrinsic productivity effect as assumed by human capital theory, but because education merely signals potential worker productivity and access to better paying jobs (Spence, 1973). Employers rely on the signaling role of education when it is too difficult to directly measure the worker productivity. If employers have imperfect information about the performance of potential employees, they face uncertainty on the future productivity of the employee when they are hiring. Therefore, they tend to rely on widely recognized educational qualifications. Also, individuals have an incentive to invest in higher education as it allows them to signal their potential productivity and so to capture better paying jobs. This mechanism does not lead to overeducation from a private point of view, but there may be overeducation from a social point of view if governments overinvest in higher education. These public investments are likely to lead to an increase in the number of higher educated workers, thus resulting in a social rate of return that may be below the social discount rate (Psacharopoulos, 1994).

Another alternative explanation is offered by *search theory*. It assumes that individuals temporarily accept a job that does not match their educational level while they continue to search for a matching job (see Burdett, 1978). Individuals prefer a job in which they are overeducated rather than been unemployed to reduce the search costs. According to Jovanovic's (1976) *matching theory*, mismatch is a consequence of imperfect information available to employees about the characteristics of the jobs and to employers about employees' capabilities. Individuals have to experience the quality of their match; they will quit their job if they evaluated their match as something bad. However, as McCormick (1990) showed, accepting a job below one's education may not always be the best option if potential employers interpret this behaviour as a negative signal. Employers might assume that these individuals lack sufficient motivation, experience or skills to work in a job that matches their educational level. This results in a higher probability of unemployment or in less favorable labour market positions. Early mismatch, for instance resulting from search costs, thus may lead to stigmatization and may have a long run negative impact on the individual's labour market opportunities.

Also *assignment theory* has often been referred to in the overeducation literature, but in particular to explain the wage effects of mismatch (see Sattinger, 1980, 1993; Hartog, 2000). Assignment models build on the basic ideas of human capital models namely that education raises productivity. Additionally, they assume that the productivity is determined by the level of complexity of the job. As such, these models account for the heterogeneity of both workers and jobs, which the standard human capital model does not explicitly account for. The matching process in some of these models depends on assigning workers in a top-down perspective according to their qualifications. The most educated worker gets the most complex job and the least educated worker will be assigned to the simplest job. However, there seems no clear link with overeducation (see Hartog, 2000 for a detailed discussion).

There are another two theories that could explain mismatch in the labour market. However, these theories are at odds with neo-classical economic theory. Human capital theory assumes an efficient labor market that distributes jobs and wages on the basis of the qualifications of the workers. However, standard human capital does not account for the existence of imperfect market conditions, such as those resulting from labour market segmentation. In *dual labour market theory*, it is assumed that the labour market splits in two distinct segments: (1) a primary sector and (2) a secondary sector (Piore, 1975; Cain, 1976). These labor market segments have different regulations and, different demand and supply conditions. The primary sector, for example, is characterized by high educated jobs with high job security and high pay and better promotion opportunities. The secondary sector is characterized by lower educated jobs, lower returns of education and temporary contracts. Additionally, mobility between the

segments is limited, with the result that high educated individuals who get a job in the secondary labour market are often 'stuck' in their temporary and precarious position. This results in a more persistent form of overeducation.

Thurow's *job competition theory* (1975) also opposes the human capital theory. This theory assumes rigid wages. Within a job competition framework, individuals are likely to stay overeducated as wages are rigid providing no guidance or incentives for adjustment. In this model, it is assumed that job characteristics determine earnings and that earnings are not related to the worker's qualifications or productivity. According to the theory, employers prefer better educated workers as it is expected that these individuals have the lowest cost of training for the job. This will create a hiring queue where the potential employees will be ranked according to their training costs. The higher the educational level, the lower the cost for training, the more individuals will take a position at the beginning of the row (Heijke, 1996). Employees will also invest more in education in order to protect their place in the queue, although they might get a job where they do not utilize all their capabilities. However, when there is an oversupply of highly educated workers or when there is a recession, a shift in the distribution of workers in the queue will take place and employers will increase their hiring standards. This will force high educated individuals to accept positions for which they are overeducated resulting in the crowding out of lower educated workers for these positions. These lower educated workers are forced to sink to even lower positions or to become unemployed.

Several studies have tested which of these theories is most consistent with the empirically observed effects of mismatch on wages (Duncan & Hoffman, 1981; Hartog & Oosterbeek, 1988; Sloane, Battu & Seaman, 1999). These studies have found that the assignment model beats the human capital theory and the job competition theory, i.e. the assignment theory is most consistent with the empirical findings of effects on wages. This research also indicates that women and non-whites have a higher probability of overeducation. This may be due to labour market rigidities, which force individuals to accept a job lower than their own educational level. Researchers have also found that the incidence of overeducation decreases with age and experience. These findings support that mismatch is a consequence of imperfect information and that individuals will search further for an adequate job. However, these results are also in line with the human capital theory if on – the – job experience is a substitute for deficiencies in skills. Also individuals with better grades and less repeated years have a lower probability of being overeducated (Battu, Belfield & Sloane, 1999; Büchel & Pollmann-Schult, 2004; Verhaest & Omey, 2010). It seems that good grades place individuals at the front of the queue for highly adequately educated jobs. But,

again, also the human capital and the signaling theory could explain this. Overall, most of these empirical results on the determinants of overeducation are thus consistent with several of the aforementioned theories. Finally, several studies also looked at the dynamics of overeducation. Some of these studies found that overeducation is a trap rather than a stepping stone (Baert, Cockx & Verhaest, 2013). Being overeducated thus leads to long-term negative effects, which seems to contradict the career mobility thesis.

However, we have to note that results are not always consistent. Some studies have shown that the use of different measures of overeducation does not lead to similar conclusions (Verhaest & Omeij, 2006a, 2006b). Moreover, as argued by Leuven and Oosterbeek (2011), ability bias and measurement errors probably explain the difference in returns to education and overeducation. A limited number of studies have taken into account the problem of measurement error and unobserved individual heterogeneity (Frenette, 2004; Bauer, 2002; Dolton & Silles, 2008; Verhaest & Omeij, 2012). The results of these studies are mixed, but the main conclusion is that both measurement error and unobserved heterogeneity result in biased estimates on the wage return of overeducation.

From the above it is clear that there are several rivaling theories explaining observed mismatches in the labour market and their effects. None of them seems to be dominant. So, further research on the empirical effects of vertical and particularly horizontal mismatch and its consequences and how these findings can be explained theoretically is fully justified. Such research contributes to a better understanding of the phenomenon of mismatch in order to evaluate its importance as a policy issue.

FIELD OF STUDY MISMATCH OR HORIZONTAL MISMATCH

Recently, a few researchers have focused on another type of educational mismatch, namely horizontal mismatch or field of study mismatch (Wolbers, 2003; Robst, 2007). Several studies have used different terms for field of study mismatch, such as mismatch on type of schooling (Robst, 2007a, 2007b), education job mismatch (Boudarbat & Chernoff, 2012), field of education-occupation match (Nordin, Persson & Rooth, 2010) or job mismatch. In these studies, horizontal mismatch or field of study mismatch is defined as working in a job where the attained field of study does not match the required field of study. This corresponds with our definition of field of study mismatch. We define this type of mismatch as working in a job for which the acquired field of study differs from the optimal field of study for the job. The optimal field of study for a job is that field of study that provides the best economic mix and amount of skills and most efficient utilization of these skills in the job (cf. Chapter 1, for

a detailed clarification). Individuals that have a field of study that is not related to the job are defined as having a mismatch, others are defined as having a match.

However, measuring horizontal mismatch is not an easy task. First, there are only a few datasets that contain explicit information about the correspondence between the field of study and the occupation. Second, for some occupations, it is not straightforward to match them with a specific field of study (such as managers, politicians). In some studies, these kind of occupations or fields of study are often not included in the analysis to avoid this vagueness (Nordin *et al.*, 2010). Alternatively, other ‘easier’ measurement methods are used to counteract some of these problems (cf. *infra*). Further, as argued by Desjardins and Rubenson (2011), field of study mismatch does not always have to be an issue, such as in countries where educational systems rather focus on general skills and leave occupation-specific skills to be learned on the job. However, we might argue that in such countries the educational system as such is suboptimal. An one fits all general educational program surely would not deliver the best economic mix and levels of skills for all jobs.

Despite these limitations in operationalizing the concept of horizontal mismatch, field-of-study mismatch has gained increased attention in the literature. To explain field of study, they have used the aforementioned theories explaining overeducation (see Domadenik, Farčnik & Pastore, 2013). Moreover, researchers have studied which determinants influence field of study mismatch. These studies have found that men, non-whites and graduates in Humanities, Arts and Linguistics have a higher probability of field of study mismatch. A number of studies have also shown that the match with respect to the field of study matters for earnings and job satisfaction (see Robst, 2007a; Béduwe & Giret, 2011; Støren & Arnesen, 2011). Robst (2007a) found that the wage penalty of horizontal mismatch is higher for individuals with fields of study with a more specific orientation. The more transferable skills are to jobs in other occupational domains, the smaller the wage effects of being mismatched. Moreover, it seems that if graduates work in a job in which they are overeducated *and* have a field of study mismatch, the situation is much more problematic than if they have a field-of-study mismatch without being overeducated (Robst, 2007a; Støren & Arnesen, 2011) Also the reasons for accepting a job for which they are mismatched seem to influence the wage penalty (Robst 2007b). Individuals who accept a job outside their field of study because they were unable to find a job in their domain – a demand side reason - have a higher wage penalty than individuals accepting the job because of supply side reasons (pay and promotions opportunities, working conditions). Robst (2007b) found that individuals accepting a job outside their field of study because of pay and promotions opportunities earn a higher wage than adequately educated workers. Nevertheless, even if the attention in the literature

for the theme of field of study mismatch is growing, there are many questions within the educational mismatch debate that remain to be answered. In this dissertation we contribute to the existing literature and attempt to answer several of these questions.

R E S E A R C H Q U E S T I O N S

In this dissertation, we investigate educational mismatch among higher graduates, with a specific focus on field of study mismatch. There are three main topics that we analyze in depth. The first topic is the measurement issues of field of study mismatch. This will be discussed in Chapter 1 and Chapter 3. Another important question in this dissertation is which factors determine the alternative combinations of overeducation and horizontal mismatch. This is the second topic of this thesis, which will be investigated in detail in Chapter 2, Chapter 4 and Chapter 5. In a last topic, we focus on the consequences of being overeducated and having a horizontal (mis)match. This issue is covered in Chapter 2, Chapter 3 and Chapter 4.

The investigation of these three topics is guided by the following five research questions:

1. How can field of study mismatch be measured and to what extent is the incidence of field of study mismatch affected by its measurement method? (Chapter 1)
2. Which factors determine the combination of overeducation and horizontal mismatch? (Chapter 2)
3. How can unobserved heterogeneity and measurement error explain the differential impact of alternative combinations of mismatches on wages? (Chapter 3)
4. To what extent does the likelihood and the effect of overeducation differ depending on different educational motives? (Chapter 4)
5. How can differences in educational mismatches across countries and fields of study be explained by differences in labour institutions, educational institutions, and labour market imbalances? (Chapter 5)

OUTLINE OF THE DIFFERENT CHAPTERS

In *Chapter 1*, we focus on the measurement of field of study mismatch. In the educational mismatch literature, overeducation has been measured using three measurement methods: (1) worker self-assessment, (2) job analysis and (3) realized matches. The worker self-assessment approach is based on the opinion of individuals. The job analysis is based on the opinion of job experts. The last method is a statistical method where the required education is assessed by the mean or mode level of education within each occupation. Each of these methods has his own advantages and disadvantages. In the overeducation literature, the job analysis approach have often been used to measure overeducation. However, the common practice to measure overeducation is the worker self- assessment method. Regarding field of study mismatch, this method can also be considered as the most popular approach. One of the main reasons to use the worker self-assessment is data availability. Measuring field of study mismatch based on this method is much easier and less time-consuming than using the job analysis method. Until now, none of the authors have measured field of study mismatch based on all three approaches. Additionally, no study explored whether other approaches would deliver different results or assessed which of these approaches is the best method to measure field of study mismatch. Each of these questions will be discussed in our first chapter.

In the field of study mismatch literature, some studies show that in particular a combination of overeducation and field of study mismatch is harmful to wages and job satisfaction (see Robst, 2008; Béduwé and Giret, 2011). It thus seems that the combination of overeducation and mismatch in terms of fields of study is particularly problematic for individuals. In *Chapter 2*, we investigate whether a comparable analysis for Flanders delivers similar conclusions relying on cross-sectional data and standard regression techniques. However, it may be argued that individuals combining overeducation and horizontal mismatch might be apparently and not really overeducated. Workers may not be capable to execute jobs that are in line with their education level because of unobserved lower innate ability or lower quality of education. Or they may be apparently and not really overeducated because of mismeasurement of the required education for the job. Hence, unobserved ability and measurement errors may bias results on effects of mismatch. Another finding in the literature is that there is no evidence of a wage penalty for a mere field of study mismatch without overeducation. Hence, it seems that this last type of mismatch is less problematic for individuals, perhaps because it also indicates that workers are employable in a large range of occupations. Yet, also here unobserved heterogeneity and measurement error could explain this lack of evidence on a wage penalty. Individuals may compensate their lack of required field of study skills by higher levels of innate ability. Or they may wrongly be classified as having a horizontal mismatch. This suggest substantial problems of

random measurement error, leading to biased estimates of the effects on wages and other outcome variables. There are a few studies that investigated the role of unobserved heterogeneity and measurement error in the relationship between overeducation and wages (cf. *infra*). However, none of these studies investigated whether these biases affect the estimates of field of study mismatch. In *Chapter 3*, we add to this literature and investigate whether and to what extent unobserved heterogeneity and measurement error also bias the estimated impact of both horizontal and vertical educational mismatches.

Based on the findings in the literature, we may assume that the combination of overeducation and horizontal mismatch has a more negative effect on labour outcomes. It is well known which determinants and mechanisms determine overeducation and mere field of study mismatch. At the micro level, these include a lower quality of human capital, job search constraints and discrimination, which all affect the likelihood of overeducation (McGuinness, 2006). Characteristics that affect the probability of field of study mismatch are age, nationality, marital status and field of study (Robst, 2007; Nordin *et al.*, 2010; Boudarbat & Chernoff, 2012). Boudarbat and Chernoff (2012) also investigate whether job search behavior of individuals could affect the likelihood of field of study mismatch, but the effect was insignificant. In *Chapter 2*, we build further upon these types of studies and determine whether different combinations of horizontal and vertical mismatches among graduates are driven by different determinants at the individual level.

Not only individual characteristics could provide an explanation for both types of mismatches, but also mechanisms at more aggregate levels. In the mismatch literature, there is a small but growing body of research that has begun to address the question whether the imbalances between demand and supply are responsible for the variation in overeducation at the country level. Groot and Maassen van den Brink (2000) found that the incidence of overeducation is positively related with the growth of the labour force. Di Pietro (2002) showed that differences in overeducation across countries are related to the educational composition of the labour force, the strictness of employment protection legislation and the level of R&D investment. Verhaest and Van der Velden (2013) and Croce and Ghignoni (2012) also showed that demand and supply conditions within the labor market as well as the institutional setting matter for overeducation. However, none of these studies focused on more aggregate determinants of horizontal mismatch or different types of combinations of horizontal and vertical mismatch. What determines different types of mismatches at more aggregate levels is the focus of *Chapter 5*. In particular, we investigate to what extent differences in educational mismatches across countries and fields of study five years

after graduation are explained by differences in labour institutions, educational institutions, and labour market imbalances.

Finally, in *Chapter 4*, the focus is exclusively on overeducation. Overeducation seems a great concern because we know from the research literature that overeducated individuals receive lower earnings (Hartog, 2000; Rubb, 2003) and are less satisfied with their jobs (Tsang, 1987; Allen & van der Velden, 2001) than adequately educated individuals with similar levels of education. Moreover, studies show that the rising participation rates in higher education and the labour market outcomes are not evenly spread amongst the different fields of education. There are significant differences in risk of overeducation across graduates from different higher educational types and disciplines. College graduates in Engineering and Health have a lower probability of overeducation and earn a higher wages than graduates in Arts, Humanities and Linguistics (Frenette, 2004; Hilmer & Hilmer, 2012). In a report of the OECD (2013), it is shown that individuals still choose these ‘soft’ majors rather than the ‘hard’ majors. Therefore, we might wonder why individuals choose these kind of majors even despite these negative labour market outcomes. We discuss this in *Chapter 4*. We distinguish four different educational motives: (1) investment motive, (2) educational consumption motive, (3) student life consumption motive and (4) social norms. We investigate whether these different motives affect the likelihood of overeducation and other labour market outcomes.

DATA AND METHODOLOGY

We end this introduction with a brief outline of the data that will be used and the methods that will be applied. For most of our research questions, we rely on the SONAR data documenting the transition from school to work in Flanders (see SONAR, 2003, 2004, 2005). This dataset contains data on three cohorts and focuses on the educational and early labour market career of these individuals. Most of the field of study mismatch research is based on higher educated individuals. This will also be our research subject. The increase of participation in tertiary education makes this subject very interesting to investigate.

A unique feature of the SONAR data is that they allow to measure field of study mismatch based on each of the three aforementioned approaches (cf. *Chapter 1*). As for the workers assessment method, both a direct and an indirect self-assessment measure are available. For the job analysis method, we rely on 1992 Standard Occupation Classification of Statistics Netherlands. Also the realized matches measurement method is computed on the basis of this classification. For field of study mismatch, we rely on the modal matching procedure. For overeducation,

we are able to compute the incidence of mismatch based on the median or modal procedure. The availability of different measures of mismatch also allows to account for measurement error when the impact of educational mismatch is investigated (cf. *Chapter 3* and *4*)

The SONAR database enables us to construct a panel data set that contains information on the following three time points: (i) the start of the first registered job, (ii) at the age of 26 and (iii) at the age of 29. Information on essential variables such as net wages, job satisfaction and mismatch status is available for these three time points. The longitudinal character of these data enables to apply panel-data techniques to account for unobserved heterogeneity (cf. *Chapter 3* and *4*).

In *Chapter 2*, we also use the SONAR database to determine which determinants increase the likelihood of being overeducated and having a field of study mismatch. To analyze the determinants of the combination of horizontal and vertical mismatch on a more aggregate level (cf. *Chapter 5*), we use the REFLEX (see Allen & Van der Velden, 2011) and HEGESCO data (see Allen, Pavlin & Van der Velden, 2011). These surveys are conducted among graduates from 16 European countries and Japan (REFLEX) and five Central- and Eastern-European countries (HEGESCO). The data include detailed information about each respondent's study program, first employment after graduation and employment at the time of the survey. These datasets allows us to apply a multilevel analysis and to investigate the mechanisms underlying the differences in mismatches across countries and fields of study. The match status in this study is measured by using the worker self-assessments method.

S T R U C T U R E O F T H E T H E S I S

My dissertation follows the structure outlined before, with each chapter focusing on one of the specific research questions. In a final chapter of this dissertation, we will summarize the main findings of the dissertation, discuss overall limitations and provide some policy implications, and end with the formulation of a few directions for further research.

REFERENCES

- Allen, J., & van der Velden, R. (2001), 'Educational mismatches versus skill mismatches: effects on wages, job satisfaction, and on-the-job search', *Oxford Economic Papers*, 5, 434-452.
- Allen, J., Pavlin, S. & van der Velden, R. (eds.) (2011), *Competencies and Early Labour Market Careers of Higher Education Graduates in Europe*, Ljubljana: University of Ljubljana.
- Baert, S., Cockx, B. & Verhaest, D. (2013), 'Overeducation at the start of the career: Stepping stone or trap?', *Labour Economics*, 25, 123-140.
- Barro, R. J. & Lee, J. W. (2013), 'A new data set of educational attainment in the world, 1950-2010', *Journal of Development Economics*, 104, 184-198.
- Battu, H., Belfield C. & Sloane, P. (1999), 'Overeducation among graduates: a cohort view', *Education Economics*, 7, 21-39.
- Bauer, T. (2002), 'Educational mismatch and wages: a panel analyses', *Economics of Education Review*, 21, 221-229.
- Becker, G. (1964), *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*, New York: Columbia University Press.
- Béduwé, C., & Giret, J.-F. (2011), 'Mismatch of vocational graduates: What penalty on French labour market?', *Journal of Vocational Behavior*, 78, 68-79.
- Bennett, J. & McGuinness, S. (2009), 'Assessing the Impact of Skill Shortages on the Productivity Performance of High-Tech Firms in Northern Ireland', *Applied Economics*, 41(6), 727-737.
- Boudarbat, B. & Chernoff, V. (2012), 'EDUCATION-job match among recent Canadian university graduates', *Applied Economics Letters*, 19(18), 1923-1926.
- Büchel, F. & Pollmann-Schult, M. (2004), 'Overeducation and human capital endowments', *International Journal of Manpower*, 25, 150-166.
- Cain, G.G. (1976), 'The challenge of segmented labor market theories to orthodox theory: A survey', *Journal of Economic Literature*, 14 (4), 1215-1257.
- Capelli, P. (2014), 'Skill Gaps, Skill Shortage, and Skill Mismatches: Evidence for the US', Working Paper 20382. Cambridge, MA: National Bureau of Economic Research.

- Cockx, B. (2013), 'Youth unemployment after the great recession: evidence and lessons of national policies', *Intereconomics*, 48(4), 202-209.
- Croce, G., & Ghignoni, E. (2013), 'Demand and supply of skilled labour and overeducation in Europe: a country-level analyses', *Comparative Economic Studies*, 54, 413-439.
- Desjardins, R. & K. Rubenson (2011), 'An Analysis of Skill Mismatch Using Direct Measures of Skills', *OECD Education Working Papers*, No. 63, OECD Publishing, Paris.
- Dion, D.V. (2005), 'The Lisbon Process: an European Odyssey', *European Journal of Education*, 40(3), 295-313.
- Dolton, P., & Silles, M. (2008), 'The effects of over-education on earnings in the graduate labour market', *Economics of Education Review*, 27, 125-139.
- Domadenik, P., Farčnik, D. & Pastore, F. (2013), 'Horizontal Mismatch in the Labour Market of Graduates: The Role of Signalling', *IZA Working Paper*, No. 7527.
- Di Pietro, G. (2002), 'Technological change, labor markets and low skill, low-technology traps', *Technological Forecasting & Social Change*, 69, 885-895.
- Di Pietro, G. & Urwin, P. (2006), 'Education and skills mismatch in the Italian graduate labour market', *Applied Economics*, 38, 79-93.
- Duncan, G. & Hoffman, S. (1981), 'The incidence and wage effects of overeducation', *Economics of Education Review*, 1(1), 75-86.
- Freeman, R. (1976), *The Overeducated American*, Academic Press: New York.
- Frenette, M. (2004), 'The overqualified Canadian graduate: the role of the academic program in the incidence, persistence, and economic returns to overqualification', *Economics of Education Review*, 23, 29-45.
- Groot, W. & Maassen van den Brink, H. (2000), 'Overeducation in the labor market: a meta-analysis', *Economics of Education Review*, 19(2), 149-158.
- Hartog, J. (2000), 'Overeducation and earnings: where are we, where should we go?', *Economics of Education Review*, 19, 131-147.
- Hartog, J., & Oosterbeek, H. (1988), 'Education, allocation and earnings in the Netherlands: Overschooling?', *Economics of Education Review*, 7(2), 185-194.

- Heijke, H. (1996), 'Labour Market Information for Educational Investments', *Working Paper 002*, Maastricht: ROA, Research Centre for Education and the Labour Market.
- Hilmer, M.J. & Hilmer, C.E. (2012), 'On the relationship between student tastes and motivations, higher education decisions, and annual earnings', *Economics of Education Review*, 31, 66–75.
- Jovanovic, B. (1979), 'Job Matching and the Theory of Turnover', *Journal of Political Economy*, 87 (5), 972 -990.
- Leuven, E., & Oosterbeek, H. (2011), 'Overeducation and Mismatch in the Labor Market', in Hanushek, E., Machin, S., and Woessman, L. (ed.), *Handbook of the Economics of Education*, 4, 283-326.
- Mavromaras, K., McGuinness, S., O'Leary, N., Sloane, P., & Wei, Z. (2013), 'Job Mismatches and Labour Market Outcomes: Panel Evidence on Australian University Graduates', *Economic Record*, 89, 382-395.
- McCormick, B. (1990), 'A theory of signalling during job search, employment efficiency, and "stigmatised" jobs', *The Review of Economic Studies*, 57(2), 299-313.
- McGuinness, S. (2006), 'Overeducation in the labour market', *Journal of Economic Surveys*, 20, 387–418.
- McGuinness, S., & Sloane, P. J. (2011), 'Labour market mismatch among UK graduates: An analysis using REFLEX data', *Economics of Education Review*, 30(1), 130-145.
- Ng, Y. (2001), 'Overeducation and undereducation and their effect on earnings: evidence from Hong Kong, 1986–1996', *Pacific Economic Review*, 6(33), 401–418.
- Nordin, M., Persson, I., & Rooth, D.O., (2010), 'Education-occupation mismatch: Is there an income penalty?', *Economics of Education Review*, 29(6), 1047-1059.
- OECD (2013), 'How's Life? At a Glance', in *How's Life? 2013: Measuring Well-being*, OECD Publishing, 36p.
- Psacharopoulos, G. (1994), 'Returns to investment in education: A global update', *World development*, 22(9), 1325-1343.
- Piore, M. (1975), 'Notes for a theory of labor market stratification'. In: R. Edwards, M. Reich and D. Gordon (red.) *Labor market segmentation* (pp. 125-150). London: Lexington Books.
- Ramos, M (2014), 'Mismatched mismatch measures. Does the definition of over-and underqualification matter?', Working paper.
- Robst, J. (2007a), 'Education and job match: the relatedness of college major and work', *Economics of Education Review*, 26, 397-407.

- Robst, J. (2007b), 'Education, College Major, and Job match: Gender Differences in Reasons for Mismatch', *Education Economics*, 15, 159-175
- Robst, J. (2008), 'Overeducation and college major: expanding the definition of mismatch between schooling and jobs', *The Manchester School*, 76, 349-368.
- Rubb, S. (2003), 'Overeducation in the labor market: a comment and re-analysis of a meta-analysis', *Economics of Education Review*, 22, 621-629.
- Ryan, C., & Sinning, M. (2009), 'Skill matches to job requirements', National Centre for Vocational Education Research, Australia, Research Report.
- Sattinger, M. (1980), *Capital and the Distribution of Labor Earnings*. Amsterdam: North Holland Publishing.
- Sattinger, M. (1993), 'Assignment models of the distribution of earnings', *Journal of economic literature*, 31, 831-880.
- Sicherman, N., & Galor, O. (1990), 'A theory of career mobility', *Journal of Political Economy*, 98, 169-192.
- Sloane, P.J., Battu, H., & Seaman, P. (1999), 'Overeducation, Undereducation and the British Labour Market', *Applied Economics*, 31, 1437-1453.
- SONAR (2003), Hoe maken Vlaamse jongeren de overgang van school naar werk?, basisrapportering cohorte 1978 (eerste golf), 147p.
- SONAR (2004), Hoe maken Vlaamse jongeren de overgang van school naar werk?, basisrapportering cohorte 1976 (tweede golf), 116p.
- SONAR (2005), Hoe maken Vlaamse jongeren de overgang van school naar werk?, technisch rapport cohorte 1980 (eerste golf), 181p.-
- Spence, M. (1973), 'Job Market Signaling', *The Quarterly Journal of Economics*, 83 (3), 355 -374.
- Støren, L. A., & Arnesen, C. A. (2007), 'Winners and Losers' in *The Flexible Professional in the Knowledge Society: General Results of the REFLEX Project*, The Netherlands: Research Centre for Education and the Labour Market, University of Maastricht.
- Sutherland, J. (2012), 'Qualifications Mismatch and Skills Mismatch', *Education and Training*, 54(7), 619-632.
- Thurow, L. C. (1975), *Generating inequality*. New York: Basic Books.
- Tsang, M. (1987), 'The impact of underutilization of education on productivity: a case study of the U.S. Bell Companies', *Economics of Education Review*, 4, 93-104.

- Verhaest, D. & Omey, E. (2006a), 'The impact of overeducation and its measurement', *Social Indicators Research*, 77, 419-448.
- Verhaest, D. & Omey, E. (2006b), 'Measuring the Incidence of Over- and Undereducation', *Quality and Quantity*, 40, 783 – 803.
- Verhaest, D. & Omey, E. (2010), 'The determinants of overeducation: different measures, different outcomes?', *International Journal of Manpower*, 31 (6), 608-625.
- Verhaest, D., & Omey, E. (2012), 'Overeducation, undereducation and earnings: further evidence on the importance of ability and measurement error bias', *Journal of Labor Research*, 33, 76-90.
- Verhaest, D., & van der Velden, R. (2013), 'Cross-country differences in graduate overeducation', *European Sociological Review*, 29, 642-653.
- Wolbers, M. (2003), 'Job mismatches and their labour market effects among school-leavers in Europe', *European Sociological Review*, 19, 249-266.

CHAPTER 1

HOW TO MEASURE FIELD-OF-STUDY MISMATCH? A COMPARATIVE ANALYSIS OF THE DIFFERENT METHODS³

Sana Sellami, Dieter Verhaest and Walter Van Trier

ABSTRACT

In this study, we focus on the measurement of field of study mismatch on the labour market. A first part of the paper reviews the literature, detailing and discussing the different approaches used to measure field of study mismatch. In the second part of the paper, based on a data-set allowing the use of ‘direct worker self-assessment’, ‘indirect worker self-assessment’, ‘job analysis’ and ‘realized matches’, we investigate whether these different approaches result in significant differences with respect to both the incidence and the determinants of field of study mismatch. Since significant differences do indeed exist, we conclude that empirical results of field of study mismatch should be interpreted with some caution. We recommend to use more than one measure of horizontal mismatch to obtain more reliable results.

Key words: mismatch, measurement, graduates, youth labour market

³ We thank Pierre Coppieters, Karel Neels, Rolf van der Velden, the participants of the workshop of the European Network on Transition in Youth (Brno, 2015) for their comments and suggestions on an earlier version of this paper.

INTRODUCTION

The past decades witnessed a rapid expansion of tertiary education. However, this expansion of tertiary education was not evenly spread over all fields of study. In 2011, one of the most popular fields of study among tertiary education students in Europe was Social sciences, Business and Law (OECD, 2013). The second largest group of students opted for Humanities, Arts and Education. Fields of study such as Sciences and Engineering, Manufacturing and Construction were less popular among students. Qualifying the general trend in this way is of importance, because studies have shown that labour market outcomes differ amongst fields of study. Indeed, monetary returns as well as unemployment rates diverge substantially amongst fields of study with returns being higher for fields of study such as Health, Engineering, Business and Science relative to Arts and Humanities (Arcidiacono, 2004; Finnie & Frenette, 2003; McGuinness, 2003; O'Leary & Sloane, 2005; Walker & Zhu, 2003).

The labour market success of these graduates may not only be assessed in terms of realized wages and overall employment chances, but also in terms of being employed in jobs that match with one's education. This educational match may be assessed both in a vertical way (i.e. whether one is not overeducated or undereducated for the job) and in a horizontal way (i.e. whether the content of the job fits with the specialization of the degree). The latter dimension is particularly relevant when focusing on the labour market chances of graduates from different fields of study. Robst (2007a), Wolbers (2003) and Verhaest, Sellami and van der Velden (2015) found that Humanities and Arts graduates are also relatively more likely to have a mismatch between their field of study and the content of their job. A number of studies showed that this match with respect to the field of study matters for earnings and job satisfaction, with those combining field of study mismatch with overeducation facing the most adverse effects (Robst, 2007a; Støren & Arnesen, 2011; Béduwe & Giret, 2011). If so, lower monetary and psychological rewards for particular degrees are thus (partly) explained through a higher likelihood on both types of educational mismatches.

In this study, we focus more profoundly on the horizontal dimension of educational mismatch. The international literature on field of study mismatch is rapidly growing and, with it, our understanding of the phenomenon. However, as with overeducation, field of study mismatch has been measured relying on alternative methods. While subjective self-assessment methods have been the dominant approach insofar, more objective job analysis or statistical approaches relying on realized matches have been used as well. Given the likely importance of field-of-study mismatch in accounting for differences in other labour market outcomes, the question arises which methods

used to measure this kind of mismatch are most appropriate and if and to what extent the methods do affect its incidence as well as its determinants. With respect to overeducation, several literature reviews have been conducted providing useful insights into the advantages and disadvantages of each of the methods (Groot & Maassen van den Brink, 2000; Hartog, 2000; Leuven & Oosterbeek, 2011; McGuinness, 2006). Further, single-dataset studies have shown that different methods do indeed result in differences in the incidence and determinants of overeducation (Battu *et al.*, 2000; Verhaest & Omeij, 2006a, 2010; Ramos, 2014). However, whether this is also the case regarding field of study mismatch remains an unexploited area.

We aim at filling two research gaps. First, we conduct a detailed review of the literature on field of study mismatch, focusing on the way the different contributions operationalize and measure the concept. Second, using a rich dataset on young Flemish graduates which allows us to apply the main approaches to measure field-of-study mismatch found in the literature, we examine the extent to which the analysis of the incidence and determinants of field of study mismatch is influenced by the applied measurement method. We measure field of study mismatch based on four different approaches: (1) direct worker self-assessment, (2) indirect worker self-assessment, (3) job analysis and (4) realized matches. As far as we know, none of the studies on field of study mismatch have used the indirect self-assessment measurement method.

The paper is structured as follows. Before we provide an overview of studies that have measured field of study mismatch, we will start with a conceptual and terminological clarification of field of study mismatch in the next section. In the second section we will discuss the different concepts of field of study mismatch and discuss in detail how field of study mismatch has been measured by several authors. In the third section we describe the data and methods applied in this study. This includes the way to compute the different measures of horizontal mismatch. Further, we analyze the incidence of horizontal mismatch by the applied measurement method. We end with some final conclusions.

CONCEPTUAL CLARIFICATIONS

There is a substantial research literature that focuses on *educational mismatch*. This type of mismatch refers to an imperfect match between graduates' educational attainment and the educational requirements of jobs. The bulk of this literature has focused on the vertical dimension, especially on overeducation. Individuals are usually defined to be overeducated if they work in a job in which their educational level exceeds the required level for doing the

job (McGuinness, 2006). Nonetheless, several studies have also focused on the mechanisms and the effects of mismatch in terms of field of study. The topic initially merely attracted attention by sociologists such as Solga and Konietzka (1999), Witte and Kalleberg (1995) or Wolbers (2003). More recently, the topic has also gained increased attention by economists, with in particular the study by Robst (2007a) being influential. In line with the definition of overeducation, these studies usually conceptualize field of study mismatch as a mismatch between the attained field of study of the individual and the required field of study for the job. While we adhere to the term field of study mismatch throughout this paper, several other terminologies have been used in the literature for what basically comes down to the same concept. For example, Støren and Arnesen (2011) and Beduwe and Giret (2011) refer to horizontal (educational) mismatch. Others call this mismatch on type of schooling (Robst, 2007a, 2007b), education-job mismatch (Bourdarbat & Chernoff, 2012) or field of education-occupation match (Nordin, Persson & Rooth, 2010).

Our definition on field of study mismatch requires two major clarifications. First of all, the term *field of study* needs to be defined. We consider a field of study to group educational programs focusing on the acquisition and signaling of a particular cluster of knowledge and skills to apply this knowledge, whatever their complexity, their applied learning methods and their relative focus on knowledge as opposed to skills. Fields of study thus usually group programs across educational levels and across different levels of quality. Moreover, we do not differentiate depending on whether the program is rather academically oriented (and thus focusses rather on knowledge) or rather vocationally oriented (and thus focusses rather on skills). Nonetheless, they may differ depending on the degree of specialization of the programs. For instance, programs in chemistry are likely to be more specialized than programs in engineering. Of course, from an operational point of view, fields of study can be more narrowly or more broadly be defined depending on the degree of aggregation of the different programs.

Further, also the *required field of study* needs to be clarified. This required field may be interpreted as the field delivering the cluster of knowledge and skills that is necessary to execute the job. Yet, from an economic point of view, it is unlikely to be efficient to produce all the required knowledge and skills by means of formal education; some required skills may simply be more efficiently acquired through other types of skill acquisition such as on-the-job training. Hence, since an optimal balance may exist between different types of knowledge and skill acquisition activities, we define the required field of study for a job as the one delivering the most optimal preparation for the job. A program is not (only) optimal because it may be the most efficient way to acquire some of the skills required for the job, but (even more so) because it facilitates further on-the-job learning for required

skills that are less easily acquired through more formal learning. Relying on an efficiency approach also implies that requirements may be defined both from a social and from a private point of view. For instance, from a social point of view, the educational system may not offer the programs that deliver the most optimal preparation for particular types of occupations. From a private point of view, workers in these occupations may nevertheless have an educational match if their program offers the best-available preparation. A similar divergence may occur in the case of the so-called licensed occupations, when individuals need a certificate of a particular program to entry into these occupations. Ideally, the license coincides with a certificate from the socially optimal program. If not, for instance because of bureaucratic inertia or protectionist forces, individuals will only have a match from a private point of view.

Given that the required education is defined as the optimal education, educational mismatches should not necessarily coincide with *skill mismatches*. The latter can be defined as working in a job where the required skills of the job do not match the acquired skills (Allen & van der Velden, 2001). Workers may thus be overskilled or underskilled for their job, meaning that individuals have more or less skills than the overall skill level required for their job. A match in terms of formal education is not a necessary nor a sufficient condition for skill utilization. For instance, a graduate having the optimal field of study for a job may nevertheless be underskilled at the start if it is optimal to acquire part of the required skills through further informal learning. Despite this conceptual distinction between educational and skill mismatches, both are often used as equivalent terms. Of course, relying on educational mismatch measures as proxies for skill mismatches is often a matter of pragmatism: direct data on attained and required skills are often not available to the researchers. However, even individuals with similar qualifications and reported experiences may be very heterogeneous in skills. For example, a highly educated individual working in a less-demanding job may not underutilize his skills because of low innate talents and abilities or because he experienced a depreciation of his skills. A small body of literature has started to deal with both types of mismatches as being different concepts, in particular by focusing on the relation between skill mismatches and vertical educational mismatch (see Allen & van der Velden, 2001; Green & McIntosh, 2007; Mavromaras, McGuinness, O'Leary, Sloane & Wei, 2013). These studies usually confirm that overeducation does not necessarily imply overskilling (and vice versa) and that both types of mismatches may have a distinct effect on wages and/or job satisfaction.

To measure mismatches, three different methods have regularly been used in the literature: worker self-assessments, job analysis and realized matches. These measurement methods were originally developed in the

overeducation literature (see, e.g., Hartog, 2000). The *worker self-assessment method* (WA) is based on the individuals opinion, whereby individuals assess whether their education matches the required education of their job. This may be done directly (DWA), for instance by asking individuals whether they feel overeducated or not, or indirectly (IWA), for instance by asking them which educational level is needed to get or to perform their job. *Job analysis* (JA) is a more objective approach which is based on the evaluation by job analysts, who define the required education for jobs relying on occupational classification methods. The *realized matches* method (RM) derives the required educational level from the actual distribution of educational levels within occupations. For instance, to measure the required level of education relying on this method, the mean or the modal educational level within an occupation has been used. In the context of over- and undereducation, each of these methods have extensively been reviewed and discussed in the literature. For field of study mismatch, similar methods have been used but an extensive review and analysis of these different methods is not present. In the next section, we will provide an extensive literature review on this issue.

L I T E R A T U R E R E V I E W

The methods used in the international literature to measure field of study mismatch are similar to those being used for overeducation. A pioneering study on field-of-study mismatch is the one by Witte and Kalleberg (1995). They used a direct worker-assessment approach to measure this type of mismatch. They asked individuals whether they have been trained for their occupation. If they answered affirmative, they were assumed to have a fit between their education and their job. Since then, most of the studies have followed a similar approach. Nonetheless, a number of researchers have also relied on a job analysis approach. A first application of this method was implemented by Wolbers (2003), who relied on the ISCO occupational classification. For each occupation (on the basis of the three-digit code), he defined the most appropriate field of study. Finally, the application of the realized matches approach in the field-of-study literature is rather rare. Recently, Nieto, Matano and Ramos (2015) used this method by measuring the required field of study by the modal field of study of workers within each occupation.

A general overview of the studies on field-of-study, their measurement approach and the resulting incidences of field-of-study mismatch can be found in Table 1.1. In short, we note that there are substantial differences in the incidence of the field of study mismatch across the different studies and across the three measurement approaches. Overall, the incidence of measured field of study mismatch ranges from 5 to 59 percent. Among studies using the WA approach (20 out of 28 reported studies), the pioneering study of Witte and Kalleberg (1995) seems to be an

outlier with an incidence that lies between 39% and 51%. For other studies relying on WA, we note incidences between 5% and 35%. The average incidence based on this method across all studies is 20.9%. In the case of JA (7 studies), we find substantially higher incidences between 17% and 59%, with an average of 35.1%. The only study based on RM finds an incidence of about 40%.

While the applied method may be one explanation for these differences across studies, also differences in sample composition across the cited studies are likely to play a role. In some studies, researchers focused only on the higher educated individuals, in other studies workers were the research subject. Further, also within each broad category of measures, there are substantial differences in the specific way of measurement. In the remainder this section, we discuss in more detail how these different measurement methods are applied in practice and discuss the strengths and weaknesses of each of these methods.

TABLE 1-1 REVIEW OF THE STUDIES ABOUT HORIZONTAL MISMATCH

Study	Subjects	Country	Measure	Question and Answer categories (JA – RM used classification system)	Incidence
Allen and de Weert (2007)	Graduates from tertiary education	Spain, Germany, Netherlands, UK and Japan	DWA	<p>Respondents were asked to indicate the extent to which the degree course is related to the job.</p> <p>Five categories were provided: (1) My field of study is the only possible/ by far the best field, (2) Some other fields could prepare for the area of work as well, (3) Another field would have been more useful, (4) Field of study does not matter very much, (5) Higher education studies are not all related to my area of work.</p> <p>The first two categories were defined as match, the other three categories indicate work that was clearly outside one's field.</p>	14.1% ⁴
Allen and Van der Velden (2001)	Graduates from tertiary education	Netherlands	DWA	<p>Which field of education is most appropriate for the job?</p> <p>Five categories were provided: (1) Only my own field of education, (2) My own or a related field, (3) A completely different field of education, (4) For this job no specific field is required, (5) For this job no specific field (yet) exists.</p> <p>The first two categories were defined as match, the other three categories indicate work that was clearly outside one's field.</p>	20.0%
Béduwé and Giret (2011)	Graduates from tertiary education	France	JA	<p>Using normative correspondence tables, one for educational level (Afficard, 1981) and one for the specialty (Fourcade, Ourliac & Ourtau, 1992)</p>	59%

⁴ The incidence of horizontal mismatch has been recalculated

Boudarbat and Chernoff (2012)	Graduates from university	Canada	DWA	<p>Respondents were asked to indicate whether their job is closely, somewhat or not related to education.</p> <p>The category closely related to education is match, other categories were defined as otherwise</p>	35.1%
Di Pietro and Urwin (2006)	Graduates from university	Italy	DWA	<p>Those in graduated jobs were asked whether (1) any university degree was a formal requirement or (2) a university degree in a specific subject or subject area was a formal requirement.</p> <p>If any university degree was a formal requirement than the individual has a horizontal mismatch.</p>	4.6%
Domadenik, Farcnik and Pastore (2013)	Graduates from tertiary education	Slovenia	JA	International Standard Classification of Education 2008 and a three digit code.	<p>29.1% (2007)</p> <p>29.5% (2008)</p> <p>55.1% (2009)²</p>
Grayson (2004)	Graduates from university	USA (York University)	DWA	How closely is your job related to your undergraduate education at York? Is it closely related, somewhat related, or not related at all?	n.a.
Heijke, Meng and Ris (2003)	Graduates from tertiary education	Netherlands	DWA	<p>Respondents were asked about the relationship between their field of study and his or her area of work.</p> <p>Respondents that indicated that neither the own field of study nor a related field of study would have been the best preparation are defined as having a horizontal mismatch.</p>	18%
Katz-Gerro and Yaish (2003)	Graduates from tertiary education	Israel	JA	Israeli Central Bureau of Statistics and used a three digit code to define the occupational groups	37.1% ²

Kelly, O'Connell and Smyth (2010)	Graduates from tertiary education	Ireland	DWA	Respondents were asked how matched they felt their field of study was to their current job	27%
Kim, Ahn and Kim (2011)	Graduates from tertiary education	Korea	DWA	Respondents could indicate whether their field of study matched or was completely (partially) different from what their job normally required. If respondents indicate their field of study was completely different from what is required, they were defined as horizontal mismatched.	18.4%
Klein (2011)	Graduates from tertiary education	Germany	DWA	Respondents were asked whether they are adequately employed according their field of study. They could answer this question with a five point scale, where (1) yes definitely, (5) definitely not. The last three categories indicate a job mismatch	35.2%
Kucel and Vilalta-Bufi (2010)	Graduates from tertiary education	Spain	DWA	Which field of study is most appropriate for the job? They could choose between four categories: (1) Strictly own field of education, (2) My own or a related field, (3) A completely different field of education, (4) No particular field required. Respondents have a match if they answered with the first two categories, otherwise a mismatch.	18%
Kucel, Vilalta- Bufi and Róbert (2011)	Graduates from tertiary education	East and Central Europe	DWA	Which field of study is most appropriate for the job? (cf. Kucel and Vilalta- Bufi (2010) for the used categories)	13% - 16%
Little and Arthur (2010)	Graduates from tertiary education	11 European Countries	DWA	Which field of study is most appropriate for the job?	6% - 13% (field of

				(cf. Kucul and Vilalta- Bufi (2010) for the used categories)	study not related)
Nieto, Matano and Ramos (2015)	Native and immigrant workers between 15 and 64 years old	15 European Union Countries	RM	Used information from the Adult Education Survey	39%-40%
Nordin, Persson and Rooth (2010)	Graduates from tertiary education	Sweden	JA	For education data they used the SUN2000 Classification. For the occupational data they used the SSK classification and used a three digit code to defined the occupational groups	17%-23%
Robst (2007a)	Graduates from tertiary education	USA	DWA	To what extent was your work related to your highest degree field? Was it closely related, somewhat related, or not related? Individuals that worked in a job that somewhat related were defined partially mismatched, working in a job that is not related are completely mismatched	20.1%
Robst (2007b)	Graduates from tertiary education	USA	DWA	To what extent was your work related to your highest degree field? Was it closely related, somewhat related, or not related? (cf Robst (2007a) for definition)	19.1%-21.4%
Robst (2008)	Graduates from tertiary education	USA	DWA	To what extent was your work related to your highest degree field? Was it closely related, somewhat related, or not related? (cf Robst (2007a) for definition)	n.a.
Solga and Konietzka (1999)	Graduates from several birth cohorts	East and West Germany	JA	International Standard Classification of Occupations 1968(ISCO) and use a three digit code	23%-27% (W. Germany) 25%-26% (E. Germany)
Støren and Arnesen (2011)	Graduates from tertiary education	Thirteen OECD Countries	DWA	Which field of study is most appropriate for the job? Individuals could provide four answers: (1) Strictly own field of education, (2) My own or a related field, (3) A completely different field of education , (4) No particular field required	15% ⁵

⁵ The incidence of horizontal mismatch has been recalculated

Verhaest, Van Trier and Sellami (2011)	Graduates from tertiary education	Belgium (Flanders)	DWA	Was the content of your first job in line with your education? Categories were: (1) completely, (2) somewhat in line (3) not at all in line.	16.1%
Verhaest, Sellami and van der Velden (2015)	Graduates from tertiary education	17 European countries and Japan	DWA	Which field of study is most appropriate for the job? (cf. Støren and Arnesen (2011) for the categories)	10.4%
Witte and Kalleberg (1995)	Panel study of households of seven waves (1984- 1990)	Germany	DWA	Respondents were asked whether they have been trained for their occupation. Categories were 'yes', 'no', 'currently in education' or 'have not been trained for an occupation'.	39%-51%
Wolbers (2003)	School-leavers which are 15-35 years old and left initial education within the past five or ten years.	Europe	JA	International Standard Classification of Occupations 1988(ISCO) and use a three digit code	n.a.
Zhu (2014)	Graduates from tertiary education	China	DWA	Respondents were asked about their current job status. They could answer with (1) 'I am now employed, and the job is related to my major' or (2) 'I am now employed, but the job is unrelated to my major'. The first two categories were defined as match, the other category as mismatch	28.2%

The worker self-assessment approach (WA)

As illustrated by Table 1.1, most of the studies focusing on field of study mismatch use the so-called worker self-assessment method. The worker self-assessment method produces a measure of mismatch based on the view of the job holder about the appropriate educational requirement for his or her job. In other words, the individual worker assesses whether he or she has the appropriate field of study to perform the job and, in this sense, it is frequently referred to as the subjective measure. In theory, the worker self-assessment measure can be constructed either directly or indirectly. In the case of the direct method (DWA), individuals are asked to what extent their field of study is related with their job. Also a more indirect method (IWA) may be possible, by asking individuals about the field of study that was required to get or to perform their job. The comparison of the attained with the required field of study is then made by the researcher. In the overeducation literature, the IWA approach is much more prominent than the DWA approach (Groot & Maassen van den Brink, 2000). However, as far as we know, none of the published studies on field of study mismatch have used the IWA method insofar.

Witte and Kalleberg (1995) were among the first to use the WA method within the context of field of study mismatch. They asked individuals whether they have been trained for their occupation with as possible answers: 'yes', 'no', 'currently in education' or 'have not been trained for an occupation'. If individuals answered 'yes', they were assumed to have a fit between their education and their job. If not, they were assumed to be mismatched. On the basis of this approach, Witte and Kalleberg found that 61% of the women were employed in a job for which they had been trained whereas only 49% of the men were found to have a match. However, we have to bear in mind that the operationalization of Witte and Kalleberg might also capture overeducation. The reason is that individuals could interpret 'having been trained for the occupation' as having both the appropriate educational level and the appropriate field of study. This may (partly) explain why the incidence in their study is substantially higher than in other studies relying on WA.

Whereas Witte and Kalleberg distinguish only between two broad categories, other studies allow for the possibility of a third category. One of the studies that used this kind of categorization is the study of Robst (2007a). Using data on US college graduates, he relied on a survey question regarding the extent to which their work was related with the field of their highest degree. Respondents could answer that their field was 'closely related', 'somewhat related' or 'not related' to their work. Robst (2007a) did not assign those who are in the middle category to either match or mismatch, but defined a third category of so-called 'partial mismatch'. A more recent study by Boudarbat and Chernoff (2012) provided the respondents with the same answer categories as Robst (2007a). Alternatively, a

number of studies rather rely on a Likert scale. Also on the basis of this approach, a decision has to be made about the classification of the middle categories. In the study of Klein (2010), for instance, individuals were asked whether they are adequately employed according to their field of study. They could answer this question with a five point scale, where (1) yes definitely, (5) definitely not. The last three categories were defined as a field of study mismatch.

It is clear that the decision to classify the middle category as match or mismatch will affect the measured incidence of mismatch. However, this decision is more than just a decision about where one wants to put the cut off. Depending on the theoretical definition that is applied regarding the required field of study, a different decision may be made. In our framework, the required field of study is defined as the most optimal field of study. For some occupations, a more general field of study may be more optimal than a rather specific one. Hence, even those who answer that their field of study is somewhat related to their job (cf. Robst, 2007a) may have the most appropriate field of study according to this definition. This implies that those having a ‘complete’ match cannot be distinguished from those having a ‘moderate’ match, making it defensible to group those with a ‘somewhat related field’ with those with a ‘closely related field’.

While most of the aforementioned studies ask the respondents whether their work is related with their field of study (e.g. Robst, 2007a), many other studies reverse the question and rather ask respondents whether their field of study was most appropriate for the job. The studies of Kucel and his colleagues (2010, 2011), Little and Arthur (2010), Støren and Arnesen (2011) and Verhaest *et al.* (2015) all use the same so-called REFLEX data. Respondents got the following question: “which field of study is most appropriate for the job?”. The individuals could provide four different answers: (1) Strictly own field of education, (2) My own or a related field, (3) A completely different field of education and (4) No particular field required. Within most of these studies, individuals are usually considered to have a field of study mismatch both if they reported that neither their own field of study nor a related field of study would have been the best preparation. Hence, also those stating that ‘no particular field was required’ or that ‘no specific field (yet) exists’ were assumed to have a field of study mismatch. Only Little and Arthur (2010) analyzed this category as a separate category.

Regarding the assignment of the ‘no particular field of study was required’ answer to the mismatch or match category, arguments for both decisions may be put forward. First of all, individuals providing this answer may be employed in jobs requiring rather specific skills within a domain for which none of the programs offered by the educational system prepares. If the organization of such a program would be cost-effective, these individuals may be considered having a mismatch, but only from a social point of view. Second, at the other extreme, these individuals may be employed in jobs requiring mostly general skills or a broad range of specific skills and knowledge across different disciplines, such as for managers or politicians. In such cases, an educational program focusing purely on general skills or on a broad range of specific skills may offer a more efficient pathway than a more

specific and disciplinary-focused program. If so, these individuals should be defined as having a mismatch. However, the most efficient pathway may just as well be a more specific program followed by more intensive on-the-job learning. In this case, the specific program may to a large extent serve as a signal for ability. Such a situation should not be considered to be problematic, neither from the point of view of the firm nor from the point of view of the worker and, hence, all of these workers should be defined to have a match in terms of field of study. Given these pros and cons, we might wonder why working in job that does not require a specific field of study has consistently been defined as mismatch in the previous studies. Probably, most of the authors interpret field of study mismatch in terms of field-specific skill mismatches rather than in terms of the fit between one's field of study and the field of study delivering the most optimal preparation for one's job. From the point of view of the individual, at least part of the specific skills acquired through education will not be fully utilized in the job and, as a result, they may feel to be mismatched even if they followed a suited educational trajectory. In the results section, we will test to what extent the decision to classify those answering that 'no particular field of study was required' either in the mismatch or match category affects the results.

Finally, there are some studies who asked the individuals about their field of study mismatch status using another wording than highest degree field. For example Grayson (2004) use undergraduate education, others have use field of study (Kelly, O'Connell & Smith, 2010; Kim, Ahn & Kim, 2011; Klein, 2010; Verhaest, Van Trier & Sellami, 2011). Also Di Pietro and Urwin (2006) use another articulation then the above mentioned studies. They asked the respondents whether any university degree was a formal requirement for the job or a university degree in a specific subject or subject area. They assume that individuals have a horizontal mismatch if any university degree was a formal requirement for the graduate's current job. They found a very small incidence of field of study mismatch (4.6%). A possible explanation for this low incidence is that the authors, based on the data, only could measure a part of horizontal mismatch.

The Job analysis approach (JA)

Another set of contributions relies on the so-called job analysis approach. In this method, job analysts define the required education for jobs relying on occupational classification methods. While the JA approach is rather common in overeducation literature, this approach has been used less frequently for the measurement of field of study mismatch (cf. Table 1.1).

Two of the studies that use the job analysis measurement method to measure field of study mismatch use the International Standard Classification of Occupations (ISCO). Solga and Konietzka (1999) were amongst the first using the JA measure to measure field of study mismatch. As many other studies, they used field of study mismatch rather as proxy for field specific skill mismatch, which they define as 'the fit between the 'skills obtained and

certified via vocational credential and the occupation exercised in the first job'. They investigated this mismatch for German workers and relied for this on the 3-digit codes of the International Standard Classification of Occupations (ISCO) of 1968. They defined an individual as having a mismatch if the ISCO-code for one's 'occupational' education and one's first occupation were different. In their study, they found an incidence of mismatch between 23% and 27%. Also Wolbers (2003) used the ISCO classification to investigate field of study mismatch among school leavers from 13 European countries. He relied on the 3-digit code and used the classification of 1988. All fields of study were distributed into eight major field of study clusters, which were matched with a number of occupations on the basis of the author's assumed correspondence of the skills acquired through the field of study and those needed in the occupation.

Along with the ISCO classification, several other classifications have been used to measure field of study mismatch. Nordin and his colleagues (2010) relied on a 3-digit code and used the Standard Swedish Occupational Classification (SSYK) to determine the extent of field of study mismatch under Swedish higher educated graduates. From this classification, they created 34 different occupations. Their educational attainment is based on the SUN2000 classification, this classification fits the International Standard Classification of Education (ISCED97). Based on this classification, they constructed 29 different fields of study. The fields-of-study that matches one occupation discipline perfectly are classified as being matched. Domadenik, Farčnik and Pastore (2013) adopt the same combination of occupation classification and field of study as Nordin *et al.* (2010). They used the International Standard Classification of Education (ISCED97) to define the required field of study. For the occupational classification they used data of the Statistical Register of the Labour –Active Population, which includes data on the entire employment history, and the Standard Classification of Occupation 2008 to construct the occupational groups. They found an incidence of mismatch that lies between 29% in 2007 and 55% in 2009. The high incidence of field of study mismatch in 2009 may partly due to the crisis conditions.

Also Katz-Gerro and Yaish (2010) defined field of study mismatch based on a JA measure. They used data of Israeli Central Bureau of Statistics and constructed occupational groups based on the 3-digit code. They distinguish eleven academic or five post-secondary fields of study. The matched jobs were 13 occupational groups that were similar to the fields of study. Those occupations which could not be matched were assigned to a modified version, these were six occupational groups.

Béduwé and Giret (2011) use normative correspondence tables, which are similar to occupational classification systems, to determine the relation between the jobs occupied and the diplomas that are established by the individuals. They distinguish between 25 groups of the different areas of vocational knowledge. Within these groups both the types of education and the occupations can belong. An individual is horizontal mismatches when the vocational area of employment differs from the field of study. They found a relative high incidence of

horizontal mismatched individuals (59%), where 30% were only horizontal mismatched and 29% combine horizontal mismatched with vertical mismatched. They assume that the high incidence of horizontal mismatch is probably due to high transferability of the human capital acquired during education

Each of the abovementioned studies distinguish between two categories; match and mismatch (see Solga & Konietzka, 1999; Wolbers, 2003; Katz- Gerro & Yaish, 2010; Béduwé & Giret, 2011). The incidence of these studies lies between 23% and 59%. The differences in incidence may due to country differences (differences in economy, educational systems) or it might also capture overeducation. Only Nordin *et al.* (2010) distinguish between three categories; match, weakly matched and mismatch. Evidently, this strict definition of the mismatch category causes the incidence of mismatch to be lower than when a broader categorization is used. While the average mismatch incidence relying on JA across studies equals 35.1%, Nordin *et al.* (2010) found average incidences of 23% and 17% for men and women respectively. The respective incidences of ‘weak matches were 18% and 8%.

The realized matches approach (RM)

The realized matches measure is the third approach on which the measurement of field-of-study mismatch may be based. To determine the required educational level or field of study, this approach uses the actual distribution of educational levels or fields of study within the different occupations. In the overeducation literature, its usage is not uncommon. The required level of education is often measured using the mean educational level within one’s occupation (Verdugo & Verdugo, 1998). Other authors prefer to use the modal (Kiker, Santos & De Oliveira, 1997) or median (Verhaest & Omey, 2010) level of education.

As far as we know, the realized matches method has been used only once insofar to measure field of study mismatch. Nieto, Matano and Ramos (2015) relied on this method to explore the differences in vertical and horizontal mismatch of natives and immigrants in Europe. They used the Adult Educational survey and assumed that someone has a field of study mismatch if his or her field of study differs from the modal field of study within one’s occupation. They noted an incidence of field of study mismatch of about 40%.

Evaluation of the different measurement approaches

From this overview, we can conclude that there are substantial differences across the different studies in the methods applied and the measured incidences of field of study mismatch. Direct worker self-assessment is clearly the most popular method with, more than 70% of the studies having used this approach.

The DWA approach also delivers the lowest likelihood of field of study mismatch, the average was about 21% across studies. Within the JA approach, we found a lot of differences in the incidence between the different studies, it ranges from 17% to 59% (cf. Table 1.1). One of the reason that might explain these differences are the differences in categorization. Most of the studies used two categories, match or mismatch, just one study used three categories and found the lowest incidence of mismatch based on this method (see Nordin *et al.*, 2010). Another explanation for the differences in mismatch may due to the used classification system, a classification system that is based on the setting of one country can differ from another which makes. For example, the description of job functions can differ between countries. Also an international classification system is not always evident, it quite difficult to compare between different countries. Classification systems are also often not up to date, it is, however, important that classification systems have to redefined from time to time so that technological changes and other changes are included. The differences in incidence between the three approaches can be explained by the differences in populations in the cited studies. Finally, possible differences in the orientation of educational systems makes comparing between the mentioned studies more difficult.

Given these substantial differences in incidences, it is important to know which of these methods delivers the best approach to measure horizontal mismatch. In the overeducation literature, mentioned by Hartog (2000), the JA is the best method to opt for. The question is whether this method is a better method to measure field of study mismatch. The JA approach is not influenced by the individuals' opinion, as the WA approach, and may be more preferred in longitudinal research. Using a worker assessment method in longitudinal research might rather reflect the general feeling with the job. It might be an indication of adaptation. Scholars have found that the negative effect of mismatch (overeducation) on job satisfaction diminish with year of experience. Individuals may perceive their position within their labor market less problematic and more satisfied with their job because of their acquired skills and experience, so they would less likely to inclined that they are mismatched. This can be avoid by using the JA method, this method compares the educational requirement with the formal educational degree, without taking into account the acquired skills or training during the labour market career. However, the classification system that will be used have to be up-to-date, otherwise they become obsolete. Yet, it is not easy incorporate changes in requirements or education in classification systems. Therefore, many studies have relied on existing classification systems, which may lead to a systematic bias. Another weakness of the JA method is that it depends on the disaggregation of the used occupations classifications, if a less detailed classification is used it may result in underestimation of field of study mismatch. We also might question the review of the experts, there might be some subjectivity involved or they may have not all the information on the exact content of the job which may lead to misclassification. So, if an up-to-date and detailed classification system would not be available, using the JA method would not be preferable. Is the WA measure than an adequate method? We also might wonder which of these measurement methods is preferred in analyzing the effects of field of study mismatch on wages and job satisfaction.

One of the main reason to use the WA approach is that the individual can best judge whether the job matches their field of study, no one knows a job better than the own who performs it. However, as above mentioned, in longitudinal research this approach is less recommended. Yet, by informing individuals only take into account the attained field of study during their educational career, and not the acquired experience or skills during their labour market career, using the WA approach in the long run would be less problematic. Further, we also might wonder which of two measurement methods are preferred to analyze the effects on job satisfaction and wages. In case of job satisfaction, it may be preferred to use subjective measurement methods. Job satisfaction depends more on subjective characteristics, than on objective conditions. Also for overeducation, Verhaest and Omeij (2006b) confirm that the indirect worker self-assessment approach explains the largest part of the variation of job satisfaction. For wages, the JA method should be preferred, this has also been confirmed by the above authors. If we, however, would use a worker self-assessment approach it might that the level of the wages influence the subjective judgment of mismatch. For example, individuals with higher earnings might rather feel matched. Another disadvantage of this method is the wide variation in phrasing. The differences in phrasing ensure that respondents would answer the questions differently⁶. This also might explain the differences in incidence (cf. Table 1.1). It would be better to limit the variation in phrasing or to set up a standard question that researchers could rely on. This would also make the comparison between different studies easier. Further, survey questions about different forms of mismatch can be interrelated by respondents. An individual with a skill match and field of study mismatch in practice, might answer the question on field of study mismatch positive because of the skill match which will bias his answer about the match between the field of study and the job. These individuals would rather state that they are matched. Therefore, it is important to make a clear distinction between skill mismatch and field of study mismatch in the survey, by providing individuals the explanation about these two forms of mismatch.

Further, the RM is not often been used to measure overeducation and field of study mismatch, although this method can always be calculated. The RM method fits especially with the assignment model, the worker with the most widespread field of study for a certain job will have a match for the job. The main reason of not using this measure is probably because this measure depends on the demand and supply in the survey and does not reflect the actual requirements of the jobs. On the one hand, there are jobs that are nearly exclusively populated by individuals with a specific field of study and on the other hand there are jobs populated by graduates from different subjects. If one field of study happened to have a slightly higher frequency, this field of study is the modal field of study and other fields of study are defined as mismatched. This would probably overestimate the incidence of horizontal mismatch. We might wonder whether the measurement of mismatch based on RM shows a real incidence of mismatch or just a product of the modal matching procedure. Also the supply of educational programs

⁶ In the overeducation literature, Green *et al.* (1999) have asked the respondents how much education is required to get their job and how much education is required to do their jobs. They noted that a quarter of their respondents give different answers to these question.

determine the distribution of fields of study within an occupation. When there are more graduates than jobs in a certain field, individuals are have to accept a job that is unrelated with their field of study. If these individuals accept a job in a segment where the demand is growing, the modal level might change and might underestimated the real incidence of field of study mismatch. As in the case of the JA measure, this measure is also influenced by the categorization of fields of study (educational level) and occupations. So, the results might change if the number of professional disciplines and/or fields of study will further aggregate (disaggregate) into some limited number of categories.

As the RM measurement method, the IWA has not been used to measure field of study mismatch. As each of the above mentioned methods, this method also has his weaknesses. Graduates are expected to have little incentive to misreport the required field of study, because they might have forgotten what employers required to perform the job or report their personal requirements. Next, we also have some critique on the term ‘indirect worker self-assessment’. This measurement method partly measures the formal requirements of the employer for the job, but this is not quit clear if we depend on the denomination. ‘Employer assessment’ would adequately cover the definition of field of study mismatch based on this measurement method.

Finally, as have been mentioned in the section above, is that the incidence of field of study mismatch depends on the categories that are taken into account to define field of study mismatch. It is not quite obvious whether to classify the middle category ‘somewhat related’ as match, mismatch or as an apart category. One of the main reasons to threat this middle category as an apart category is because of the exclusivity. It is a quit unique category and in some cases it would be rather false to classify this group as a mismatch, especially for individuals with a degree in a relatively broad field. One cannot say that these individuals have a mismatch with all professions. Also fields of study that train to more than one occupations, it would be rather false classifying these individuals as mismatch cause their attained skills are transferable across different occupations. There are, however, also several reasons for classifying the middle category as match. First, it correspondence with the definition of field of study mismatch in most of the studies. Next, defining this category as match takes the studies that educate to more than one occupation into account. A last reason is that the category ‘somewhat in line’ can defined as match because of the associated positive connotation. But threating this category as an apart category is probably better because of the exclusivity. In the second part of this study, we make a clear distinction between the three categories of field of study mismatch and investigate how this may affect the results.

NEW EVIDENCE

As mentioned, we define field of study mismatch as working in a job for which the acquired field of study differs from the optimal field of study for the job. The optimal field of study for a job is that field of study that provides the best economic mix and amount of skills and most efficient utilization of these skills in the job. Individuals that have a field of study that is not related to the job are defined as having a mismatch. If we would compare our concept of field of study mismatch with that of the pioneer study of Witte and Kalleberg, we can state that the optimal field of study for the job is in this case defined from an individual's point of view. If individuals believe that they have been trained for the job, they assume that their field of study is the optimal field of study to do the job. This is in line with our concept. Second, as Robst (2007a) we will distinguish between three categories (1) related, (2) somewhat related, (3) not at all related. We will discuss in the results section discuss whether classifying this category as match or mismatch influences the incidence of mismatch. Also in line with previous studies is that it is quite common to ask the respondents whether their work is related with their field of study. Also in this study the same question has been used for the DWA approach.

In the next section we will discuss how we measure field of study mismatch. Our dataset provide us the possibility to measure field of study mismatch on the existing standard measurement methods. To our knowledge, this is the first study that measure field of study mismatch based on the four different methods. In the previous studies IWA measure has not (often) been used to define field of study mismatch. The reason for this is data availability. We will also discuss how the incidence of field of study mismatch differ from the above studies. Thereby, as we have mentioned in the above section, in the literature most studies distinguish three categories to define horizontal mismatch. In some studies the middle category has been defined as match, in others as mismatch and in a few studies it has been measured as an apart category. In this study we will see what the impact is of these three different categorization. We also distinguish between different categorization of field of study, we use a more detailed categorization and a broader categorization. In the results section we will discuss how this affect our results.

In this section we discuss the results regards fields of study mismatch. We will discuss the differences in incidence of field of study mismatch depending on the four approaches. Moreover, as mentioned in the methodology section we distinguish between two levels of aggregation and investigate whether this has an impact on the incidence of field of study mismatch. And at last, we discuss the effects of a couple of determinants on fields of study mismatch, depending on the measurement.

Data and measurement

For the analysis in this study, we use SONAR data regarding the transition from school to work in Flanders. This dataset contains data on three cohorts of about 3000 Flemish young individuals, which were born in the years 1976, 1978 and 1980 respectively. Each cohort was interviewed at the age of 23. Follow-up surveys were conducted at age 26 for the cohort 1976 and 1978. For the cohort 1976 and 1980, data are also available at the age of 29. The response rates for these follow-up surveys ranged from 60% to 70%. A unique feature of these data is that they allow to measure field of study mismatch based on each of the three approaches. Moreover, in the case of the worker self-assessment approach, they allow to construct both a direct and an indirect measure. More information about the set-up of the survey can be found in SONAR (2003, 2004, and 2005).

In our study we focus on individuals with a first registered job, which is defined as the first job with a standard labour contract in which the graduates worked for at least one month. This first job is observed in our dataset for 8247 individuals. Further, we focus on higher educated individuals, i.e. those with a college or university degree. In total, 3483 individuals are higher educated and have a first registered job that was observed at the time of the last survey. After further exclusion of those who are self-employed and respondents with missing values, we keep a final sample of 3317 individuals.

The SONAR surveys include two questions in which the respondents are asked about their field of study (mis)match status. The first question allows to derive a DWA measure and is formulated as follows: “Was the content of your first job in line with your education?”. Respondents could choose among: (1) completely, (2) somewhat in line (3) not at all in line. In our benchmark analysis, we define the first two answers as horizontal match and the other categories as mismatch. In the results section, we will also discuss whether the results differ if we use another categorization.

The second worker self-assessment measure is an indirect self-assessment measure (IWA). Respondents were asked about the educational level and the field of study that was required to get the job. First, the respondents got the question whether any educational qualification was required. They could answer the question with ‘yes’ or ‘no’. If the respondents answered this question affirmative, they got the following question: ‘Which fields of study were required by the employer? If needed, respondents were able to report more than one detailed field of study that was required for the job. In total, more than 400 different fields of study were reported. We clustered these fields of study in two types of categories: (A) detailed clusters of fields of study and (B) broad clusters of fields of study. For categorization A, we clustered both the reported required fields and the graduate’s attained field into 177

detailed categories. For categorization B, we grouped the reported fields of study in 11 broader categories⁷. In the case of correspondence between the attained category and at least one of the required categories, graduates were assumed to have a match on the basis of the IWA measure. Apart from those reporting one or more required fields, a substantial group did not report any particular required field. These individuals are classified in a separate mismatch group called ‘no particular field of study was required’. In our benchmark analysis, we will rely on categorization B. In some additional analyses, we will investigate in which manner the results differ in the case categorization A is being used. Regarding the ‘no particular field of study was required’ category, we report both analyses in which this category is defined as a mismatch and in which it is considered as a match.

To determine mismatch based on the job analysis, we rely on the 1992 Standard Occupation Classification of Statistics Netherlands. This classification defines for each job the specific tasks and the corresponding requirements in terms of educational level and field of study. Since the classification was originally developed for The Netherlands, we translated this to the Flemish educational context. Based on additional information provided by Statistics Netherlands (CBS, 2001) and information about the required learning outcomes of the various study programs in Flanders, we examined which fields of study match the competencies required for every occupational discipline. The CBS classification distinguishes 65 occupational disciplines at the 3-digit level. Regarding the field of study of the program attained by the graduate, we consider 177 detailed clusters (cf. IWA measure). Each field of study was matched with one or more professional disciplines⁸. We differentiate between professional disciplines that are too a large extent related to the field of study and those who are to some extent related to the field of study. In Appendix (Table A), we include the conversion table in which all fields of study are assigned to the most appropriate professional discipline. In the benchmark analysis, individuals which field of study was at least to some extent related with the professional discipline are defined as having a horizontal match. Individuals with a completely different field of study are defined as having a horizontal mismatch. Additionally, we also report results relying on other categorizations.

Finally, to compute horizontal mismatch based on realized matches, we use the modal procedure. To keep enough observations in each occupation, we rely on the 3-digit occupational code (cf. supra). Individuals are assumed to have a field of study mismatch if their field of study differs from the modal field of study within each occupation. Regarding the categorization of fields of study, we distinguish again between two different levels of aggregation

⁷ We distinguished the following fields of study: (1) General fields of study, (2) Economics, Business and Law, (3) Natural Sciences, Applied Natural Sciences and Technique, (4) Arts, (5) Biological and Applied Biological Sciences, (6) Health and Welfare, (7) Architecture, (8) Education (9) Social Sciences, (10) Philosophy, Literature and Applied Linguistics, and (11) Fields of study preparing for occupations in the Armed Forces. Those with a field of study in the first or the last category are excluded from our analysis. The general fields of study are not distinguished in higher education.

⁸ We have to mention that some fields of study may match certain teacher occupations. However, for some specific cases there is only a match when the individual also have graduate teaching diploma. These cases are assigned with (**) in the conversion table, see Appendix A.

(A) the 177 detailed clusters of fields of study and (B) 11 broad clusters. In the results section we investigate whether the different levels of aggregation influence the outcomes of field of study mismatch.

The incidence of horizontal mismatch

In Table 1.2 we report the incidence of horizontal mismatch based on the four approaches. We distinguish between two levels of aggregation, a detailed clusters of field of study and a broad clusters for field of study. For the DWA and JA measures, we initially distinguish three categories: (1) Match, (2) Rather match, and (3) Mismatch. For IWA, we distinguish another category: ‘no particular field of study was required’.

The incidence of the Mismatch category depends largely on the used measurement approach, and ranges between 15% and 40%. Based on categorization B, the lowest incidences are found on the basis of DWA (15.8%) and JA (15.3%). For DWA, this is below the average of 20.9% based on DWA in the literature (cf. Table 1.1). Nonetheless, it is between the minimum (5%) and maximum (35%) level measured in other studies relying on this method. For JA, this is in line with the results of Nordin *et al.* (2010), who note an incidence of about 17%. Nonetheless, it is much lower than the average in the literature based on this measure (35.1%). While the incidence of mismatch is relatively similar for the JA and DWA method, we find some differences in the distribution across the ‘Match’ and ‘Rather match’ categories. Based on JA three quarters of the individuals are found to have a complete match, while only 60% of the individuals are found to have a complete match relying on DSA. The highest incidence for the ‘Mismatch’ category (30.0%) is found for RM. This incidence is still below the one found by Nieto *et al.* (2015). They found an incidence of about 40%. However, since they focused on the whole working population, our results are not really comparable. Finally, relying on IWA, about 25% of the individuals have a field of study mismatch at the start of the career. However, it should be noted that also more than 21% of the individuals report that for their job no particular field was required. Given that no other studies relying on this method are available, it is unclear whether these incidence are exceptionally high or low.

If we compare these results with the incidence of horizontal mismatch using another level of aggregation, the incidence of horizontal mismatch indeed differs depending on the level of aggregation regarding fields of study. For each of the three measures, we find a higher incidence of field of study mismatch if we rely on a more detailed clustering (category A). The increase is relatively similar across the different measures and amounts about 8 to 10 percentage points⁹. Between the incidence found on the basis of Category A and Category B, we find a difference of almost 10% for the three measures.

⁹ This is easily explained by the following example, suppose an individual has graduated in Economics but works as legal expert. In the case of the more detailed categorization A, he would be assessed to have a mismatch, while using aggregation level B he has a match. Since the fields of study Economics, Business and Law are defined as one domain on the basis of categorization B, each job that requires a degree in one of the subdomains is assessed to have a match.

TABLE 1-2 THE INCIDENCE OF HORIZONTAL MISMATCH (BY LEVEL OF AGGREGATION)

	DWA	IWA		JA		RM	
		(A)	(B)	(A)	(B)	(A)	(B)
Match	59.2%	44.1%	54.1%	59.0%	74.4%	61.9%	70.0%
Rather match	25.0%	-	-	16.4%	10.3%	-	-
Mismatch	15.8 %	34.5%	24.5%	24.6 %	15.3%	38.1%	30.0%
No particular field of study was required		21.4%	21.4 %				

Data source: SONAR 1976 (23, 23, 29), 1978 (23, 26), 1980 (23, 29), own calculations; number of individuals =3317

As mentioned in the literature section, most studies distinguish only between two categories, field of study match or field of study mismatch. Individuals with a somewhat related job are usually defined as having a match, but some authors also define these individuals as having a mismatch. Further, individuals in a job where no particular field of study was required are usually defined as having a mismatch. It is clear that the decision regarding the way the different categories are matched will affect the results. To compare our results with other studies, we also report results by distinguishing only two categories. First, we consider individuals with a job that is somewhat in line with their field of study (DWA and JA) to have a match; individuals that reported that no field of study was required (IWA) are defined as having a mismatch. Results are shown in table 1.3. Using this dichotomous categorization, the incidence of field of study match is now by far the lowest relying on IWA. Less than half of the sample (44.1%) is now assessed to have a match if we use the most detailed clustering for the fields of study for this method. On the other hand, relying on DWA, this dichotomization delivers an incidence of match of up to 84.2%. But also other types of categorizations may be considered. Bourdarbat and Chernoff (2011) defined the ‘rather match’ category as mismatch instead of match. Evidently, this procedure delivers a much higher incidence of individuals that have a mismatch. In our case, we would note a mismatch incidence of 40.8% in the case of DWA and of 25.6% to 41.0% in the case of JA.

TABLE 1-3 THE INCIDENCE OF HORIZONTAL MISMATCH (MATCH VS. MISMATCH)

	DSA	IWA		JA		RM	
		(A)	(B)	(A)	(B)	(A)	(B)
Match	84.2%	44.1%	54.1%	75.4%	85.7%	61.9%	70.0%
Mismatch	15.8%	55.9%	45.9%	24.6%	15.3%	38.1%	30.0%

Data source: SONAR 1976 (23, 23, 29), 1978 (23, 26), 1980 (23, 29), own calculations; number of individuals =3317

Correspondence between the different measures

The fact that different measures deliver different outcomes is also illustrated in Table 1.4, which reports the correlations between the eight mismatch indicators relying on the dichotomous operationalization (cf. table 1.3). Even among measures relying on a similar methodology but using a different level of aggregation, correlations are

fairly low: 0.427 for the RM measures, 0.655 for the JA measures and 0.817 for the IWA measures. Not surprisingly, correlations between measures using different approaches are even lower. First, the correlations between the DWA measures and the other measures are relatively stable and between 0.235 (with RMB) and 0.342 (with JAa). The correlations between the IWA measures and the other measures are even lower and between 0.141 and 0.290. Finally, the correlation between the RM and the JA measures are somewhat stronger (between 0.215 and 0.655). The JA measures have slightly stronger correlations with the DWA measure (between 0.290 and 0.342) than with the IWA measures (between 0.141 and 0.230). This is not in line with the findings in the overeducation literature; they note a higher correlation between the JA and the IWA, than with the DWA.

Overall, these correlations suggest that the correspondence across the different measures is relatively low. This is in line with what has been found in similar research on overeducation (see, e.g., Verhaest & Omey, 2006a). This low correspondence is also illustrated in table 1.5, which reports the percentage of individuals in our sample that are classified identically on the basis of a minimum number of measures (relying on categorization B). While 61.1% of the graduates had a horizontal mismatch on the basis of at least one measure, only 5.6% had a mismatch on the basis of every measure. Overall, only 44.5% of the respondents are equally classified on the basis of the 4 measures (5.6% with a mismatch and 38.9% with a match).

TABLE 1-4 CORRELATIONS BETWEEN THE DIFFERENT MISMATCH MEASURES

		DWA	IWA		JA		RM	
			(A)	(B)	(A)	(B)	(A)	(B)
DWA		1.000						
IWA	(1)	0.279	1.000					
	(2)	0.290	0.817	1.000				
JA	(1)	0.342	0.230	0.229	1.000			
	(2)	0.290	0.141	0.195	0.655	1.000		
RM	(1)	0.240	0.275	0.198	0.367	0.215	1.000	
	(2)	0.235	0.177	0.203	0.598	0.532	0.417	1.000

Data source: SONAR 1976 (23, 23, 29), 1978 (23, 26), 1980 (23, 29), own calculations; number of individuals =3317

TABLE 1-5 NUMBER OF MEASURES OF FIELD OF STUDY (MIS)MATCH

At least on the basis of ... measure(s)	Field of study mismatch	Field of study match
1	61.1%	94.4%
2	27.6%	87.3%
3	12.0%	50.0%
4	5.6%	38.9%

Data source: SONAR 1976 (23, 23, 29), 1978 (23, 26), 1980 (23, 29), own calculations; number of individuals =3317; calculated using Category B for IWA, JA and RM

Field of study mismatch and overeducation

The SONAR dataset also provides information about the overeducation status of the individuals. In Table 1.6, we report the incidence of overeducation and horizontal mismatch, each time on a similar methodology for both types of mismatch¹⁰. As Støren and Arnesen (2011) and Verhaest *et al.* (2015), we distinguish the following four categories: (1) Full Match, (2) Mere vertical mismatch, (3) Mere Horizontal Mismatch, and (4) Full Mismatch.

Based on DWA, the group with a Full Match has the largest incidence in comparison with the other approaches. Also the incidence of Full Match is quite similar based on IWA and JA, using category A (cf. Table 1.6: IWA, column 1; JA, column 1) and based on IWA and RM, using category B (cf. Table 1.6: IWA, column 2; RM, column 2). The result based on DWA may reflect the expectations and satisfaction of an individual. Individuals who view their mismatch as less problematic are less likely to incline that they are mismatched.

The incidence of merely horizontal mismatch is rather small, based on the DWA approach. The largest incidence of merely horizontal mismatch is found by the IWA measurement method, we found an incidence that lies between 24% and 31%. Further, we find different results for the category 'Merely vertical mismatch'. Only 6.1% of the respondent is merely overeducated, based on the IWA, but the JA measures an incidence that is 5.5 times higher. Finally, we find that the probability to have a Full Mismatch is rather small, based on the DWA measure. We note a relatively higher incidence for the three other approaches, which lies between 17% and 33% based on Category A, and between 10 and 21% depending on Category B. We can conclude that the results differ depending on aggregation level. A more detailed aggregation level provides a higher incidence of field of study mismatch, than a broader aggregation level.

TABLE 1-6 INCIDENCE OF FIELD OF STUDY AND OVEREDUCATION

	DWA	IWA		JA		RM	
		(A)	(B)	(A)	(B)	(A)	(B)
Full Match	72.6%	41.5%	48.1%	41.7%	43.7%	34.4%	51.0%
Merely vertical mismatch	11.6%	2.6%	6.1%	33.8%	41.0%	3.7%	18.9%
Merely horizontal mismatch	4.4%	31.1%	24.5%	7.1%	5.1%	28.8%	12.2%
Full Mismatch	11.4%	24.9%	21.4%	17.5%	10.2%	33.0%	17.8%

Data source: SONAR 1976 (23, 23, 29), 1978 (23, 26), 1980 (23, 29), own calculations; number of individuals =3317

The determinants of field of study mismatch

In a last analysis, we also look at whether the determinants of field of study mismatch in terms of personal characteristics and educational background differ if we use alternative measurement approaches and aggregation

¹⁰ For more information about the measurement of overeducation relying on the SONAR data, we refer to Verhaest and Omey (2006).

levels (cf. Table 1.7). As personal characteristics, we account for gender, ethnicity and educational level of the father. Regarding the educational background, we investigate the role of the educational level, field of study and academic performance and repeated years. These characteristics have regularly been investigated in the literature on educational mismatches (Verhaest & Omeij, 2010; Robst, 2007a). Regarding field of study mismatch, we rely on the dichotomous categorization (cf. Table 1.3). The analysis is conducted by means of logistic regression.

Table 1.8 report the estimation results for each of the seven measures. First, for gender and ethnicity, we do not find statistically significant evidence based on any of the measures. Regarding the educational level of the father, we do, find some statistically significant effect, but only based on the JA and relying on the most detailed categorization A (Table 1.7, JA column 1). On the basis of this measure, we note that those with father with a lower secondary education degree are more likely to have a horizontal mismatch in comparison to the least educated.

Educational characteristics seem more important in explaining horizontal mismatch. However, these results clearly differ across the alternative measures. First of all, we find that individuals who have participated in higher tertiary education are more likely to have a horizontal mismatch if measured on the basis of the RM and IWA approach. However, using JA, we only find a significant effect if we use category B to define field of study mismatch. This results seems in line with the study of Verhaest *et al.* (2015). Moreover, relying on DWA, we do not find evidence on this as well.

Also regarding the fields of study, our conclusions depend on the used measurement approaches and the different aggregations levels. Graduates from Arts have a higher probability of field of study mismatch based on the four approaches. For graduates with a degree in Linguistics, History or Philosophy and those with a degree in Behavioral and Social Sciences, we find some evidence on a statistically significantly higher likelihood on mismatch in comparison to the reference category. These results seems in line with findings in earlier studies (cf. Wolbers, 2003; Robst, 2007) A possible explanation is that these fields of study provide relatively more general skills which are transferable across different types of jobs. Another explanation might be that less vacancies are available for these graduates, forcing them to accept jobs outside their field of study. However, this result did not show up for each of the measures. For graduates from Behavioral and Social sciences, for instance, this conclusion can only be made relying on JA or RM. For some of the fields of study, we even find contrasting results. We note a lower incidence of field of study mismatch for graduates in Health and Medicine in comparison to those with an Economics, Business and Law degree on the basis of five out of seven measures. This was also found by earlier studies. However, relying on RMB, we note a higher incidence (cf. Table 1.7, RM column 2). Similarly, we find a higher probability of horizontal mismatch for graduates in ‘Natural Sciences and Engineering’ based on the means of the JA and RM measure, but a lower probability based on the IWA measure. Finally, graduates from Education have

a lower likelihood to have a field of study mismatch based on the WA measures and the RMa measure and a higher likelihood to have such a mismatch if measured relying on JA and RMb.

Finally, also regarding the role of academic performance, we find some differences in conclusions. While individuals who graduated with a distinction grade are found to have a lower incidence of horizontal mismatch based on all but one measure, those who graduates with a high or highest distinction are found to have a lower probability of field of study mismatch only based on the WA measures. Similarly, we only find statistically significant evidence regarding the role of repeated years if mismatch is being measured relying on JA; individuals who repeated years are found to have a higher probability of horizontal mismatch if measured on the basis of these measures.

The above results show that the application of different measurement method not lead to similar conclusions. For the RM measure we expected that this measurement method does not measure real field of study mismatch. Our results indicate that this measurement method have somewhat different results than the other methods. This probably depend on the distribution of the fields of study and jobs or the chosen aggregation level. Also based on the JA measurement method, we find slightly different results than founded in earlier studies. The findings based on WA measures are mostly in line with earlier studies.

In the previous results, we defined field of study mismatch as individuals who work outside their own study field, by means of DWA and JA. Individuals who work in a job that is somewhat related were defined as match. Table 1.8 show the results of the effects on field of study mismatch, if we define the somewhat related rather as mismatch. Based on the DWA, we find an insignificant effect for individuals that have followed higher tertiary education. Also the effect of Graduates from Linguistics, History and Philosophy and Arts turns out to be no longer statistically significant. However, graduates from Natural Sciences and Engineering have now a lower probability to have a field of study mismatch. We also find some differences for the results based on the JA. We do not find any longer a significant effect of social background. Within fields of study, we find for Natural Sciences and Engineering a relatively less strong effect on the incidence of horizontal mismatch. Also the probability of field of study mismatch for graduates from Arts has significantly declined. Graduates from Education have a much lower likelihood to have a field of study mismatch, than measured in Table 1.7.

We also tested whether the results of the determinants of field of study mismatch differ if we used another definition for mismatch based on the IWA. These results are reported in Table 1.8. First, we note some similar effects of the social characteristics and social background. However, we do find that individuals who have a father that has attained tertiary education have a lower incidence of field of study mismatch (based on category B). Second, we also find some differences between the effects of field of study on field of study mismatch, than noted

in Table 1.7. We do not find any significant effect of Health and Medicine. Moreover, we note a less statistical significant effect Linguistics, History and Philosophy, Natural Sciences and Engineering and Arts. For Education we note a less significant and positive effect. This means that graduates from Education have a higher incidence of field of study mismatch. We did not find this based on the previous definition of field of study mismatch. Finally, we find a less significant effect of the attained distinction with graduation. So, we can conclude that the results indeed differ if we define mismatch as the discrepancy between the acquired and required field of study.

Conclusion of the measuring section

Using SONAR data, we also find differences in incidence measured by the different methods. We find an incidence of field of study mismatch in the first job after leaving that lies between 15% and 40%. On the basis of at least one measure, we find that 63% has a horizontal mismatch and only 5% has a field of study mismatch based on every measure. The correlations between the different measures is also not quite strong and range from 19% to 80%. Further, we also tested whether the results of determinants of field of study mismatch would be affected by using various measures, different aggregation level for the fields of study and different definitions of mismatch. First of all we did not find any significant evidence for the social characteristics, only if we used another definition for field of study mismatch we find that men have a lower likelihood of field of study mismatch (cf. Table 1.8, JA column 2).

For educational level, we find similar results based on the four measures. However, if we use more categories to define field of study mismatch, we also find a significant positive effect of educational level on field of study mismatch (cf. Table 1.8, DWA column 1). This illustrates that the outcomes are sensitive to the way field of study mismatch has been measured. Further we also found clearly different results over the various measures if we measure the impact of different fields of study on field of study mismatch. Based on the JA and RM, we found that Behavioral and Social Sciences increases the likelihood of field of study mismatch (cf. Table 1.7). We noted similar effects if we use other definitions for field of study mismatch (cf. Table 1.8). If we measure mismatch based on the IWA, defining 'no particular field of study required' as match, we found a positive significant effect on field of study mismatch of Behavioral and Social Sciences (cf. Table 1.8, IWA column 2). This might be explained by the fact that another definition of mismatch indeed influence the results of field of study mismatch. However, for the other measures we do not find any significant evidence. For Natural Sciences and Engineering we noted a positive effect based on the JA and RM, but based on the other two measured we found an opposite effect. This also the case for Education. A possible explanation might be that the chosen aggregation level influences the results or it might be due to the technological change.

TABLE 1-7 THE PROBABILITY OF FIELD OF STUDY MISMATCH

	DWA	IWA		JA		RM	
		(1)	(2)	(1)	(2)	(1)	(2)
	Coeff.						
	(std.err.)						
<u>Personal characteristics</u>							
<i>Man</i>	-0.048	0.057	-0.040	0.031	-0.032	0.023	-0.015
	(0.060)	(0.054)	(0.054)	(0.055)	(0.063)	(0.052)	(0.057)
<i>Ethnicity</i>	0.198	-0.001	-0.018	0.077	0.005	-0.286	-0.149
	(0.280)	(0.260)	(0.247)	(0.269)	(0.327)	(0.244)	(0.275)
<i>Social background (diploma father)</i>							
<i>(Primary education Ref.)</i>							
Lower secondary education	0.039	-0.053	-0.102	0.232*	0.161	-0.165	-0.015
	(0.132)	(0.126)	(0.122)	(0.126)	(0.146)	(0.114)	(0.127)
Higher secondary education	-0.062	-0.109	-0.075	0.069	-0.011	-0.074	-0.008
	(0.124)	(0.117)	(0.114)	(0.118)	(0.138)	(0.106)	(0.118)
Tertiary education	-0.050	-0.082	-0.021	0.127	0.066	-0.010	-0.082
	(0.122)	(0.116)	(0.112)	(0.117)	(0.136)	(0.106)	(0.117)
Unknown	-0.150	0.143	0.126	0.158	0.185	0.008	0.139
	(0.167)	(0.153)	(0.148)	(0.151)	(0.171)	(0.138)	(0.151)
<u>Educational characteristics</u>							
<i>Educational level</i>							
Higher tertiary education	0.039	0.171**	0.132**	0.116	0.228***	0.531***	0.365***
	(0.072)	(0.065)	(0.065)	(0.067)	(0.081)	(0.064)	(0.068)
<i>Fields of study</i>							
<i>(Economics, Business, and Law Ref.)</i>							
Linguistics, History and Philosophy	0.320***	0.149	0.402***	0.982***	1.631***	0.149	2.570***
	(0.120)	(0.117)	(0.116)	(0.112)	(0.121)	(0.124)	(0.162)
Behavioral and Social sciences	0.117	0.060	0.131	0.531***	0.879***	-0.046	1.152***
	(0.088)	(0.084)	(0.084)	(0.084)	(0.095)	(0.081)	(0.085)

Health and (para)medicine	-0.615*** (0.106)	-0.431*** (0.081)	-0.510*** (0.083)	-0.284*** (0.094)	-0.124 (0.120)	-0.783*** (0.075)	0.175* (0.092)
Natural Sciences and Engineering	-0.021 (0.077)	-0.148** (0.071)	-0.340*** (0.071)	0.486*** (0.071)	0.313*** (0.090)	0.087 (0.069)	0.973*** (0.074)
Arts	0.289* (0.160)	0.547*** (0.173)	0.817*** (0.165)	0.786*** (0.150)	1.255*** (0.156)	0.423** (0.181)	1.746*** (0.162)
Education	-0.512*** (0.100)	-0.459*** (0.082)	-0.374*** (0.083)	0.149* (0.084)	0.725*** (0.095)	-0.510*** (0.073)	0.497*** (0.088)
<i>Academic performance</i>							
Graduating with a distinction grade	-0.217*** (0.059)	-0.195*** (0.053)	-0.221*** (0.053)	-0.140** (0.054)	-0.056 (0.063)	-0.136*** (0.050)	-0.105* (0.056)
Graduating with high or highest distinction grade	-0.343*** (0.107)	-0.222** (0.089)	-0.326*** (0.090)	-0.068 (0.090)	-0.113 (0.106)	-0.105 (0.086)	-0.073 (0.098)
Repeated Years	0.061 (0.049)	-0.058 (0.045)	-0.053 (0.045)	0.096** (0.046)	0.141*** (0.053)	-0.004 (0.045)	0.026 (0.049)
Constant	-0.661*** (0.387)	7.775*** (0.464)	6.401*** (0.391)	-0.533*** (0.355)	-1.292*** (0.414)	1.193*** (0.329)	-1.198*** (0.365)

Data source: SONAR 1976 (23, 23, 29), 1978 (23, 26), 1980 (23, 29), own calculations; number of individuals = 3317; (1) Category A; (2) category B

Control variables: cohort (2 dummies), having a child (1 dummy), cohabiting (1 dummy), year of observation, year of observation²

*p<0.10;**p<0.05;***p<0.01

TABLE 1-8 THE PROBABILITY OF FIELD OF STUDY MISMATCH (USING DIFFERENT DEFINITIONS)

	DWA	IWA		JA	
	Coeff. (std.err.)	(1) Coeff. (std.err.)	(2) Coeff. (std.err.)	(1) Coeff. (std.err.)	(2) Coeff. (std.err.)
Social characteristics					
Man	-0.013 (0.050)	0.064 (0.053)	-0.028 (0.059)	0.069 (0.051)	-0.180*** (0.057)
Ethnicity	-0.166 (0.253)	-0.186 (0.271)	-0.220 (0.300)	0.186 (0.249)	0.287 (0.262)
Social background (diploma father) <i>(Primary education Ref.)</i>					
Lower secondary education	-0.088 (0.111)	-0.028 (0.117)	-0.130 (0.125)	0.075 (0.112)	-0.109 (0.125)
Higher secondary education	-0.144 (0.103)	-0.113 (0.109)	-0.131 (0.117)	0.001 (0.104)	-0.152 (0.116)
Tertiary education	-0.143 (0.102)	-0.173 (0.108)	-0.200* (0.116)	0.039 (0.104)	-0.129 (0.114)
Unknown	-0.210 (0.135)	-0.050 (0.141)	-0.015 (0.150)	0.067 (0.137)	0.004 (0.149)
Educational characteristics					
Educational level					
Higher tertiary education	0.122** (0.061)	0.258*** (0.064)	0.216*** (0.073)	0.060 (0.061)	0.231*** (0.069)
Fields of study					
Linguistics, History and Philosophy	0.095 (0.109)	0.155 (0.116)	0.243** (0.123)	1.018*** (0.119)	1.729*** (0.121)
Behavioral and Social sciences	-0.080 (0.078)	0.043 (0.083)	0.269*** (0.091)	0.352*** (0.078)	0.923*** (0.085)
Health and (para)medicine	-0.797*** (0.079)	-0.128 (0.080)	-0.052 (0.089)	-0.698*** (0.081)	-0.071 (0.096)
Natural Sciences and Engineering	-0.180*** (0.065)	-0.046 (0.070)	-0.204** (0.081)	0.110* (0.065)	0.695*** (0.075)
Arts	-0.122 (0.148)	-0.369** (0.173)	0.141 (0.169)	0.367** (0.150)	1.377*** (0.154)
Education	-0.653*** (0.077)	-0.087 (0.082)	0.184** (0.089)	-0.360*** (0.076)	0.495*** (0.086)
Academic performance					
Graduating with a distinction grade	-0.144*** (0.049)	-0.072 (0.053)	-0.132** (0.058)	-0.156*** (0.050)	-0.073 (0.056)
Graduating with high or highest distinction grade	-0.348*** (0.107)	-0.053 (0.088)	-0.224** (0.101)	-0.189** (0.085)	0.044 (0.091)
Repeated Years	0.007 (0.043)	-0.062 (0.045)	-0.047 (0.050)	0.057 (0.043)	0.094** (0.048)
Constant	0.249*** (0.324)	4.108*** (0.336)	4.120*** (0.349)	-0.128 (0.324)	-1.092*** (0.364)

Data source: SONAR 1976 (23, 23, 29), 1978 (23, 26), 1980 (23, 29), own calculations; number of individuals = 3317; (1) Category A; (2) category B. Control variables: cohort (2 dummies), having a child (1 dummy), cohabiting (1 dummy), year of observation, year of observation². *p<0.10;**p<0.05;***p<0.01

DISCUSSION AND CONCLUSION

In this paper we investigated the measurement issues of field of study mismatch. We also examined whether the results were sensitive to the different measurement methods. We distinguish between three approaches: the worker self-assessment, job analysis and the realized matches. With the worker self-assessment approach, we differentiate between two measures: direct worker self-assessment and the indirect worker self-assessment. Until now, none of the studies used the IWA to measure field of study mismatch, we were able to measure field of study mismatch based on this measure.

The main conclusion that we can draw from the findings in the literature is that none of the used methods is more preferred than the other. There are good reasons to prefer the JA or the WA, probably the RM is less recommendable. For estimating the effect on wages, the JA measurement method would be preferred, however for the effect on job satisfaction a subjective measurement method would be preferred. This reason is that using a worker self-assessment measurement method for wages might be some subjectivity involved. For longitudinal research the JA measurement method would be a better method than one of the workers assessment methods, because this methods are sensitive to the subjectivity of individuals and will rather reflect a general feeling with their job. This may result in a lower incidence of horizontal mismatch. However, if the data would only provide a limited number of field of studies and broader occupations, it would also underestimate field of study mismatch. Our results support this assumption, we find lower incidence of field of study mismatch if we used a less detailed aggregation level, in that case the WA approach probably more preferred.

Another important conclusion that can be draw for our results is that results regarding field of study mismatch indeed differ if we use differed measurement approach. We found that the incidence differ depending on the categories that are taken into account to define field of study mismatch. Defining field of study mismatch narrow probably gives a better view of the real incidence of horizontal mismatch. Accounting the middle category 'to some extent match' as mismatch would be in some cases rather false, especially for individuals with a degree in a relatively broad field. One cannot argue that these individuals have a mismatch with all professions. Therefore, is it better to treat this group as an apart category. Also the determinants of field of study mismatch differ regarding the used approach. The results of the DWA and IWA are probably the most consistent with findings from previous studies. Yet, if we use another categorization, the results of IWA are less in line with previous research. Therefore, different categorizations can deliver different results, so it is important to justify the choice of categorization and be aware of possible differences because of other categorization by comparing with previous studies. We also have to interpret these results with caution because of error in the measurement of field of study mismatch. Thus, we recommend to use two measurement methods, the JA measurement method and a worker self-assessment approach, by instrumental variable techniques to correct for biases causes by random error.

Based on this study there still remain a few subjects open to evaluate. In our study we were only tended to focus on a measure of horizontal mismatch from the point of view of the employee. It would be also interesting if we also could rely on a measure from the point of view of the employer. Another interesting point is to investigate the distinction between field of study mismatch and skills mismatch and test whether skills mismatch may or may not imply horizontal mismatch. Another topic for further research might be to develop an alternative measurement method of field of study mismatch. Interesting is also to investigate the impact of the different approaches on job satisfaction and wages. A last topic for further research is the effect of the four approaches in longitudinal research.

REFERENCES

- Affichard, J. (1981), 'Quels emplois après l'école: la valeur des titres scolaires depuis 1973', *Economie et statistique*, 173, 7–26.
- Allen J. & De Weert E. (2007), 'What Do Educational Mismatches Tell Us About Skill Mismatches? A Cross-country Analysis', *European Journal of Education*, 42 (1), 59-73.
- Allen, J. & van der Velden, R. (2001), 'Educational mismatches versus skill mismatches: effects on wages, job satisfaction, and on-the-job search', *Oxford Economic Papers*, 5, 434–452.
- Arcidiacono, P. (2004), 'Ability sorting and the returns to college major', *Journal of Econometrics*, 121(1–2), 343–375.
- Béduwé, C., & Giret, J.-F. (2011), 'Mismatch of vocational graduates: What penalty on French labour market?', *Journal of Vocational Behavior*, 78, 68-79.
- Boudarbat, B. & Chernoff, V. (2012), 'Education–job match among recent Canadian university graduates', *Applied Economics Letters*, 19(18), 1923-1926.
- CBS, (2001), Standaard beroepenclassificatie 1992 - editie 2001.
- Di Pietro, G. & Urwin, P. (2006)? 'Education and skills mismatch in the Italian graduate labour market', *Applied Economics*, 38, 79-93.
- Domadenik, P., Farčnik, D. & Pastore, F. (2013), 'Horizontal Mismatch in the Labour Market of Graduates: The Role of Signalling', *IZA Working Paper*, No. 7527.
- Finnie, R., & Frenette, M. (2003), 'Earnings differences by major field of study: Evidence from three cohorts of recent Canadian graduates', *Economics of Education Review*, 22(2), 179–192.

- Fourcade, B., Ourliac, G., & Ourtau, M. (1992), 'Les groupes formation emploi GFE: une nomenclature pour l'analyse de la relation formation emploi dans les régions', *L'orientation scolaire et professionnelle*, 4, 383–410.
- Green, F., McIntosh, S., and Vignoles, A. (1999) *Overeducation and Skills. Clarifying the Concepts*, Center for Economic Performance, Discussion paper n. 435, September.
- Green, F., & McIntosh, S. (2007), 'Is there a genuine under-utilization of skills amongst the over-qualified?', *Applied Economics*, 39(4), 427-439.
- Groot, W. & Maassen van den Brink, H. (2000), 'Overeducation in the labor market: a meta-analysis', *Economics of Education Review*, 19(2), 149–158.
- Hartog, J. (2000), 'Overeducation and earnings: where are we, where should we go?', *Economics of Education Review*, 19, 131–147.
- Heijke, H., Meng, C. & Ris, C. (2003), 'Fitting to the job: the role of generic and vocational competencies in adjustment and performance', *Labour Economics*, 10 (2), 215-229.
- Katz-Gerro, T. & Yaish, M. (2003), 'Higher Education: is more better? Gender differences in Labour Market Returns to Tertiary Education in Israel', *Oxford Review of Education*, 29(4), 571-592.
- Kelly, E., O'Connell, P.J. & Smyth, E. (2010), 'The economic returns to field of study and competencies among higher education graduates in Ireland', *Economics of Education Review*, 29, 650-657.
- Kiker, B.F., Santos, M.C. & Mendes de Oliveira, M. (1997), 'Overeducation and undereducation: Evidence for Portugal', *Economics of Education Review*, 16(2), 111-125.
- Kim, H.K., Ahn, S.C & Kim, J. (2011), 'Vertical and Horizontal Education-Job Mismatches in the Korean Youth Labor Market: A Quantile Regression Approach', *Working Paper*.
- Klein, M. (2011), 'Higher education and non-pecuniary returns in Germany: tracing the mechanisms behind field of study effects at the start of the career', *Irish Educational Studies*, 30 (2), 253- 270.
- Kucel, A. & Vilalta-Bufi, M. (2010), 'Is there a wage penalty to horizontal and vertical mismatch?', *DEMOSOC Working Paper No. 34*.
- Kucel, A., Vilalta-Bufi, M. & Robert, P.(2011), Graduate Labor mismatch in Eastern Europe, Working Paper, *Col.lecció d'Economia E11/259*
- Little, B. & Arthur, L. (2010), 'Less time to study, less well prepared for work, yet satisfied with higher education: a UK perspective on links between higher education and the labour market', *Journal of Education and Work*, 23(3), 275- 296.

- Mavromaras, K., McGuinness, S., O’Leary, N., Sloane, P., & Wei, Z. (2013), ‘Job Mismatches and Labour Market Outcomes: Panel Evidence on Australian University Graduates’, *Economic Record*, 89, 382-395.
- McGuinness, S. (2003), ‘Overeducation as a sheepskin effect: Evidence from Northern Ireland’, *Applied Economics*, 35(5), 597–608.
- McGuinness, S. (2006), ‘Overeducation in the labour market’, *Journal of Economic Surveys*, 20, 387–418.
- Nieto, S., Matano, A. & Ramos, R. (2015), ‘Educational mismatches in the EU: Immigrants vs. Natives’, *International Journal of Manpower*, 36 (4), 540-561.
- Nordin, M., Persson, I., & Rooth, D.O., (2010), ‘Education-occupation mismatch: Is there an income penalty?’, *Economics of Education Review*, 29(6), 1047-1059.
- O’Leary, N. C., & Sloane, P. J. (2005), ‘The returns to a university education in Great Britain’, *National Institute Economic Review*, 193(1), 75–89.
- Ramos, M (2014), ‘Mismatched mismatch measures. Does the definition of over-and underqualification matter?’, Working paper.
- Robst, J. (2007a), ‘Education and job match: the relatedness of college major and work’, *Economics of Education Review*, 26, 397-407.
- Robst, J. (2007b), ‘Education, College Major, and Job match: Gender Differences in Reasons for Mismatch’, *Education Economics*, 15, 159-175.
- Robst, J. (2008), ‘Overeducation and college major: expanding the definition of mismatch between schooling and jobs’, *The Manchester School*, 76, 349-368.
- Rumberger, R. (1987), ‘The impact of surplus schooling on productivity and earnings’, *Journal of Human Resources*, 22 (1), 24-50.
- Solga, H. & Konietzka, D. (1999), ‘Occupational Matching and Social Stratification’, *European Sociological Review*, 15 (1), 25-47.
- SONAR (2003), ‘Hoe maken Vlaamse jongeren de overgang van school naar werk?’, basisrapportering cohorte 1978 (eerste golf), 147p.
- SONAR (2004), ‘Hoe maken Vlaamse jongeren de overgang van school naar werk?’, basisrapportering cohorte 1976 (tweede golf), 116p.
- SONAR (2005), ‘Hoe maken Vlaamse jongeren de overgang van school naar werk?’, technisch rapport cohorte 1980 (eerste golf)? 181p.-.

- Støren, L. A., & Arnesen, C. A. (2007), 'Winners and Losers' in *The Flexible Professional in the Knowledge Society: General Results of the REFLEX Project*, The Netherlands: Research Centre for Education and the Labour Market, University of Maastricht.
- Verdugo, R. & Verdugo, N. (1989), 'The impact of Surplus Schooling on Earnings', *Journal of Human Resources*, 24 (4), 629-642.
- Verhaest, D., Sellami, S. & Van der Velden, R. (2015), 'Differences in horizontal and vertical mismatches across countries and fields of study', *International Labour Review*, forthcoming.
- Verhaest, D., Van Trier, W., & Sellami, S. (2011), 'Welke factoren bepalen de aansluiting van onderwijs en beroep? Een onderzoek bij Vlaamse afgestudeerden uit het hoger onderwijs', *Tijdschrift voor Arbeidsvraagstukken*, 27, 416-436.
- Verhaest, D., Omeij, E. (2006a), 'Measuring the incidence of over- and undereducation', *Quality & Quantity*, 40 (5), 783-803.
- Verhaest, D., & Omeij, E. (2006b). Discriminating between alternative measures of over-education. *Applied economics*, 38(18), 2113-2120.
- Witte, J. C. & Kalleberg, A. L. (1995), 'Matching Education and Jobs: The Fit Between Vocational Education and Employment in the German Labour Market', *European Sociological Review*, 11, 293-317.
- Wolbers, M. (2003), 'Job mismatches and their labour market effects among school-leavers in Europe', *European Sociological Review*, 19, 249-266.
- Walker, I., & Zhu, Y. (2003), 'Education, earnings and productivity: Recent UK evidence', *Labour Market Trends*, 111(3), 145-152.
- Zhu, Y. (2014), 'The impact of major-job mismatch on college graduates' early career earnings: evidence from China', *Education Economics*, 22 (5), 511-528.

A P P E N D I X

TABLE A CONVERSION TABLE

In this appendix we include the conversion table in which all fields-of-study are assigned to the most appropriate professional discipline. We have to mention that some fields of study may match certain teacher occupations. However, for some specific cases there is only a match when the individual also have graduate teaching diploma. These cases are assigned with (**) in the conversion table.

<i>Educational level</i>	<i>Field- of-study</i>	<i>Match with occupa- tional code</i>	<i>To some extent match with occupational code</i>
ASO	<u>General study areas without focus or combined focus:</u> 1e grade and 2e grade General Modern languages, modern languages, modern languages – wp sport – mathematics, mathematics, Latin, Greek, sciences steinder pedagogy, Latin-sciences	011, 012	023, 021
	<u>General study areas with focus on secondary education:</u> Greek, Latin, Greek-Latin, Greek-modern languages, Latin-modern languages	011, 012	151, 152,153, 023, 021
	<u>General study areas with focus on Sciences:</u> Sciences, Science – Mathematics, especially sciences formation, sport sciences	011, 012	051, 023, 021
	<u>General study areas with focus on economy:</u> Economy, economy & mathematics, modern languages, economy & sports, economy & sciences	011, 012	111, 112, 113, 115, 116,117, 118, 121, 023, 021
	<u>General study areas with focus on Humanities and Social Sciences:</u> Humanities and social sciences	011, 012	161, 163, 164, 023, 021
	<u>General study areas with focus on religion</u>	011, 012	162
	<u>General study areas with focus on art (general education)</u>	011, 012	154, 161
	<u>General study areas with focus on art:</u> Ballet, dance, artistic formation	011, 012, 154	
	<u>General study areas with focus on sport</u>	011, 012	
	BSO	<u>Car:</u> Electro-mechanics (all ed. auto body & truck driver)	065
<u>Car:</u> Bodywork (bodywork (3the degree), bodywork & paint (7th bso)		064	065, 067, 061, 026
<u>Car:</u> truck driver		082	065, 027, 061

	<u>Construction:</u> General	062	063, 061, ,026
	<u>Construction:</u> Machinist (construction, broker (3the BSO), Paver (7th bso)	062, 063	065, 061, 026
	<u>Decorative techniques:</u> Retail, advertising and illustration, advertising chart	154	116, 068, 061, 026
	<u>Decorative techniques:</u> Set and exhibition booths, pilot	154	121, 151
	<u>Graphic communication and media:</u> Company chart formatting, printing, graphics systems	068	154, 061, 026
	<u>Trade:</u> Office, sales, store management and shop window, Office Administration and data management, sales and representation	115, 116, 117,111	118, 031
	<u>Hostesses Education</u>	116	111
	<u>Wood</u>	062	061, 026
	<u>Jewelry</u>	064	154, 061
	<u>Cooling:</u> Central and sanitary installations, heating equipment, cooling equipment, plumber	062, 065	064, 066, 067, 061, 026
	<u>Agriculture and horticulture</u>	041, 042, 043, 044	024
	<u>Body Care (hairdresser)</u>	172	171, 035
	<u>Maritime education (ship and port work)</u>	083	064, 065, 082, 081, 027
	<u>Mechanics-electricity:</u> Computer-controlled machine tools, electrical installations, industrial maintenance, industrial electricity, processing, machine tools, industrial techniques	065, 066, 067	064, 071, 061, 026, 025
	<u>Mechanics-electricity:</u> Photo-construction welding, welding, pipefitting, metal-welding-assembling (operation), metal and plastic joinery	064	065, 062, 061, 026
	<u>Fashion:</u> Clothing-sales-retouches, fashion realization and-sale	117, 072, 154	026, 111, 061
	<u>Musical Instrument Construction</u>	061	026
	<u>People Care:</u> Care, -nutrition, childcare assistance, organizational, family and industry techniques, customer care	172	092, 095, 091, 035, 171
	<u>Textile</u>	071, 072	061, 026
	<u>Nutrition:</u> Baker, butcher (process)	071	061, 026
	<u>Nutrition:</u> Hotel	115	172, 171, 111, 035, 031
	<u>Nutrition:</u> Restaurant and kitchen	172	171, 035
4 th grade BSO	<u>Clothing, Fashion Design</u>	072, 154	117, 026, 061, 151
	<u>Plastic arts</u>	154	151, 033
	<u>Psychiatric nursing, hospital nursing</u>	092	095, 172, 091, 028
TSO	<u>Car:</u> car techniques	065	064, 061, 026
	<u>Construction:</u> construction and wood	062	063, 061, 026
	<u>Chemistry:</u> pharmacy assistant	093	051, 091, 028

<u>Chemistry:</u> chemical process techniques, engineering-science	051, 071	025, 026
<u>Photography</u>	068	154, 061, 026
<u>Glass Techniques</u>	064	154, 061, 026
<u>Graphic communication and media</u>	068	154, 061, 026
<u>Trade:</u> computers	114, 115	116, 117, 111, 031
<u>Trade:</u> trade (languages), sales & distribution, real estate management, commercial communications	115, 116, 117	118, 111, 031
<u>Trade:</u> computer science (management), commercial Web traffic	114	111, 031
<u>Trade:</u> medico-social administration	094	115, 111, 091, 031
<u>Trade:</u> liberal professions, administration, SME administration Secretariat	115	116, 117, 111, 031
<u>Trade:</u> transport and goods shipment	084	115, 111, 027
<u>Wood (interior decoration)</u>	062	061, 026
<u>Cooling and heat</u>	062, 065	064, 061, 026
<u>Agriculture and horticulture</u>	041, 042, 043, 044	024
<u>Agriculture and horticulture:</u> biotechnology	043, 051	041, 042, 044, 024, 026
<u>Body care, beauty</u>	172	171, 035
<u>Maritime education (deck, engines)</u>	082, 083	064, 065, 081, 027
<u>Mechanics-electricity:</u> computer-controlled mechanical production engineering, electrical engineering, Electr (on) IC installation techniques, electro-mechanics, electrical techniques, industrial maintenance techniques, industrial Sciences, techniques, mechanics, construction and planning techniques, mechanical (design) techniques, steering and security technologies, control techniques	065, 066, 067	064, 071, 061, 026, 025
<u>Mechanics-electricity:</u> industrial ICT, industrial computing	066, 067	114, 061, 026
<u>Aircraft mechanics-electricity:</u> techniques	065, 083	066, 067, 061, 026
<u>Fashion (CAD-confection):</u> Creation and fashion, Creation and pattern designs	072	117, 154, 026, 061
<u>Optics</u>	064, 093	061, 091
<u>Orthopedic techniques</u>	093	028, 091
<u>People Care:</u> social and technical sciences, youth care, boarding school , nurses	172	163, 092, 095, 171, 035, 091
<u>Dental Techniques</u>	093	028, 091
<u>Textile</u>	071, 072	026
<u>Military education</u>	142	131, 025
<u>Tourism:</u> reception & PR; Tourism (and recreation/and organization)	115, 116	111, 031
<u>Nutrition:</u> bakery and butcher/(process)	071	026
<u>Nutrition:</u> hotel and hotel management	115, 173	116, 172, 111, 031, 035, 171

Higher education (first cycle)	<u>Architecture:</u> architect-assistance, interior design	062	061, 026
	<u>Audiovisual and Visual Arts:</u> audiovisual technology, image-sound-installation, photography, cinematography	067, 068, 154, 164	061, 026, 185
	<u>Audiovisual and Visual Arts:</u> Plastic arts	154	033, 192, 151
	<u>Biotechnology:</u> agriculture and biotechnology	051, 071, 042, 043	041, 044, 024, 026, 183, 134
	<u>Biotechnology:</u> landscape and garden architecture	042	041, 043, 044, 024, 026, 183
	<u>Health:</u> (bio) medical laboratory technology, pharmaceutical and biological techniques, laboratory and food technology	093, 051	071, 092, 026, 187, 134, 091
	<u>Health:</u> Physiotherapy	092	093, 028, 091
	<u>Health:</u> Ergo therapy	092	093, 028, 091
	<u>Health:</u> Speech therapy and Audiology	092	093, 028, 091
	<u>Health:</u> Optics, orthopedics	093	092, 028, 091, 187
	<u>Health:</u> Nursing, midwife	092, 093	028, 172, 095, 094, 091, 194, 136
	<u>Health:</u> Nutrition and Dietetics	095, 172	093, 051, 028, 187, 136, 091
	<u>Business:</u> environmental administration, secretarial, management engineer	115	116, 117, 111, 132, 031, 183, 188, 134
	<u>Business:</u> Accountancy-taxation	115, 132	112, 113, 116, 117, 118, 121, 111, 031, 188, 137
	<u>Business:</u> business management	116, 113, 194	112, 115, 117, 118, 121, 136, 188, 031, 137
	<u>Commercial sciences and business administration:</u> marketing	116, 194	112, 113, 115, 116, 117, 118, 121, 111, 031, 188, 137
	<u>Business:</u> Finance and insurance	112, 121, 115, 116	113, 118, 117, 031, 111, 132, 188,
	<u>Business:</u> Real Estate	116	026, 031, 188, 111
	<u>Business:</u> Tourism	116	115, 111, 031, 188, 194
	<u>Business:</u> Business communication, communication management, press and communication, public relations (PR and communication management)	116, 164	115, 117, 111, 031, 188, 194, 137
<u>Business:</u> expedition, distribution and transport	084, 113	115, 116, 117, 122, 111, 186, 031, 027, 188	

<u>Business:</u> hotel management	173, 194	115 (reception), 172, 116, 111, 171, 031, 188
<u>Business:</u> information management and support, applied Informatics	114	113, 066, 111, 031, 026, 185, 188, 137
<u>Business:</u> medical secretariat	094	115, 031, 188, 136, 111
<u>Business:</u> legal practice	137, 132, 115	116, 113, 131, 031, 188, 191, 137, 111
<u>Business:</u> business translation and interpreting	152, 115	111, 033, 192
<u>Industrial Sciences and technology:</u> car mechanics	065	064, 066, 067, 061, 026, 185
<u>Industrial Sciences and technology:</u> construction, wood	062, 063	061, 026, 185, 135
<u>Industrial Sciences and technology:</u> (bio) chemistry, biotechnology	051, 071	093, 061, 183, 026, 185, 135
<u>Industrial Sciences and technology:</u> confection, textile	072	065, 067, 066, 071, 061, 026, 185
<u>Industrial Sciences and technology:</u> Electricity, electronics, electro mechanics, mechanics, control engineering, air conditioning, maintenance techniques	065, 066, 067	064, 071, 061, 026, 185, 135
<u>Industrial Sciences and technology:</u> facility management, facility services	113, 173	061, 031, 188, 137
<u>Industrial Sciences and technology:</u> printing companies	068	154, 061, 026, 185, 135
<u>Industrial Sciences and technology:</u> logistics technology	083, 084, 113, 121	082, 115, 081, 026, 027, 185, 186, 132
<u>Industrial Sciences and technology:</u> aviation	065, 082, 083	066, 067, 081, 027, 185, 132
<u>Industrial Sciences and technology:</u> environmental management	042, 043	041, 044, 051, 024, 183, 134
<u>Industrial Sciences and technology:</u> multimedia and communication technology	066, 068, 114	061, 026, 186
<u>Education:</u> kinder garden and primary education	021, 023	172, 024, 025, 026, 027, 028, 031, 032, 033, 034, 035, 022, 182
<u>Education:</u> Regency (General courses)	021, 023, 025, 031, 033, 034	024, 026, 027, 028, 032, 035, 022, 182, 133
<u>Education:</u> physical education	021, 034	023, 024, 025, 026, 027, 028, 031, 032, 033, 035, 022, 182, 132

	Education: musical, plastic education	021, 033	023, 024, 025, 026, 027, 028, 031, 032, 034, 035,022, 182
	Education: Regency technical courses or the business courses	021, 026, 031, 035	023, 024, 025, 027, 028, 032, 033, 034, 022, 182, 132
	Social work: Assistant in psychology	161, 165, 165, 163	034,193, 182
	Social work: social worker, social counseling, social (cultural) worker	161, 163	165, 172,182, 034, 022, 193
	Social work: Orthopedagogy, educator	022, 161, 163	172, 023, 034, 183, 193, 133
	Social work: personnel management, Union work	161, 163	165, 034, 193
	Nautical Sciences: marine engineering, ship mechanics	083, 065,186	082, 066, 067, 061, 026, 186, 135
Higher education (second cycle)	Architecture, interior architecture	062, 026(**), 021(**)	026,061, 023(**)
	Audiovisual and Visual Arts: audiovisual art, film, photography	154, 164, 026(**), 033 (**),021(**)	067, 068, 026, 033 ,151, 023(**),185
	Audiovisual and Visual Arts: Graphics, graphics (and advertising) design, illustrative design, fine arts, liberal arts, painting, 3d design, mixed media, plastic arts, ceramics	154, 068, 033 (*), 021(**)	033 ,151, 061,023(**),192
	Fashion designs	154, 033(**), 021(**)	033, 072, 023(**),185, 061
	Conservation and restoration	154	062, 151
	Health: Rehabilitation Sciences and physiotherapy	092, 028 (**), 021(**)	028, 093, 091, 023(**)
	Business: business engineering	121, 111-116, 118, 188, 031(**), 021(**)	031, 137, 132, 117, 023(**), 186, 185, 137
	Business: public administration	111-113, 115, 116, 118, 188, 031(**), 021(**)	031, 163, 132, 114, 117, 121, 137,023(**), 137
	Business: public administration	191, 137, 132, 032(**), 021(**)	113, 032, 023(**), 188, 111
	Industrial Sciences and technology: industrial engineer (General, electrical, ICT, mechanics, chemistry, construction)	062, 063, 064, 065, 066, 067, 071, 072, 025 (**), 026 (**), 021(**)	025, 026, 121, 051, 023(**), 185, 135, 061
	Industrial Sciences and technology: industrial engineer agriculture, environmental studies	042, 043, 071, 025 (**), 026 (**), 021(**)	025, 026, 062, 063, 065, 072, 051,183, 023(**), 184, 185, 134, 135, 061

	<u>Industrial Sciences and technology:</u> industrial engineer textiles technology	072, 025 (**), 026 (**), 021(**)	025, 026, 051, 065, 071, 066, 067, 023(**),185, 135, 061
	<u>Industrial Sciences and technology:</u> industrial engineer informatics	066, 067, 114, 025 (**), 026 (**), 021(**)	025, 026, 051, 023(**),185, 135, 061
	<u>Music and performing arts:</u> Dramatic art and drama	154, 033 (**), 021(**)	033, 023(**), 151
	<u>Music and performing arts:</u> Music and instrument	154, 033 (**), 021(**)	033, 023(**), 151
	<u>Product Development</u>	061, 072, 026 (**), 021(**)	026, 064, 065, 066, 067, 068, 023(**), 185, 135, 061
	<u>Applied language studies:</u> journalism	164, 033 (**), 021(**)	033, 116, 152, 151, 023(**), 192
	<u>Applied linguistics:</u> translator, interpreter	152, 033 (**), 021(**)	033 ,151, 023(**), 192
University	<u>Kinesiology and Rehabilitation Sciences:</u> Physical education	034 (**), 092,021 (**)	093, 138, 091
	<u>Kinesiology and Rehabilitation Sciences:</u> Physiotherapy	092, 021, 028 (**)	093, 091, 028
	<u>Biomedical Sciences</u>	093, 028 (**), 021(**), 025 (**)	051, 023(**), 025, 028, 092, 187, 136, 134, 091
	<u>Biomedical Sciences:</u> nutrition and dietetics	095, 035(**), 172, 021 (**)	035, 051, 023, 093, 023(**), 187, 136, 091
	Pharmaceutical Sciences	093, 028(**), 025 (**), 021 (**)	051, 023(**), 025, 028, 094, 187, 091
	<u>Medicine</u>	092, 021 (**), 028 (**)	094, 187, 093, 028, 091, 023 (**), 194, 136
	<u>Social Health Sciences:</u> Speech therapy and Audiology	092, 021(**), 028 (**)	028, 093, 091, 023 (**)
	<u>Dentistry</u>	092, 021(**), 028 (**)	028, 093, 091, 023 (**), 187
	<u>Veterinary Medicine</u>	092, 028 (**),021 (**)	028, 093, 091, 023 (**), 187, 136
	<u>Medical-social sciences</u>	092, 095, 028 (**),021 (**)	028, 187, 091,023 (**), 136
	<u>Sciences:</u> Biology, biochemistry & biotechnology	051, 071, 093, 025 (**), 021 (**)	042, 043, 025, 023 (**), 183, 134, 041
	<u>Applied biological sciences:</u> Bio-engineer	042, 043, 093, 071, 025 (**),021 (**)	025, 092, 051, 044, 023 (**), 183, 134, 041

<u>Applied sciences:</u> Civil engineer	062, 063, 064, 065, 066, 067, 071, 072, 026(**), 025 (**),021 (**)	025, 026), 114, 121, 051, 061 023 (**), 185, 186, 135, 137, 138
<u>Sciences:</u> Geography	043, 051, 063, 034(**), 025 (**), 021 (**)	165 (human geography), 025, 034, 023 (**), 183, 134, 041
<u>Sciences:</u> Geology	043, 051, 063, 025 (**), 021 (**), 034 (**)	072, 025, 034,023 (**), 183, 134, 041
<u>Sciences:</u> Physics	051, 072, 021(**), 025(**)	025, 062-067, 071, 121,135, 023 (**), 184, 061
<u>Sciences:</u> Chemistry	051, 071, 025 (**)	093, 028, 025, 023(**), 042, 184
<u>Sciences:</u> Computer science (applied)	114, 066, 067, 021 (**), 025 (**),026 (**), 031 (**)	025, 026, 031, 113, 023 (**), 188, 137, 111
<u>Sciences:</u> Mathematics	051, 116, 121, 072, 021(**), 025 (**)	025, 066, 114, 115, 135, 023 (**), 184
<u>Economics and applied economic sciences:</u> Business Engineering	111-116, 118, 121, 188,185, 025 (**), 026 (**), 021 (**), 031 (**)	025, 026, 031, 132, 137, 117, 023 (**), 186, 191, 181,
<u>Psychology and educational sciences:</u> Educational Sciences	023 (**),021 (**), 022,	163, 165, 034 (**), 172, 021, 023, 182, 193, 133, 161
<u>Psychology and educational sciences:</u> Psychology	165, 034, 021 (**)	163, 034, 022, 023 (**), 193, 138, 161
<u>Psychology and educational sciences:</u> Agogic sciences	165, 022 (**), 021(**), 034 (**), 023 (**)	163, 164, 034, 022, 021, 023, 193, 133, 161
<u>Law, notarial law and Criminology:</u> Law	132, 021, (**), 032 (**)	032, 142, 023 (**), 191, 131
<u>Law, notarial law and Criminology:</u> Notarial Law	132, 021(**), 032 (**)	032, 023 (**), 191, 131
<u>Law, notarial law and Criminology:</u> Criminology	132, 021(**), 032 (**)	032, 163, 165, 023 (**), 191
<u>Political and social sciences:</u> Social and political sciences, sociology, political science,	165, 021 (**), 034 (**)	163, 164, 034,022 (**), 161, 023 (**), 193, 138

	<u>Political and social sciences:</u> Communication Sciences	116, 164, 165, 034(**), 021(**)	034, 023 (**), 192, 186, 161, 163
	<u>Language and literature</u>	151, 152, 153, 021 (**), 033 (**)	033 164, 023(**), 154, 192
	<u>Philosophy and ethics</u>	152, 033 (**), 021 (**)	033, 162, 023 (**), 192, 138, 151
	<u>Theology, religious studies, Canon law</u>	162, 033(**), 021 (**)	033, 152, 161, 023 (**)
	<u>Business Economics</u>	111-113, 115, 116, 118, 188, 021 (**), 031 (**)	114, 117, 031, 132, 137, 023 (**), 181, 191
	<u>Economic Sciences</u>	111-112, 116, 137, 021(**), 031 (**), 188	113, 115, 118, 121, 165 023 (**), 031, 181
	<u>Archaeology and arts</u>	151, 152, 153, 154, 033(**), 021 (**)	033, 023 (**), 192, 138
	<u>History</u>	151, 152, 153, 021(**), 033(**)	033, 023 (**), 192, 138
Others	<u>Military education</u>	142, 191	026
	<u>Police and gendarmerie education</u>	142, 191	026
	<u>Steward (ess)</u>	085	
	<u>Pilot</u>	082, 186	
BUSO	<u>Clothing, care, nutrition, family and teacher</u>	072, 172	026, 035, 034
	<u>Wood, construction, metal, electricity</u>	062, 064, 066, 067	026
	<u>Accounting, sales, insurance</u>	115, 116, 117	031
	<u>Textile and leather working</u>	072	026
	<u>Agriculture and horticulture</u>	041, 042, 043, 044	024

TABLE B INCIDENCE OF HORIZONTAL MISMATCH FOR SOME SOCIAL CATEGORIES

	DWA	IWA	JA	RM
Gender				
Men	16.7%	44.1%	27.2%	32.5%
Women	15.2%	47.1%	22.7%	28.3%
Chi ²	1.3	3.1	9.1***	6.8**
Educational level				
Lower tertiary	13.6%	45.5%	19.5%	19.5%
Higher tertiary	19.2%	46.5%	32.3%	45.9%
Chi ²	19.3***	0.3	69.4***	267.1***
Fields of study				
Linguistics, History and Philosophy	26.9%	60.4%	53.8%	94.0%
Economics, Business, and Law	18.3%	49.2%	17.1%	11.3%
Behavioral sciences	21.9%	53.0%	34.0%	48.3%
Health and (para)medicine	6.0%	39.1%	10.3%	14.0%
Natural sciences and engineering	16.9%	38.4%	33.1%	43.0%
Arts	28.4%	74.1%	46.9%	75.3%
Education	7.7%	40.4%	19.1%	19.3%
Chi ²	100.0***	84.4***	242.0***	806.3***

CHAPTER 2

AANSLUITING VAN ONDERWIJS EN BEROEP BIJ VLAAMSE AFGESTUDEERDEN UIT HET HOGER ONDERWIJS ¹¹

EEN ONDERZOEK NAAR DETERMINANTEN EN EFFECTEN¹²

Dieter Verhaest, Walter Van Trier and Sana Sellami

ABSTRACT

The literature on mismatch considers the so-called ‘overeducated’ mostly as a homogeneous category and does not consider the match between subject and job content. In this article we distinguish between the overeducated with a horizontal match and those without a horizontal match. Our starting hypothesis is that being overeducated without realizing a horizontal match is especially problematic. Our results, based on data for higher education graduates in Flanders, are consistent with this. We find that the negative effect of being overeducated is stronger for youngsters without a horizontal match. We also find that both types of overeducation are connected to different mechanisms. The regional unemployment rate, for instance, mainly explains overeducation with horizontal match. Both types of overeducation, even if not in the same way, are also influenced by the quality of human capital as well as the subject of study.

Keywords: overeducation, horizontal mismatch, school-leavers

¹¹ Verhaest, D., Van Trier, W., & Sellami, S. (2011). Welke factoren bepalen de aansluiting van onderwijs en beroep? Een onderzoek bij Vlaamse afgestudeerden uit het hoger onderwijs. *Tijdschrift voor Arbeidsvraagstukken*, 27(4), 415-435.

¹² Wij bedanken de anonieme reviewers en Didier Fouarge voor hun opmerkingen en suggesties bij vorige versies van deze tekst.

INLEIDING

In de loop van de voorbije decennia werd uitgebreid onderzoek verricht naar de mate waarin de onderwijscertificaten waarover jongeren in de initiële fase van hun arbeidsloopbaan beschikken, aansluiten bij de baan die ze uitvoeren. De aandacht ging hierbij vooral naar de relatie tussen het verworven en het voor een adequate uitvoering van de baan vereiste onderwijsniveau. Uit dit onderzoek blijkt dat in heel wat landen een substantieel gedeelte van de jongeren hun loopbaan begint als ‘overgeschoolde’ (Battu *et al.*, 1999; Verhaest & Omey, 2010; Verhaest & van der Velden, 2013). Dit is in meerdere opzichten problematisch. Uit onderzoeksresultaten blijkt immers dat overscholing gepaard gaat met een lagere verloning (Hartog, 2000) en met een lagere arbeidstevredenheid (Verhaest & Omey, 2009). Het is ook problematisch omdat deze situatie van overscholing in sommige landen voor een relatief grote groep jongeren langere tijd blijft duren, soms jarenlang (Verhaest, Schatteman & Van Trier, 2014). Bovendien blijkt de kans op overscholing groter te zijn voor sommige groepen van schoolverlaters dan voor andere (zie, bijvoorbeeld, Verhaest & Omey, 2010). In de empirische literatuur stelt men voor een groot aantal kenmerken een correlatie vast met het risico dat jongeren lopen op overscholing. Deze kenmerken beslaan een breed gamma en gaan van toegeschreven kenmerken, zoals gender en sociale achtergrond, via karakteristieken van de onderwijsloopbaan tot de situatie op de lokale arbeidsmarkt.

Afgezien van enkele schaarse uitzonderingen (o.a. Chevalier, 2003; Verhaest & Omey, 2006; Green & Zhu, 2010) beschouwt deze literatuur ‘overgeschoolden’ als een homogene categorie. Dit uitgangspunt is echter niet evident. Ook ‘overgeschoolden’ kunnen immers in cruciale opzichten van elkaar verschillen. Sommige schoolverlaters komen terecht in een baan die weliswaar minder scholing vereist dan zij verwierven, maar die inhoudelijk wel aansluit bij de gevolgde studierichting. Zij zijn ‘enkel overgeschoold’. Andere schoolverlaters komen terecht in een baan waarvoor ze overgeschoold zijn, maar die bovendien ook inhoudelijk niet overeenstemt met de gevolgde studies. In dat geval is er ‘geen aansluiting’.

Het lijkt aannemelijk dat deze verschillende vormen van aansluiting vanuit het oogpunt van succes bij de overgang van school naar werk niet allemaal (even) problematisch zijn. Zoals de theorie van de carrièremobiliteit (Sicherman & Galor, 1990) suggereert, kan starten in een job waarvoor men enkel overgeschoold is zelfs heilzaam zijn. Zo verwerft men de nodige praktijkervaring, die toelaat om later door te groeien naar een functie die overeenkomt met het behaalde opleidingsniveau. Mogelijk duidt deze vorm van overscholing voor sommige schoolverlaters ook op een gebrekkige kwaliteit van het menselijk kapitaal. Ze zijn, zoals Chevalier (2003) het stelt, slechts schijnbaar overgeschoold. Hoewel men een gebrekkige kwaliteit van het menselijk kapitaal op zich wel als problematisch kan beschouwen, stelt er zich vanuit het aansluitingsperspectief niet echt een probleem. Overscholing zonder inhoudelijke aansluiting daarentegen lijkt onder alle omstandigheden te wijzen op een problematische aansluiting. Verder beperkt deze vorm van overscholing wellicht aanzienlijk de kansen op

doorstroom naar een adequate job. De these dat overscholing zonder inhoudelijke aansluiting problematischer is, wordt bevestigd door de resultaten van Robst (2008), die vond dat overscholing sterkere negatieve effecten heeft op het loon indien er geen inhoudelijke aansluiting is tussen beroep en richting. Béduwé en Giret (2011) vonden geen verschil tussen beide vormen van aansluiting voor het loon, maar wel een lagere arbeidstevredenheid in het geval van overscholing zonder inhoudelijke aansluiting.

Indien overscholing inderdaad vooral problematisch is zonder inhoudelijke aansluiting dan is het ook van belang om na te gaan welke mechanismen beïnvloeden wie in deze categorie terecht komt. Wordt de ongelijkheid omwille van verschillen in kansen op overscholing tussen groepen van schoolverlaters verder versterkt door een grotere kans om tevens terecht te komen in een baan zonder inhoudelijke aansluiting? Meer recent neemt men een toenemende aandacht waar voor onderzoek naar de determinanten van de inhoudelijke aansluiting. Het aantal studies blijft echter relatief beperkt (Wolbers, 2003; Robst, 2007b en 2008; Humblet, 2007). Bovendien zijn er nauwelijks studies die expliciet onderzoeken welke mechanismen een combinatie van overscholing en inhoudelijke mismatch kunnen verklaren. Tot slot is aanvullende evidentie nodig omtrent het gecombineerde effect van overscholing en inhoudelijke aansluiting.

In deze studie onderzoeken we daarom eerst of overscholing ook voor Vlaamse hoger opgeleide jongeren in hun eerste baan grotere negatieve effecten teweeg brengt in combinatie met een gebrekkige inhoudelijke aansluiting. Als resultaatsindicatoren gebruiken we lonen en arbeidstevredenheid. Verder bestuderen we de determinanten van de aansluitingsvorm. De aansluitingsvorm beschouwen we uitdrukkelijk als gekenmerkt door een combinatie van niveau en richting. We operationaliseren dit door een onderscheid te maken tussen ‘overscholing met inhoudelijke aansluiting’, en ‘overscholing zonder inhoudelijke aansluiting’. Meer specifiek gaan we na in welke mate verschillen in menselijk kapitaal, studiedomein, werkervaring en regionale arbeidsmarktcondities eventueel een invloed uitoefenen op wie welke vorm van aansluiting ervaart. Als empirisch materiaal gebruiken we de SONAR-gegevensbank. Deze gegevensbank is het resultaat van een grootschalige representatieve bevraging van meerdere geboortecohorten van Vlaamse jongeren over de overgang van onderwijs naar arbeidsmarkt.

In de volgende sectie gaan we uitvoeriger in op de literatuur en formuleren we enkele hypothesen. Vervolgens komen de gebruikte data en de gebruikte analysemethode aan bod. Daarna bespreken we onze schattingsresultaten. We eindigen het artikel met een discussie en enkele algemene conclusies.

HYPOTHESEN

De centrale stelling in dit artikel is dat de aansluiting tussen onderwijs en arbeidsmarkt voor schoolverlaters vooral problematisch is als overscholing gepaard gaat met tewerkstelling buiten het domein van de gevolgde studierichting. Bijgevolg kunnen we verwachten dat deze combinatie leidt tot sterkere negatieve effecten op uitkomstvariabelen, zoals lonen en arbeidstevredenheid. Hoewel deze stelling bevestiging lijkt te vinden in de literatuur, blijft het aantal studies op dit terrein nog erg beperkt. Daarom focust onze eerste hypothese op deze effecten. We onderscheiden hierbij een zwakke en een sterke versie. In de zwakke versie gaat het om een zogenaamd gecumuleerd effect. Lonen en tevredenheid zijn het laagst in het geval van overscholing zonder inhoudelijke aansluiting omdat het effect van elke vorm van mismatch op zich negatief is. In de sterke versie is er sprake van een bijkomend interactie-effect. De specifieke combinatie van beide vormen van mismatch veroorzaakt in dat geval een extra negatief effect.

Hypothese 1a: Het negatieve effect van mismatch op lonen en tevredenheid is het sterkst bij overscholing zonder inhoudelijke aansluiting

Hypothese 1b: Een gebrekkige aansluiting met de gevolgde studierichting versterkt het negatieve effect van overscholing op lonen en tevredenheid (negatieve interactie-effect tussen overscholing en lonen)

Indien deze hypothesen correct zijn dan is het vanuit een ongelijkheidsperspectief belangrijk om te weten welke schoolverlaters de grootste kans hebben om in deze vorm van aansluiting terecht te komen. Onze argumentatie waarom overscholing met inhoudelijke aansluiting minder problematisch is, licht al een tip van de sluier en focust vooral op de kwaliteit en oriëntatie (algemeen of eerder specifiek) van het menselijk kapitaal. Deze elementen kunnen evenwel slechts gedeeltelijk verklaren waarom bepaalde schoolverlaters meer of minder kans hebben op een bepaalde vorm van aansluiting. Ook de vraag- en aanbodverhoudingen op de arbeidsmarkt zullen immers een rol spelen. Onevenwichten tussen vraag en aanbod kunnen zowel cyclisch als structureel zijn en kunnen betrekking hebben op de volledige arbeidsmarkt of op specifieke segmenten. Aanbodoverschotten leiden ertoe dat schoolverlaters niet noodzakelijk terecht komen in de job van hun voorkeur. We gaan hierbij uit van de veronderstelling dat schoolverlaters de voorkeur geven aan een job zonder overscholing boven overscholing met aansluiting en deze laatste categorie boven overscholing zonder aansluiting. Of schoolverlaters er effectief in slagen om terecht te komen in een aangepaste job hangt, gegeven bepaalde arbeidsmarktcondities, af van hun plaats in de zogenaamde wachtrij voor jobs (Thurow, 1975).

Op basis van bovenstaande argumentatie formuleren we enkele hypothesen omtrent de kenmerken van schoolverlaters die bepalend zijn voor de aansluitingsvorm. Anders dan de meeste voorgaande studies focussen we expliciet op de combinaties van deze twee vormen van mismatch.

Een eerste factor die mogelijk de aansluitingsvorm bepaalt, is de *kwaliteit van het menselijk kapitaal* van de schoolverlaters. In sommige gevallen is deze kwaliteit te beperkt om aanspraak te kunnen maken op een job die overeenstemt met het behaalde diplomaniveau. Dit effect wordt allicht nog versterkt indien er sprake is van een aanbodoverschot op de arbeidsmarkt. Een lagere kwaliteit geeft in dit geval aanleiding tot een lagere ranking in de wachtrij voor jobs, waardoor niet alleen de kans op overscholing zonder inhoudelijke aansluiting, maar ook de kans op overscholing mét inhoudelijke aansluiting toeneemt. De literatuur bevestigt alvast dat een lagere kwaliteit van het menselijk kapitaal aanleiding geeft tot een hogere overscholingskans. Verschillende studies vonden immers dat de kans op overscholing lager is onder schoolverlaters met betere studieresultaten (Battu *et al.*, 1999; Dolton & Silles, 2003; Büchel & Pollmann-Schult, 2004; Verhaest & Omeij, 2010) en hoger aangeschreven diploma's (Robst, 1995; McGuinness, 2003; Verhaest & Van der Velden, 2010). Interessant zijn ook de resultaten van Støren en Arnesen (2006) die als één van de weinigen focussen op de combinatie tussen horizontale en verticale mismatch. Zij vonden dat betere studieresultaten zowel de kans op overscholing met inhoudelijke aansluiting als de kans op overscholing zonder inhoudelijke aansluiting negatief beïnvloeden. We testen dus volgende hypothese:

Hypothese 2: Een hogere kwaliteit van het menselijk kapitaal reduceert beide vormen van overscholing.

Verder zal ook de *aard van de opleiding* een rol spelen. Zo verwachten we dat de onmiddellijke inzetbaarheid van schoolverlaters uit brede opleidingen lager is. De nodige specifieke vaardigheden ontbreken, waardoor het vaker optimaal is om te starten in een job op een lager functieniveau. Een aantal studies lijken deze these te bevestigen. Zo vonden Verhaest, Schatteman en Van Trier (2014) en Verhaest en Van der Velden (2010) dat beroepsgerichte opleidingen sterker zijn in het vermijden van overscholing aan het begin van de carrière, terwijl algemenere opleidingen veeleer de kansen op doorgroei van overscholing naar een goede match bevorderen. Een andere indicatie voor het belang van de aard van de opleiding is de vaststelling dat er sterke verschillen zijn tussen studierichtingen in zowel kansen op overscholing (McGuinness, 2003; Frenette, 2004) als kansen op horizontale mismatch (Wolbers, 2003; Boudarbat en Chernoff, 2012). Allicht bepalen vraag en aanbod ook mede deze resultaten. Zo zullen bredere studierichtingen met een relatief hoge vraag aanleiding geven tot een hogere kans op overscholing binnen het domein en een lagere kans op overscholing buiten het domein. Specifieke opleidingen met een relatief lage vraag zullen dan weer resulteren in een hogere kans op overscholing buiten het domein. Hun kans op overscholing binnen het domein is echter minder eenduidig. Omwille van hun specifieke opleiding is het minder noodzakelijk om te starten op een lager functieniveau. De lagere vraag biedt aan werkgevers evenwel de kans om hen toch op lagere functieniveaus tewerk te stellen. Onze hypothesen zijn daarom de volgende:

Hypothese 3a: Schoolverlaters uit brede opleidingen met een relatief lage vraag hebben een hogere kans op beide vormen van overscholing.

Hypothese 3b: Schoolverlaters uit specifieke opleidingen met een relatief hoge vraag hebben een lagere kans op beide vormen van overscholing.

Hypothese 3c: Schoolverlaters uit brede opleidingen met een relatief hoge vraag hebben een hogere kans op overscholing met inhoudelijke aansluiting en een lagere kans op overscholing zonder inhoudelijke aansluiting.

Hypothese 3d: Schoolverlaters uit specifieke opleidingen met een relatief lage vraag hebben een hogere kans op overscholing zonder inhoudelijke aansluiting

Een ander aspect dat hiermee samenhangt betreft *de rol van werkervaring tijdens het onderwijs*, zij het in de vorm van studentenarbeid of als stage. We kunnen verwachten dat deze werkervaring het minder noodzakelijk maakt om op een lager functieniveau te starten. Weinig studies bekijken het effect van werkervaring onder schoolverlaters. Verhaest en Omeij (2010) vonden beperkte evidentie dat werkervaring onder de vorm van stage leidt tot lagere overscholingskansen. Wolbers (2003) vond dan weer geen indicaties dat stages leiden tot een lagere kans op horizontale mismatch. We testen volgende hypothese:

Hypothese 4: Werkervaring verlaagt vooral de kans op overscholing met inhoudelijke aansluiting.

Tot slot verwachten we dat ook de *regionale arbeidsmarktcondities* een rol spelen. Een overschot aan werkzoekenden biedt aan werkgevers immers meer mogelijkheden om hoger opgeleiden met aansluitende studierichting aan te werven voor lagere functies. Het effect op de kans op overscholing zonder inhoudelijke aansluiting is minder eenduidig. Een overschot zet werkzoekenden er allicht toe aan om vlugger een functie aan te nemen die niet aansluit bij de gevolgde opleiding. Gezien het overschot aan werkzoekenden zijn werkgevers echter minder vlug geneigd om in een andere richting te rekruteren. Resultaten uit de literatuur lijken alvast niet in tegenspraak met deze these. De evidentie met betrekking tot de relatie tussen regionale arbeidsmarktcondities en de kans op overscholing onder schoolverlaters is gemengd, mogelijks omdat overscholing niet zomaar als homogene categorie kan worden beschouwd. Verhaest en Omeij (2010) vonden geen duidelijk effect van de regionale werkloosheidsgraad op de kans op overscholing onder Vlaamse hoger opgeleide schoolverlaters. Verhaest, Schatteman en Van Trier (2014) en Hensen *et al.* (2009) vonden echter wel een verband tussen overscholing onder schoolverlaters en de regionale arbeidsmarktcondities. Verder vonden Hensen *et al.* (2009) geen invloed op de inhoudelijke aansluiting tussen opleiding en baan. We testen dus de volgende hypothese:

Hypothese 5: Een hoge regionale werkloosheidsgraad verhoogt vooral de kans op overscholing met aansluiting

D A T A E N M E T H O D E

Onze analyses maken gebruik van de gegevens uit de zogeheten SONAR-gegevensbank. Deze gegevensbank bevat gedetailleerde gegevens over de volledige onderwijsloopbaan en de beginnende arbeidsloopbaan van

ongeveer 9000 Vlaamse jongeren. Deze gegevens werden verzameld met face-to-face interviews bij representatieve steekproeven uit de geboortecohorten 1976, 1978 en 1980. Alle individuen zijn een eerste keer bevraagd op de leeftijd van 23 jaar en een tweede keer op de leeftijd van 26 jaar voor de cohorten 1976 en 1978 en van 29 jaar voor de cohorte 1980. Voor meer informatie over de data verwijzen we naar SONAR (2003, 2004, 2005)¹³.

We focussen op de eerste significante baan, gedefinieerd als de eerste baan in een regulier arbeidscontract die minstens één maand duurde. Verder beperken we de analyse tot de hoger opgeleiden. In de Vlaamse context zijn dit schoolverlaters die minstens over een diploma hoger onderwijs van het korte type (HOKT) of hoger onderwijs lange type (HOLT) beschikken. Ook de schoolverlaters met een eerste job als zelfstandige of met een deeltijdse jobs van minder dan een 50% van een voltijdse werkweek laten we uit de analyse. Tot slot beperken we ons tevens tot schoolverlaters die na hun eerste job niet meer teruggekeerd zijn naar het onderwijs¹⁴. In totaal beschikken we over 2937 respondenten met geldige gegevens voor de variabelen die in alle analyses zijn opgenomen.

Een eerste analyse focust op de effecten van de aard van aansluiting op loon en arbeidstevredenheid (Hypotheses 1a en 1b). Het effect op arbeidstevredenheid wordt geschat met een ordinaal probit model. De analyse van de lonen is gebaseerd op een lineaire regressie, met de logaritme van het reële nettoloon per uur als afhankelijke variabele. Verder bekijken we aan de hand van een multinomiaal logit model welke kenmerken van schoolverlaters de aard van de aansluiting beïnvloeden. Hierbij onderscheiden we drie categorieën: ‘geen overscholing’, ‘overscholing met inhoudelijke aansluiting’ en ‘overscholing zonder inhoudelijke aansluiting’. Omwille van het beperkte aantal respondenten kunnen we de groep ‘geen overscholing zonder inhoudelijke aansluiting’ niet als aparte categorie in deze analyse opnemen (cfr. infra). Alle variabelen opgenomen in de analyse van de determinanten van de aansluitingsvorm gebruiken we ook als controlevariabelen in de analyse van arbeidstevredenheid en lonen.

Overscholing

De SONAR-gegevens laten toe om bij het bepalen van overscholing zowel gebruik te maken van een directe subjectieve methode als van een zogeheten objectieve methode. De directe subjectieve methode is gebaseerd op

13 Om een zo en zo representatief mogelijk samengestelde steekproef van respondenten te realiseren, hebben SONAR medewerkers verschillende procedures doorgevoerd, zo werd bijvoorbeeld non-respons opgevangen door vervanging. De potentiële respondenten werden gegroepeerd in aan elkaar gekoppelde adressen om weigeringen en afwezigheden op te kunnen vangen. De steekproeven blijken representatief te zijn, echter is er een lichte vertekening, namelijk de sociaal-economisch zwakkere categorieën zijn minder goed vertegenwoordigd (zie voor gedetailleerde informatie Laurijssen, 2005 ; Glorieux & Laurijssen, 2011).

14 Dit reduceert de sample met 228 respondenten. De reden voor het weglaten van deze respondenten is dubbel. Ten eerste kunnen we verwachten dat heel wat van deze respondenten hun job zien als tijdelijke in afwachting van de start van het nieuwe academiejaar. Voor deze respondenten is de aansluiting dan ook minder belangrijk. Verder wordt de afleiding van sommige variabelen die opgenomen zijn in onze analyse, zoals het behalen van een rijbewijs vóór de start van het schoolverlaten, bemoeilijkt.

het oordeel van het individu zelf. Respondenten kregen de volgende vraag: ‘Had u voor uw eerste job volgens u een te hoge of een te lage opleiding of was uw opleiding juist goed qua niveau?’ De objectieve methode is gebaseerd op een werkwijze waarbij jobanalysten het vereiste scholingsniveau voor een beroep bepalen. Voor de codering van de beroepen gebruiken we de Standaard Beroepenclassificatie van het Nederlandse CBS (2002). Deze classificatie levert voor elk beroep een functieniveau op. Hierbij wordt het hogere functieniveau gelijkgesteld aan het HOKT onderwijsniveau, terwijl het wetenschappelijke niveau gelijkgesteld wordt aan HOLT. Wij opteren voor deze twee maatstaven omdat ze het dichtst aansluiten bij het overscholingsconcept: een onderwijsniveau dat het minimale vereiste niveau voor de goede uitoefening van de job overstijgt (Hartog, 2000; Verhaest en Omeij, 2010). Eerdere analyses op basis van de SONAR-data toonden aan dat deze twee maatstaven zowel qua incidentie als qua determinanten soms verschillende resultaten opleveren (Verhaest en Omeij, 2006; 2010). Bijgevolg is een analyse waarbij gebruik gemaakt wordt van beide alternatieven aangewezen. Wat de verticale (mis)match betreft maken we geen onderscheid tussen adequaat geschoolden en ondergeschoolden.

Inhoudelijke aansluiting

Voor de maatstaf van inhoudelijke aansluiting gaan we op een analoge manier tewerk als bij overscholing en kunnen we zowel gebruik maken van een subjectieve als van een objectieve methode. Onderzoek van Humblet (2008) op basis van de SONAR-data toont dat de verschillende methoden wel dezelfde graad van incidentie van inhoudelijke aansluiting opleveren, maar dat de correlatie tussen beide maatstaven relatief laag is. In de hier gerapporteerde analyses gebruiken wij voor het meten van inhoudelijke aansluiting enkel de subjectieve methode. De belangrijkste motivering voor deze keuze is dat de objectieve methode sterk afhankelijk is van het detail van de gebruikte classificaties van studierichtingen en beroepen en dat men deze methode in de literatuur over inhoudelijke aansluiting ook niet vaak hanteert. Bovendien is de objectieve maatstaf niet beschikbaar voor alle SONAR-cohorten. In de enquêtes stelde men de vraag: ‘Lag uw eerste of laatst geregistreerde job inhoudelijk in de lijn van uw studies?’. Respondenten hadden de mogelijkheid hier te antwoorden met helemaal, enigszins of helemaal niet. Deze antwoorden vormen de informatie voor het bepalen of er al dan niet sprake is van inhoudelijke aansluiting. In de volgende analyses voegen we de categorieën “helemaal” en “enigszins” samen. Iemand met als antwoord “enigszins” wordt dus verondersteld een baan te hebben die inhoudelijk aansluit bij de studies.

Tabel 2.1 geeft de procentuele verdeling van de respondenten over de vier vormen van aansluiting die we onderscheiden. Tabel 2.2 toont de relatie tussen beide verdelingen. Bij gebruik van de subjectieve maatstaf blijkt de groep met een ‘goede match’ aanzienlijk groter te zijn. Dit ligt in de lijn van de resultaten gerapporteerd in Verhaest en Omeij (2006). Zoals aangegeven in Verhaest en Omeij (2010) weerspiegelt de subjectieve maatstaf allicht mee de verwachtingen en de tevredenheid van respondenten. Zij die hun mismatch als minder

problematisch beschouwen zijn allicht minder vlug geneigd te antwoorden dat ze overgeschoold zijn. Het aandeel niet overgeschoolden zonder inhoudelijke aansluiting blijkt zeer klein te zijn. Voor het aandeel overgeschoolden zonder inhoudelijke aansluiting maakt het kennelijk niet veel uit welke van de twee maatstaven men gebruikt. In beide gevallen bevat deze categorie iets meer dan 10% van de respondenten. Bovendien blijken beide maatstaven in hoge mate dezelfde respondenten in deze categorie te plaatsen. In het geval van de categorie ‘overgeschoold met inhoudelijke aansluiting’ blijken de aandelen op basis van de onderscheiden maatstaven wel sterk van elkaar te verschillen. Volgens de subjectieve maatstaf is slechts 11,9% enkel overgeschoold; maar volgens de objectieve maatstaf ligt dit percentage 3,5 keer hoger. Opmerkelijk is ook de vaststelling dat een kleine 30% van de respondenten aangeeft dat hun eerste baan zowel inhoudelijk als qua niveau bij hun onderwijs aansluit, terwijl ze op basis van de meer objectieve maatstaf toch als overgeschoold gedefinieerd worden. Dit lijkt de centrale stelling van dit artikel, dat overscholing met inhoudelijke aansluiting in veel gevallen minder problematisch is, te onderschrijven. Tot slot blijkt de combinatie ‘geen overscholing’ en ‘geen inhoudelijke aansluiting’ slechts in beperkte mate voor te komen. Tewerkgesteld zijn in een eerste job op een functieniveau dat minstens even hoog is als het bereikte opleidingsniveau impliceert m.a.w. meestal tewerkstelling binnen het domein waarin men gestudeerd heeft.

TABEL 2-1 AANDEEL VAN VERSCHILLENDE VORMEN VAN AANSLUITING TUSSEN ONDERWIJS EN ARBEIDSMARKT IN DE EERSTE BAAN VOLGENS TWEE MAATSTAVEN VAN OVERSCHOLING

	Objectieve maatstaf	Subjectieve maatstaf
Goede match	44.6%	72,0%
Niet overgeschoold, maar geen inhoudelijke aansluiting	2.6%	4.6%
Overgeschoold met inhoudelijke aansluiting	39.3%	11.9%
Overgeschoold zonder inhoudelijke aansluiting	13.5%	11.5%

Bron: SONAR-gegevens, eigen bewerkingen; N = 2937

TABEL 2-2 RELATIE TUSSEN DE TWEE MAATSTAVEN VOOR AANSLUITING

Subjectieve maatstaf	Goede match	Niet over- geschoold, maar geen inhoudelijke aansluiting	Over-geschoold met inhoudelijke aansluiting	Over-geschoold zonder inhoudelijke aansluiting
Objectieve maatstaf				
Goede match	42,4%	0%	2,2%	0%
Niet overgeschoold, maar geen inhoudelijke aansluiting	0%	1,9%	0%	0,7%
Overgeschoold met inhoudelijke aansluiting	29,6%	0%	9,7%	0%
Overgeschoold zonder inhoudelijke aansluiting	0%	2,7%	0%	10,8%

Bron: SONAR-gegevensbank, eigen bewerkingen; N = 2937

Arbeidstevredenheid en loon

Globale arbeidstevredenheid wordt in de SONAR-databank gemeten op basis een vijfpuntenchaal, gaande van ‘zeer ontevreden’ tot ‘zeer tevreden’. De vraag over het nettoloon aan de start van de eerste job verschilt tussen de golven en cohorten. Voor cohorte 1976 vraagt men bij de survey op 23 jaar om het officiële maandelijks nettoloon aan te geven met intervallen van BEF5.000 voor lagere lonen en van BEF10.000 voor hogere lonen. In latere golven en bij andere cohorten vraagt men naar het exacte maandelijks netto-inkomen. Bij eventuele weigering vraagt men alsnog om het looninterval aan te geven. Voor intervalantwoorden gebruiken we het middelpunt van het interval. Alle waarden worden omgerekend naar uurlonen en gedefleerd op basis van de zogenaamde gezondheidsindex¹⁵.

Kwaliteit van menselijk kapitaal

De invloed van de kwaliteit van het menselijk kapitaal (Hypothese 2) wordt getest d.m.v. vier variabelen. Allereerst nemen we een dummy op die aangeeft of studenten hun diploma hebben behaald aan de universiteit. Universitair onderwijs wordt in Vlaanderen vaak als moeilijker en selectiever gepercipieerd dan niet-universitair hoger onderwijs. Ook nemen we een dummy op voor het behalen van een bijkomend diploma (zoals aanvullende masterdiploma’s, doctoraatsopleiding, ...) bovenop het standaard diploma. We bekijken daarnaast het effect van het behaalde eindresultaat in het laatste jaar hoger onderwijs, evenals het aantal jaren zitten blijven in de loop van het hoger onderwijs in het model op.

Onderwijsdomeinen

Om de rol van de gevolgde opleidingsrichting te meten (Hypothese 3) groeperen wij twaalf verschillende opleidingsrichtingen op basis van twee dimensies: de breedte van de opleiding en de relatieve vraag naar de opleiding. Voor een beoordeling van de relatieve vraag maken we gebruik van de schoolverlatersstudies van de VDAB (zie o.a. VDAB, 2009). De categorie ‘brede opleidingen met een relatief lage vraag’ bevat de domeinen ‘politieke en sociale wetenschappen’, ‘psychologie en pedagogische wetenschappen’ en ‘wijsbegeerte, letteren en toegepaste taalkunde’. Jongeren uit de richtingen ‘gezondheidszorg’, ‘onderwijs’, ‘architectuur’, ‘toegepaste biologische wetenschappen en biotechniek’ of ‘toegepaste wetenschappen en techniek’ groeperen we onder ‘specifieke opleidingen met een relatief hoge vraag’. In de categorie ‘brede opleidingen met een relatief hoge vraag’ wordt het domein ‘economie en bedrijfskunde’ ondergebracht. Tot slot categoriseren we het domein ‘muziek en kunsten’ in de groep ‘specifieke opleidingen met een relatief lage vraag’. De domeinen ‘rechten en criminologische wetenschappen’ en ‘natuurwetenschappen en wiskunde’ scoren op het vlak van de relatieve vraag vaak gemiddeld.

¹⁵ Voor deze analyses werden respondenten met extreme waarden voor het loon niet opgenomen.

We brengen hen daarom niet onder in één van de onderscheiden categorieën. Ook het domein ‘sociaal-agogisch werk’ brengen we niet onder in één van deze categorieën. Dit domein omvat meerdere opleidingsrichtingen die het geheel moeilijk als breed of specifiek laten catalogeren.

Werkervaring

Voor de invloed van werkervaring (Hypothese 4) introduceren we in het model een dummy voor participatie in studentenwerk en een dummy voor participatie in stages als onderdeel van het onderwijscurriculum.

Werkloosheid

De invloed van regionale arbeidsmarktcondities bekijken we door de regionale werkloosheidsgraad bij arbeidsmarktintrede in het model op te nemen (Hypothese 5).

Controle variabelen

Naast de klassieke toegeschreven variabelen (geslacht, niet-westerse achtergrond en geboortjaar) controleren we ook voor het krijgen van een studiebeurs tijdens het hoger onderwijs, het bezit zijn van een rijbewijs voor het verlaten van het onderwijs, samenwonen, het aantal jaren scholing van de vader en starten met zoeken naar een job vóór het verlaten van het onderwijs. Verder controleren we ook voor de provincie, de urbanisatie van de woongemeente, en het scholingsniveau.

R E S U L T A T E N

De tabellen 2.3 en 2.4 geven de analyseresultaten voor de invloed van de aansluitingsvorm op het loon en op de arbeidstevredenheid. Voor wat betreft *het loon* stellen we een duidelijk effect vast van de verschillende vormen van aansluiting. Jongeren die een eerste baan vinden op het juiste niveau zijn zonder meer beter af dan hun collega's die dat niet doen. Voor de qua niveau adequaat geschoolde jongeren maakt het geen significant verschil of die eerste baan ook goed (of niet) inhoudelijk aansluit op de afstudeerrichting. Voor overgeschoolde jongeren is de inhoudelijke aansluiting wel van belang. Overscholing zonder inhoudelijke aansluiting levert een lager loon op dan overscholing mét inhoudelijke aansluiting. Een F-test weerlegt de nulhypothese dat het effect van overscholing niet afhankelijk is van de inhoudelijke aansluiting. Deze resultaten gelden zowel bij gebruik van de objectieve als bij gebruik van de subjectieve indicator voor overscholing.

TABEL 2-3 INVLOED VAN AANSLUITINGSVORM OP LOON (LN(REËEL UURLOON) - LINEAIRE REGRESSIE)

	Objectieve maatstaf	Subjectieve maatstaf
	Coëf. (std. fout)	Coëf. (std. fout)
Goede match (ref.)		
Niet overgeschoold, geen inhoudelijke aansluiting (a1)	0,011 (,017)	0,014 (,013)
Overgeschoold met inhoudelijke aansluiting (a2)	-0,044*** (,008)	-0,039*** (,009)
Overgeschoold zonder inhoudelijke aansluiting (a3)	-0,097*** (,009)	-0,090*** (,011)
F test: $a1+a2=a3$	11,6***	13,1***
R ²	0,195	0,192

Bron: SONAR-gegevensbank, eigen bewerkingen; N = 2937; controlevariabelen: zie tabel 2.5; *: $p < 0.10$; **: $p < 0.05$; ***: $p < 0.01$.

TABEL 2-4 INVLOED VAN AANSLUITINGSVORM OP ARBEIDSTEVREDENHEID (ORDINAAL PROBIT MODEL)

	Objectieve maatstaf	Subjectieve maatstaf
	Coëf. (Std. fout)	Coëf. (Std. fout)
Goede match (ref.)		
Niet overgeschoold, geen inhoudelijke aansluiting (a1)	-0,766*** (,128)	-0,611*** (,102)
Overgeschoold met inhoudelijke aansluiting (a2)	-0,272*** (,051)	-0,776*** (,070)
Overgeschoold zonder inhoudelijke aansluiting (a3)	-1,084*** (,067)	-1,235*** (,068)
Chi ² test: $a1+a2=a3$	0,10	1,31
Pseudo R ²	0,067	0,085

Bron: SONAR-gegevensbank, eigen bewerkingen; N = 2937; controlevariabelen: zie tabel 2.5; *: $p < 0.10$; **: $p < 0.05$; ***: $p < 0.01$.

Voor de resultaten inzake *arbeidstevredenheid* (tabel 2.4) liggen de zaken enigszins anders. In dit geval heeft het al dan niet vinden van een baan die inhoudelijk aansluit ook voor de qua niveau adequaat geschoolden een negatief effect. Een goede match realiseren op beide dimensies scoort qua arbeidstevredenheid significant beter dan de drie andere mogelijke vormen van aansluiting. Verder vinden we, net als bij het loon, dat mismatch op beide dimensies de meest ongunstige aansluitingsvorm is. Deze bevindingen gelden voor beide maatstaven. Opvallend is wel dat overscholing met inhoudelijke aansluiting een veel negatiever effect heeft bij gebruik van de subjectieve maatstaf.

Samengevat kunnen we dus Hypothese 1a noch voor lonen noch voor arbeidstevredenheid verwerpen. Het negatieve effect is voor beide indicatoren het grootst bij overscholing zonder inhoudelijke aansluiting. Hypothese 1b lijkt daarentegen enkel op te gaan voor lonen. Enkel in dat geval wordt het negatieve effect van overscholing versterkt door een ontbrekende inhoudelijke aansluiting¹⁶.

De tabellen 2.5 en 2.6 bevatten de resultaten van de schattingen met als afhankelijke variabele de aansluitingsvorm op basis van de objectieve maatstaf (tabel 2.5) enerzijds, de subjectieve maatstaf van overscholing (tabel 2.6) anderzijds. We bespreken de resultaten per hypothese.

Een eerste resultaat betreft *de indicatoren van de kwaliteit van het menselijk kapitaal*. Bij gebruik van de objectieve indicator en met uitzondering voor het verwerven van een extra diploma verminderen zij consistent de kans op overscholing. Een universitair diploma en goede afstudeerresultaten verminderen zowel de kans op overscholing mét als de kans op overscholing zonder inhoudelijke aansluiting. Het aantal bisjaren heeft een significant positief effect op de kans op overscholing zonder inhoudelijke aansluiting. Het belangrijkste verschil bij het gebruik van de subjectieve indicator betreft het effect van een extra diploma en van het aantal bisjaren, die beiden een grotere kans op overscholing met inhoudelijke aansluiting voortbrengen. Hypothese 2, dat de kwaliteit van het menselijk kapitaal de kans op overscholing mét en zonder inhoudelijke aansluiting reduceert, wordt dus niet weerlegd. Dit geldt wel consistent voor overscholing zonder inhoudelijke dan voor overscholing mét inhoudelijke aansluiting.

16 Een mogelijke verklaring voor dit effect is het verschil in jaren overscholing tussen de aansluitingsvormen. Bijkomende controles wijzen uit dat dit niet het geval is en dat het effect daarom wijst op een extra bestraffing van overgeschoolden omwille van hun ontbrekende inhoudelijke aansluiting.

TABEL 2-5 DETERMINANTEN VAN AANSLUITING TUSSEN OPLEIDING EN EERSTE JOB (OBJECTIEVE MAATSTAF): MULTINOMIAAL LOGIT MODEL

	Niet overgeschoold			Overgeschoold met inhoudelijke aansluiting			Overgeschoold zonder inhoudelijke aansluiting		
	Marg. eff.	Sign.	St. fout	Marg. eff.	Sign.	St. fout	Marg. eff.	Sign.	St. fout
<i>Kwaliteit menselijk kapitaal</i>									
Universiteit	0,246	***	(,042)	-0,151	***	(,036)	-0,095	***	(,017)
Extra diploma (manama, aggregaat, doctoraatsopleiding,...)	0,011		(,043)	0,016		(,038)	-0,027	*	(,015)
Eindresultaat: Voldoende (ref.)									
Eindresultaat: Onderscheiding	0,082	***	(,028)	-0,025		(,024)	-0,056	***	(,012)
Eindresultaat: Grote of grootste onderscheiding	0,194	***	(,033)	-0,124	***	(,031)	-0,070	***	(,014)
Aantal jaren gebist in hoger onderwijs	-0,051	***	(,019)	0,013		(,018)	0,038	***	(,009)
<i>Studiedomein</i>									
Domein: Economie en Bedrijfskunde (ref.)									
Domein: Wijsbegeerte, letteren en toegepaste taalkunde	0,043		(,073)	-0,167	***	(,044)	0,124	***	(,048)
Domein: Politieke en Sociale Wetenschappen	-0,174	**	(,076)	-0,140	***	(,052)	0,314	***	(,083)
Domein: Psychologie en Pedagogische wetenschappen	-0,026		(,084)	-0,101	*	(,061)	0,127		(,084)
Domein: Gezondheidszorg, Medische en Param. wet.	0,334	***	(,032)	-0,228	***	(,031)	-0,107	***	(,012)
Domein: Onderwijs	0,542	***	(,019)	-0,440	***	(,016)	-0,101	***	(,009)
Domein: Architectuur	0,028		(,085)	-0,065		(,071)	0,037		(,049)
Domein: Toegepaste Biologische wet. en Biotechniek	0,080		(,068)	-0,136	**	(,055)	0,056		(,051)
Domein: Toegepaste wetenschappen en techniek	0,185	***	(,029)	-0,128	***	(,025)	-0,058	***	(,012)
Domein: Muziek en kunsten	-0,081		(,113)	-0,026		(,089)	0,107		(,066)
Domein: Rechten en Criminologische wetenschappen	-0,024		(,092)	-0,145	***	(,056)	0,169	**	(,073)
Domein: Natuurwetenschappen en wiskunde	0,260	***	(,063)	-0,268	***	(,039)	0,008		(,053)
Domein: Sociaal-agogisch werk	0,292	***	(,035)	-0,221	***	(,033)	-0,071	***	(,015)
<i>Werkervaring</i>									
Stage	0,021		(,037)	0,014		(,034)	-0,035	*	(,019)
Ervaring als jobstudent of vakantiewerk	-0,005		(,043)	-0,027		(,036)	0,033	*	(,019)
<i>Regionale arbeidsmarktcondities</i>									
LN(regionale werkloosheid)	-0,189	***	(,063)	0,132	**	(,063)	0,057		(,041)
<i>Controlevariabelen</i>									
Vrouw	-0,036		(,026)	0,024		(,024)	0,012		(,011)
Niet-westerse origine	0,073		(,062)	-0,098	*	(,051)	0,026		(,033)
Jaren scholing vader	0,010	***	(,004)	-0,009	**	(,004)	-0,001		(,002)
Samenwonend	-0,039		(,034)	-0,001		(,032)	0,039	*	(,020)
Studiebeurs tijdens HO	-0,007		(,027)	-0,019		(,024)	0,026	*	(,014)
Start zoeken vóór schoolverlaten	0,063	***	(,024)	-0,029		(,020)	-0,034	***	(,013)
Rijbewijs	0,011		(,032)	0,017		(,030)	-0,027		(,017)
Hoger onderwijs van twee cycli	-0,275	***	(,044)	0,226	***	(,035)	0,049	**	(,024)

Provincie: Antwerpen (ref.)								
Provincie: Vlaams-Brabant	-0,021	(,027)	0,010	(,023)	0,012	(,015)		
Provincie: West-Vlaanderen	0,025	(,037)	-0,031	(,035)	0,006	(,021)		
Provincie: Oost-Vlaanderen	0,036	(,032)	-0,029	(,030)	-0,007	(,015)		
Provincie: Limburg	-0,034	(,036)	0,013	(,035)	0,021	(,021)		
Verstedelijking: Grootsteden (ref.)								
Verstedelijking: Centrumsteden	0,012	(,061)	-0,013	(,053)	0,000	(,035)		
Verstedelijking: Gemeenten met sterke verstedelijking	0,020	(,054)	-0,022	(,046)	0,002	(,034)		
Verstedelijking: Gemeenten met matige verstedelijking	0,062	(,057)	-0,065	(,048)	0,003	(,034)		
Verstedelijking: Landelijke gemeenten	0,058	(,075)	-0,001	(,072)	-0,057	(,029)	**	
Geboortjaar: 1976 (ref.)								
Geboortjaar: 1978	-0,044	(,030)	0,015	(,030)	0,029	(,020)		
Geboortjaar: 1980	-0,188	***	(,029)	0,093	***	(,027)	0,094	***
Pseudo R ²	0.162							

Bron: SONAR-gegevensbank, eigen bewerkingen; N = 2937; *: p<0.10; **: p<0.05; ***: p<0.01.

TABEL 2-6 DETERMINANTEN VAN AANSLUITING TUSSEN OPLEIDING EN EERSTE JOB (SUBJECTIEVE MAATSTAF): MULTINOMIAAL LOGIT MODEL

	Niet overgeschoold			Overgeschoold met Overgeschoold			zonder		
	Marg. eff.	Sign.	St. fout	Marg. eff.	Sign.	St. fout	Marg. eff.	Sign.	St. fout
<i>Kwaliteit menselijk kapitaal</i>									
Universiteit	0,074	***	(,025)	-0,019		(,020)	-0,055	***	(,014)
Extra diploma (manama, aggregaat, doctoraatsopleiding,...)	-0,039		(,025)	0,041	**	(,019)	-0,002		(,015)
Eindresultaat: Voldoende (ref.)									
Eindresultaat: Onderscheiding	0,041	**	(,017)	0,000		(,012)	-0,041	***	(,011)
Eindresultaat: Grote of grootste onderscheiding	0,082	***	(,019)	-0,033	*	(,017)	-0,048	***	(,011)
Aantal jaren gebist in hoger onderwijs	-0,070	***	(,011)	0,030	** *	(,010)	0,040	***	(,007)
<i>Studiedomein</i>									
Domein: Economie en Bedrijfskunde (ref.)									
Domein: Wijsbegeerte, letteren en toegepaste taalkunde	-0,139	**	(,057)	0,001		(,026)	0,138	***	(,049)
Domein: Politieke en Sociale Wetenschappen	-0,427	***	(,066)	0,092	*	(,054)	0,334	***	(,075)
Domein: Psychologie en Pedagogische wetenschappen	-0,151	*	(,079)	0,044		(,043)	0,107		(,077)
Domein: Gezondheidszorg, Medische en Param. wet.	0,118	***	(,020)	-0,054	***	(,015)	-0,063	***	(,014)
Domein: Onderwijs	0,149	***	(,016)	-0,081	***	(,014)	-0,067	***	(,010)
Domein: Architectuur	-0,184	**	(,075)	0,129	*	(,066)	0,055		(,049)
Domein: Toegepaste Biologische wet. en Biotechniek	-0,102		(,076)	-0,001		(,041)	0,103		(,069)
Domein: Toegepaste wetenschappen en techniek	0,040	**	(,019)	0,001		(,018)	-0,040	***	(,013)
Domein: Muziek en kunsten	-0,087		(,056)	-0,021		(,034)	0,107	*	(,057)
Domein: Rechten en Criminologische wetenschappen	-0,185	**	(,072)	0,019		(,043)	0,166	***	(,063)
Domein: Natuurwetenschappen en wiskunde	-0,002		(,051)	-0,009		(,039)	0,012		(,041)
Domein: Sociaal-agogisch werk	0,079	***	(,029)	-0,038	*	(,022)	-0,041	***	(,016)
<i>Werkervaring</i>									
Stage	0,019		(,024)	0,009		(,014)	-0,029	*	(,016)
Ervaring als jobstudent of vakantiewerk	-0,031		(,028)	-0,004		(,020)	0,035	**	(,015)
<i>Regionale arbeidsmarktcondities</i>									
LN(regionale werkloosheid)	-0,112	**	(,050)	0,057	*	(,034)	0,055		(,036)
<i>Controlevariabelen</i>									
Vrouw	0,001		(,017)	0,000		(,012)	-0,001		(,009)
Niet-westerse origine	-0,050		(,047)	0,008		(,033)	0,042		(,028)
Jaren scholing vader	0,003		(,003)	-0,003		(,002)	-0,000		(,002)
Samenwonend	0,002		(,022)	-0,031	**	(,013)	0,029	*	(,017)
Studiebeurs tijdens HO	-0,037	**	(,018)	0,018		(,013)	0,019		(,014)
Start zoeken vóór schoolverlaten	0,047	***	(,015)	-0,017		(,011)	-0,030	***	(,011)
Rijbewijs	-0,001		(,019)	0,017		(,015)	-0,015		(,012)
Hoger onderwijs van twee cycli	-0,079	**	(,034)	0,066	***	(,023)	0,012		(,022)
Provincie: Antwerpen (ref.)									
Provincie: Vlaams-Brabant	-0,006		(,023)	0,005		(,019)	0,001		(,012)

Provincie: West-Vlaanderen	0,003	(,030)	-0,008		(,022)	0,006	(,018)
Provincie: Oost-Vlaanderen	0,024	(,019)	-0,013		(,015)	-0,011	(,012)
Provincie: Limburg	-0,047	(,035)	0,027		(,028)	0,020	(,017)
Verstedelijking: Grootsteden (ref.)							
Verstedelijking: Centrumsteden	0,042	(,035)	-0,041	**	(,016)	-0,001	(,028)
Verstedelijking: Gemeenten met sterke verstedelijking	0,050	(,037)	-0,045	***	(,017)	-0,005	(,027)
Verstedelijking: Gemeenten met matige verstedelijking	0,063	(,033)	-0,047	***	(,017)	-0,015	(,025)
Verstedelijking: Landelijke gemeenten	0,094	**	(,041)	-0,054	**	(,024)	-0,040
Geboortjaar: 1976 (ref.)							
Geboortjaar: 1978	-0,029	(,024)	0,002		(,016)	0,027	(,018)
Geboortjaar: 1980	-0,068	***	(,022)	-0,004	(,014)	0,072	***
Pseudo R ²	0,111						

Bron: SONAR-gegevensvank, eigen bewerkingen; N = 2937; *: p<0.10; **: p<0.05; ***: p<0.01.

Wat de invloed van het studiedomein op de aard van de aansluiting betreft, zijn de resultaten verre van eenduidig. 'Economie en bedrijfskunde', het enige domein dat we typeerden als een 'brede opleiding met een relatief hoge vraag', heeft de grootste kans op overscholing met inhoudelijke aansluiting en een minder dan gemiddelde kans op overscholing zonder inhoudelijke aansluiting. Dit resultaat ligt in de lijn van Hypothese 3c. Domeinen gekarakteriseerd door een brede opleiding en een relatief lage vraag – 'Wijsbegeerte, letteren en toegepaste taalkunde', 'politieke en sociale wetenschappen' en 'psychologie en pedagogische wetenschappen' - hebben een erg hoge kans op overscholing zonder inhoudelijke aansluiting. Zij behoren allen tot de top drie. 'Psychologie en pedagogische wetenschappen' heeft bovendien van alle domeinen de tweede grootste kans op overscholing met inhoudelijke aansluiting. Voor dit domein wordt Hypothese 3a dus niet weerlegd. De andere twee domeinen scoren wat betreft de kans op overscholing met inhoudelijke aansluiting echter minder dan het gemiddelde. De groep van domeinen met een specifieke opleiding en een relatief hoge vraag vertoont verschillende patronen. 'Gezondheidszorg, medische en paramedische wetenschappen' en 'onderwijs' realiseren de twee beste scores inzake de kans op een goede match op beide dimensies. Zij lopen het laagste risico op overscholing zowel met als zonder inhoudelijke aansluiting. 'Toegepaste wetenschappen en techniek' volgt een gelijkaardig patroon maar minder uitgesproken. Voor deze domeinen weerleggen de resultaten Hypothese 3b dus niet. Voor 'Architectuur' en 'Toegepaste biologische wetenschappen en biotechniek' is dit minder duidelijk. Zij scoren slechts gemiddeld op de kans op overscholing zowel zonder als met inhoudelijke aansluiting. 'Muziek en kunsten' typeerden we als een specifieke opleiding met een relatief lage vraag. Deze richting scoort hoog op de kans tot overscholing met inhoudelijke aansluiting en gemiddeld op de kans op overscholing zonder inhoudelijke aansluiting. Dit leidt eerder tot een weerlegging van Hypothese 3d. Resten nog de drie domeinen die we moeilijk konden plaatsen. Op basis van de gerapporteerde resultaten volgt 'Rechten en criminologische wetenschappen' een gelijkaardig patroon als de groep met een brede opleiding en een relatief lage vraag. De kans op overscholing zonder inhoudelijke aansluiting is erg groot en de kans op overscholing met inhoudelijke aansluiting is lager dan gemiddeld. 'Natuurwetenschappen en Wiskunde' en 'Sociaal-agogisch werk' volgen eerder het patroon van de domeinen met specifieke opleidingen en relatief hoge vraag. Zij realiseren een lage kans op beide vormen van overscholing.

Bij gebruik van de subjectieve indicator voor overscholing valt op dat de rangorde van de domeinen voor wat betreft de kans op overscholing zonder inhoudelijke aansluiting nauwelijks verschilt van de rangorde op basis van de objectieve indicator. De verschillen tussen de beoordeling op basis van experts en deze van de respondenten beïnvloeden hoofdzakelijk de resultaten voor de kans op een goede match en de kans op overscholing met inhoudelijke aansluiting. Afgestudeerden uit de richting 'architectuur' beschouwen zichzelf als relatief meer overgeschoold op basis van de subjectieve indicator. Zij realiseren in dit geval de grootste kans op overscholing met inhoudelijke aansluiting, maar sluiten de rij voor wat betreft de kans op een goede match op beide dimensies. 'Economie en Bedrijfskunde' scoort maar gemiddeld voor de kans op overscholing met inhoudelijke aansluiting, maar beter op een goede match dan op basis van de objectieve indicator. 'Muziek en kunst' scoort voor een goede

match beter, zij het ook slechts gemiddeld, op basis van de subjectieve indicator dan op basis van de objectieve en doet het veel slechter wat betreft de kans op overscholing met inhoudelijke aansluiting. Afgestudeerden uit de richting ‘Politieke en Sociale wetenschappen’ voelen zich relatief beter qua inhoudelijk aansluiting dan op basis van de expert-beoordeling.

De indicatoren voor *werkervaring tijdens de onderwijsloopbaan* zijn enkel significant voor de kans op overscholing zonder inhoudelijke aansluiting en leveren geen consistent resultaat op. Stage als onderdeel van het curriculum geeft een kleinere kans op overscholing zonder inhoudelijke aansluiting; studentenjobs of vakantiewerk een grotere kans. Bij gebruik van de subjectieve indicator vervalt het significante effect van stages, maar heeft ervaring als jobstudent of met vakantiewerk een positief effect op de kans op overscholing zonder inhoudelijke aansluiting en een licht negatief effect op de kans op overscholing met inhoudelijke aansluiting. Dit laatste is evenwel onvoldoende om Hypothese 4 – werkervaring verlaagt vooral de kans op overscholing met inhoudelijke aansluiting – niet te kunnen weerleggen.

Slechte *regionale arbeidsmarktcondities*, tot slot, geïndiceerd door een hoge regionale werkloosheidsgraad, beïnvloedt negatief de kans op een goede match en positief de kans op overscholing met inhoudelijke aansluiting, zowel op basis van de objectieve als op basis van de subjectieve maatstaf. Deze vaststelling ligt in de lijn van Hypothese 5.

D I S C U S S I E

Overscholing zonder inhoudelijke aansluiting is problematischer dan overscholing met inhoudelijke aansluiting. Deze centrale stelling van dit artikel wordt duidelijk ondersteund door onze resultaten. Het effect van overscholing op het loon is sterker indien er tevens sprake is van een gebrek aan inhoudelijke aansluiting. Bovendien leidt overscholing zonder inhoudelijke aansluiting tot minder tevredenheid met de job dan bij andere schoolverlaters met een mismatch. Deze bevindingen sluiten aan bij de resultaten van voorgaande onderzoeken door Robst (2008) en Béduwé en Giret (2011). Tot slot wijzen de verschillen in resultaten van de analyses met de objectieve en deze met de subjectieve maatstaf voor overscholing er op dat schoolverlaters vooral een combinatie van overscholing en inhoudelijke mismatch als een problematische aansluiting beschouwen. Op basis van beide maatstaven is er een grote consensus over wie overscholing met inhoudelijke aansluiting ervaart. Op basis van het subjectieve oordeel van de schoolverlater zelf ligt het aandeel van overscholing zonder inhoudelijke aansluiting echter aanzienlijk lager.

Verder geven onze resultaten aan dat beide vormen van overscholing bepaald worden door verschillende mechanismen. Zo bepalen regionale arbeidsmarktcondities vooral overscholing met inhoudelijke aansluiting. Dit

resultaat is niet onlogisch. In tijden van hoge werkloosheid kunnen werkgevers selectiever zijn en zullen ze dus minder geneigd zijn om werkzoekenden zonder inhoudelijke aansluiting aan te werven. Mogelijk verklaart dit ook waarom sommige studies die overscholing als homogene categorie beschouwen geen duidelijke evidentie vinden voor de rol van regionale arbeidsmarktcondities (zie bvb. Verhaest & Omey, 2010). Andere factoren beïnvloeden wel beide overscholingstypes, maar niet noodzakelijk op dezelfde manier en in dezelfde mate. De kwaliteit van het menselijk kapitaal beïnvloedt beide overscholingstypes negatief. Dit sluit aan bij de bevindingen van onderzoeken die overscholing als een homogene categorie beschouwen (zie bvb. Büchel & Pollmann-Schult, 2004). Het effect blijkt echter sterker te zijn voor overscholing zonder inhoudelijke aansluiting. Mogelijk wijst ook dit erop dat overscholing met inhoudelijke aansluiting niet altijd even problematisch is.

Daarnaast vinden we, zoals andere auteurs (zie bvb. McGuinness, 2003; Wolbers, 2003), dat ook de gevolgde studierichting sterk bepalend is voor de aansluiting. Zoals verwacht is het effect echter niet steeds hetzelfde voor beide vormen van overscholing. Zo hebben studenten uit het domein 'economie en bedrijfskunde' een relatief hoge kans op overscholing met inhoudelijke aansluiting en een relatief lage kans op overscholing zonder inhoudelijke aansluiting. Een mogelijke verklaring ligt in het brede karakter van de opleidingen binnen dit domein gecombineerd met een relatief hoge vraag op de arbeidsmarkt. De resultaten lagen evenwel niet voor alle domeinen in de lijn van de verwachtingen. Mogelijk bepalen nog andere factoren dan hun oriëntatie en de relatieve vraag de verschillen in aansluiting. Sommige domeinen geven, bijvoorbeeld, mogelijk meer dan andere uit op beroepen die men in de literatuur aanduidt als 'licensed professions' (Klein, 2000) of hebben, wat men in de sociologische literatuur noemt, een 'grotere structureringscapaciteit' (Maurice *et al*, 1986).

Voor de stelling dat werkervaring vooral de kans op overscholing binnen het domein reduceert vinden we daarentegen geen enkele evidentie. Integendeel, het effect van ervaring als jobstudent was zelfs positief voor de kans op overscholing buiten het domein. Mogelijk signaleert participatie in studentenwerk een hogere bereidheid om jobs aan te nemen. Een andere potentiële verklaring is dat de aansluiting tussen deze werkervaring en de gevolgde opleiding relatief beperkt is. Hiervoor kunnen we verwijzen naar Allen (2007), die vond dat Vlaamse studenten uit het hoger onderwijs inderdaad relatief weinig participeren in studentenwerk dat aansluit bij de studies.

De bespreking van de resultaten in dit artikel was in eerste instantie gebaseerd op de analyses met een objectieve maatstaf voor overscholing. Een belangrijke kanttekening is echter dat de vooropgestelde hypothesen omtrent de determinanten van de aansluiting minder bevestiging vinden bij gebruik van de subjectieve maatstaf. Vooral in het geval van overscholing met inhoudelijke aansluiting tonen zich verschillen tussen de resultaten op basis van de objectieve en de subjectieve indicator. Onze hypothese is dat respondenten zich in hun beoordeling van hun overscholingsstatus mede laten beïnvloeden door de mate waarin ze die zelf als problematisch ervaren. Verder

onderzoek hiernaar zou echter welkom zijn. Andere belangrijke pistes voor verder onderzoek betreffen vooral de nood aan een betere en meer directe meting van een aantal factoren die in onze analyses een belangrijke rol spelen. We denken hierbij in de eerste plaats aan een betere indicator voor de relatieve vraag naar bepaalde opleidingsdomeinen, evenals voor het brede of specifieke karakter van de opleidingsdomeinen. Mogelijk is tevens een meer gedetailleerde opdeling van de opleidingsdomeinen nodig. Tot slot is er ook nood aan meer diepgaand onderzoek naar de rol van werkervaring en de mate waarin de aansluiting van deze ervaringen met de gevolgde opleiding een rol kunnen spelen in het vermijden van toekomstige mismatches.

C O N C L U S I E

In dit artikel exploreerden we de effecten en determinanten van de aansluiting tussen onderwijs en beroep tijdens de initiële arbeidsloopbaan van Vlaamse schoolverlaters uit het hoger onderwijs. Hierbij maakten we een onderscheid tussen overscholing zonder en overscholing met inhoudelijke aansluiting. Onze centrale these dat vooral overscholing zonder inhoudelijke aansluiting problematisch is, wordt ondersteund door onze resultaten. Verder vinden we duidelijke indicaties dat deze verschillende vormen van aansluiting tevens verbonden zijn met verschillende mechanismen. Meer gericht onderzoek naar de specifieke rol van bepaalde mechanismen is evenwel noodzakelijk.

R E F E R E N T I E S

- Allen, J. (2007), 'Mobilization of human resources', in J. Allen and R. van der Velden (red.) *The flexible Professional in the Knowledge Society: General Results of the REFLEX Project*, (pp.159-197). Maastricht, Maastricht University.
- Battu, H., Belfield, C. & Sloane, P. (1999), 'Overeducation among graduates: a cohort view', *Education Economics*, 7, 21-39.
- Béduwé, C. & Giret, J.-F. (2011), 'Mismatch of vocational graduates: What penalty on French labour market?', *Journal of Vocational Behavior*, 78, 68-79.
- Boudarbat, B. & Chernoff, V. (2012), 'Education–job match among recent Canadian university graduates', *Applied Economics Letters*, 19(18), 1923-1926.
- Büchel, F. & Pollmann-Schult, M. (2004), 'Overeducation and human capital endowments', *International Journal of Manpower*, 25, 150–166.
- Chevalier, A. (2003), 'Measuring Over-Education?', *Economica*, 70, 509 – 531.

- Dolton, P. & Silles, M. (2003), 'The Determination and Consequences of Graduate Overeducation', in F. Büchel, A. de Grip & A. Mertens (red.), *Overeducation in Europe. Current Issues in theory and Policy* (pp.189-216), Cheltenham: Edward Elgar.
- Frenette, M. (2004), 'The overqualified Canadian graduate: the role of the academic program in the incidence, persistence, and economic returns to overqualification', *Economics of Education Review*, 23, 29–45.
- Giret, J.F. & Hatot, C. (2001), 'Mesurer le déclassement à l'embauche des jeunes: l'exemple des titulaires de DUT et de BTS', *Formation Emploi*, 75, 59-73.
- Glorieux, I. & Laurijssen, I. (2011) , Mag het iets meer zijn? Een toets van de effecten van een bevraging meer of minder door middel van een vergelijking van twee SONAR-cohorten SSL/OD2/2011.33 , Leuven: Steunpunt 'Studie- en Schoolloopbanen' (SSL).
- Green, F. & Zhu, Y. (2010), 'Overqualification, job dissatisfaction, and increasing dispersion in the returns to graduate education', *Oxford Economic Papers*, 62, 740-763.
- Hartog, J. (2000), 'Over-education and earnings: where are we, where should we go?', *Economics of Education Review*, 19, 131-47.
- Hensen, M., de Vries, M.R. & Cörvers, F. (2009), 'The Role of Geographic Mobility in Reducing Education-Job Mismatches in the Netherlands', *Papers in Regional Science*, 88, 667-682.
- Humblet, S. (2007), *Horizontale mismatch op de arbeidsmarkt: literatuurstudie*, Leuven, Steunpunt Studie en Schoolloopbanen, SSL Rapport OD2/2007.2.
- Humblet, S. (2008), *Meting van horizontale mismatch op de arbeidsmarkt bij jongeren in Vlaanderen*, Leuven, Steunpunt Studie en Schoolloopbanen, SSL Rapport OD2/2008.12.
- Kleiner, M. (2000), 'Occupational licensing', *Journal of Economic Perspectives*, 14, 189-202.
- Laurijssen, I., & Onderzoeksgroep, T. O. R. (2005). Technisch verslag: Respons en wegingscoëfficiënten SONAR-cohorten. TOR, O.(Ed.), 1-32.
- Maurice, M, Sellier, M. & Silvestre, J.J. (1986), *The Social Foundations of Industrial Power: A Comparison of France and Germany*, Cambridge: MIT Press.
- McGuinness, S. (2003), 'Graduate Overeducation as a Sheepskin Effect: Evidence from Northern Ireland', *Applied Economics*, 35, 597–608.
- Robst, J. (1995). 'Career Mobility, job match and overeducation', *Eastern Economic Journal*, 21, 539-550.
- Robst, J. (2007a), 'Education and Job Match: The Relatedness of College Major and Work', *Economics of Education Review*, 26, 397–407.

- Robst, J. (2007b), 'Education, College Major, and Job Match: Gender Differences in Reasons for Mismatch', *Education Economics*, 15, 159–175.
- Robst, J. (2008), 'Overeducation and College Major: Expanding the Definition of Mismatch between Schooling and Jobs', *The Manchester School*, 76, 349-368.
- Sicherman, N. & Galor, O. (1990) 'A theory of career mobility', *Journal of Political Economy*, 98, 169-192.
- SONAR (2003), Hoe maken Vlaamse jongeren de overgang van school naar werk?, basisrapportering cohorte 1978 (eerste golf), 147p.
- SONAR (2004), Hoe maken Vlaamse jongeren de overgang van school naar werk?, basisrapportering cohorte 1976 (tweede golf), 116p.
- SONAR (2005), Hoe maken Vlaamse jongeren de overgang van school naar werk?, technisch rapport cohorte 1980 (eerste golf)? 181p.-.
- Støren, L.A. & Arnesen, C.A. (2006), *What Promotes a Successful Utilization of Competence in the Labour Market Five Years after Graduation?* Paper presented at the 2006 Workshop of the European Research Network on Transitions in Youth, Marseille, 7-9 September 2006, 27 p.
- Thurow, L. (1975). *Generating Inequality: Mechanisms of distribution in the U.S. economy*. New York: Basic Books.
- Van Trier, W., Coppieters, P., Nonneman, W. & Humblet, S. (2010), *Wie realiseert bij de overgang van school naar werk een betere horizontale match? Een analyse van gegevens voor de eerste baan van Vlaamse jongeren op basis van de SONAR-gegevensbank*. Leuven, Steunpunt Studie en Schoolloopbanen, SSL-rapport OD2/2010.18.
- VDAB (2009), *Werkzoekende schoolverlaters in Vlaanderen, 25^e studie 2008-2009. Een diploma zet je op weg. Schoolverlaters op zoek naar werk*. Brussel: VDAB.
- Verhaest, D. & Omeij, E. (2006), 'Measuring the Incidence of Over- and Undereducation', *Quality and Quantity*, 40, 783–803.
- Verhaest, D. & Omeij, E. (2009), 'Objective over-education and worker well-being: a shadow price approach', *Journal of Economic Psychology*, 30, 469-481.
- Verhaest, D. & Omeij, E. (2010), 'The determinants of overeducation: different measures, different outcomes?', *International Journal of Manpower*, 31, 608-625.
- Verhaest, D., Schatteman, T., & Van Trier, W. (2014), *Overeducation in the early career of secondary education graduates: An analysis using sequence techniques* (No. 14/876). Ghent University, Faculty of Economics and Business Administration.

Verhaest, D., & van der Velden, R. (2013), 'Cross-country differences in graduate overeducation', *European Sociological Review*, 29, 642-653.

Wolbers, M.H.J. (2003), 'Job Mismatches and their Labour-Market Effects among School-Leavers in Europe', *European Sociological Review*, 19, 249-266.

CHAPTER 3

THE IMPACT OF EDUCATIONAL MISMATCHES ON WAGES: THE INFLUENCE OF MEASUREMENT ERROR AND UNOBSERVED HETEROGENEITY¹⁷

Sana Sellami, Dieter Verhaest, Walter Nonneman, Walter Van Trier

ABSTRACT

We investigate the differential impact of alternative combinations of horizontal and vertical educational mismatches on wages. We consider the role of unobserved worker characteristics by using panel data on Flemish highly educated graduates. By using an IV approach, with one mismatch measure as instrumental variable for another, we account for random measurement error in both types of mismatches. We consistently find that over-educated individuals without field-of-study mismatch earn less than adequately educated workers with a similar educational background. However, for individuals who are working outside their field of study, such a wage penalty is not always observed; in some cases, field-of-study mismatch even seems to be financially beneficial to the worker. Yet, more research is required to determine the specific conditions under which these positive wage effects of field of study mismatch prevail.

Keywords: overeducation, field of study mismatch, underemployment, earnings inequality, returns to education, ability bias

¹⁷ We thank Pierre Coppieters, Karel Neels Rolf van der Velden and the participants of the workshop of the European Network on Transitions in Youth (Berlin, 2013) for their comments and suggestions on an earlier version of this chapter.

INTRODUCTION

Research shows that, in many countries, a substantial proportion of young people is overeducated at the start of the career – i.e. these young people are employed in jobs requiring less education than the level they attained (Groot & Maassen van den Brink, 2000). A substantial proportion of young people also fails to find a job matching their field of study (Wolbers, 2003; Robst, 2007a; Verhaest *et al.*, 2015). The relevance of the mismatch subject is indicated by a large number of studies finding that overeducated individuals receive lower earnings (Hartog, 2000; Rubb, 2003) than adequately educated individuals with similar levels of education. More recently, a number of studies showed that also the match with respect to the field of study matters for earnings. For US graduates, Robst (2008) found that the negative impact of overeducation on wages is stronger for those who are employed outside their field of study. Similar conclusions were reached by Støren and Arnesen (2007) on the basis of data for graduates from a large range of European countries. Bédoué and Giret (2011) did not find such an effect for French vocational graduates. Finally, Verhaest *et al.* (2011) found more negative effects of overeducation for Flemish school leavers when overeducation was combined with horizontal mismatch. As Bédoué and Giret, they did not find a wage effect of horizontal mismatch if not combined with overeducation.

In general, the aforementioned studies thus suggest that in particular a combination of overeducation and mismatch in terms of fields of study is problematic for individuals. This seems logical since both their level and their type of education are not fully utilized in their jobs (Robst, 2008). Within this interpretation, the combination of both types of mismatches is the consequence of labour market allocation problems, either temporary because of job search costs (Dolado *et al.*, 2009) and imperfect information (Jovanovic, 1979), or more permanently because of labour market rigidities such as downward wage rigidity (Thurow, 1975) and lack of mobility (Frank, 1978). While labour market allocation problems may also cause individuals to be overeducated without having a field-of-study mismatch, this may have less severe effects on productivity since only their level of education is not fully utilized. Hence the smaller wage penalty that is associated with this type of mismatch. Another striking finding is the insignificant wage effect of horizontal mismatches among those having the appropriate level of education. This suggests that this type of mismatch concerns no real problem in terms of productivity and is not a consequence of labour market allocation problems. In contrast to the findings on the other types of mismatch, this is in line with Human Capital Theory (Becker, 1964), which assumes that labour markets are able to fully reap the benefits of educational investments. For instance, these individuals may be employed in occupations that face upward pressure on wages as a consequence of labour demand growth. Or both employers and employees may manage to reshape the jobs of these workers in order to utilize all of their skills¹⁸. It also may be due to wage agreements on

18 Part of the adjustment may also be realized through additional training and further skill development. This is likely to be more realistic for those who have a rather general education since they will be able to utilize a substantial part of the skills that were learned in education, even if their job does not require their field of study. Moreover, this difference in selection across mismatch types in terms of the transferability of the skills may also contribute to the difference in observed wage penalties across mismatch types since mismatch penalties are likely to depend on the transferability of skills. Individuals with more transferable

intersectoral, sectoral, regional and/or national levels. For example, for some functions in the public sector only the educational level determines the level of the wages which are set at the national level through negotiation with the government. The attained field of study does not influence the level of wages.

The number of studies having already investigated the combined impact of horizontal and vertical mismatches yet remains limited. Moreover, each of the aforementioned studies relied on standard cross-sectional regression analysis. The extent to which their conclusions regarding the impact of mismatches on wages are correct largely depends on two prerequisites. First of all, individuals with a mismatch need to be similar to those without a mismatch in terms of unobservable characteristics that affect wages (Leuven & Oosterbeek, 2011). If not, some individuals may only be formally matched or mismatched (cf. Chevalier, 2003). For instance, because of lower innate ability or lower quality of education, workers may not be capable to occupy jobs that are formally in line with their level of education. Hence the lower wages of overeducated workers. That this problem of unobserved heterogeneity is real is at least illustrated by a few studies that found that overeducated workers score on average lower on cognitive ability tests (Green *et al.*, 2002; Sohn, 2010). Similarly, individuals may combine a lack of required field-of-study skills with higher levels of innate ability. Hence the finding that horizontally mismatched workers earn as much as their adequately educated counterparts, even if horizontal mismatch, *ceteris paribus*, affects productivity negatively. A second prerequisite is that the educational requirements of jobs are not measured with error. For instance, random measurement error may cause some individuals to be wrongly classified as mismatched while others may be apparently matched. This may cause the observed earnings differences between matched and mismatched individuals to be much smaller than they truly are. The problem of measurement error is obvious from the finding that different measures of mismatch are only loosely correlated to each other (Battu *et al.*, 2000; Verhaest & Omey, 2006; Sellami *et al.*, 2015).

Both unobserved worker heterogeneity and measurement error thus may substantially bias the results on the impact of both horizontal and vertical mismatches on wages. Several studies have already investigated the role of unobserved worker characteristics for the relationship between overeducation and wages by using panel data. Bauer (2002) and Frenette (2004) indeed found that unobserved heterogeneity explains almost the full earnings penalty of overeducation. More recent studies, however, found that unobserved factors explain only half or even less of the wage effect of overeducation (Dolton & Silles, 2008; Korpi & Tählén, 2009; Verhaest & Omey, 2012; Mavromaras *et al.*, 2013). Also cross-sectional studies that included skill-related indicators and test scores found that heterogeneous skills explain only part of the effect of educational mismatches (Chevalier & Lindley, 2009;

skills are likely to face relatively small wage penalties. However, for individuals with a more specific field of study, the wage penalties of mismatch are likely to be much higher. This hypothesis is not tested in this study and is left for further research.

Sohn, 2010; Levels *et al.*, 2014). With respect to the role of measurement error in educational requirements, evidence is more scarce. A limited number of studies investigated the role of random measurement error for the estimated wage penalty to overeducation by using one overeducation measure as instrumental variable for another. Robst (1994) found a substantially higher wage penalty to overeducation if measurement error was accounted for. Similarly, Dolton and Silles (2008) and Verhaest and Omey (2012) concluded that upward ability bias found in their study was (more than) compensated by the downward bias resulting from measurement error. As far as we know, no studies have already investigated the role of unobserved heterogeneity and random measurement error for the wage impact of horizontal mismatches and its combination with overeducation.

In this paper, we investigate whether and to what extent unobserved heterogeneity and random measurement error explain the differential impact of alternative combinations of mismatches. We rely on data regarding the transition from school to work in Flanders (Belgium). These data are based on large-scale representative surveys for cohorts of 23-year olds with follow-up surveys at ages 26 and/or 29. The longitudinal character of these data enables to apply panel-data techniques to account for unobserved heterogeneity. Further, the data provide several measures on both horizontal and vertical mismatch, also allowing to account for measurement error by means of applying instrumental variable analysis.

The remainder of the paper is structured as follows. First, we give an overview of the used data and explain our empirical methodology. Next, the results are overviewed. We end with a discussion and formulate some final conclusions.

DATA AND METHODOLOGY

The analysis is based on the SONAR data regarding the transition from school to work in Flanders. This dataset contains data on three cohorts of about 3000 Flemish young people, which were born in the years 1976, 1978 and 1980 respectively. Each cohort was interviewed at the age of 23. Follow-up surveys were conducted at age 26 for the cohort 1976 and 1978. For the cohort 1976 and 1980, data are also available at the age of 29. The response rates for these follow-up surveys ranged from 60% to 70%. More information about the set-up of the survey can be found in SONAR (2003, 2004, and 2005). We construct a panel data set that contains information on the following three time points: (i) the start of the first registered job, (ii) at the age of 26 and (iii) at the age of 29^{19,20}. Information on essential variables such as net wages, job satisfaction and mismatch status is available for these

19 For individuals without jobs at the time of the interview, information was gathered referring to the end of their last job.

20 The situation at age 23 is not included since information about the mismatch status and net wages are not available for all individuals and cohorts.

three time points, except if they were for less than one year in their first job at age 26 or 29. We focus in our analysis on individuals with a higher education degree. We exclude those who are self-employed, observations with missing values or extreme values of wages, respondents for which we have only one observations, and those with a change in their level of education or field of study between the observation points. This leaves a sample of 2235 individuals and 5066 observations.

In our analysis, we focus on the effects of vertical and horizontal mismatch on the net wages. Two types of models are estimated in the literature on the impact of overeducation. While some studies estimate a specification that conditions on the level or years of attained educations, others rather condition on required years of education (see Hartog, 2000; Rubb, 2003). While the first specification compares the effects of mismatch for individuals with a similar educational background, the second specification compares individuals that occupy similar jobs. In the fixed-effects models, however, effects of time-constant educational background variables such as the level of education and the field of study are not identified. Essentially, the fixed-effects models investigate the impact of changes in the mismatch status for an individual without change in educational attainment over time. So, in order to have comparable estimates, we condition on attained years of education and field of study in the random effects model. Several specifications are estimated, with the most general models having the following specifications for the random effects (1.1) and fixed effects (1.2) analyses respectively.

$$\ln Y_{it} = \alpha_1 YOVER_{it} + \beta_1 YEDUC_i + \delta_1 HMM_{it} + \gamma_1 YOVER_{it} * HMM_{it} + X_i \phi_1 + I_{it} \theta_1 + \mu_{1i} + \varepsilon_{1it} \quad (1.1)$$

$$\ln Y_{it} = \alpha_2 YOVER_{it} + \beta_2 HMM_{it} + \gamma_2 YOVER * HMM_{it} + I_{it} \theta_2 + \mu_{2i} + \varepsilon_{2it} \quad (1.2)$$

with Y_{it} = net wages of individual i at time t (with $t=1$ for start first job, $t=2$ for observation at age 26, $t=3$ for observation at age 29), $YOVER_{it}$ = years of overeducation, HMM_{it} = horizontal mismatch, $YEDUC_i$ = years of education, X_i = a vector of fixed observed individual characteristics, I_{it} = a vector of observed characteristics that vary within individuals, μ_{1i} or μ_{2i} = an individual random or fixed effect, and error terms ε_{1it} and ε_{2it} . By assuming fixed effects instead of random effects, we account for the eventual correlation of the mismatch and other observed variables with unobservable individual variables such as ability and motivation. For both the fixed-effects and random-effects model, we distinguish three specifications that differ with respect to the mismatch variables that are included: (i) in a first specification we only include $YOVER_{it}$, allowing to compare our results with other studies that did not account for horizontal mismatches²¹; (ii) in a second model we add HMM_{it} and (iii) in a last specification we also include the interaction term between the two types of mismatch (cf. equation (1.1) and (1.2)).

21 Given that we focus on higher educated individuals, only a small part of the individuals are undereducated. Therefore, we do not account for years of undereducation.

To investigate the extent to which random measurement error in mismatch results in biased outcomes, equations (1.1) and (1.2) are estimated relying both on standard panel-data estimators and on instrumental-variable (IV) panel-data estimators. For our IV estimators, we use one or more measures of mismatch as instruments for a benchmark measure. In a first IV procedure, only years of overeducation is assumed to be measured with error. Hence, $YOVER_{it}$ and $YOVER * HMM_{it}$ are instrumented. A second procedure also accounts for measurement error in horizontal mismatch and thus assumes also HMM_{it} to be endogenous. Below, we discuss our measures of mismatch that are used as benchmark or as instrument in more detail²².

Measurement of overeducation

The literature distinguishes several types of methods for the measurement of overeducation (see Hartog, 2000, for a discussion). A first method is based on a subjective approach where respondents are asked if they are over-, under- or adequately educated for their job. A second method is an indirect measure of overeducation. Respondents can be asked what the required level is to do or to get the job. Overeducation is then measured by comparing the required level of education with the attained educational level. A third measure is a more objective job analysis measure, which is based on the required educational level according to an occupational classification. A fourth method, realized matched, compares the educational level of the worker with the average or modal educational level of the workers within her occupation.

In our analysis, we rely on job analysis (JA) as main indicator for overeducation since it reflects the core idea of overeducation in the literature (Hartog, 2000). In the SONAR data, each occupation has been coded following the Standard Occupation Classification of Statistics Netherlands (CBS, 2001). The classification contains five functional levels: less than lower secondary (<LS), lower secondary (LS), higher secondary (HS), lower tertiary (LT) and higher tertiary education (HT). The equivalent years of attained and required education are based on the minimal years that are needed to achieve each level: < LS = 6 years, LS = 10 years, HS = 12 years, LT = 15 years and HT = 16 years. Hence, an individual is defined to be overeducated ($OVER=1$) if the educational level exceeds the functional level. Years of overeducation ($YOVER$) are computed by years of attained education minus years of required education for overeducated individuals; for other workers it is set to zero.

²² In appendix A, we provide a more detailed exposition of our estimation procedures.

To account for random measurement error in our JA measure, we apply an instrumental variable approach, with a direct self-assessment measure (DSA) of overeducation and an indirect self-assessment measure (ISA) as instruments²³. The first measure is based on the following survey question: ‘According to your opinion, do you have a level of education that is too high, too low or appropriate for your job?’ We use a dummy for overeducation as instrumental variable. Individuals that indicate that their level of education is too high for the job are defined as overeducated ($OVER=1$), while those with an appropriate level or a lower level of education are defined as having an overeducation ($OVER=0$). The second subjective measure is based on the survey questions regarding the required level to get the job. First, the respondents were asked whether a qualification was required to get their job. If they confirmed this question, they got the following question: ‘To get your job, what educational level were you required to have?’ We use the same educational classification as for the JA measure to compute years of required education and years of overeducation. Those who answered that no qualification was required to get the job are classified in the functional category <LS. In comparison to the JA measure, these two subjective measures have some disadvantages. One of the limitations of the DSA measure is that it does not deliver information regarding the years of overeducation. Second, subjective overeducation measures are likely to be influenced by job satisfaction and probably reflect match satisfaction instead of overeducation. Individuals who view their mismatch as less problematic may be less likely to admit that they are mismatched. Further, ISA measures relying on a question regarding the required level ‘to do’ the job can be considered to be more appropriate than those relying on the required level ‘to get’ the job (see Hartog 2000; Verhaest & Omey, 2006). However, such a measure is not available in the SONAR data for all cohorts and jobs²⁴. Nevertheless, both our DSA and ISA measure might serve as useful instrument. As a robustness check, we also execute some estimates with the DSA measure as benchmark and the JA and ISA measures as instrumental variables²⁵.

TABLE 3-1 DESCRIPTIVE STATISTICS ON HORIZONTAL AND VERTICAL MISMATCH (AVERAGE VALUES)

	JA			DSA			ISA		
	Start first job	At age 26	At age 29	Start first job	At age 26	At age 29	Start first job	At age 26	At age 29
YOVER	1.676	1.144	1.218	-	-	-	1.293	0.988	1.082
OVER	0.522	0.422	0.455	0.235	0.140	0.116	0.281	0.193	0.182
HMM	0.253	0.245	0.263	0.161	0.107	0.100	0.466	0.201	0.264

Data source: SONAR 1976 (23), 1976 (26), 1976 (29), 1978 (23), 1978 (26), 1980 (23) and 1980 (29), own calculations; number of individuals = 2235, number of observations = 5066.

In Table 3.1, we report descriptives on the incidence of overeducation relying on our three measures. Based on

23 In appendix B, we discuss in more detail how the use of alternative measures of mismatch as instruments allows to account for random measurement error.

24 This measure is not available for the cohort of 1976. For the 1978 cohort, it is only available for first jobs before the age of 23.

25 For this analysis, we include a dummy for overeducation (OVER) instead of years of overeducation (YOVER). Both instruments (JA and ISA) are measured in years of overeducation.

the JA measure, the incidence of overeducation is 52% at the start of the first job. At the age of 26 and 29, the incidence of overeducation is lower and amounts about 42% and 46% respectively. For the subjective measures, we find at the start of the career an incidence of about 24% based on the DSA measure. The incidence of overeducation decreases to 14% at the age of 26 and to about 12% at the age of 29. This lower incidence of overeducation on the basis of more subjective measures are in line with other studies (see Verhaest & Omey, 2006, for an overview). Relying on the ISA measure, the incidence of overeducation is 28% at the start of the career. At the age of 26 and 29, the incidence of overeducation is lower and amounts 19% and 18% respectively. We also report correlations between the three mismatch indicators for both types of mismatches (see Table 3.2). We note a relatively low correlation of 0.429 between *YOVER* on the basis of JA and *OVER* on the basis of DSA. This low correlation is in line with other studies (see Battu *et al.*, 2000; Van der Velden & van Smoorenburg, 1999).

Measurement of horizontal mismatch

Also for horizontal mismatch, we use a JA approach for our benchmark measure. The CBS classification also defines for each occupation a required field of study. Since the classification was originally developed for the Netherlands, we translated this to the Flemish educational context. Based on the additional information provided by the CBS (CBS, 2001) and information about the required learning outcomes of the various study programs in Flanders, we examined which fields of study match the competencies required for every occupation. We distinguished 177 fields of study and 65 professional disciplines. The 177 fields of study are derived from the question in the survey about the completed field of study. Each field of study was matched with one or more professional disciplines. Individuals with a field of study that is at least to some extent related with their professional discipline are defined as having a horizontal match ($HMM=0$). Individuals with a completely different field of study are defined as having a horizontal mismatch ($HMM=1$). More detailed information on the construction of this job analysis measure can be found in Sellami *et al.* (2015).

Because random measurement is also unavoidable for this JA indicator, we also instrument horizontal mismatch. As instruments we also use a DSA and an ISA measure. The DSA measure is based on the following survey question: “Was the content of your first (last) (current) job in line with your education?”. Here, respondents could choose among: (1) completely, (2) somewhat in line, and (3) not at all in line. The first two answers are defined as a horizontal match and the latter as a horizontal mismatch. The second subjective measure is based on the field of study asked by the employer at the time of hiring to get the job. The respondents who answered affirmatively on the question whether a qualification was required to get their job (cf. *supra*), also got the following question: ‘Which field(s) of study were required by the employer?’ We clustered both the reported required fields and the graduate’s attained field into 11 broad categories. In the case

of correspondence between the broad attained and required field, graduates were assumed to have a match on the basis of ISA. Apart from those reporting one or more required fields, a substantial group did not report any particular required field. While this is evidently not problematic for the employer, it is for the graduate since her field of study is not fully utilized in the job (see Sellami *et al.*, 2015, for a discussion). Therefore, also these individuals are defined to have a horizontal mismatch. Nevertheless, we execute a sensitivity analysis to assess whether this decision affects our conclusions. For this analysis, we keep 'horizontal mismatch' and 'no particular field required' as two separate categories and include separate dummies on each of these two categories as instrumental variables for our JA measure of horizontal mismatch.

As with overeducation, the incidence of horizontal mismatch depends on the applied measure (see Table 3.1). If measured by means of JA, we find that 25% of the sample is horizontally mismatched at the start of the career (see table 1). Similar incidence are observed at the age of 26 and at the age of 29. Based on the direct subjective measure we note lower incidences of horizontal mismatches. At the start of the career, about 16% has a horizontal mismatch, while at a later age this incidence further drops to about 11%. The indirect subjective measure conversely delivers a much higher incidence of horizontal mismatch at the start of the career (47%). At the age of 26 and 29, this is clearly lower (20% and 26% respectively). A possible explanation for the differences between the JA measure and the DSA measure may be due to the chosen level of aggregation, another aggregation level would deliver another incidence of horizontal mismatch. Moreover, in the case of ISA, this higher incidence can be explained by the fact that 21% of the individuals reported that no field of study was required. For a more detailed description of the incidence of the different categories of mismatch, we refer to Appendix C.

As for overeducation, we also note relatively low correlations between the measures of horizontal mismatch; these correlations are around 0.3. Also the correlations between overeducation and horizontal mismatch are positive, indicating that those who are overeducated are also more likely to be horizontally mismatched. Given these correlations between the two types of mismatch, the risk on spillover effects when estimating the impact of mismatch on wages is clear, with one type of mismatch eventually picking up part of the effect of the other type of mismatch.

TABLE 3-2 CORRELATIONS BETWEEN THE TWO MEASURES OF MISMATCH

	OVER (JA)	YOVER (JA)	OVER (DSA)	OVER (ISA)	YOVER (ISA)	HMM (JA)	HMM (DSA)
YOVER (JA)	0.765	1.000					
OVER (DSA)	0.345	0.429	1.000				
OVER (ISA)	0.342	0.375	0.434	1.000			
YOVER (ISA)	0.250	0.377	0.373	0.758	1.000		
HMM (JA)	0.191	0.243	0.220	0.264	0.279	1.000	
HMM (DSA)	0.230	0.339	0.412	0.320	0.380	0.296	1.000
HMM (ISA)	0.225	0.268	0.294	0.415	0.449	0.262	0.308

Data source: SONAR 1976 (23, 23, 29), 1978 (23, 26), 1980 (23, 29), own calculations; number of individuals = 2235, number of observations= 5066.

Wages

The survey question regarding wages differs somehow between the waves and cohorts. For the initial interview (at the age of 23), of the 1976 cohort official net monthly wages were reported in intervals of 124 euro (BEF5000) for lower wages and intervals of 248 euro (BEF10000) for higher wages. In the other surveys, respondents were asked to report their exact net monthly wage. If the respondents refused to answer this question, they got the interval question. For these answers, we used the midpoint of the interval. All answers are converted to hourly wages and deflated on the basis of the consumer price index that is typically used for wage indexation²⁶. Observations with two standard deviations above or below the average natural logarithm wage in the sample are excluded²⁷.

Control variables

We include several control variables in each model. Time-fixed control variables (\mathbf{X}) are dummies for gender (1 dummy), non-European descent (1), year of birth (2), and broad fields of study (10). We also include a number of time-varying variables (\mathbf{J}), namely work experience, work experience squared, tenure, tenure squared, percentage of employment (full-time=100%), cohabiting (1 dummy), having a child (1), observation at age 26 (1) and at age 29 (1), firm size (4), sector of employment (11), public sector (1), shift work (2) and night work (4). A detailed description of each of these variables and their measurement can be found in Appendix D.

²⁶ Conversion into hourly wages is based on the percentage of employment (full-time=100%), and equalizing full-time jobs to 40 hours/week.

²⁷ By using the log of wages, we align with standard practice in the labour economics literature. In line with empirical findings, human capital theory predicts a log linear relationship between earnings and years of education (see Mincer, 1974).

Given the fact that some employers pay higher wages than others, some of the results may be responsive to the inclusion of firm characteristics as control variables. Whether these characteristics should be included is dubious since the choice for a particular firm and industry may be endogenous to one's ability to find a good match. Therefore, as a sensitivity analysis, we also estimate a model without controlling for the size of the firm, the sector of employment and for whether the individual is employed in the private or public sector.

ESTIMATION RESULTS

In table 3.3, we report the estimation results on the impact of mismatch on wages, relying on our benchmark measure of mismatch. As mentioned in the methodology section, we distinguish three specifications, depending on the type of mismatch that is accounted for. Further, different estimations are reported depending on whether random or fixed effects are assumed and on whether random measurement error in mismatch is accounted for. We first discuss the results for models that do not account for measurement error. Thereafter, we also turn to the IV estimates. At the end, we also report the results of a number of sensitivity and robustness analyses.

Standard panel-data results

On the basis of specification A (Table 3.3, column 1 and 2), we find that overeducated workers earn less than adequately educated workers with similar years of education and more than adequately educated workers with similar years of required education²⁸. This is consistent with the findings of other studies. Including fixed effects instead of random effects results in a somewhat lower estimated penalty for overeducation, suggesting that part of the penalty to overeducation may result from lower ability levels or lower quality levels of education among overeducated workers.

If also horizontal mismatch is included in the model (specification B), we find similar results for overeducation. Further, we find a significantly negative effect of horizontal mismatch on net wages if random effects are assumed. This result is in line with other studies (e.g., Robst, 2008). If we account for fixed effects, however, we find a statistically insignificant effect for horizontal mismatch. This suggests that the penalty to horizontal mismatch is not real and simply results from adverse unobserved characteristics.

In the last specification (C), we additionally include the interaction term between overeducation and horizontal mismatch. For the overeducated individuals without horizontal mismatch, we now find a slightly larger earnings

²⁸ The estimated difference in $\ln(\text{wages})$ between overeducated workers and adequately educated workers with similar years of required education can be derived from the random-effects model and is equal to $0.119 - 0.020 = 0.098$.

penalty than on the basis of the two other specifications. For individuals that are employed outside their own study field without overeducation, we do not find any wage effect. As other studies (e.g. Robst, 2008; Støren & Arnesen, 2011), we find a negative interaction effect between horizontal mismatch and overeducation if eventual correlation between mismatch and unobserved heterogeneity is not accounted for (see Table 3.3, column 1). After controlling for fixed effects, however, this interaction turns out to be statistically insignificant. This suggests that those who combine both types of mismatches have unobserved characteristics that have an adverse effect on wages, resulting in a spurious interaction effect if not adequately accounted for.

It may be tempting to conclude on the basis of the standard fixed-effects results reported in Table 3.3 that, along with overeducated workers without horizontal mismatch, also overeducated workers with a horizontal mismatch face a statistically significant wage penalty in comparison to those without any type of mismatch. However, the extent to which this is true may depend on the number of years of overeducation that is considered. Therefore, in table 3.4, we additionally report the wage effects for the following three groups: those combining average conditional years of overeducation (2.94 years) with a horizontal match, those having only a horizontal mismatch and those combining average conditional years of overeducation with a horizontal mismatch. These results confirm that the estimated wage penalty on the basis of the standard fixed-effects estimator is similar for both types of overeducated workers, with wage penalties of 4.4% for average overeducated worker without horizontal mismatch and a wage penalty of 4.1% for those with a horizontal mismatch.

TABLE 3-3 THE IMPACT OF EDUCATIONAL MISMATCH ON LN WAGES (BENCHMARK ANALYSIS WITH JA MEASURE)

	Standard panel-data estimates				IV panel-data estimates (<i>YOVER</i> endogenous)				IV panel-data estimates (<i>YOVER</i> and <i>HMM</i> endogenous)			
	(1) Random effects		(2) Fixed effects		(3) Random effects		(4) Fixed effects		(5) Random effects		(6) Fixed effects	
Specification A												
YEDUC	0.118***	(0.007)			0.113***	(0.007)						
YOVER	-0.020***	(0.001)	-0.013***	(0.002)	-0.054***	(0.004)	-0.044***	(0.008)				
Overall R²	0.343		0.207		0.300		0.213					
Within R²	0.336		0.350		0.285		0.303					
Specification B												
YEDUC	0.123***	(0.006)			0.113***	(0.007)			0.113***	(0.007)		
YOVER	-0.019***	(0.001)	-0.013***	(0.002)	-0.056***	(0.004)	-0.049***	(0.008)	-0.061***	(0.007)	-0.069***	(0.016)
HMM	-0.012**	(0.006)	-0.001	(0.011)	0.015**	(0.007)	0.033**	(0.013)	0.050	(0.036)	0.200**	(0.100)
Overall R²	0.344		0.207		0.292		0.204		0.278		0.133	
Within R²	0.336		0.350		0.282		0.292		0.271		0.169	
Specification C												
YEDUC	0.119***	(0.006)			0.110***	(0.007)			0.111***	(0.007)		
YOVER	-0.016***	(0.002)	-0.015***	(0.003)	-0.067***	(0.007)	-0.070***	(0.014)	-0.066***	(0.012)	-0.080***	(0.021)
HMM	0.001	(0.007)	-0.006	(0.013)	-0.013	(0.013)	-0.030	(0.025)	-0.024	(0.044)	0.103	(0.117)
YOVER*HMM	-0.007***	(0.003)	0.003	(0.004)	0.018**	(0.008)	0.035**	(0.014)	0.011	(0.015)	0.027	(0.026)
Overall R²	0.346		0.205		0.279		0.172		0.276		0.141	
Within R²	0.335		0.350		0.277		0.273		0.273		0.237	

YEDUC years of education, *YOVER* years of overeducation, *HMM* horizontal mismatch.

The following time-invariant variables are included in the random effects models: dummies for gender, non-European descent, year of birth and fields of study.

The following control variables are included in every model: experience, experience squared, tenure, tenure squared, percentage of full employment, dummies for cohabiting, having a child, sector, firm size, night work, shift work, public sector, observation at age of 26, observation at age 29.

Number of individuals = 2235, number of observations = 5066

*p<0.10; **p<0.05; ***p<0.01; Standard errors are in parentheses

TABLE 3-4 WAGE EFFECTS FOR AVERAGE OVEREDUCATED WORKERS(\$)

	Standard panel-data estimates		IV panel-data estimates - <i>YOVER</i> endogenous		IV panel-data estimates - <i>YOVER</i> and <i>HMM</i> endogenous	
	Random effects (1)	Fixed effects (2)	Random effects (3)	Fixed effects (4)	Random effects (5)	Fixed effects (6)
Overeducated	-0.047***	-0.044***	-0.197***	-0.206***	-0.194***	-0.235***
Horizontal mismatch	0.001	-0.006	-0.013	-0.030	-0.024	0.103
Horizontal mismatch and Overeducated	-0.067***	-0.041***	-0.157***	-0.133***	-0.185***	-0.053

© Computed for workers with conditional average years of overeducation (=2.94 years); derived from estimates on specification C, reported in table 3.3
 *p<0.10;**p<0.05;***p<0.01.

IV panel-data results

To account for measurement error, we also execute instrumental variable panel-data estimates. In a first model (Table 3.3; column 3 and 4), we only account for random measurement error in overeducation. On the basis of specification A, we find a much higher wage penalty for overeducation than on the basis of the standard panel-data model. While the fixed-effects model delivers a slightly lower estimated penalty of overeducation, the estimate of 4.4% is still substantially higher than the estimate of 2.0% that was found on the basis of the standard random-effects model. Also this result is in line with other studies (e.g. Dolton & Silles, 2008) and suggests that the downward bias of the estimated penalty resulting from measurement error is higher than the upward bias resulting from unobserved heterogeneity.

On the basis of specification B, we now find a significantly positive effect of HMM if measurement error in overeducation is accounted for. This means that horizontally mismatched individuals earn more than individuals with a similar educational background who work within their own field of study. On the basis of the fixed-effects model, this estimated bonus is more than 3%. This result suggests that the previously found penalty to HMM is spurious and results from inadequate measurement of overeducation. To the extent that overeducation and horizontal mismatch are correlated, the HMM variable thus seems to pick up part of the effect of overeducation because overeducation is imperfectly measured.

Finally, on the basis of specification C, we also investigate whether the effect of HMM differs depending on the degree of overeducation. Also these results differ from the ones previously found in the literature. On the basis of the fixed-effects model, we find an insignificant negative effect for horizontal mismatch and a statistically positive interaction effect between both types of mismatches. If we neglect the insignificance of the HMM coefficient, this would mean that the effect of HMM is negative for individuals that are employed at their level of education. Further, those having only one year of overeducation seem to experience no HMM penalty (-0.030+0.035 ≈ 0), while those having more than one year of overeducation even seem to experience a wage bonus for their HMM.

This last conclusion is also evident from Table 3.4, which reports results for workers with average conditional years of overeducation. While average overeducated workers without HMM are estimated to face a wage penalty of 20.6%, those with a HMM have a wage penalty of 13.3% only. Another remarkable finding is that the fixed-effects estimate of the wage penalty to overeducation with horizontal mismatch is lower than the random-effects estimate, while no such difference in the estimated wage penalty is found with respect to overeducation without horizontal mismatch. This suggests that in particular those who combine both types of mismatches have adverse unobserved characteristics.

The aforementioned estimates did only account for measurement error in overeducation. In a last series of estimates, we also account for measurement error in HMM. The absolute values of the coefficients for HMM are larger than those in the models that do not account for measurement error in HMM. This suggests that measurement error also biases the estimated effects of HMM towards zero. However, the estimated effect of HMM remains, in the case of Specification C, statistically insignificant. We thus do not find convincing evidence on the basis of this specification that those who are only horizontally mismatched earn more than those who face no mismatches. Moreover, as shown in Table 3.4, once accounting for measurement error in HMM, we also do not find statistically significant evidence that those who combine horizontal mismatch with average years of overeducation earn less than adequately educated workers. At least, neglecting statistical significance, our results suggest that those combining both types of mismatches should have more than 1.94 years of overeducation²⁹ to face a wage penalty in comparison to those not having any type of mismatch. The estimated wage penalty for those with average years of overeducation and no HMM, on the other hand, further increases to 23.5%. With this wage penalty, these overeducated workers without HMM also earn significantly less than their overeducated counterparts with a HMM.³⁰

While IV estimators may deliver unbiased estimates, these estimates are in general less efficient. This problem is further attenuated by the application of fixed-effects estimators instead of random-effects estimators. This may contribute to the insignificance of the effects on HMM. However, additional test results, reported in Table 3.5, indicate that our IV fixed-effects procedure is both adequate and preferable to the other test procedure. First of all, Hausman tests reject the null hypotheses that the random-effects estimators and the standard panel-data estimators deliver unbiased estimates. Further, on the basis of the Sargan test of over-identifying restrictions, we can never reject the validity of the instruments even if evaluated at relatively high threshold p values. Finally, F tests on the first stage regressions reject the null hypothesis that the instruments have no impact on the endogenous

29 This threshold is calculated by solving for YOVER the following equation: $0.103 + (0.027 - 0.080) * YOVER = 0$.

30 The difference in wage penalties between these types of workers ($-23.5\% - (-5.3\%) \approx -18.2\%$) is statistically significant at the 10% level.

variables and the test statistics largely exceed the rule of thumb value of 10 which is in general used to differentiate between weak and strong instruments (see Stock *et al.*, 2002).

Apart from these often-used statistics and rule-of-thumb diagnostics, several other statistics can be used to evaluate the strength of instruments, such as the Angrist-Pischke (AP) F-test for weak instruments. The null hypothesis of this test is that an endogenous regressor is weakly identified. If we only account for measurement error in YOVER, we do not detect problems of weak identification based on the results of this test. Once accounting for measurement random error in HMM, we find for HMM (specification C) a test statistic that is lower than the critical value for 10% maximal relative IV bias³¹. However, this is only a small bias which is tolerable. Another test is the Anderson canonical correlation likelihood ratio test that tests whether the model is correctly identified. This likelihood ratio test whether the instrument adequate identify the equation. The results show that our model is not under identified, for both models the test show significant results. The last test, the Cragg-Davidson statistic (C-D statistic), is closely related to the Anderson CC –test and tests the hypothesis of weak identification. To test whether we have weak instruments, we look at whether this test statistic is larger than the critical values of the test of maximal relative bias and the test of maximal size³². If we control for measurement error in both YOVER and HMM, we find a test statistic that is lower than the critical value for a 10% maximal IV relative bias³³. Overall, we thus do not find indications that our instrumental variable procedure is not valid.

³¹ The critical value for HMM 10% maximal IV relative bias is 9.08.

³² Stock and Yogo (2005) provide a test for weak instruments by using the F –statistic form of the C-D statistic. The authors distinguish between two tests, (1) maximal relative bias and (2) maximal size. The first test is relative based on the part of the bias of the IV estimator relative to the bias of the OLS estimator. The null hypothesis of this test is that the used instruments are weak. Weak instruments are defined as instruments that can result in an asymptotic relative bias greater than some value b (Baum, Schaffer and Stilman, 2007). The second test is based on the performance of the Wald test statistic for endogenous regressors. The Wald test is rejects too often, if there is a problem of weak identification. Within this test, weak instruments are defined as instruments that will lead of a rejection rate higher than 10% when the true rejection rate is 5%. The critical values are determined by the IV estimator, the number of instruments, the number of included endogenous regressor and how much bias the researcher is willing to tolerate.

³³ The critical value of the C-D statistic of 10% maximal IV relative bias is 7.77 and the value of 20% maximal relative bias is 5.35.

TABLE 3-5 TEST STATISTICS ON THE VALIDITY AND RELIABILITY OF THE IV FIXED-EFFECTS ESTIMATES (P VALUES IN PARENTHESES)

Estimation procedure (table 3-3)	YOVER endogenous (4)	YOVER and HMM endogenous (6)
Hausman test (null: IV RE estimates are unbiased)		
Specification A	50.1 (0.026)	-
Specification B	56.7 (0.009)	45.7 (0.087)
Specification C	37.6 (0.035)	51.1 (0.039)
Hausman test (null: standard FE estimates are unbiased)		
Specification A	76.8 (0.000)	-
Specification B	57.3 (0.007)	79.9 (0.000)
Specification C	63.5 (0.002)	90.9 (0.000)
Sargan Chi² test of over-identifying restrictions		
Specification A	1.2 (0.204)	-
Specification B	1.0 (0.312)	0.4 (0.839)
Specification C	0.5 (0.771)	1.3 (0.740)
F test first stage equation on excluded IV's		
Specification A: <i>YOVER</i>	153.1 (0.000)	-
Specification B: <i>YOVER</i>	125.5 (0.000)	86.7 (0.000)
Specification B: <i>HMM</i>	-	43.7 (0.000)
Specification C: <i>YOVER</i>	80.1 (0.000)	70.0 (0.000)
Specification C: <i>HMM</i>	-	32.8 (0.000)
Specification C: <i>YOVER</i> * <i>HMM</i>	154.2 (0.000)	91.3 (0.000)
Angrist-Pischke multivariate F test of excluded IV's		
Specification A: <i>YOVER</i>	153.1 (0.000)	-
Specification B: <i>YOVER</i>	125.5 (0.000)	27.2(0.000)
Specification B: <i>HMM</i>	-	13.7 (0.000)
Specification C: <i>YOVER</i>	31.7 (0.000)	10.7 (0.000)
Specification C: <i>HMM</i>	-	7.3 (0.000)
Specification C: <i>YOVER</i> * <i>HMM</i>	61.1 (0.000)	9.5 (0.000)
Anderson-Canon corr. LM statistic (Under identification test)		
Specification A	279.38 (0.000)	-
Specification B	233.4 (0.000)	33.8 (0.000)
Specification C	168.9 (0.000)	35.2 (0.000)
Cragg- Donald Wald F statistic (Weak identification test)		
Specification A	153.07*	-
Specification B	125.5*	8.43
Specification C	44.3*	5.9

Number of individuals = 2235, number of observations= 5066

For C-D Wald F test, * equal 5% confidence of less than 20% maximal IV relative bias. The critical values are on request.

*p<0.10;**p<0.05;***p<0.01;

Sensitivity analyses

We end with a few sensitivity analyses. As a first sensitivity analysis, we also estimate a model without controlling for the sector of employment and the size of the firm. The results of this analysis are presented in Appendix E. While the coefficients differ slightly, our major conclusions remain unaffected. In a second sensitivity analysis, we

re-estimate the full model with a dummy for ‘no particular field required’ in the case of the ISA measure as additional instrument. Appendix F presents the results obtained from this analysis. Also these results also largely consistent with those presented earlier.

Finally, we investigate whether our results differ if we use the DSA measure as main indicator and the JA and ISA measures as instrumental variables. In Table 3.6, we report the results on the wage effects for the different types of workers (see Appendix G for the full estimation results). Based on the standard fixed-effects panel estimates, we now find a wage penalty of 4.5% for overeducated workers without HMM and a wage penalty of 6.8% for those with a horizontal mismatch. These results are similar to the findings in our benchmark analysis, although the estimated effect for the latter is somewhat higher (cf. Table 3.4). The IV analysis delivers more pronounced differences in comparison to our benchmark analysis. If we only account for measurement error in overeducation, we find that both types of overeducated workers face a similar wage penalty of about 16%. In the benchmark analysis, the estimated penalties for average overeducated workers were 21% and 13% for those without and those with HMM respectively. Finally, if we also account for measurement error in HMM, we find a substantial and statistically significant wage bonus in the case of HMM without overeducation. While also our benchmark analysis delivered a wage bonus for this group of workers, the estimate was not statistically significantly different from zero. Moreover, the estimated wage penalty to overeducation is again relatively similar for both types of workers (14% and 15%). In our benchmark analysis that relied on JA, the estimated penalty for those with HMM was not statistically significantly different from zero either.

TABLE 3-6 WAGE EFFECTS FOR OVEREDUCATED WORKERS

			IV panel-data estimates - <i>YOVER</i> endogenous		IV panel-data estimates - <i>YOVER</i> and <i>HMM</i> en- dogenous	
	Random ef- fects (1)	Fixed ef- fects (2)	Random ef- fects (3)	Fixed ef- fects (4)	Random ef- fects (5)	Fixed effects (6)
Overeducated	-0.061***	-0.045***	-0.276***	-0.157***	-0.236***	-0.140**
Horizontal mismatch	-0.004	-0.004	0.062***	0.056*	0.262***	0.403**
Horizontal mismatch and Overeducated	-0.113***	-0.068***	-0.232***	-0.156***	-0.261***	-0.145***

® derived from estimates on specification C, reported in Appendix, Table G.

*p<0.10;**p<0.05;***p<0.01.

As in our benchmark analysis, we also execute a number of tests on the reliability and validity of our instruments when using the DSA measure as main indicator (cf. Appendix H for the results). The results from the Sargan test reveal that, in case of specification C, we cannot reject the null hypothesis that the instruments are uncorrelated with the error term when accounting both for measurement error in overeducation and in field of study mismatch. However, this is not the case if we only account for measurement error in overeducation. For specification B, the results reject the null hypothesis. Hence, it seems that a least one of the instruments is not exogenous. Further, if

we only account for measurement error in overeducation, the instruments pass the test of both no under identification and no weak identification (see Anderson-Canon correlation. Likelihood ratio statistic and Cragg-Donald Wald F statistic). However, if we also account for measurement error in HMM, both models (Specification B and Specification C) seem to suffer from weak instruments bias since the C-D test does not reach the conventional levels of significance³⁴.

DISCUSSION

Earlier studies on the relationship between mismatch and wages have mainly focused on the wage effects of vertical educational mismatches (over- and undereducation). In line with some more recent studies, we investigated the impact of alternative combinations of vertical and horizontal mismatches. The main contribution of our study lied in investigating whether and to what extent unobserved heterogeneity and measurement error explain the differential impact of alternative combinations of mismatches. We investigated the role of unobserved worker characteristics by using panel data on Flemish highly educated graduates. By using an IV approach, with one mismatch measure as instrumental variable for another, we accounted for random measurement error. In our benchmark analysis, we used a JA approach for our main measure of mismatch and DSA and ISA measures as instruments. In an additional sensitivity analysis, we used DSA as main measurement instead.

Our results based on the standard random-effects estimates (cf. Table 3, column 1) are consistent with the findings of other studies relying on cross-sectional data (Robst, 2008; Støren & Arnesen, 2011). We found that the negative effects of overeducation are the strongest for those who are employed outside their field of study. Also the finding that those with a horizontal mismatch but an appropriate level of education earn at least as much as adequately workers with a similar educational background was previously found in the literature.

However, once accounting for unobserved heterogeneity and measurement error in both types of mismatches, some of these conclusions substantially change. First of all, based on our fixed-effects IV estimates, we did not find that those with a field-of-study mismatch face a stronger wage penalty to overeducation than those without field-of-study mismatch. On the contrary, on the basis of our benchmark analysis, with JA as main measure for mismatch, we even found those combining field-of-study mismatch with moderate levels of overeducation earning no less than those without any type of mismatch. Secondly, on the basis of an additional analysis with DSA as main measure for mismatch, those having a field-of-study mismatch without being overeducated were

³⁴ The C-D test for Specification B and C is lower than the value of the 30% maximal IV relative bias, which is 4.73 (Specification B) and 4.40 (Specification C).

found to earn more than those without any type of mismatch. Only those being overeducated without having a field-of-study mismatch were thus consistently found to face a wage penalty in comparison to those without any type of mismatch. Moreover, this wage penalty was found to be much higher than the one estimated on the basis of the standard random-effects model.

The difference in outcomes between the standard random-effects model and those on the basis of the IV fixed-effects specification seems to be attributed to three different types of biases. First of all, assuming fixed effects instead of random effects reduced the estimated wage penalty for those combining both types of mismatches. This suggests that those combining both types of mismatches are negatively selected in terms of unobservables. Secondly, measurement error in overeducation provides another source of bias. Once accounting for this type of error in our benchmark analysis, the estimated interaction effect between both types of mismatches turned positive. A likely explanation is that, if measurement error in overeducation is not accounted for, horizontal mismatch picks up part of the effect of overeducation because of the correlation between both types of mismatch (cf. Table 3.2). Thirdly, also measurement error in HMM matters. This is easiest illustrated by the results on our specification without interaction effect between overeducation and horizontal mismatch (specification B); accounting for measurement error in both types of mismatch resulted in a much more sizeable estimated HMM bonus in comparison to the estimates that only accounted for measurement error in overeducation.

Overall, we thus do not find that a HMM is associated with a wage penalty and it thus seems not to be problematic for those who are treated. On the contrary, in some cases, it even seems to be associated with a wage bonus. As explained in the introduction, a potential explanation may be that these individuals are employed in segments that face labour shortages, resulting in upward wage pressure. This may compensate eventual negative effects resulting from skill underutilization. Or, related to this, these individuals may accept a horizontal mismatch because these jobs offers them compensating wage advantages. In line with these arguments, earlier studies have indeed shown that better pay and promotion opportunities may be a reason to accept a job that is not related with their educational level (Bender & Heywood, 2006) or field of study (Robst, 2007b).

However, it seems that this result is measurement specific. The wage bonus that is associated with HMM for individuals without overeducation seems only significant in the sensitivity analysis that relied on DSA as main measure. Yet, there may be some doubts about the validity of the results based on the DSA. On the basis of the Sargan test, we rejected the null hypothesis that our instruments are exogenous if we accounted for measurement error in overeducation. Further, the C-D statistic showed that there may also be some problem of weak identification in our analysis relying on DSA as main measure. Conversely, the analyses relying on JA as main measure did not deliver indications of unreliable and invalid instruments. Hence, it seems preferable to

rely primarily on the outcomes of our benchmark analysis. Nonetheless, some caution is recommended and more research on this issue would be welcome.

C O N C L U S I O N

Overall, this study indicates that horizontal mismatch is less a problem than overeducation. In line with previous studies, we found that overeducated individuals without field-of-study mismatch earn much less than adequately educated workers with a similar educational background. This suggests that this type of mismatch is rather an involuntary choice, for instance because of a lack of jobs at their own educational level. However, for individuals who are working outside their field of study, this seems not to be the case; some of them even seem to earn a wage premium. This suggests that such a mismatch is much more often voluntary, for instance because employers face labour shortages for these jobs and therefore offer higher wages. Nevertheless, regarding the issue which individuals with a HMM face a wage premium, our results were not stable and depended on the choice of the method for measuring mismatches. Therefore, more research relying on other datasets would also be useful.

R E F E R E N C E S

- Battu, H., Belfield, C., & Sloane, P. (2000), 'How well can we measure graduate overeducation and its effect?', *National Institute Economic Review*, 171, 82-93.
- Bauer, T. (2002), 'Educational mismatch and wages: a panel analysis', *Economics of Education Review*, 21, 221-229.
- Baum, C. F., Schaffer, M. E., & Stillman, S. (2007), 'Enhanced routines for instrumental variables/GMM estimation and testing', *Stata Journal*, 7(4), 465-506.
- Becker, G. (1964), *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*, New York: Columbia University Press.
- Béduwé, C., & Giret, J.F. (2011), 'Mismatch of vocational graduates: What penalty on French labour market?', *Journal of Vocational Behavior*, 78, 68-79.
- Bender, K.A., & Heywood, J.S. (2009), 'Educational Mismatch among Ph.D.s: Determinants and Consequences', NBER Chapters, in: *Science and Engineering Careers in the United States: An Analysis of Markets and Employment*, 229-255. National Bureau of Economic Research, Inc.
- Chevalier, A. (2003), 'Measuring over-education', *Economica*, 70, 509-531.

- Chevalier, A., & Lindley, J. (2009), 'Overeducation and the skills of UK graduates', *Journal of the Royal Statistical Society A*, 172 (2), 307-337.
- Dolado, J., Jansen, M., & Jimeno, J. (2009). 'On-the-job search in a matching model with heterogeneous jobs and workers', *Economic Journal*, 119 (534), 200-228.
- Dolton, P., & Silles, M. (2008), 'The effects of over-education on earnings in the graduate labour market', *Economics of Education Review*, 27, 125-139.
- Frank, R. (1978), 'Why women earn less: the theory and estimation of differential overqualification', *American Economic Review*, 68, 360-373.
- Frenette, M. (2004), 'The overqualified Canadian graduate: the role of the academic program in the incidence, persistence, and economic returns to overqualification', *Economics of Education Review*, 23, 29-45.
- Green, F., McIntosh, S. & Vignoles, A. (2002), 'The Utilization of Education and Skills: Evidence from Britain,' *The Manchester School*, 70(6), 792–811
- Groot, W. & Maassen van den Brink, H. (2000), 'Overeducation in the labor market: a meta-analysis', *Economics of Education Review*, 19(2), 149–158.
- Hartog, J. (2000), 'Overeducation and earnings: where are we, where should we go?', *Economics of Education Review*, 19, 131–147.
- Jovanovic, B. (1979), 'Job Matching and the Theory of Turnover', *Journal of Political Economy*, 87 (5), 972 -990.
- Korpi, T., & Tählin, M. (2009), 'Education mismatch, wages, and wage growth: overeducation in Sweden 1974-2000', *Labour Economics*, 16, 183-193.
- Leuven, E., & Oosterbeek, H. (2011), 'Overeducation and Mismatch in the Labor Market', in Hanushek, E., Machin, S., and Woessman, L. (ed.), *Handbook of the Economics of Education*, 4, 283-326.
- Levels, M., van der Velden, R., & Allen, J. (2014), 'Educational mismatches and skills: new empirical tests of old hypotheses', *Oxford Economic Papers*, 66, 959-982.
- Mavromaras, K., McGuinness, S., O'Leary, N., Sloane, P., & Wei, Z. (2013), 'Job Mismatches and Labour Market Outcomes: Panel Evidence on Australian University Graduates', *Economic Record*, 89, 382-395.
- Mincer, J. (1974). *Schooling, experience, and earnings*. New York: NBER
- Robst, J. (1994), 'Measurement error and the returns to excess schooling', *Applied Economics Letters*, 1, 142-144.
- Robst, J. (2007a), 'Education and job match: the relatedness of college major and work', *Economics of Education Review*, 26, 397-407.

- Robst, J. (2007b), 'Education, College Major, and Job match: Gender Differences in Reasons for Mismatch', *Education Economics*, 15, 159-175.
- Robst, J. (2008), 'Overeducation and college major: expanding the definition of mismatch between schooling and jobs', *The Manchester School*, 76, 349-368.
- Rubb, S. (2003), 'Overeducation in the labor market: a comment and re-analysis of a meta-analysis', *Economics of Education Review*, 22, 621-629.
- Sellami, S., Verhaest, D., & Van Trier, W. (2015), *Measuring field-of-study mismatch: a comparative analysis of the different methods*, unpublished manuscript.
- SONAR (2003), *Hoe maken Vlaamse jongeren de overgang van school naar werk?*, basisrapportering cohorte 1978 (eerste golf), 147p.
- SONAR (2004), *Hoe maken Vlaamse jongeren de overgang van school naar werk?*, basisrapportering cohorte 1976 (tweede golf), 116p.
- SONAR (2005), *Hoe maken Vlaamse jongeren de overgang van school naar werk?*, technisch rapport cohorte 1980 (eerste golf), 181p.-
- Sohn, K. (2010), 'The role of cognitive and noncognitive skills in overeducation', *Journal of Labor Research*, 31, 124-145.
- Stock, J., Wright, J., & Yogo, M. (2002), 'A Survey of Weak Instruments and Weak Identification in Generalized Method of Moments', *Journal of the American Statistical Association*, 20, 518-529.
- Stock, J. H., & Yogo, M. (2005). 'Testing for Weak Instruments in Linear IV Regression', in *Identification and Inference for Econometric Models: Essays in Honor of Thomas Rothenberg*, (ed.) D.W. Andrews and J. H. Stock, 80-108. Cambridge University Press.
- Støren, L. A., & Arnesen, C. A. (2007), 'Winners and Losers' in *The Flexible Professional in the Knowledge Society: General Results of the REFLEX Project*, The Netherlands: Research Centre for Education and the Labour Market, University of Maastricht.
- Thurow, L. (1975), *Generating Inequality*, New York: Basic Books.
- Van der Velden, R. & van Smoorenburg, M. (1999), 'Overscholing en beloning: Het effect van verschillende meetmethoden', *Tijdschrift voor Arbeidsvraagstukken*, 15 (2), 111-123.
- Verhaest, D. & Omeij, E. (2006), 'Measuring the Incidence of Over- and Undereducation', *Quality and Quantity*, 40, 783-803

- Verhaest, D., & Omeij, E. (2012), 'Overeducation, undereducation and earnings: further evidence on the importance of ability and measurement error bias', *Journal of Labor Research*, 33, 76-90.
- Verhaest, D., Van Trier, W., & Sellami, S. (2011), 'Welke factoren bepalen de aansluiting van onderwijs en beroep? Een onderzoek bij Vlaamse afgestudeerden uit het hoger onderwijs', *Tijdschrift voor Arbeidsvraagstukken*, 27, 416-436.
- Verhaest, D., Sellami, S., & van der Velden, R. (2015), 'Differences in horizontal and vertical mismatches across countries and fields of study', *International Labour Review*, forthcoming.
- Wolbers, M. (2003), 'Job mismatches and their labour market effects among school-leavers in Europe', *European Sociological Review*, 19, 249-266.

A P P E N D I X

APPENDIX A DETAILED EXPLANATION OF THE ESTIMATED MODELS

For the analysis of the panel data, we rely on two basics models: (1) the random-effects model and (2) the fixed-effects model. One of the main advantages of using a random-effects model is that we can include time-invariant variables, such like gender or years of education (cf. *infra*). In the fixed-effects model these variables are absorbed by the fixed effects. The random-effects model assumes that the variation across entities is random and uncorrelated with the independent variables³⁵ that are included in the model. Random-effects estimators are more efficient and should therefore be used if the underlying assumptions are believed to be satisfied. If not, the random effects estimator will be biased and the fixed effects model is the correct estimation procedure. In the overeducation literature, it is usually assumed that overeducation partly results from the lower ability of individuals (e.g. Leuven & Oosterbeek, 2011). Given that innate ability is also likely to affect wages, the random-effects model will not be adequate and the estimated coefficients will be biased.

In our study, we distinguish between three specifications that differ with respect to the mismatch variables that are included. In a first specification, **Specification A**, we only include $YOVER_{it}$, allowing to compare our results with other studies that did not account for horizontal mismatches. This model has the following specifications for the random (A.1) and fixed effects (A.2) analyses respectively:

$$\ln Y_{it} = \alpha_1 YOVER_{it} + \beta_1 YEDUC_i + \mathbf{X}_i \boldsymbol{\varphi}_1 + \mathbf{I}_{it} \boldsymbol{\theta}_1 + \mu_{1i} + \varepsilon_{1it} \quad (\text{A.1})$$

$$\ln Y_{it} = \alpha_2 YOVER_{it} + \mathbf{I}_{it} \boldsymbol{\theta}_2 + \mu_{2i} + \varepsilon_{2it} \quad (\text{A.2})$$

where Y_{it} = net wages of individual i at time t (with $t=1$ for start first job, $t=2$ for observation at age 26, $t=3$ for observation at age 29), $YOVER_{it}$ = years of overeducation, $YEDUC_i$ = years of education, \mathbf{X}_i = a vector of fixed observed individual characteristics, \mathbf{I}_{it} = a vector of observed characteristics that vary within individuals, μ_{1i} or μ_{2i} = an individual random or fixed effect, and error terms ε_{1it} and ε_{2it} .

In a second model, **Specification B**, we add HMM_{it} , which is a dummy for horizontal mismatch. By adding horizontal mismatch, we have the following specifications for the random and fixed effects models respectively:

$$\ln Y_{it} = \alpha_3 YOVER_{it} + \beta_3 YEDUC_i + \delta_3 HMM_{it} + \mathbf{X}_i \boldsymbol{\varphi}_3 + \mathbf{I}_{it} \boldsymbol{\theta}_3 + \mu_{3i} + \varepsilon_{3it} \quad (\text{A.3})$$

³⁵ We can test this by using the Hausman specification test, cf. Table 3.5.

$$\ln Y_{it} = \alpha_4 YOVER_{it} + \beta_4 HMM_{it} + \mathbf{I}_{it} \boldsymbol{\theta}_4 + \boldsymbol{\mu}_{4i} + \boldsymbol{\varepsilon}_{4it} \quad (\text{A.4})$$

In a last specification, **Specification C**, we also include the interaction effect $YOVER_{it} * HMM_{it}$:

$$\ln Y_{it} = \alpha_5 YOVER_{it} + \beta_5 YEDUC_i + \delta_5 HMM_{it} + \gamma_5 YOVER_{it} * HMM_{it} + \mathbf{X}_i \boldsymbol{\varphi}_5 + \mathbf{I}_{it} \boldsymbol{\theta}_5 + \boldsymbol{\mu}_{5i} + \boldsymbol{\varepsilon}_{5it} \quad (\text{A.5})$$

$$\ln Y_{it} = \alpha_6 YOVER_{it} + \beta_6 HMM_{it} + \gamma_6 YOVER_{it} * HMM_{it} + \mathbf{I}_{it} \boldsymbol{\theta}_2 + \boldsymbol{\mu}_{2i} + \boldsymbol{\varepsilon}_{2it} \quad (\text{A.6})$$

Every specification is estimated relying on six types of estimation methods, depending on whether random or fixed effects are assumed and depending on the variables that are instrumented to account for measurement error. To control for measurement error, we use, in our benchmark analysis, the two subjective measures of mismatch as instrument for the objective one. To disentangle the effect resulting from the different types of measurement errors, we conduct two different analyses. In a first analysis, we only control for random measurement error in overeducation. In second analysis, we investigate if there are any differences in effects when also random measurement error in horizontal mismatch is accounted for.

In the first analysis, only $YOVER_{it}$ is thus considered to be endogenous. The specifications for the first stage estimations, in the case of **Specification A**, are the following for the random- and fixed-effects models respectively:

$$YOVER_{it}^{JA} = \eta_7 OVER_{it}^{DSA} + \lambda_7 YOVER_{it}^{ISA} + \delta_7 YEDUC_i + \mathbf{X}_i \boldsymbol{\varphi}_7 + \mathbf{I}_{it} \boldsymbol{\theta}_7 + \boldsymbol{\mu}_{7i} + \boldsymbol{\varepsilon}_{7it} \quad (\text{A.7})$$

$$YOVER_{it}^{JA} = \eta_8 OVER_{it}^{DSA} + \lambda_8 YOVER_{it}^{ISA} + \mathbf{I}_{it} \boldsymbol{\theta}_8 + \boldsymbol{\mu}_{8i} + \boldsymbol{\varepsilon}_{8it} \quad (\text{A.8})$$

For **Specification B**, we have the following specifications for random effects (A.9) and fixed effects (A.10) first-stage equations if only $YOVER_{it}$ is considered endogenous:

$$YOVER_{it}^{JA} = \eta_9 OVER_{it}^{DSA} + \lambda_9 YOVER_{it}^{ISA} + \pi_9 HMM_{it}^{JA} + \delta_9 YEDUC_i + \mathbf{X}_i \boldsymbol{\varphi}_9 + \mathbf{I}_{it} \boldsymbol{\theta}_9 + \boldsymbol{\mu}_{9i} + \boldsymbol{\varepsilon}_{9it} \quad (\text{A.9})$$

$$YOVER_{it}^{JA} = \eta_{10} OVER_{it}^{DSA} + \lambda_{10} YOVER_{it}^{ISA} + \pi_{10} HMM_{it}^{JA} + \mathbf{I}_{it} \boldsymbol{\theta}_{10} + \boldsymbol{\mu}_{10i} + \boldsymbol{\varepsilon}_{10it} \quad (\text{A.10})$$

In the interaction term specification (**Specification C**), also the interaction term $YOVER_{it} * HMM_{it}$ is assumed to be measured with error due to the error in $YOVER_{it}$. We thus have two first-stage equations for each estimation, which include the following additional instruments: $OVER_{it}^{DSA} * HMM_{it}^{JA}$ and $YOVER_{it}^{ISA} * HMM_{it}^{JA}$.

In a second IV analysis, we also consider HMM_{it} to be endogenous. For **Specification B**, this results in the following first stage equations:

$$YOVER_{it}^{JA} = \eta_{11}OVER_{it}^{DSA} + \lambda_{11}YOVER_{it}^{ISA} + \pi_{11}HMM_{it}^{DSA} + \kappa_{11}HMM_{it}^{ISA} + \delta_{11}YEDUC_i + \mathbf{X}_i\boldsymbol{\phi}_{11} + \mathbf{I}_{it}\boldsymbol{\theta}_{11} + \boldsymbol{\mu}_{11i} + \boldsymbol{\varepsilon}_{11it} \quad (\text{A.11})$$

$$HMM_{it}^{JA} = \eta_{12}OVER_{it}^{DSA} + \lambda_{12}YOVER_{it}^{ISA} + \pi_{12}HMM_{it}^{DSA} + \kappa_{12}HMM_{it}^{ISA} + \delta_{12}YEDUC_i + \mathbf{X}_i\boldsymbol{\phi}_{12} + \mathbf{I}_{it}\boldsymbol{\theta}_{12} + \boldsymbol{\mu}_{12i} + \boldsymbol{\varepsilon}_{12it} \quad (\text{A.12})$$

$$YOVER_{it}^{JA} = \eta_{13}OVER_{it}^{DSA} + \lambda_{13}YOVER_{it}^{ISA} + \pi_{13}HMM_{it}^{DSA} + \kappa_{13}HMM_{it}^{ISA} + \mathbf{I}_{it}\boldsymbol{\theta}_{13} + \boldsymbol{\mu}_{13i} + \boldsymbol{\varepsilon}_{13it} \quad (\text{A.13})$$

$$HMM_{it}^{JA} = \eta_{14}OVER_{it}^{DSA} + \lambda_{14}YOVER_{it}^{ISA} + \pi_{14}HMM_{it}^{DSA} + \kappa_{14}HMM_{it}^{ISA} + \mathbf{I}_{it}\boldsymbol{\theta}_{14} + \boldsymbol{\mu}_{14i} + \boldsymbol{\varepsilon}_{14it} \quad (\text{A.14})$$

To conclude, for **Specification C**, also the interaction terms are considered to be endogenous. So, we have three first-stage equations for each estimation, with the following instruments additionally included each time:

$$OVER_{it}^{DSA} * HMM_{it}^{DSA} \text{ and } YOVER_{it}^{ISA} * HMM_{it}^{ISA} .$$

In this appendix, we discuss how alternative measures of overeducation and horizontal mismatch can be used as instruments to account for random measurement error. As discussed earlier, our benchmark method can be measured with error. This may be due to the chosen aggregation level or the used classification system. This classification error may cause random measurement error. A random measurement error biases the effects of both mismatches on wages.

Suppose that wages (y) only depend upon years of overeducation:

$$\ln Y_{it} = \alpha YOVER_{it} + \varepsilon_{it} \quad (\mathbf{B.1})$$

Where ε_{it} is an error term with a zero mean and variance σ^2 . Further, assume we have two independent indicators, \widetilde{YOVER}^1 and \widetilde{YOVER}^2 , which each measure $YOVER$ with random error³⁶. The measured values are thus equal to the sum of true value of $YOVER_{it}$ and a measurement error μ_t ,

$$\widetilde{YOVER}_{it}^1 = YOVER_{it} + \mu_{t1} \quad (\mathbf{B.2})$$

$$\widetilde{YOVER}_{it}^2 = YOVER_{it} + \mu_{t2} \quad (\mathbf{B.3})$$

The measurement error μ_{t1} and μ_{t2} have zero mean and constant variance. These measurement errors are random and thus independent of the error term ε_{it} . Given equation (B.1), (B.2) and (B.3), we have the following equations:

$$\ln Y_{it} = \alpha \widetilde{YOVER}_{it}^1 + (\varepsilon_{it} - \alpha \mu_{t1}) \quad (\mathbf{B.4})$$

$$\ln Y_{it} = \alpha \widetilde{YOVER}_{it}^2 + (\varepsilon_{it} - \alpha \mu_{t2}) \quad (\mathbf{B.5})$$

A standard OLS estimation of these equations will lead to biased estimates of α , because $E((\varepsilon_{it} - \alpha \mu_{t1}) \widetilde{YOVER}_{it}^1) \neq 0$ and $E((\varepsilon_{it} - \alpha \mu_{t2}) \widetilde{YOVER}_{it}^2) \neq 0$. By using instrumental variables techniques, we are able to correct for biases resulting from random measurement error. We might use \widetilde{YOVER}^2 as an instrument for \widetilde{YOVER}^1 (and vice versa). This results in the following second-step equations, given the first step equations ($\widetilde{YOVER}_{it}^1 = \widehat{\pi}_1 \widetilde{YOVER}_{it}^2 + \varepsilon_{t1}$) and ($\widetilde{YOVER}_{it}^2 = \widehat{\pi}_1 \widetilde{YOVER}_{it}^1 + \varepsilon_{t1}$):

³⁶ We can make the same assumptions for HMM_{it} .

$$\ln Y_{it} = \alpha \left(\widehat{\bar{n}}_1 \widetilde{YOVER}_{it}^2 \right) + (\varepsilon_{it} + \alpha(\varepsilon_{t1} - \mu_{t1})) \quad (\mathbf{B.6})$$

$$\ln Y_{it} = \alpha \left(\widehat{\bar{n}}_2 \widetilde{YOVER}_{it}^1 \right) + (\varepsilon_{it} + \alpha(\varepsilon_{t2} - \mu_{t2})) \quad (\mathbf{B.7})$$

Whether this procedure is appropriate depends on the relation of the measurements errors and the error term in equation (B1). If the measurement error terms are, as assumed, purely random and thus not correlated with the outcome variable, i.e. $E(\mu_{t1} \varepsilon_{it}) = 0$ and $E(\mu_{t2} \varepsilon_{it}) = 0$, both (B.6) and (B.7) deliver a consistent estimate of α and, hence, each measure can be used as instrument for the other one. Alternatively, if the measurement error term of one of the measures, for instance \widetilde{YOVER}^1 , would be spuriously correlated with the outcome variable, i.e. $E(\mu_{t1} \varepsilon_{it}) \neq 0$ and $E(\mu_{t2} \varepsilon_{it}) = 0$, only the estimation of (B.7) would result in a consistent estimates of α . In the case when the measurement errors of both indicators would be correlated with the outcome variable, neither of the two estimations would result in a consistent estimate of α .

TABLE C INCIDENCE OF OVEREDUCATION AND HORIZONTAL MISMATCH

	JA			DSA			ISA		
	Start first job	At age 26	At age 29	Start first job	At age 26	At age 29	Start first job	At age 26	At age 29
Full Match	0.404	0.475	0.437	0.721	0.803	0.818	0.464	0.711	0.686
Mere Vertical mismatch	0.343	0.281	0.301	0.118	0.090	0.082	0.067	0.088	0.050
Mere horizontal mismatch	0.072	0.103	0.109	0.044	0.057	0.066	0.255	0.096	0.133
Full Mismatch	0.181	0.142	0.154	0.117	0.050	0.034	0.211	0.104	0.131

Data source: SONAR 1976 (23, 23, 29), 1978 (23, 26, 29), 1980 (23, 29), own calculations; number of individuals = 2235, number of observations= 5066.

TABLE D INCLUDED VARIABLES

VARIABLES	MEASURED	(%)
TIME INVARIANT VARIABLES		
GENDER	Man (dummy)	40.1
ETNICITY	Non-European descendent (dummy)	0.77
YEAR OF BIRTH	1978	30.3
	1980	32.7
YEARS OF EDUCATION	LT = 15 years	64.9
	HT= 16 years	35.1
FIELDS OF STUDY	General fields-of study	
	Economics, Business and Law	29.7
	Science, Applied Sciences and Technique	17.0
	Arts	2.1
	Applied Biological Sciences and – techniques	2.7
	Health & Welfare	13.1
	Architecture	0.9
	Education	17.3
	Social Sciences	11.8
	Philosophy, Literature and Applied Linguistics	5.4
TIME VARIANT VARIABLES (MEAN)		
WORK EXPERIENCE	Experience gained during the labour market career of an individual in years (First job =0)	2.76
TENURE	Duration within a certain job in years, calculated by date of survey –starting date of the last registered job (First job=0)	1.65
COHABITING	Yes (dummy)	0.42
HAVING A CHILD	Yes (dummy)	0.04
PERCENTAGE OF EMPLOYMENT	100% full time	96.1
SIZE OF THE FIRM	less than 10 employees	0.15
	between 10 and 49 employees	0.30
	between 50 and 249 employees	0.27
	250 or more employees.	0.27
SECTOR OF EMPLOYMENT	Agriculture,	0.00
	Mining and Quarrying,	0.02
	Textile,	0.07
	Industry,	0.03
	Education,	0.21
	Health,	0.20
	Electricity,	0.05
	Transport and Communication,	0.05
	Finances,	0.06
	Rental Services,	0.13
	Food,	0.01
	Wholesaling,	0.07
	Unknown sector	0.09
	SHIFT WORK	No (dummy)
	Unknown (dummy)	0.00
NIGHT WORK	Night work	0.04
	Day-Night work	0.04

Data source: SONAR 1976 (23, 23, 29), 1978 (23, 26, 1980 (23, 29), own calculations; number of individuals = 2235

TABLE E THE IMPACT OF EDUCATIONAL MISMATCH ON LN WAGES (WITHOUT INDUSTRY CHARACTERISTICS)

	Standard panel-data estimates				IV panel-data estimates (<i>YOVER</i> endogenous)				IV panel-data estimates (<i>YOVER</i> and <i>HMM</i> endogenous)			
	Random effects (1)		Fixed effects (2)		Random effects (3)		Fixed effects (4)		Random effects (5)		Fixed effects (6)	
Specification A												
YEDUC	0.118***	(0.006)			0.117***	(0.007)						
<i>YOVER</i>	-0.019***	(0.001)	-0.014***	(0.002)	-0.048***	(0.003)	-0.040***	(0.006)				
Overall R²	0.335		0.209		0.283		0.166					
Within R²	0.333		0.338		0.283		0.296					
Specification B												
YEDUC	0.124***	(0.007)			0.116***	(0.007)			0.115***	(0.007)		
<i>YOVER</i>	-0.019***	(0.001)	-0.014***	(0.002)	-0.052***	(0.004)	-0.045***	(0.007)	-0.060***	(0.007)	-0.068***	(0.016)
<i>HMM</i>	-0.009	(0.006)	-0.001	(0.011)	0.025***	(0.007)	0.037**	(0.014)	0.092**	(0.037)	0.237**	(0.105)
Overall R²	0.320		0.182		0.276		0.160		0.246		0.096	
Within R²	0.326		0.330		0.278		0.285		0.257		0.127	
Specification C												
YEDUC	0.125***	(0.007)			0.113***	(0.007)			0.112***	(0.008)		
<i>YOVER</i>	-0.016***	(0.002)	-0.016***	(0.003)	-0.065***	(0.007)	-0.067***	(0.013)	-0.070***	(0.012)	-0.082***	(0.022)
<i>HMM</i>	0.003	(0.007)	-0.006	(0.013)	-0.010	(0.013)	-0.029	(0.025)	0.051	(0.045)	0.123	(0.119)
<i>YOVER</i> * <i>HMM</i>	-0.007***	(0.003)	0.003	(0.004)	0.022***	(0.008)	0.037**	(0.014)	0.019	(0.016)	0.032	(0.026)
Overall R²	0.322		0.180		0.259		0.131		0.239		0.101	
Within R²	0.325		0.331		0.273		0.265		0.257		0.166	

YEDUC years of education, *OVER* overeducation, *HMM* horizontal mismatch.

The following time- invariant variables are included in the random effects models: dummies for gender, non – European descent, year of birth and fields- of study.

The following control variables are included in every model: experience, experience squared, tenure, tenure squared, percentage of full employment, dummies for cohabiting, having a child , night work, shift work , observation at age of 26, observation at age 29.

Number of individuals = 2235, number of observations= 5066

p<0.10;*p<0.05;****p<0.01; Standard errors are in parentheses

TABLE F THE IMPACT OF EDUCATIONAL MISMATCH ON LN WAGES (WITH ‘NO PARTICULAR FIELD’ AS ADDITIONAL INSTRUMENT)

	IV panel-data estimates (<i>YOVER</i> and <i>HMM</i> endogenous)			
	Random effects (5)		Fixed effects (6)	
Specification B				
YEDUC	0.113***	(0.007)	-	-
<i>YOVER</i>	-0.060***	(0.013)	-0.070***	(0.016)
<i>HMM</i>	0.043	(0.060)	0.205**	(0.100)
Overall R²	0.282		0.131	
Within R²	0.274		0.161	
Specification C				
YEDUC	0.111***	(0.007)	-	-
<i>YOVER</i>	-0.066***	(0.012)	-0.077***	(0.022)
<i>HMM</i>	0.016	(0.042)	0.119	(0.114)
<i>YOVER</i> * <i>HMM</i>	0.013	(0.015)	0.022	(0.025)
Overall R²	0.277		0.141	
Within R²	0.275		0.200	

YEDUC years of education, *YOVER* years of overeducation, *HMM* horizontal mismatch.

The following time- invariant variables are included in the random effects models: dummies for gender, non – European descent, year of birth and fields- of study.

The following control variables are included in every model: experience, experience squared, tenure, tenure squared, percentage of full employment, dummies for cohabiting, having a child , night work, shift work , observation at age of 26, observation at age 29.

Number of individuals = 2235, number of observations= 5066

p<0.10; *p<0.05; *.p<0.01; Standard errors are in parentheses

TABLE G THE IMPACT OF EDUCATIONAL MISMATCH ON LN WAGES (DSA MEASURE)

	Standard panel-data estimates				IV panel-data estimates (<i>OVER</i> endogenous)				IV panel-data estimates (<i>OVER</i> and <i>HMM</i> endogenous)			
	Random effects (1)		Fixed effects (2)		Random effects (3)		Fixed effects (4)		Random effects (5)		Fixed effects (6)	
Specification A												
YEDUC	0.129***	(0.007)			0.145***	(0.007)						
<i>OVER</i>	-0.082***	(0.006)	-0.054***	(0.009)	-0.244***	(0.007)	-0.157***	(0.027)				
Overall R ²	0.338		0.188		0.289		0.179					
Within R ²	0.335		0.346		0.269		0.316					
Specification B												
YEDUC	0.128***	(0.007)			0.148***	(0.008)			0.154***	(0.009)		
<i>OVER</i>	-0.073***	(0.007)	-0.052***	(0.009)	-0.286***	(0.023)	-0.186***	(0.036)	-0.348***	(0.054)	-0.271***	(0.103)
<i>HMM</i>	-0.027***	(0.007)	-0.009	(0.010)	0.055***	(0.012)	0.035**	(0.016)	0.142**	(0.063)	0.167	(0.125)
Overall R ²	0.340		0.182		0.269		0.166		0.231		0.113	
Within R ²	0.335		0.330		0.250		0.298		0.214		0.194	
Specification C												
YEDUC	0.128***	(0.007)			0.148***	(0.008)			0.147***	(0.008)		
<i>OVER</i>	-0.061***	(0.008)	-0.045***	(0.011)	-0.276***	(0.031)	-0.157***	(0.045)	-0.236***	(0.049)	-0.140**	(0.036)
<i>HMM</i>	-0.004	(0.010)	0.004	(0.014)	0.062***	(0.018)	0.056**	(0.024)	0.262***	(0.089)	0.403**	(0.184)
<i>OVER*HMM</i>	-0.048***	(0.015)	-0.027	(0.019)	-0.018	(0.038)	-0.055	(0.048)	-0.287**	(0.114)	-0.408**	(0.204)
Overall R ²	0.342		0.193		0.272		0.174		0.240		0.098	
Within R ²	0.336		0.347		0.253		0.309		0.219		0.102	

YEDUC years of education, *OVER* overeducation, *HMM* horizontal mismatch.

The following time- invariant variables are included in the random effects models: dummies for gender, non – European descent, year of birth and fields- of study.

The following control variables are included in every model: experience, experience squared, tenure, tenure squared, percentage of full employment, dummies for cohabiting, having a child , night work, shift work , observation at age of 26, observation at age 29.

Number of individuals = 2235, number of observations= 5066

p<0.10;*p<0.05;****p<0.01; Standard errors are in parentheses

TABLE H TEST STATISTICS ON THE VALIDITY AND RELIABILITY OF THE IV FIXED-EFFECTS ESTIMATES (P VALUES IN PARENTHESES)

Estimation procedure (table G)	YOVER endogenous (4)	YOVER and HMM endogenous (6)
Hausman test (null: IV RE estimates are unbiased)		
Specification A	80.2 (0.000)	-
Specification B	87.7 (0.000)	107.2 (0.000)
Specification C	92.0 (0.000)	85.8 (0.000)
Hausman test (null: standard FE estimates are unbiased)		
Specification A	15.6 (0.997)	-
Specification B	15.2 (0.999)	11.0 (0.999)
Specification C	15.8 (0.999)	13.1 (0.998)
Sargan Chi² test of over-identifying restrictions		
Specification A	2.7 (0.100)	-
Specification B	2.7 (0.104)	5.0 (0.082)
Specification C	4.6 (0.098)	3.0 (0.395)
F test first stage equation on excluded IV's		
Specification A: YOVER	175.5 (0.000)	-
Specification B: YOVER	152.8 (0.000)	96.0 (0.000)
Specification B: HMM	-	78.6 (0.000)
Specification C: YOVER	101.2 (0.000)	64.9 (0.000)
Specification C: HMM	-	66.9 (0.000)
Specification C: YOVER*HMM	772.8 (0.000)	102.9 (0.000)
Angrist-Pischke multivariate F test of excluded IV's		
Specification A: YOVER	175.5 (0.000)	-
Specification B: YOVER	152.8 (0.000)	10.0 (0.000)
Specification B: HMM	-	8.2 (0.000)
Specification C: YOVER	42.4 (0.000)	19.7 (0.000)
Specification C: HMM	-	3.2 (0.012)
Specification C: YOVER*HMM	324.2 (0.000)	4.2 (0.002)
Anderson-Canon corr. LM statistic (Under identification test)		
Specification A	315.8 (0.000)	-
Specification B	279.0 (0.000)	17.6 (0.005)
Specification C	148.8 (0.000)	21.3 (0.003)
Cragg- Donald Wald F statistic (Weak identification test)		
Specification A	175.5*	-
Specification B	152.8*	4.4
Specification C	38.7*	3.5

Number of individuals = 2235, number of observations = 5066

For C-D Wald F test, * equal 5% confidence of less than 20% maximal IV relative bias. The critical values are on request

*p<0.10;**p<0.05***p<0.01

CHAPTER 4

EDUCATION AS INVESTMENT, CONSUMPTION OR ADAPTING TO SOCIAL NORM: IMPLICATIONS FOR EDUCATIONAL MISMATCH AMONG GRADUATES³⁷

Sana Sellami, Dieter Verhaest, Walter Nonneman, Walter Van Trier

ABSTRACT

We investigate the relationship between different motives to participate in higher education (investment, educational consumption, student life consumption and social norms) and the likelihood to be overeducated during the first years on the labour market. We also look at whether these motives affect the impact of overeducation on wages and job satisfaction. For this, we rely on representative data for Flemish (Belgian) graduates. To correct for ability and measurement error bias, we conduct a panel-data instrumental variable analysis. Key findings are that individuals motivated by education consumption are less likely to be overeducated but face a stronger job satisfaction penalty to overeducation than other workers. Our results also suggest that individuals who continue in education because of student life consumption have a higher likelihood of overeducation.

Keywords: educational motives, educational choices, wages, job satisfaction, underemployment, overqualification, overeducation

³⁷ We thank Pierre Coppieters, Karel Neels, Seamus McGuinness, Rolf van der Velden, the participants of the workshop of the European Network on Transitions in Youth (Barcelona, 2014) for their comments and suggestions on an earlier version of this paper. This research benefited from financial support of the Flemish Government in the framework of the SONAR research program and the Policy Research Centre for Study and School Careers (SSL).

INTRODUCTION

Over the past decades, an increasing number of young people enrolled in colleges and universities, resulting in a rising number of labour market entrants holding a higher education qualification (see Barro & Lee, 2013). A widespread interpretation of this development relies on standard human capital (Becker, 1964; Mincer, 1974) or signalling (cf. Arrow, 1973; Spence, 1973) models. According to both models, the primary motivation to attend college is to improve future labour market chances. The use of these models is substantiated by the well-established fact that better educated individuals earn higher wages and have a lower probability to be unemployed than lower educated individuals.

However, recently some concerns have been raised about potential overinvestment in higher education. These concerns stem, amongst others, from studies showing that a significant number of individuals are employed in jobs below their level of education (Groot & Maassen van den Brink, 2000; McGuinness, 2006). This is a reason for concern since we know from the research literature that overeducated individuals receive lower earnings (Hartog, 2000; Rubb, 2003) and are less satisfied with their jobs (Tsang, 1987; Allen & van der Velden, 2001) than adequately educated individuals with similar levels of education. Another concern relates to the fact that rising participation rates in higher education as well as the labour market outcomes are not evenly spread amongst the different fields of education. Indeed, there are significant differences in risk of overeducation across graduates from different higher educational types and disciplines. College graduates who major in Engineering and Health tend to have lower probability of overeducation than graduates from majors such as Humanities, Arts and Theology (Frenette, 2004; Verhaest *et al.*, 2015). Research also shows that graduates of different fields have different wages, individuals from majors in Business and Engineering have higher wages than graduates in major as Humanities and Arts (a.o. Hilmer & Hilmer, 2012).

Given that certain fields of study and qualification levels consistently yield a higher likelihood of over-education, one may wonder why students keep on choosing these programs. A possible explanation rests on the classic distinction between education conceived of as either an investment or a consumption good (cf. Schaafsma, 1979; Kodde & Ritzen, 1984; Alstadsæter, 2011). Indeed, students may get immediate satisfaction from participating in higher education. They may enjoy acquiring knowledge; they may attend college because they dislike working or they may opt for the joys of student life. In each of these cases, the investment effect of participating in higher education on later labour market outcomes would be dominated or blurred, if not annihilated by the satisfaction from consuming education itself. Another possible explanation for why individuals participate in higher education and choose a particular educational field points at the importance of social norms guiding their choices. For many adolescents, going to college or choosing a particular field of study may be self-evident given the social context in which they grow up. While the role of the social norms has long been recognized within sociology (Coleman,

1961), its role has only recently attracted considerable attention by economists. According to Akerlof and Kranton (2000; 2002), one's utility depends on the extent to which one's choices enhance her self-image, which in turn depends on the social environment.

Several studies have already confirmed that a large part of the return to college is indeed related to the consumption value of education (see, e.g., Carneiro *et al.*, 2003; Arcidiacono, 2004). A number of recent papers have also demonstrated the role of social norms for educational and occupational choices (e.g. Falck *et al.*, 2012; Favara, 2012). However, to the best of our knowledge, no studies have yet looked at the relation between consumption or social norms as motives for participation in higher education and labour market outcomes such as overeducation. The specific reasons why and how young people participate in higher education may affect the likelihood to be overeducated through several channels. Firstly, to the extent that students are driven by other than investments motives, it may be rational to choose for programs that increase the risk of overeducation. Secondly, these motives may affect one's study effort and academic achievement in terms of grades, a factor which has been shown to influence the likelihood to become overeducated (Battu *et al.*, 1999; Büchel & Pollmann-Schult, 2004; Verhaest & Omey, 2010). Finally, different motives are likely to be associated with different labour market aspirations, resulting in differences in occupational choices and, hence, differences in one's willingness to accept job offers (not) matching one's educational background. Moreover, apart from affecting one's likelihood to be overeducated, these differences in aspirations may also affect the impact that overeducation has on monetary and non-monetary outcomes.

In this paper, we explore, for a sample of graduates to what extent the likelihood to be overeducated indeed differs depending on the motive (investment, consumption, social norms) for participation in higher education. We also investigate whether overeducation has different consequences in terms of wages and job satisfaction depending on these motives. For this analysis, we rely on representative data regarding the transition from higher education to work in Flanders (Belgium). The data deliver several measures on overeducation, which allow to investigate the robustness of our outcomes for alternative measures and to account for measurement error. Moreover, panel-data techniques are applied to account for unobserved heterogeneity.

The remainder of the paper is structured as follows. In the next section, we explain our theoretical framework and formulate our hypotheses. Thereafter, we will present the data and the used methodology. Further, we give an overview of our results. We end with a discussion and some general conclusions.

THEORETICAL FRAMEWORK AND HYPOTHESES

There exists a vast literature on the factors influencing the choices of young people when entering tertiary education. In this paper we intend to add to this literature by investigating whether young people's educational motives account for the match between their education and labour market needs. The background of this question is the widely documented fact that young people keep choosing educational tracks with a high(er) probability of directing them to jobs for which they are overeducated. To study this question, we relate various motives for participating in higher education (investment, educational consumption, student life consumption and adapting to social norms) to labour market outcomes.

FIGURE 4.1 CONCEPTUAL MODEL

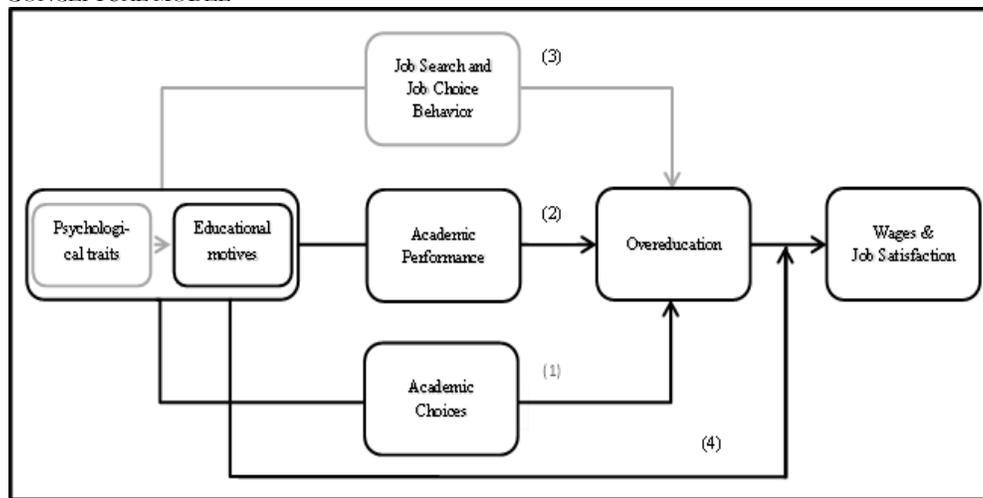


Figure 4.1 displays our conceptual framework, with the black boxes and arrows representing relationships that are directly tested in this paper, whereas the grey boxes and arrows represent variables and relationships being tested only indirectly. We expect the educational motives to affect the likelihood to be overeducated through three main channels. Firstly, they are likely to affect the academic choices in terms of the level of the degree and the field of study (Figure 4.1, Arrow 1). Secondly, we expect an impact on academic performance, for instance reflected in the grades with which the individual graduates or the degree of grade retention (Figure 4.1, Arrow 2). And thirdly, we expect the educational motives to be related to the job search and job choice behaviour of the graduate (Figure 4.1, Arrow 3). Finally, we also assume the educational motives to affect the impact of overeducation on wages and job satisfaction (Figure 4.1, Arrow 4). Below, we discuss each of the elements of our model in more detail and formulate our hypotheses.

Educational motives

First, we conceive of educational motives as driven by general preferences and interests. Individuals differ in their preferences and interest. Some individuals are likely to engage in activities because of materialistic desires, others rather participate because they feel pressured by their social context or because they are just interested in particular activities. These different attitudes can be sources of motivations to attend college. Given the research issue in this paper, we use an economic approach and distinguish three different educational motives: investment, consumption and social norms. Within consumption motives, we distinguish between two kinds of motives: (i) educational consumption and (ii) student life consumption³⁸. Basically, we thus expect educational motives to be driven by these general preferences and interests. Given that these factors are not measured in our dataset, we do not formulate specific hypotheses regarding this relationship.

In the economics literature, the dominant framework explaining the decision of students to participate in education is the human capital theory, initiated by economists such as Becker (1964) and Mincer (1975). According to this theory, education enhances future productivity and participation in education can be conceived of as an investment decision. If the discounted future benefits of participating in higher education outweigh discounted costs, individuals will decide to participate in higher education. Many studies support the idea that educational decisions depend upon costs and future monetary benefits. Freeman (1971) and Berger (1988) found that, to the extent that they are aware of earnings differentials, students will choose the type of education offering the greatest total expected utility. Also Montmarquette *et al* (2002) found that expected earnings are essential for the choice of a college major. Further, Duchesne and Nonneman (1998) found a positive effect of the wage differentials between college and non-college occupations in the local labour markets on the student's probability of attending higher education. Fuller *et al* (1982) showed that investment in education is likely to be higher when the costs of education are lower. A rival explanation for the choosing to participate in higher education is the screening or signalling theory (cf. Arrow, 1973; Spence, 1973). According to this theory, educational attainment is (only) a mere signal of potential productivity. The costs of participating in higher education are expected to depend upon innate ability, which in turn influences productivity. So, productivity differences already exist before education takes place, but employers use education as a filter for ability. Consequently, despite their different view of the role of education, also the signaling framework assumes that individuals participate in higher education in order to improve future labour market chances. Rather than being an investment in skills, education is an investment in a signal.

³⁸ Also in the psychological literature, numerous studies have focused on the associations between individual motivations and a broad range of behaviors and of social and economic outcomes. Central within this literature is the distinction between controlled and autonomous motivation (Ryan & Deci, 2000; Vansteenkiste *et al*, 2006). Controlled motivation refers to doing something because of pressure by an external or internal force. Autonomous motivation refers to doing something because it is inherently interesting or because it is personally important (Vansteenkiste *et al*, 2006). Within this categorization, investment motives and social norms are thus conceived as controlled motivation, while consumption motives are rather conceived of autonomous motivation.

Yet, not only financial incentives affect the decision to attend higher education. Students may decide to continue education because they like the courses, they enjoy learning new things, they like to participate in student life or would like to have an enjoyable job in the future (Alstadsæter *et al*, 2008; Alstadsæter, 2011). In short, these individuals enjoy other types of returns than the pecuniary returns and may well choose fields of study with lower wage returns, such as Humanities, Arts or Linguistics. If so, attending college would be affected by consumption motives. The consumption value of education has attracted increased attention during the last few decades (see Schaafsma, 1976; Kodde & Ritzen, 1988; Gullason, 1989; Duchesne & Nonneman, 1998; Alstadsæter, 2011). Kodde and Ritzen (1988) were amongst the first to extend the human capital framework with consumption motives. According to their model, individuals choose the optimal bundle of education, current and future consumption, given their time and budget constraints. Empirical evidence supports the conjecture that the consumption motive influences the decision to attend college. Arcidiacono (2004) found that the choice of major depends on preferences for studying particular majors in college. He also concludes that individuals choose different levels of education and types of education because of different abilities. Also Carneiro *et al* (2003) maintain that a large part of the return to college is non-pecuniary. In our analysis, we distinguish between two consumption motives: (i) educational consumption and (ii) student life consumption. Educational consumption is defined as participating in (higher) education because acquiring knowledge and learning new things delivers direct utility or because one enjoys studying. Student-life consumption refers to individuals participating in education because they dislike working, because it delivers them the opportunity to participate in extracurricular student life or because it delivers them the opportunity to share time with friends.

From a more sociological point of view, social norms could also determine the choice of attending college. Coleman (1961; 1988) was one of the first to use the term ‘social capital’ and to consider the social context as a potential useful resource for rational actors to achieve their goals. In his approach, social capital is embedded in social relations and structures. To succeed individuals have to understand and adopt the norms and standards from the social category where they belong to. Coleman (1988) also argues that effective communication and enforcement of social norms can be promoted by network closure. For example, when parents have such a network, they are better able to communicate the common norms and values, and through sanctions and rewards correct the behavior of their children. He claims that network closure influences the academic performance and the behavior of students. Also in the economics literature, there is a growing attention for the role of the social context to explain students’ behavior. Akerlof and Kranton (2000; 2002) claim that an individual’s identity is associated with the social environment and that individuals gain utility if their behavior matches the ideal of the social category to which they belong. They claim that these norms and ideal behavior attached to each social category are socially determined. If individuals do not fit the ideal characteristics and ideal behavior of their social category, this causes a loss of utility.

Academic choices

We assume that each of the aforementioned educational motives influences the choice of degree and college major. Several studies have shown that, to the extent that students are aware of and respond to earnings differentials, they will choose the type of education that has significant monetary returns. Hilmer and Hilmer (2012), for instance, found that students citing the importance of financial well-being are relatively more likely to choose for a major in Business and Engineering and that these individuals have higher wages. Arcidiacono (2004) reports similar results. As already mentioned, overeducated individuals are found to realize a lower return to education. Hence, we can expect that individuals participating in higher education motivated by investment will be less likely to choose for programs that are associated with high risks of being overeducated.

However, as already mentioned, not all college majors may be chosen because of pecuniary returns. Alstadsæter *et al.* (2008) mention that many individuals choose educational tracks leading to jobs in sectors with relatively low wages and higher unemployment, such as major in Humanities, Arts or Theology. These college majors are also consistently found to have a higher likelihood of overeducation (see McGuinness, 2003; Frenette, 2004; Verhaest *et al.*, 2015). Apparently, these programs have, on average, a relatively high consumption value, resulting in higher participation rates and lower wages than would be the case if decisions were solely based on future labour market outcomes. This higher consumption value may be related to both educational and student life consumption. The topics of these majors may, on average, be assessed to be relatively more exiting and thus may attract students who participate in higher education because of educational consumptions. These topics may also require less effort, thus attracting students who attend college primarily because of the associated student life. To conclude, we expect students who participate in higher education because of educational or student life consumption to be more likely to choose for programs that are associated with a high risk of being overeducated.

Hypothesis 1: Individuals participating in higher education motivated by educational or student life consumption (investment) are more (less) likely to choose for programs associated with high (low) risk of overeducation.

With respect to social norms, only a few studies investigate whether identity affects educational choices. In line with the claims of Akerlof and Kranton (2000, 2002), Favara (2012) shows that boys and girls choose differently and according to their own gender stereotype. Based on this evidence, we may expect that individuals with highly educated parents try to achieve a level of education as high as possible. Regarding the choice of field of study, they may choose the field of study that matches the ideal of their social category. In a family of doctors, for instance, it may be considered obvious that the children also become doctors. However, for others, it may just as well be a social norm to become a social worker or an artist. Therefore, it is not a-priori clear whether individuals motivated by social norms will, on average, be more or less likely to choose for programs associated with more

overeducation. Given that other empirical evidence is lacking, we do not consider a hypothesis regarding this educational motive.

Academic performance

In the literature on overeducation, several studies found that overeducation is lower among school leavers with better academic grades and those without grade retention (Battu *et al.*, 1999; Dolton & Silles, 2003; Büchel & Pollmann-Schult, 2004; Verhaest & Omev, 2010). Hence, to the extent that educational motives affect academic performance, they will also affect overeducation through this channel. The expected impact of investment on academic performance is ambiguous. We expect that individuals motivated by investment make a comparison between the costs and the benefits of the effort associated with achieving certain grades and avoiding grade retention. Hence, only when the benefits of academic performance in terms of improved labour market chances outweigh the cost of additional effort, they will be willing to obtain higher grades. Further, we assume that individuals with an educational consumption motive will have better grades throughout their educational career, simply because they enjoy studying and learning things related to the topic of their major³⁹. Graduates with a student life consumption motive are assumed to be more interested in being part of the student environment than in studying, resulting in lower grades and a higher likelihood on grade retention. Finally, the impact of adapting to social norms as a motive for participating in higher education on academic performance is theoretically ambiguous. For some social categories, it might be important to achieve high grades and to fulfill higher education without grade retention, whereas for other social categories this might not be a social norm at all. Therefore, we test the following hypothesis:

Hypothesis 2: Individuals participating in higher education because of educational consumption (student life consumption) are more (less) likely to achieve high levels of academic performance

Job search and job choice behavior

We expect the likelihood of overeducation to be influenced by the educational motives even after accounting for differences in academic choices and achievements, amongst others through their impact on job search and job choice behaviour. We assume that individuals who attend college because of investment are less likely to search for and accept jobs for which they are overeducated. To secure the returns on their investment, they are likely to prefer jobs matching their educational level since these jobs pay higher wages.

³⁹ In line with this, several psychological studies have found that autonomous motivation is associated with better academic performance (Soenens & Vansteenkiste, 2005; Boggiano *et al.*, 1993)

Individuals motivated by educational consumption attend college because they are willing to learn new things and/or because they have a strong interest in the topic of their education. It seems likely that these motives are related to more general personal interests and motivations. Hence, we expect these individuals not only to be willing to achieve these goals through education, but also through their jobs. Evidence indicates that matching jobs are more successful in generating learning effects than jobs for which one is overeducated (e.g. Verhaest & Omey, 2013). Moreover, jobs that match with one's education are also likely to be jobs that match one's general personal interests for these individuals. Therefore, we also expect individuals motivated by educational consumption to be less likely to accept jobs for which they are overeducated. This effect may be reinforced if employers perceive these individuals to be more motivated than others. Alternatively, individuals who just attend college because of the attractions of student life are expected to be less career-oriented and to attach less importance to the match between their education and their jobs. They may also be perceived by employers to be less highly motivated.

Finally, the effect of participating in higher education to adapt to a social norm is again not a priori clear. On the one hand, it may be a social norm to get a high-status job and, hence, a job for which one is less likely to be overeducated. On the other hand, the social norm with respect to employment may be rather related to the content of an occupation or to a sector than to the level of the job. Hence, given that previous empirical evidence is lacking, we again do not formulate a hypothesis regarding this motive.

Hypothesis 3: For given academic choices and achievements, individuals having participated in higher education because of investment or educational consumption (student life consumption) are less (more) likely to be overeducated.

Overeducation

From the above theoretical considerations, we also derive hypotheses for the overall relationship between the four motives and overeducation. Individuals having participated in higher education because of investment are expected to be less likely to be overeducated. These individuals are expected to search for a job matching their educational level (cf. *Hypothesis 3*) and are expected to choose educational levels and fields of study with a lower likelihood of overeducation (cf. *Hypothesis 1*). Individuals having participated in higher education because of student life consumption are expected to have a higher likelihood to be overeducated, because of choosing study programs associated with higher degrees of overeducation (cf. *Hypothesis 1*), because of their lower quality of human capital (cf. *Hypothesis 2*), and because of being less career-oriented (cf. *Hypothesis 3*). For educational consumption and social norms, no hypothesis is considered, because the expected effects operate in different directions.

Hypothesis 4: Individuals having participated in higher education because of investment (student life consumption) are less (more) likely to be overeducated (overall effect).

Wages and job satisfaction

Differences in educational motives may also be expected to result in differences in wage and job satisfaction effects of overeducation. It is well known that overeducated individuals earn less than those with similar levels of education, but possessing the education required to perform their jobs (Hartog, 2000). We assume that individuals having participated in higher education because of investment face a smaller wage penalty to overeducation. We suppose that these individuals only accept a mismatch if the job offers them compensating wage advantages. It is unclear to what extent the level of wages will be taken into account by individuals participating in higher education because of the other motives. Therefore, we only test the following hypothesis:

Hypothesis 5: The wage penalty to overeducation is smaller for individuals having participated in higher education because of investment.

Several studies investigated the relationship between overeducation and job satisfaction as well. These studies conclude that overeducated individuals are less satisfied with their job than adequately educated individuals with similar levels of education (Allen & van der Velden, 2001; Verhaest & Omey, 2009). We assume that also this job satisfaction penalty differs according to the educational motives. Individuals who attend college because of investment can be expected to face strong job dissatisfaction if they employed in jobs with low wages and low career prospects. In general, the literature does not only find overeducation to be associated with lower wages, but also with few opportunities of being promoted to adequate jobs (Baert *et al*, 2013). Hence, we expect these individuals to face a relatively strong job satisfaction penalty in the case of overeducation. Given their willingness to avoid being overeducated, we also expect that individuals having participated in higher education because of educational consumption face a relatively stronger job satisfaction penalty to overeducation. We thus test the following hypothesis:

Hypothesis 6: The job satisfaction penalty to overeducation is higher for individuals having participated in higher education because of investment and/or educational consumption.

DATA AND METHODOLOGY

Data

For our analysis we use the so-called SONAR data. This dataset contains data on the transition from education to work for three cohorts of about 3000 Flemish youngsters, born in the years 1976, 1978 and 1980 respectively. For each cohort data is available at the age of 23. Follow-up surveys were conducted at age of 26 for the 1976 and 1978 cohorts. The 1976 and 1980 cohorts were also interviewed at the age of 29. More information about the set-up of the survey can be found in SONAR (2003, 2004, 2005). We construct a panel data-set containing information for the following four time points: (i) the start of the first job, (ii) at the age of 23, (iii) at the age of 26 and (iii) at the age of 29⁴⁰. Essential information such as net wages, job satisfaction and the mismatch status is in general available for each of these four time points. An exception is the situation at age 23 for the 1976 cohort, for which information on wages and job satisfaction is not available for those who were still in their first job at that time. Another exception is the information on these two variables at age 23, 26 and 29 in the specific case when individuals were, at that time, for less than one year employed in their first job. Apart from observations with missing information, we also excluded from the analysis observations on self-employed jobs, observations with extreme values for wages (cf.infra), respondents with only one observation, and respondents with a change in their level of education or field of study between two observation points. Further restriction of the dataset to those with a higher education degree leaves a sample of 2612 individuals and 6583 observations.

Educational motives

To measure the different educational motives, we use a battery of items in the survey at age 23 regarding the reasons to attend higher education. More specifically, respondents got the following question: ‘Why did you attend higher education?’. The interviewer provided a list of ten possible reasons). Using a four-point scale, respondents could indicate the degree of applicability of each of these reasons in their case. To identify the educational motives, we used principal component analysis (with varimax rotation) and measured the alternative motives on the basis of factor scores. In table 4.1 the factor loadings of the different items⁴¹ are shown. The first factor loads on the following three items: ‘Because the subject of the program interested me’, ‘Because I wanted to work further on my self-development’ and ‘Because I enjoy studying’. The percentages of the individuals that rather or completely agreed on these items were 80.0%, 78.3% and 59.4% respectively (see Appendix, Table A). The factor on these

40 For individuals without jobs at the time of the interview (i.e. at age 23, 26, or 29), information was gathered with respect to the end of their last job.

41 Along with the nine items listed in the table, a tenth item was ‘to practice the occupation of my own choice’. In a first factor analysis, this item had more than one factor loading. Since the item both refers to future labour market perspectives and to the individuals’ specific interests, this item seems to be related to both investment and consumption motives. Therefore, the item was excluded from the analysis.

three items is used as a proxy for ‘educational consumption’. The second factor is rather a proxy for ‘investment’ and is based on the items ‘In order to earn a higher wage’ (on which 60.3 % of the respondents agreed) and ‘To have a higher chance on having a good job later’ (78.5% agreed). The third factor measures ‘social norms’ and consists of two items: ‘Because my parents/family expected that’ (46.4%) and ‘It was obvious that I would continue my education’ (66.2%). Finally, a last factor loads on items such as ‘Because most of my classmates/friends also attended higher education’ (30.0%) and ‘Because I did not yet want to go working’ (50%), and is used as proxy for student life consumption. It is clear that most of the individuals thus combine two or more motives to participate in higher education.

TABLE 4-1 PRINCIPAL COMPONENT ANALYSIS OF THE EDUCATIONAL MOTIVES – FACTOR LOADINGS

	Component			
	1	2	3	4
To earn a higher wage	-0.083	0.812	0.102	0.111
To have a higher chance on a good job later	0.180	0.812	0.040	0.079
Because most of my classmates/friends also attended higher education	-0.100	0.046	0.231	0.718
Because I did not yet want to go working	0.073	0.151	0.030	0.791
Because my parents/family expected that	-0.117	0.158	0.787	0.199
It was obvious that I would continue my education	0.178	0.000	0.844	0.061
Because the subject of the studies interested me	0.699	0.038	-0.014	-0.234
Because I wanted to work further on my self-development	0.767	0.161	0.021	-0.020
Because I enjoy studying	0.711	-0.111	0.065	0.255

Data source: SONAR, own calculations; number of individuals = 2612

Overeducation

For the measurement of overeducation, we rely on two different measures. The first one is based on job analysis and derived from the Standard Occupation Classification of Statistics Netherlands (CBS, 2001). The classifications of each occupation is based on a five-digit code and contains five functional levels: less than lower secondary (<LS), lower secondary (LS), higher secondary (HS), lower tertiary (LT) and higher tertiary education (HT). An individual is defined as overeducated ($OVER=i$) if the educational level exceeds the functional level. To account for differences in the degree of overeducation, we rely on years of overeducation ($YOVER$). These years are computed by years of attained education minus years of required education for overeducated individuals and set to zero for other workers. Years of required education are defined by the minimal years of education that are usually needed to achieve the corresponding educational level: < LS = 6 years, LS = 10 years, HS = 12 years, LT = 15 years and HT = 16 years.

Using job analysis to measure overeducation has both advantages and disadvantages. A major advantage is that this measurement method reflects the concept of overeducation used in the literature, i.e. a situation in which the attained level of education exceeds the level of education required to do the job (cf. Hartog, 2000). Second, they

are not prone to social desirability bias and are based on uniform coding instructions. Third, spurious correlation between overeducation and subjective variables such as educational motives and job satisfaction, resulting from common-method bias, is avoided. A major critique on this method is that it may overestimate overeducation if the underlying classification is not regularly updated to account for increases in job requirements over time. Given this critique, we also rely on a second measure of overeducation. Regarding their first job, respondents from the 1978 and 1980 cohorts were asked the question: “What is (was), according to your own opinion, the most appropriate educational level to execute your job?” A question like this is typically used in the literature to construct a so-called worker-assessed (WA) measure of overeducation. However, in the SONAR survey, this question is not available for all jobs. Therefore, we use a modified approach (see Baert *et al.*, 2013). First, relying on the information regarding first jobs, we computed the median worker-assessed required level of education within each occupation. Second, this median level was used to define the worker-assessed level of required education for an occupation. Third, relying on this definition, we assessed for every job whether an individual was overeducated or not.

According to the JA method, 52% of the sample is vertically mismatched at the start of the career (cf. Appendix, Table A). This incidence is larger than measured at the age of 23 (44%), 26 (42%) and 29 (45%). Based on the modified subjective measure we note lower incidences of vertical mismatches. At the start of the career about 36% was overeducated according to this measure. At a later age, this incidence decreases to 27% at age 23, 29% at age 26 and 32% at age 29. These incidences are in line with other studies finding a relatively higher incidence of overeducation at the start of the career (see van der Velden & van Smoorenburg, 1999).

To assess the impact of the educational motives on years of overeducation, we estimate random-effects models. To account for the truncated nature of years of overeducation, a tobit specification is applied. To differentiate between the direct effects of the educational motives on overeducation because of differences in job search and job acceptance behavior (cf. *Hypothesis 3*) and their overall effects on overeducation (cf. *Hypothesis 4*), both models with and without controls for academic choices and performance are estimated. We also account for unobserved heterogeneity by applying a Mundlak correction (cf. Mundlak, 1978). Within this approach, we include individual means of all the time-varying variables as additional control variables. The introduction of these mean values captures the eventual correlation between the unobserved heterogeneity and the time-varying explanatory variables. As opposed to a fixed-effects model, a Mundlak correction model allows to keep time-invariant variables, such as the educational motives, as regressors in the equation.

Academic choices and performance

The program choice with respect to higher education in Flanders basically comes down to a double choice: the level of the program and the field of study. Regarding the level of the program, individuals in our sample could, at the time they entered higher education, choose between a short-term lower tertiary education at a college and a long-term higher tertiary education program at a college or university. These programs are equivalent to contemporary bachelor and master programs respectively. While many students nowadays use a college degree as stepping stone to a university degree, this was far less the case at the time our sample entered higher education. In general, those opting to get a higher tertiary degree immediately started in a long-term program. Similarly, while individuals got a short-term degree after two years of university, few students did not proceed with their program to get their long-term degree. In our sample, 37.2% of the individuals have attained a higher tertiary education (i.e. master) degree (cf. Appendix, Table A). Students also have to choose their field of study. We distinguish between the following seven fields: (1) Linguistics, history and philosophy (5.6%), (2) Economics, business, and law (30.3%), (3) Behavioral and social sciences (11.8%), (4) Health and (para)medicine (12.7%), (5) Natural sciences and engineering (20.9%), (6) Arts (2.2%), and (7) Education (16.5%).

To assess the impact of the different study motives on academic choices (cf. Figure 4.1, black line and *Hypothesis 1*), we use a binary logit model for the effect on the choice of educational level and a multinomial logit model for the choice of the field of study. In order to define programs that are associated with low or high levels of overeducation, we rely on previous research regarding overeducation among Flemish young workers (Verhaest *et al.* 2011). Regarding the level of the program, lower tertiary degrees are found to be associated with considerably lower overeducation incidences. With respect to the field of study, programs within the domains of ‘Education’ and ‘Health and Welfare’ and, to a lesser extent, ‘Natural sciences and engineering’, are found to be associated with low degrees of overeducation in Flanders. Alternatively, students within the domains of ‘Linguistics, history and philosophy’ and ‘Arts’ and, to a lesser extent, within the domains ‘Economics, business, law and criminology’ and ‘Behavioral Sciences’, have a relatively higher probability to be overeducated.

For the measurement of academic performance (cf. Figure 4.1, black line and *Hypothesis 2*) we use two variables, namely grades in the final year and grade retention in higher education. Both variables are found to be associated with overeducation in Flanders, with those having lower grades and those with more grade retention being more likely to be overeducated in first jobs (Verhaest and Omey, 2010). With respect to grades in the final year, we distinguish three categories: (1) graduating with a passing grade, (2) graduating with a distinction grade, and (3) graduating with high or highest distinction grade. Grade retention is measured in terms of the number of repeated years during tertiary education. To assess the effect of the educational motives on repeated years, we estimate a poisson regression; in the case of study results, we estimate an ordered probit model.

Wages and Job Satisfaction

As already mentioned, we also investigate the impact of overeducation and each of the study motives on two labour outcomes: wages and job satisfaction (cf. *Hypothesis 5* and *Hypothesis 6*). For wages, we use data on net hourly wages. The survey question on wages differs across waves and cohorts. For the initial interview (at the age of 23), of the 1976 cohort official net monthly wages were reported in intervals of 124 euro (BEF5000) for lower wages and intervals of 248 euro (BEF10000) for higher wages. In the other surveys, respondents were asked to report their exact net monthly wage. When refusing to provide an answer to this question, they got the interval question. We used the midpoint of the interval for these observations, converted all answers to hourly wages and deflated them on the basis of the consumer price index used for wage indexation⁴². Observations with two standard deviations above or below the average natural logarithm wage in the sample are excluded. Job satisfaction is measured on the basis of the following survey question: ‘During the early phase of your first job, how satisfied were you with your job?’. For the job at the age of 23, 26 and 29 a similar question was posed. Respondents had to answer on a five-point Likert scale. The Appendix (Table A) reports average wages by type of observation. As shown, average wage and job satisfaction levels increase with age.

For both labour market outcomes, random-effects linear regression models are estimated, with the natural log of hourly wages and job satisfaction being regressed on the educational motives, overeducation and a number of control variables. To test *Hypothesis 5* and *Hypothesis 6*, also interaction effects between overeducation and the different study motives are included. Previous research on the effects of overeducation on other outcome variables has shown that estimates may be biased because of unobserved worker heterogeneity and because of errors in the measurement of overeducation (Dolton & Vignoles, 2009; Verhaest & Omey, 2012). To tackle the first type of bias, we estimate random-effects with additional Mundlak correction terms being included. The second type of bias is accounted for by applying instrumental variable methods, using our second measure of overeducation as instrument for the first one (and the other way around).

Control variables

In each specification, we included a number of control variables: dummies for gender (1 dummy), non-European descent (1), having a child (1), cohabiting (1), and the educational attainment of both parents (8). The educational attainment of the parents is often used as a proxy for the household income and because of its influence on individuals’ decisions to attend higher education. As proxies for ability, we include the study track and study results of an individual in secondary education. Further, to account for differences in the average job quality of further

⁴² Conversion into hourly wages is based on the percentage of employment (full-time=100%), and equalizing full-time jobs to 40 hours/week.

jobs in comparison to the first jobs, we also included three dummies for whether the observation is made in the second (1), the third (1) or the fourth (1) job observed in our panel. Moreover, we included years of work experience and its square. To account for differences in preferences and labour market conditions, several other control variables are included in wage and job satisfaction analysis: firm size (4), sector of employment (12), public sector (1), shift work (2) and night work (2). Finally, in all models, the year of observation is included to account for eventual time trends.

RESULTS

In this section, we will first discuss the results on academic choices (educational level and fields of study (cf. *Hypothesis 1*). Thereafter, we will give an overview of the impact of the four student motives on academic performance (cf. *Hypothesis 2*). Further, we will comment on the effects the study motives have on the likelihood of overeducation (cf. *Hypotheses 3* and *Hypothesis 4*). Finally, we will discuss the results on the two labour market outcomes: wages and job satisfaction (cf. *Hypothesis 5* and *Hypothesis 6*).

Academic choices

Table 4.2 reports the impact of the different student motives on academic choices. We find that individuals participating in higher education for investment reasons are less likely to choose for a study program in higher tertiary education, while those participating because of educational consumption, student life-style consumption or social norms are more likely to have chosen for such a degree. This is completely in line with *Hypothesis 1*.

The results regarding the field of study are less clear. In line with our hypothesis, we find that those participating in higher education because of investment are less likely to participate in domains such as ‘Arts’, ‘Linguistics, History and Philosophy’, and ‘Behavioral and Social Sciences’, which are domains that are typically associated with a relatively high likelihood to become overeducated. On the other hand, these individuals are somehow more likely to choose for domains that are associated with a relatively low likelihood to become overeducated, such as ‘Natural Sciences and Engineering’ and ‘Health and (Para)Medicine’. However, these individuals are also more likely to choose the field of study ‘Economics, Business and Law’, which is in Flanders a college major with a relatively high likelihood of overeducation. Also the results with respect to the educational and student life consumption motives are, when abstracting each time from one domain, in line with *Hypothesis 1*, with individuals participating because of these motives to be relatively more (less) likely to choose for domains with a relatively high (low) likelihood to become overeducated. Also regarding the educational consumption motive, the domain of ‘Economics, Business and Law’ seems to be an exception since individuals participating because of educational

consumption are less likely to choose for this domain despite being associated with a relatively high likelihood to become overeducated. Regarding the student life consumption motive, the domain of 'Arts' is an exception with a low likelihood to be chosen among individuals participating because of this motive, despite this domain being associated with a relatively high degree of overeducation. Finally, individuals who have participated in higher education because of social norms are also less likely to choose for Arts as field of study.

TABLE 4-2 THE EFFECT OF THE STUDY MOTIVES ON ACADEMIC CHOICES – LOGIT COEFFICIENTS

	Level of Education		Fields of study (ref= Economics, Business and Law)				
	Binary logit		Multinomial logit				
	<i>Higher tertiary education</i>	<i>Linguistic, history and philosophy</i>	<i>Behavioral and social sciences</i>	<i>Health and (para)-medicine</i>	<i>Natural sciences & engineering</i>	<i>Arts</i>	<i>Education</i>
Investment	-0.152*** (0.048)	-0.400*** (0.069)	-0.381*** (0.050)	-0.266*** (0.050)	-0.203*** (0.049)	-0.409*** (0.076)	-0.383*** (0.051)
Educational consumption	0.286*** (0.051)	0.421*** (0.076)	0.233*** (0.051)	0.207*** (0.050)	0.181*** (0.047)	0.278*** (0.092)	0.286*** (0.051)
Student life consumption	0.266*** (0.046)	-0.153 (0.071)	-0.064 (0.047)	-0.142*** (0.047)	-0.114** (0.045)	-0.320*** (0.089)	-0.189*** (0.049)
Social norms	0.087*** (0.048)	-0.053 (0.076)	0.021 (0.048)	0.004 (0.048)	0.060 (0.047)	-0.120** (0.087)	0.137** (0.049)

Standard errors are in parentheses.

The following control variables are included in every model: gender, non-European descent, educational level of the mother, educational level of the father, study track secondary education, study results secondary education, year of birth.

In the model of the effects on fields of study the following control variables are included: educational level.

Number of individuals = 2612; *, p<0.10; **, p<0.05; ***, p<0.01

Academic performance

Table 4.3 reports the results for academic performance. Individuals having participated in higher education because of educational consumption are more likely to achieve higher levels of academic performance; they are less likely to repeat years in higher education and are more likely to have better grades. However, we do not find any significant evidence for the impact of student life consumption on academic performance. These results are thus only partially in line with *Hypothesis 2*. We also find that individuals who have participated in higher education because of investment are less likely to have high grades.

TABLE 4-3 THE IMPACT OF THE STUDENT MOTIVES ON ACADEMIC PERFORMANCE – POISSON OR ORDERED PROBIT REGRESSION COEFFICIENTS

	Repeated years	Students' grades
	Poisson regression	Ordered probit
Investment	0.030 (0.036)	-0.054** (0.024)
Educational consumption	-0.141*** (0.034)	0.161*** (0.026)
Student life consumption	0.014 (0.034)	-0.003 (0.023)
Social norms	0.017 (0.035)	-0.026 (0.024)

Standard errors are in parentheses.

The following control variables are included in every model: gender, non-European descent, educational level of the mother, educational level of the father, study track secondary education, study results secondary education, year of birth, educational level, fields of study.

Repeated years is included as control variable in the grades model.

Number of individuals = 2612

*: $p < 0.10$; **: $p < 0.05$; ***: $p < 0.01$

Overeducation

For the measurement of overeducation, we rely on two indicators. In this section, we only report detailed estimation results relying on the job analysis measure (cf. Table 4.4). The estimates relying on the worker assessment measure can be found in the Appendix (Table B).

To assess the impact of the four student motives on overeducation (cf. *Hypothesis 3* and *Hypothesis 4*), we first estimated a standard random-effects model. First, we expected that individuals participating in higher education because of investment are less likely to be overeducated (cf. *Hypothesis 4*). However, this hypothesis is not supported (cf. Table 4.4, Model I, column 1). We even find a positive significant effect (0.078), implying that these individuals have a higher likelihood to be overeducated. If we account for unobserved heterogeneity by means of introducing Mundlak correction terms (cf. Table 4.4, Model I, column 2), we find a similar effect for individuals with an investment motive. Also after accounting for academic choices and academic performance, we do not find that individuals participating in higher education for investment reasons are less likely to be overeducated (cf.

Hypothesis 3). We again find them to be more likely to be overeducated, although the effect is no longer statistically significant (Table 4.4, Model III). We also find that individuals who participated in higher education because of student life consumption have a higher probability to be overeducated. After accounting for academic choices and academic performance, we find a slightly smaller coefficient (0.085), than in the model that estimates the overall effect (0.130). So, the choice for a college major with a higher probability of overeducation and bad grades increases the overall probability of overeducation. Interestingly, our results also indicate a significantly negative overall effect on overeducation for those motivated by educational consumption. Controlling for academic choice and performance delivers the same conclusions. These results regarding the consumption motives are in line with both *Hypothesis 3* and *Hypothesis 4*. Regarding social norms, for which no hypothesis was formulated, we do not find statistically significant effects.

The results relying on the worker assessment measure for overeducation are largely similar, although this measure does not deliver a significantly overall positive effect of the investment motive (see Appendix, Table B).

TABLE 4-4 THE IMPACT OF THE STUDENT MOTIVES ON YEARS OF OVEREDUCATION- TOBIT REGRESSION COEFFICIENTS

Standard panel data random estimates						
	Model I		Model II		Model III	
	Random effects (1)	Random effects with Mundlak correction (2)	Random effects (3)	Random effects with Mundlak correction (4)	Random effects (5)	Random effects with Mundlak correction (6)
Investment	0.078** (0.034)	0.086** (0.034)	0.017 (0.033)	0.024 (0.033)	0.009 (0.033)	0.016 (0.033)
Educational consumption	-0.203*** (0.035)	-0.209*** (0.035)	-0.161*** (0.033)	-0.160*** (0.033)	-0.134*** (0.033)	-0.134*** (0.033)
Student life consumption	0.131*** (0.033)	0.120*** (0.033)	0.085*** (0.032)	0.082** (0.032)	0.086*** (0.031)	0.085*** (0.031)
Social norms	-0.015 (0.035)	-0.000 (0.034)	0.026 (0.032)	0.026 (0.032)	0.022 (0.032)	0.022 (0.032)
Control for Academic Choices	No	No	Yes	Yes	Yes	Yes
Control for Academic Performance	No	No	No	No	Yes	Yes

Standard errors are in parentheses.

The following control variables are included in every model: gender, non-European descent, educational level of the mother, educational level of the father, study track secondary education, study results secondary education, year of birth, experience, experience squared, cohabiting, having a child, years of observation, job type.

The following control variables are included in model II (column 2): educational level, fields of study.

The following control variables are included in model III (column 3): educational level, fields of study, repeated years, and grades.

Number of individuals = 2612 number of observations= 6583

*: p<0.10; **: p<0.05; ***: p<0.01

Wages and job satisfaction

Table 4.5 and Table 4.6 report the results with respect to wages and job satisfaction, relying on job analysis for the measurement of overeducation. For results based on the worker-assessment method, we refer to the Appendix (Table C and Table D).

Based on the standard random-effects panel data estimates (cf. Table 4.5, column 1), we find that overeducation has a negative impact on wages. This is in line with what is usually found in the literature. Interestingly, we also find that adequately educated workers who participate in higher education because of educational consumption realize a small wage bonus.

To assess whether the impact of overeducation depends on the educational motives, we added interaction terms between these two variables. We do not find any statistically significant evidence for *Hypothesis 5*, indicating that the wage penalty to overeducation is smaller for individuals having participated in higher education because of investment (cf. Table 4.5, column 1). Since these results may be biased by unobserved heterogeneity and measurement error, we also execute a Mundlak correction and instrumental-variable analyses (cf. Table 4.5, column 2, 3 and 4). However, also these model specifications do not deliver evidence in favour of *Hypothesis 5*. On the contrary, on the basis of the instrumental variable model, we even find that overeducated individuals earn less if they have attended higher education because of investment (cf. Table 4.5, column 4). Also on the basis of our robustness analysis that relies on the worker-assessment instead of the job analysis as benchmark measure (cf. Appendix, Table C, column 4), we find no evidence for *Hypothesis 5*, although the interaction effect is never statistically negative in this case.

Regarding the other educational motives, we did not formulate hypotheses for an interaction effect with overeducation on wages. Interestingly, we find that overeducated individuals participating in higher education because of educational consumption face a stronger wage penalty to overeducation (cf. Table 4.5, column 4). However, for these individuals the additional penalty per year of overeducation is lower than the wage bonus that they realize irrespective of their match. Hence, moderately overeducated individuals having participated in higher education because of educational consumption still earn at least as much as other moderately overeducated workers. Another unanticipated finding is the stronger wage penalty to overeducation for individuals having attended higher education because of social norms (cf. Table 4.5, column 4). On the basis of the alternative overeducation measure, we reach similar results for individuals who have attained higher education because of social norms. However, this measure does not deliver a significantly negative effect for overeducated individuals having participated in higher education because of educational consumption (cf. Appendix, Table C, column 4).

TABLE 4-5 THE IMPACT OF THE STUDENT MOTIVES AND OVEREDUCATION (JOB ANALYSIS) ON THE NATURAL LOG OF WAGES – LINEAR REGRESSION COEFFICIENTS

	Standard panel data estimates		IV-panel data estimates	
	Random effects (1)	Random effects with Mundlak correction (2)	Random effects (3)	Random effects with Mundlak correction (4)
Investment	0.001 (0.003)	-0.001 (0.003)	0.002 (0.003)	-0.003 (0.003)
Educational consumption	0.006** (0.003)	0.006* (0.003)	0.010*** (0.003)	0.008** (0.004)
Student life consumption	-0.002 (0.003)	-0.002 (0.002)	-0.002 (0.003)	-0.002 (0.003)
Social norms	0.002 (0.003)	0.001 (0.003)	0.002 (0.003)	-0.002 (0.004)
YOVER	-0.018*** (0.001)	-0.013*** (0.001)	-0.018*** (0.002)	-0.011*** (0.003)
YOVER * investment	0.001 (0.001)	-0.000 (0.002)	0.001 (0.001)	-0.004* (0.002)
YOVER * educational consumption	-0.002** (0.001)	-0.002 (0.002)	-0.005*** (0.001)	-0.005** (0.002)
YOVER * student life consumption	-0.002** (0.001)	-0.003* (0.002)	-0.002 (0.001)	-0.004 (0.002)
YOVER * social norms	-0.002 (0.001)	-0.004** (0.002)	-0.002 (0.001)	-0.005** (0.002)

Standard errors are in parentheses.

YOVER = years of overeducation

The following control variables are included: gender, non-European descent, educational level of the mother, educational level of the father, track in secondary education, study results secondary education, year of birth, educational level, fields- of study, grades, repeated years, experience, experience squared, cohabiting, having a child, years of observation, job type, percentage of full employment, sector, firm size, night work, shift work, public sector

Number of individuals = 2612; Number of observations= 6583

*p<0.10;**p<0.05;***p<0.01

For job satisfaction, we find that individuals motivated by educational consumption are more satisfied with their job (cf. Table 4.6). Based on our benchmark analysis, we also find that individuals participating in higher education because of student life consumption are less satisfied with their job. For the two other educational motives we do not find any significant evidence. In line with other studies, we find that overeducated workers are less satisfied with their job.

Regarding the interaction effects between overeducation and the motives, we find that overeducated individuals who have participated in higher education because of educational consumption face a stronger job satisfaction penalty than other overeducated workers. This is in line with our expectations (cf. *Hypothesis 6*). This result is robust across all models specifications (cf. Table 4.6, column 2, 3 and 4) and across all measures of overeducation (cf. Appendix, Table D). However, as with wages, the additional job satisfaction penalty for one year of overeducation is smaller than the autonomous positive effect of educational consumption on job satisfaction. Hence, moderately overeducated workers who participated in higher education because of educational consumption also remain at least as satisfied with their jobs as other moderately overeducated workers. We also expected a more

negative job satisfaction penalty for overeducated individuals who have attended higher education because of investment (*Hypothesis 6*). However, none of our estimates are in line with this expectation. Also for the student-life consumption and social norms motives, for which no hypotheses were formulated, we do not find any evidence on a significant interaction effect with overeducation.

TABLE 4-6 THE IMPACT OF THE STUDENT MOTIVES AND OVEREDUCATION (JOB ANALYSIS) ON JOB SATISFACTION – LINEAR REGRESSION COEFFICIENTS

	Standard panel data estimates		IV-panel data estimates	
	Random effects (1)	Random effects with Mundlak correction (2)	Random effects (3)	Random effects with Mundlak correction (4)
Investment	0.003 (0.015)	0.006 (0.016)	-0.002 (0.016)	0.011 (0.017)
Educational consumption	0.056*** (0.016)	0.048*** (0.017)	0.062*** (0.018)	0.056*** (0.020)
Student life consumption	-0.022 (0.014)	-0.022 (0.016)	-0.028 (0.016)	-0.036** (0.018)
Social norms	-0.002 (0.015)	0.009 (0.016)	-0.010 (0.016)	0.002 (0.019)
YOVER	-0.071*** (0.007)	-0.092*** (0.010)	-0.091*** (0.009)	-0.115*** (0.014)
YOVER*investment	-0.004 (0.005)	-0.002 (0.009)	-0.003 (0.007)	0.007 (0.011)
YOVER*educational consumption	-0.011** (0.007)	-0.024** (0.010)	-0.016** (0.008)	-0.025** (0.012)
YOVER* student life consumption	0.000 (0.006)	0.005 (0.010)	0.005 (0.008)	-0.005 (0.013)
YOVER*social norms	-0.007 (0.006)	0.005 (0.009)	-0.001 (0.007)	0.014 (0.011)

Standard errors are in parentheses.

YOVER = years of overeducation

The following time- invariant variables are included: gender, non-European descent, educational level of the mother, educational level of the father, track in secondary education, study results secondary education, year of birth, educational level, fields- of study, grades, : repeated years, experience, experience squared, cohabiting, having a child, years of observation, job type, percentage of full employment, sector, firm size, night work, shift work, public sector
Number of individuals = 2612; Number of observations= 6583

*: p<0.10; **: p<0.05; ***: p<0.01

DISCUSSION

We investigated whether different study motives (investment, educational consumption, student life consumption and social norms) influence the likelihood to be overeducated among higher education graduates. Starting from the established fact that overeducated workers earn less and experience lower job satisfaction than adequately educated workers with a similar educational background, we also looked at whether study motives in combination with overeducation influence wages and job satisfaction. To correct for ability and measurement error bias in this analysis, we conducted a panel-data instrumental variable analysis. For the measurement of overeducation, we relied both on job analysis and worker assessments.

Regarding academic choices, we found that individuals participating in higher education because of investment are less likely to choose for a study program leading to a Master degree in comparison to study programs that only lead to a Bachelor degree. This result is in line with our expectations since earlier studies found Flemish Bachelor graduates to be less likely to be overeducated and to experience shorter (initial) unemployment spells. However, we also found them to be more likely to choose for a program within the domain of ‘Economics, Business and Law’. Within Flanders, this field of study is characterized by a relatively high degree of overeducation. Also other studies already found that individuals motivated by investment more often choose for this domain, most likely because it is associated with relatively high earnings irrespective of the match quality. Our detailed estimation results regarding the determinants of wages (cf. Appendix E) indeed indicate that those who choose for the domain ‘Economics, Business and Law’ have relatively high wages. A potential explanation for the higher likelihood to be overeducated in combination with relatively high wages within this domain is provided by Van der Meer and Wielers (1996). They claim that employers in the financial or professional service sector prefer to hire overeducated workers because the educational credentials serve as a legitimation to their clients of the quality of the provided service.

As expected, we also found that students attending higher education because of educational and student life consumption are more likely to opt for Master programs. Individuals having participated in higher education because of student life consumption are also less likely to participate in fields of study that are associated with a low incidence of overeducation, such as ‘Health and (Para-)Medicine’ or ‘Natural sciences & Engineering’. These programs are generally perceived to be more difficult and, hence, it supports the idea that these individuals are less likely to choose for fields of study with high effort costs. In the case of individuals joining higher education because of adapting to social norms, we also found them to be more likely to choose for a program resulting in a Master degree. This result may be explained by the fact that Master programs are perceived to have a higher social status.

The results also show that individuals who participated in higher education because of educational consumption motives are more likely to perform better academically (better grades, less repeated years). This result is consistent with our assumptions and suggests that these individuals put more effort in their education. However, we did not find any significant evidence for the assumption that individuals motivated to participate in higher education by the prospect of student life consumption are less likely to achieve high levels of performance. Interestingly, individuals having participated in higher education because of investment are less likely to have good grades. A possible explanation is that these individuals only invest a certain amount of effort to get their degree. Although good grades may increase labour market chances, these graduates may feel the game is not worth the candle.

Another finding is that, among individuals with a similar educational background and similar academic achievements, those motivated by educational consumption are less likely to end up in a job for which they are overeducated. This finding was expected since, for these individuals, a job that matches with their education is also likely to be a job that matches with their preferences. Moreover, adequate jobs are also likely to be more successful in terms of self-development, which individuals who participate in higher education because of educational consumption are also likely to find important. A last explanation may be that employers are more likely to select these individuals because they appear to be highly motivated. We also found that individuals having participated in higher education being attracted by student life are more likely to be overeducated in comparison to graduates with a similar degree in terms of level and field of study and with similar academic achievements. This finding was expected and suggests that these individuals are less career-oriented and therefore less concerned about their future jobs.

Regarding the overall effect on overeducation, we found some limited evidence that individuals participating in higher education motivated by investment reasons are more likely to be overeducated. This result was not expected and seems to be explained by the aforementioned fact that these individuals choose, above all, for a program within the domain of 'Economics, Business and Law'. On the other hand, our study confirms the overall positive effect on the likelihood to be overeducated for having participated in higher education because of student life consumption. Apart from their higher likelihood to end up in jobs for which they are overeducated in comparison to otherwise similar graduates, this is explained by a higher likelihood to choose for educational levels and fields of study with a higher probability of overeducation. Interestingly, we found that individuals participating in higher education because of educational consumption are less likely to be overeducated (overall effect). Several, sometimes counteracting effects explain this relationship. While these students are more likely to choose educational levels with a higher probability of overeducation, these individuals perform better academically which may matter in the selection process. In addition, given their academic choices and performance, these individuals are more likely to find jobs that match their level of education (cf. *supra*).

Finally, we investigated to what extent the wage and job satisfaction penalty to overeducation depends on the motive to participate in higher education. We expected that individuals taking on higher education for investment reasons, would only be willing to accept jobs not matching their education if these jobs offered them a sufficient wage compensation. However, our results did not support this expectation. Based on the job analysis measure, we even found that the wage penalty to overeducation is higher for individuals who have attended higher education because of investment reasons, although the effect was only statistically significant at the 10% level. A possible explanation may be that wage inequality is more pronounced in the high wage segments on the labour market. Surprisingly, we also found that individuals who have participated in higher education because of social norms have a higher wage penalty to overeducation. A possible explanation might be that their failure to find a job

matching their educational level incites them to accept a job requiring less education than the attained level but matching their field of study. In this manner, they may avoid or at least reduce a loss in self-image in their social category. Finally, individuals who participated in tertiary education because of educational consumption were found to face stronger job satisfaction and wage penalties to overeducation than other individuals. The job satisfaction finding provides further support to the idea that these individuals have a strong aversion towards jobs that not match with their education. Nevertheless, for moderately overeducated workers, these penalties on wages and job satisfaction are compensated by positive autonomous effects of being motivated by educational consumption. This suggests that, in the case of matching jobs, those being motivated by educational consumption are more productive than other graduates. Given that it can be expected that these graduates are likely to be more intrinsically motivated for these jobs than other graduates, this may not sound surprising.

From an overall point of view, our results regarding the consumption motives were in general in line with our expectations. Regarding the investment motive, however, this was clearly not the case. As already suggested, this may be largely explained by the relatively higher participation of these individuals in programs related to Business and Law, which may combine a relatively high incidence of overeducation with relatively high wages. To check whether this claim is correct, we performed a number of additional checks. First, we estimated a reduced form wage equation that excludes overeducation and firm characteristics as independent variables (cf. Appendix F, column 2). In this model, the coefficients on the fields of study resemble a more overall effect, also taking into account their indirect impact on wages through their influence on overeducation and because they may determine access to firms paying higher wages. Also these estimates corroborate that, despite resulting in a higher likelihood to be overeducated, the domain 'Economics, Business and Law' is associated with relatively high wages (only those within the Health domain seem to earn more). Second, to test whether the field of study choice by those who participate in higher education because of investment effectively translates in higher wages despite being associated with higher incidences of overeducation, we estimated a model that also excluded field of study dummies as independent variables. On the basis of this specification, we indeed find that individuals who participate in higher education because of investment earn a positive albeit small wage bonus (cf. Appendix, Table F, column 1).

Several directions for further research can be advanced. First of all, we only accounted for average effects of the different motives. However, their impact may differ across different types of individuals. The impact of social norms, for instance, may differ depending on the social background of individuals. Individuals from a family of doctors may rather choose to become a doctor while individuals that grew up in an artistic environment may be more likely to choose for an artistic job. Moreover, social background may also influence the impact of the investment motive. As Rochat and Demeulemeester (2001) argue, individuals from a poorer social economic background may be more risk averse and, hence, choose less riskier and therefore on-average also less remunerative

fields of study. Further research with a more in-depth focus on the role of social background in explaining educational motives and their impact on labour market mismatches is therefore suggested. Secondly, for the measurement of the educational motives, we relied on retrospective surveys at age 23. Hence, more longitudinal research that surveys individuals already at the start of their higher education career would be welcome. Further, these motives might be correlated with some other unobservable variables, such as expectations, attitudes or abilities. Given the time-invariant nature of the motives, panel-data techniques cannot account for this problem. A potential solution for this problem may be to use instrumental variables. However, finding reliable and valid exclusion restrictions is not straightforward. At least, the dataset that was used in this study does not contain such instruments. Finally, we only indirectly tested the impact of the educational motives on overeducation through their impact on job search and acceptance behaviour. An interesting path for further research would be to test this in a more direct way, for instance by including direct measures of job search in the model.

C O N C L U S I O N

Overall, our results clearly sustain the claim that overeducation is not the result of educational consumption. Young people having engaged in tertiary education because of education consumption are less likely to be overeducated. We also found that these individuals face a stronger job satisfaction penalty to overeducation than other workers. Nevertheless, even if overeducated, they are still as satisfied with their jobs as other workers. Hence, the best advice for young people when entering tertiary education seems to be to choose a field of study which they find exiting, even if the overall labour market prospects for this field are less favorable. Our results also suggest to avoid that students continue in education solely because of student-life consumption. This will increase the likelihood to be overeducated. Nevertheless, several issues remain open for discussion and more research relying on data for psychological characteristics, job search behavior and social norms would be useful.

R E F E R E N C E S

- Arrow K. (1973), 'Higher education as a filter', *Journal of Public Economics*, 2(3), 193–216.
- Akerlof, G.A. & Kranton, R.E. (2000), 'Economics And Identity', *Quarterly Journal of Economics*, 115(3), 715–753.
- Akerlof, G.A. & Kranton, R.E. (2002), 'Identity and Schooling: Some Lessons for the Economics of Education', *Journal of Economic Literature*, 40(4), 1167–1201.
- Allen, J. & van der Velden, R. (2001), 'Educational mismatches versus skill mismatches: effects on wages, job satisfaction, and on-the-job search', *Oxford Economic Papers*, 5, 434–452.

- Alstadsæter, A. (2011), 'Measuring the Consumption Value of Higher Education', *CEifo Economic Studies*, 57(3), 458–479.
- Alstadsæter, A., Kolm, A.S. & Larsen, B. (2008), 'Money or joy: The choice of educational type', *European Journal of Political Economy*, 24(1), 107–122.
- Arcidiacono, P. (2004), 'Ability sorting and the returns to college major', *Journal of Econometrics*, 121(1–2), 343–375.
- Baert, S., Cockx, B. & Verhaest, D. (2013), 'Overeducation at the start of the career: Stepping stone or trap?', *Labour Economics*, 25, 123–140.
- Barro, R. J., & Lee, J. W. (2013), 'A new data set of educational attainment in the world, 1950–2010', *Journal of development economics*, 104, 184–198.
- Battu, H., Belfield, C. & Sloane, P. (1999), 'Overeducation among graduates: a cohort view', *Education Economics*, 7, 21–39.
- Becker, G. (1964), *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*, New York: Columbia University Press.
- Berger, M., (1988), 'Predicted future earnings and choice of college major', *Industrial and Labor Relations Review*, 41, 418–429.
- Boggiano, A. K., Flink, C., Shields, A., Seelbach, A. & Barrett, M. (1993), 'Use of techniques promoting students' self-determination: Effects on students' analytic problem-solving skills', *Motivation and Emotion*, 17(4), 319–336.
- Büchel, F. & Pollmann-Schult, M. (2004), 'Overeducation and human capital endowments', *International Journal of Manpower*, 25, 150–166.
- Carneiro, P., Hansen, K. & Heckman, J. (2003), 'Estimating Distributions of Treatment Effects with an Application to the Returns to Schooling and Measurement of the Effects of Uncertainty on Schooling Choice', *International Economic Review*, 44(2), 361–442.
- Coleman, J.S. (1961), *The adolescent society: The social life of the teenager and its impact on education*, New York: Free Press.
- Coleman, J.S. (1988), 'Social Capital in the Creation of Human Capital', *The American Journal of Sociology*, 94, 95–120.
- Dolton, P. & Silles, M. (2003), 'The Determination and Consequences of Graduate Overeducation'. In F. Buchel, A. de Grip & A. Mertens (red.), *Overeducation in Europe. Current Issues in Theory and Policy*, Cheltenham: Edward Elgar, 189–216.

- Dolton, P. & Silles, M. (2008), 'The effects of over-education on earnings in the graduate labour market', *Economics of Education Review*, 27, 125–139
- Duchesne, I. & Nonneman, W. (1998), 'The demand for higher education in Belgium', *Economics of Education Review*, 17(2), 211–218.
- Falck, O., Heblich, S. & Luedemann, E. (2012), 'Identity and entrepreneurship: Do school peers shape entrepreneurial intentions?', *Small Business Economics*, 39, 39–59.
- Favara, M. (2012), 'The Cost of Acting "Girly": Gender Stereotypes and Educational Choices', *IZA Discussion Paper*, No. 7037.
- Freeman, R. (1971), *The market for college-trained manpower*. Cambridge: Harvard University Press.
- Frenette, M. (2004), 'The overqualified Canadian graduate: the role of the academic program in the incidence, persistence, and economic returns to overqualification', *Economics of Education Review*, 23, 29–45.
- Fuller, W.C., Manski, C.F. & Wise, D.A. (1982), 'New evidence on the economic determinants of postsecondary schooling choices', *Journal of Human Resources*, 17(4), 477–498.
- Groot, W. & Maassen van den Brink, H. (2000), 'Overeducation in the labor market: a meta-analysis', *Economics of Education Review*, 19(2), 149–158.
- Gullason, E.T. (1989), 'The Consumption Value of Schooling. An Empirical Estimate of One Aspect', *Journal of Human Resources*, 24, 287–298.
- Hartog, J. (2000), 'Overeducation and earnings: where are we, where should we go?', *Economics of Education Review*, 19, 131–147.
- Hilmer, M.J. & Hilmer, C.E. (2012), 'On the relationship between student tastes and motivations, higher education decisions, and annual earnings', *Economics of Education Review*, 31, 66–75.
- Kodde, D.A. & Ritzen, J.M.M. (1984), 'Integrating Investment and Consumption Motives in a Neoclassical Model of Demand for Education', *Kyklos*, 37, 598–608.
- McGuinness, S. (2003), 'Graduate Overeducation as a Sheepskin Effect: Evidence from Northern Ireland', *Applied Economics*, 35, 597–608.
- Mincer, J. (1974), *Schooling, Experience and Earnings*, New York: NBER.
- Montmarquette, C., Cannings, K. & Mahseredjian, S. (2002), 'How do young people choose college majors?', *Economics of Education Review*, 21(6), 543–556.
- Rochat, D., & Demeulemeester, J. L. (2001), 'Rational choice under unequal constraints: the example of Belgian higher education', *Economics of Education Review*, 20(1), 15–26.

- Ryan, R. M. & Deci, E. L. (2000), 'Intrinsic and extrinsic motivations: Classic definitions and new Directions', *Contemporary Educational Psychology*, 25, 54–67.
- Rubb, S. (2003), 'Overeducation in the labor market: a comment and re-analysis of a meta-analysis', *Economics of Education Review*, 22, 621–629.
- Schaafsma, J. (1976), 'The Consumption and Investment Aspects of the Demand for Education', *Journal of Human Resources*, 11, 233–242.
- Soenens, B. & Vansteenkiste, M. (2005), 'Antecedents and outcomes of self-determination in 3 life domains: The role of parents' and teachers' autonomy support', *Journal of Youth and Adolescence*, 34(6), 589–604.
- Spence, M. (1973), 'Job Market Signaling', *Quarterly Journal of Economics*, 87, 355–374.
- Tsang, M. (1987), 'The impact of underutilization of education on productivity: a case study of the U.S. Bell Companies', *Economics of Education Review*, 4, 93–104.
- Van der Meer, P., & Wielers, R. (1996), 'Educational credentials and trust in the labor market', *Kyklos*, 49 (1), 29–6.
- Vansteenkiste, M. & Lens, W. (2006), 'Intrinsic versus extrinsic goal contents in self-determination theory: Another look at the quality of academic motivation', *Educational Psychologist*, 41, 19–31.
- Verhaest, D. & Omeij, E. (2009), 'Objective over-education and worker well-being: a shadow price approach', *Journal of Economic Psychology*, 30, 469–481.
- Verhaest, D. & Omeij, E. (2010), 'The determinants of overeducation: different measures, different outcomes?', *International Journal of Manpower*, 31, 608–625.
- Verhaest, D. & Omeij, E. (2012), 'Overeducation, undereducation and earnings: further evidence on the importance measurement error and ability bias', *Journal of Labor Research*, 31(1), 76–90.
- Verhaest, D. & Omeij, E. (2013), 'The relationship between formal education and skill acquisition in young workers' first jobs', *The Manchester School*, 81(4), 638–659.
- Verhaest, D., Sellami, S. & van der Velden, R. (2015), 'Differences in horizontal and vertical mismatches across countries and fields of study', *International Labour Review*, forthcoming.
- Verhaest, D., Van Trier, W. & Sellami, S. (2011), 'Welke factoren bepalen de aansluiting van onderwijs en beroep? Een onderzoek bij Vlaamse afgestudeerden uit het hoger onderwijs', *Tijdschrift voor Arbeidsvraagstukken*, 27, 416–436.

APPENDIX

TABLE A DESCRIPTIVE STATISTICS

	Time- invariant variables	Time- variant variables			
		Start first job (N=2612)	At age 23 (N=1175)	At age 26 (N=1499)	At age 29 (N=1302)
Items of educational motives					
To earn a higher wage	0.603				
To have a higher chance on a good job later	0.785				
Because most of my classmates/friends also attended higher education	0.300				
Because I did not yet want to go working	0.537				
Because my parents/family expected that	0.464				
It was obvious that I would continue studying	0.662				
Because the subject of the studies interested me	0.800				
Because I wanted to work further on my self-development	0.783				
Because I enjoy studying	0.593				
Academic Choices					
<i>Educational level</i>					
Higher tertiary education	0.372				
<i>Fields- of study</i>					
Linguistics, History & Philosophy	0.056				
Economics, Business & Law	0.303				
Behavioral & Social sciences	0.118				
Health & (para)Medicine	0.127				
Natural sciences & Engineering	0.209				
Arts	0.022				
Education	0.165				
Academic Performance					
<i>Grades</i>					
Graduating with distinction	0.405				
Graduating with high or highest distinction	0.096				
<i>Repeated years</i>	0.327				
Overeducation					
YOVER (JA)		1.700	1.449	1.137	1.219
OVER (JA)		0.521	0.444	0.421	0.452
YOVER (MSA)		0.913	0.684	0.580	0.627
OVER (MSA)		0.363	0.267	0.290	0.315
Labour Market Outcomes					
LN Wages (average net hourly wages)		2.017	2.027	2.114	2.175
Job satisfaction		3.922	4.309	4.126	4.129

TABLE B THE IMPACT OF THE STUDENT MOTIVES ON OVEREDUCATION (BASED ON THE WA MEASURE)

Standard panel data random estimates						
	Model I		Model II		Model III	
	Random effects (1)	Random effects with Mundlak correction (2)	Random effects (3)	Random effects with Mundlak correction (4)	Random effects (5)	Random effects with Mundlak correction (6)
Investment	0.008 (0.025)	0.019 (0.025)	0.007 (0.024)	0.012 (0.024)	0.001 (0.024)	0.006 (0.024)
Educational consumption	-0.091*** (0.025)	-0.096*** (0.025)	-0.103*** (0.024)	-0.103*** (0.024)	-0.084*** (0.033)	-0.085*** (0.025)
Student life consumption	0.075*** (0.033)	0.065*** (0.024)	0.047** (0.023)	0.044* (0.023)	0.047** (0.023)	0.047*** (0.023)
Social norms	0.024 (0.025)	0.023 (0.026)	0.026 (0.024)	0.026 (0.024)	0.024 (0.023)	0.025 (0.023)
Control for Academic Choices	No	No	Yes	Yes	Yes	Yes
Control for Academic Performance	No	No	No	No	Yes	Yes

Standard errors are in parentheses.

The following control variables are included in every model: gender, non-European descent, educational level of the mother, educational level of the father, study track secondary education, study results secondary education, year of birth, experience, experience squared, cohabiting, having a child, years of observation, job type

The following control variables are included in model II (column 2): educational level, fields of study.

The following control variables are included in model III (column 3): educational level, fields of study, repeated years, and grades.

Number of individuals = 2612; Number of observations= 6583

*: p<0.10; **: p<0.05; ***: p<0.01

TABLE C THE IMPACT OF THE STUDENT MOTIVES AND OVEREDUCATION ON WAGES (BASED ON THE WA MEASURE).

	Standard panel data estimates		IV-panel data estimates	
	Random effects (1)	Random effects with Mundlak correction (2)	Random effects (3)	Random effects with Mundlak correction (4)
Investment	0.001 (0.003)	-0.001 (0.003)	0.002 (0.003)	-0.000 (0.003)
Educational consumption	0.006** (0.003)	0.006* (0.003)	0.006** (0.003)	0.006* (0.003)
Student life consumption	-0.002 (0.003)	-0.002 (0.003)	-0.002 (0.003)	-0.002 (0.003)
Social norms	0.001 (0.003)	-0.001 (0.003)	0.002 (0.003)	-0.001 (0.003)
YOVER	-0.017*** (0.002)	-0.008*** (0.002)	-0.031*** (0.002)	-0.022*** (0.003)
YOVER* investment	0.001 (0.001)	-0.001 (0.002)	0.003 (0.002)	-0.002 (0.003)
YOVER* educational consumption	-0.002* (0.001)	-0.002 (0.002)	-0.004** (0.002)	-0.003 (0.003)
YOVER* student life consumption	-0.003** (0.002)	-0.004** (0.002)	-0.005** (0.002)	-0.007** (0.003)
YOVER* social norms	-0.001 (0.001)	-0.004** (0.002)	-0.002 (0.002)	-0.006** (0.003)

Standard errors are in parentheses.

YOVER = years of overeducation

The following control variables are included: gender, non-European descent, educational level of the mother, educational level of the father, track in secondary education, study results secondary education, year of birth, educational level, fields- of study, grades, repeated years, experience, experience squared, cohabiting, having a child, years of observation, job type, percentage of full employment, sector, firm size , night work , shift work , public sector

Number of individuals = 2612; Number of observations= 6583

*: p<0.10; **: p<0.05; ***: p<0.01

TABLE D THE IMPACT OF THE STUDENT MOTIVES AND OVEREDUCATION ON JOB SATISFACTION (BASED ON THE WA MEASURE).

	Standard panel data estimates		IV-panel data estimates	
	Random effects (1)	Random effects with Mundlak cor- rection (2)	Random effects (3)	Random effects with Mundlak correction
Investment	0.005 (0.015)	0.007 (0.016)	0.006 (0.014)	0.007 (0.015)
Educational consump- tion	0.056*** (0.016)	0.048*** (0.017)	0.056*** (0.015)	0.049*** (0.017)
Student life consumption	-0.021 (0.015)	-0.022 (0.016)	-0.021 (0.014)	-0.022 (0.015)
Social norms	-0.000 (0.015)	0.011 (0.016)	0.000 (0.014)	0.011 (0.016)
YOVER	-0.086*** (0.009)	-0.075*** (0.009)	-0.130*** (0.012)	-0.155*** (0.018)
YOVER* investment	-0.006 (0.006)	-0.005 (0.009)	-0.013 (0.009)	-0.014 (0.015)
YOVER* educational consumption	-0.011* (0.006)	-0.022** (0.010)	-0.022** (0.010)	-0.044** (0.017)
YOVER* student life consumption	0.002 (0.006)	0.002 (0.010)	-0.003 (0.011)	0.002 (0.017)
YOVER* social norms	-0.006 (0.006)	0.005 (0.009)	-0.009 (0.010)	0.011 (0.015)

Standard errors are in parentheses.

YOVER = years of overeducation

The following control variables are included: gender, non-European descent, educational level of the mother, educational level of the father, track in secondary education, study results secondary education, year of birth, educational level, fields- of study, grades, repeated years, experience, experience squared, cohabiting, having a child, years of observation, job type, percentage of full employment, sector, firm size, night work, shift work, public sector

Number of individuals = 2612; Number of observations= 6583

*: p<0.10; **: p<0.05; ***: p<0.01

TABLE E THE IMPACT OF THE STUDENT MOTIVES AND OVEREDUCATION (JOB ANALYSIS) ON THE NATURAL LOG OF WAGES – LINEAR REGRESSION COEFFICIENTS (FULL ESTIMATION RESULT)

	Standard panel data estimates		IV-panel data estimates	
	Random effects (1)	Random effects with Mundlak correction (2)	Random effects (3)	Random effects with Mundlak correction (4)
Investment	0.001 (0.003)	-0.001 (0.003)	0.002 (0.003)	-0.003 (0.003)
Educational consumption	0.006** (0.003)	0.006* (0.003)	0.010*** (0.003)	0.008** (0.004)
Student life consumption	-0.002 (0.003)	-0.002 (0.002)	-0.002 (0.003)	-0.002 (0.003)
Social norms	0.002 (0.003)	0.001 (0.003)	0.002 (0.003)	-0.002 (0.004)
YOVER	-0.018*** (0.001)	-0.013*** (0.002)	-0.018*** (0.002)	-0.011*** (0.003)
YOVER * Investment	0.001 (0.001)	-0.000 (0.002)	0.001 (0.001)	-0.004* (0.002)
YOVER * educational consumption	-0.002** (0.001)	-0.002 (0.002)	-0.005*** (0.001)	-0.005** (0.002)
YOVER * student life consumption	-0.002** (0.001)	-0.003* (0.002)	-0.002 (0.001)	-0.004 (0.002)
YOVER * social norms	-0.002 (0.001)	-0.004** (0.002)	-0.002 (0.001)	-0.005** (0.002)
YEXP	0.014*** (0.004)	0.009* (0.005)	0.014*** (0.005)	0.009* (0.005)
YEXP²	-0.001* (0.001)	-0.001 (0.001)	-0.001* (0.001)	-0.001 (0.001)
Years of observation	0.004** (0.002)	0.007*** (0.003)	0.004* (0.002)	0.007*** (0.003)
Man	0.031*** (0.005)	0.028*** (0.006)	0.030*** (0.005)	0.027*** (0.006)
Non – European descent	-0.031 (0.026)	-0.031 (0.026)	-0.032 (0.026)	-0.031 (0.006)
Year of birth -1976 (ref.)				
Year of birth – 1978	-0.023 (0.020)	-0.033 (0.023)	-0.023 (0.020)	-0.033 (0.023)
Year of birth – 1980	-0.014 (0.021)	-0.032 (0.030)	-0.013 (0.021)	-0.034 (0.029)
Cohabiting	-0.006 (0.005)	-0.004 (0.006)	-0.007 (0.005)	-0.004 (0.006)
Having a child	-0.004 (0.011)	-0.007 (0.012)	-0.003 (0.011)	-0.007 (0.012)
Diploma father – < lower secondary education (ref)				
Diploma father-Lower secondary education	-0.010 (0.012)	-0.013 (0.012)	-0.010 (0.012)	-0.014 (0.011)
Diploma father-Higher secondary education	0.001 (0.011)	-0.003 (0.011)	-0.000 (0.011)	-0.005 (0.011)
Diploma father-Tertiary education	0.001 (0.011)	-0.002 (0.011)	0.001 (0.014)	-0.004 (0.011)
Diploma father- unknown	-0.016 (0.014)	-0.017 (0.014)	-0.017 (0.014)	-0.019 (0.014)

Diploma mother – < lower secondary education (ref)				
Diploma mother-Lower secondary education	0.003 (0.014)	0.006 (0.014)	0.002 (0.014)	0.006 (0.014)
Diploma mother-Higher secondary education	-0.005 (0.013)	-0.003 (0.013)	-0.005 (0.013)	-0.003 (0.013)
Diploma mother-Tertiary education	0.004 (0.014)	0.008 (0.014)	0.005 (0.014)	0.008 (0.013)
Diploma mother- unknown	-0.016 (0.023)	-0.015 (0.023)	-0.016 (0.023)	-0.016 (0.023)
Track in secondary education – ASO (ref)				
Track in secondary education – TSO	0.006 (0.006)	0.004 (0.006)	0.006 (0.006)	0.005 (0.006)
Track in secondary education – BSO	-0.038* (0.020)	-0.027 (0.020)	-0.037* (0.020)	-0.026 (0.006)
Track in secondary education – KSO	0.021 (0.021)	0.025 (0.022)	0.022 (0.021)	0.027 (0.021)
Study results in SO – 1e quarter (ref)				
Study results in SO – 2e quarter	-0.009* (0.005)	-0.009 (0.006)	-0.009* (0.005)	-0.008 (0.005)
Study results in SO – 3e quarter	-0.008 (0.009)	-0.006 (0.020)	-0.008 (0.009)	-0.005 (0.009)
Study results in SO – 4e quarter	0.004 (0.015)	0.011 (0.022)	0.004 (0.015)	0.013 (0.015)
Higher tertiary education	0.109*** (0.007)	0.112*** (0.007)	0.109*** (0.007)	0.112*** (0.007)
Field of study: Economics, Business & Law (ref)				
Field of study: Linguistics, History & Philosophy	-0.045*** (0.012)	-0.036*** (0.012)	-0.045*** (0.012)	-0.035*** (0.012)
Field of study: Behavioral & Social Sciences	-0.020** (0.009)	-0.010 (0.009)	-0.020** (0.009)	-0.009 (0.009)
Field of study: Health & (para)Medicine	0.011 (0.010)	0.016 (0.011)	0.011 (0.010)	0.015 (0.011)
Field of study: Natural Sciences & Engineering	-0.003 (0.008)	-0.002 (0.008)	-0.003 (0.008)	-0.003 (0.008)
Field of study: Arts	-0.096*** (0.018)	-0.081*** (0.018)	-0.095*** (0.018)	-0.077*** (0.018)
Field of study: Education	-0.023** (0.009)	-0.015 (0.010)	-0.023** (0.009)	-0.016 (0.010)
Repeated years	-0.007* (0.004)	-0.004 (0.004)	-0.007* (0.004)	-0.004 (0.004)
Graduating with a passing grade (ref)				
Graduating with a distinction grade	0.022** (0.009)	0.022** (0.009)	0.022** (0.009)	0.021** (0.009)
Graduating with a high or highest distinction grade	0.010* (0.005)	0.009* (0.005)	0.010* (0.005)	0.008 (0.005)
Observation in job at age of 23	-0.006 (0.012)	0.005 (0.014)	-0.007 (0.012)	0.004 (0.014)
Observation in job at age of 26	0.046*** (0.012)	0.051*** (0.013)	0.046*** (0.012)	0.053*** (0.013)
Observation in job at age of 29	0.021*** (0.004)	0.022*** (0.004)	0.084*** (0.015)	0.022*** (0.004)

Percentage of employment (100% full time)	-0.004*** (0.000)	-0.005*** (0.000)	-0.004*** (0.000)	-0.005*** (0.000)
Size of the firm – less than 10 employees (ref)				
Size of the firm – between 10 and 49 employees	0.021*** (0.007)	0.021** (0.010)	0.020*** (0.007)	0.020* (0.010)
Size of the firm – between 50 and 249 employees	0.044*** (0.007)	0.035*** (0.011)	0.044*** (0.007)	0.034*** (0.011)
Size of the firm – more than 250 employees	0.064*** (0.007)	0.063*** (0.012)	0.063*** (0.007)	0.063*** (0.012)
Size of the firm - Unknown	0.040** (0.016)	0.028 (0.023)	0.039** (0.016)	0.025 (0.023)
Sector: Agriculture (ref)				
Sector: Mining and Quarrying	0.089** (0.039)	0.060 (0.065)	0.091** (0.040)	0.059 (0.066)
Sector: Craft related industry	0.114*** (0.038)	0.060 (0.063)	0.117*** (0.038)	0.062 (0.064)
Sector: Manufacturing industry	0.063 (0.039)	0.030 (0.065)	0.065 (0.040)	0.034 (0.066)
Sector: Electricity	0.095** (0.037)	0.083 (0.065)	0.096** (0.039)	0.085 (0.064)
Sector: Wholesaling,	0.059 (0.038)	0.016 (0.031)	0.061 (0.038)	0.015 (0.063)
Sector: Food	0.053 (0.042)	0.015 (0.067)	0.056 (0.042)	0.015 (0.068)
Sector: Transport and Communication	0.065* (0.039)	0.0024 (0.063)	0.067* (0.039)	0.027 (0.064)
Sector: Finances	0.091** (0.039)	0.049 (0.065)	0.094** (0.039)	0.051 (0.065)
Sector: Rental Services	0.066 (0.038)	0.019 (0.062)	0.068* (0.038)	0.022 (0.063)
Sector: Public sector	0.051 (0.039)	0.031 (0.064)	0.052 (0.039)	0.034 (0.065)
Sector: Education	0.046 (0.038)	0.021 (0.062)	0.047 (0.038)	0.026 (0.063)
Sector: Health	0.054 (0.038)	0.037 (0.062)	0.056 (0.048)	0.042 (0.063)
Sector: other services	0.053 (0.040)	0.047 (0.064)	0.055 (0.040)	0.050 (0.065)
Unknown sector	0.074* (0.040)	0.060* (0.031)	0.075* (0.040)	0.075 (0.065)
Private sector	-0.011* (0.007)	-0.026** (0.010)	-0.011* (0.007)	-0.027*** (0.010)
Day work (ref)				
Night work	0.011 (0.016)	0.003 (0.018)	0.011 (0.016)	0.001 (0.018)
Day –night work	0.015 (0.015)	0.006 (0.017)	0.017 (0.015)	0.005 (0.017)
Shift work (ref)				
No shift work	-0.008 (0.013)	-0.009 (0.016)	-0.008 (0.013)	-0.010 (0.016)
Unknown shift work	0.003 (0.017)	-0.007 (0.019)	0.004 (0.017)	-0.006 (0.019)

Standard errors are in parentheses.

YOVER = years of overeducation; YEXP = years of experience ; YEXP² = years of experience squared

Number of individuals = 2612; Number of observations= 6583

*, p<0.10; **, p<0.05; ***, p<0.01

TABLE F THE IMPACT OF THE STUDENT MOTIVES ON THE NATURAL LOG OF WAGES: REDUCED FORM ESTIMATES
(EMPLOYER CHARACTERISTICS EXCLUDED) – LINEAR REGRESSION COEFFICIENTS

	Model I		Model II	
	Random effects (1)	Random effects with Mundlak correction (2)	Random effects (3)	Random effects with Mundlak correction (4)
Investment	0.006** (0.003)	0.004* (0.003)	0.003 (0.003)	0.003 (0.003)
Educational consumption	0.002 (0.003)	0.002 (0.003)	0.003 (0.003)	0.003 (0.003)
Student life consumption	-0.005** (0.003)	-0.005* (0.002)	-0.006** (0.003)	-0.006** (0.002)
Social norms	-0.001 (0.003)	-0.001 (0.003)	0.001 (0.003)	-0.002 (0.003)
Field of study: Economics, Business and Law (ref)				
Field of study: Linguistics, History & Philosophy			-0.048*** (0.012)	-0.041*** (0.012)
Field of study: Behavioral & Social Sciences			-0.024*** (0.009)	-0.016* (0.009)
Field of study: Health & (para)Medicine			0.024*** (0.009)	0.028*** (0.009)
Field of study: Natural Sciences & Engineering			0.005 (0.008)	0.006 (0.008)
Field of study: Arts			-0.118*** (0.018)	-0.105*** (0.019)
Field of study: Education			-0.011 (0.008)	-0.004 (0.008)

Standard errors are in parentheses.

The following variable(s) are included in model II: fields of study

The following control variables are included in every model: gender, non-European descent, educational level of the mother, educational level of the father, track in secondary education, study results secondary education, year of birth, educational level, grades, repeated years, experience, experience squared, cohabiting, having a child, years of observation, job type, night work, shift work

Number of individuals = 2612; Number of observations= 6583.

*: p<0.10; **: p<0.05; ***: p<0.01.

CHAPTER 5

DIFFERENCES IN HORIZONTAL AND VERTICAL MISMATCHES ACROSS COUNTRIES AND FIELDS OF STUDY⁴³

Dieter Verhaest, Sana Sellami, Rolf van der Velden⁴⁴

ABSTRACT

We investigate to what extent differences in educational mismatches across countries and fields of study are explained by differences in labour institutions, educational institutions, and labour market imbalances. We rely on early career data for graduates in Europe and Japan and distinguish between full mismatch (FMM): field-of-study mismatch and overeducation combined), mere horizontal mismatch (HMM) and mere vertical mismatch (VMM). Mere HMM is found to be lower in countries with higher employment protection, higher unemployment benefits and more selective educational programs. For mere VMM, particularly differences in imbalances explain cross-country differences. Most country-level variables affecting mere HMM or VMM also affect FMM. In addition, FMM is positively related to collective bargaining coverage. Conclusions regarding field-of-study differences in mismatches are analogous, with both educational program characteristics and imbalances being explanatory factors.

Keywords: Field-of-study mismatch, overqualification, underemployment, youth labour markets

⁴³ Verhaest, D., Sellami, S., & van der Velden, R. (2015), 'Differences in horizontal and vertical mismatches across countries and fields of study', *International Labour Review*, forthcoming.

⁴⁴ We are grateful to Piet Coppieters, Heidi Knippradt, Karel Neels, Walter Nonneman, Walter Van Trier, Mark Visser, and the participants of the Workshop on Overeducation in Santa Maria Capua Vetere (2011), the Workshop of the European Network on Transitions in Youth in Nijmegen (2012) and the 'Dag van de Sociologie' in Nijmegen (2013) for their useful comments and suggestions on previous versions of this paper.

INTRODUCTION

The (mis)match between education and work has been the focus of considerable research in the literature. Prior work concentrates primarily on vertical mismatch or overeducation (Groot and Maassen van den Brink, 2000; McGuinness, 2006). Recently, however, more interest has been shown in so-called —horizontal mismatch‖ as well—that is, mismatch between a worker’s field of study and the content of his/her job (Wolbers, 2003; Robst, 2007). The bulk of the existing literature focuses on effects of mismatch, typically finding that mismatches are harmful in terms of wages and worker well-being (Hartog, 2000; Allen and van der Velden, 2001). There is also substantial evidence that the incidence of mismatch varies widely not only across individuals, but also across labor market segments by fields of study and across countries. At the micro level, research indicates that a variety of mechanisms are responsible for these inequalities, including a lower quality of human capital, job search constraints and discrimination (McGuinness, 2006). At more aggregate levels, a frequently suggested cause is imbalances between the demand and supply. At the macro level, the massive expansion of higher education in many Western countries is often held responsible; at the meso level, the higher incidence of mismatches among those with a humanities degree than among those with technical degrees suggests that students fail to choose fields of study that are in demand due to technological developments. However, whether these imbalances are truly responsible for the variation in mismatches at more aggregate levels largely remains to be investigated.

A small but growing body of research has begun to address this question through cross-country comparisons of the incidence of overeducation. In early work, Groot and Maassen van den Brink (2000) rely on meta-analysis to explain overeducation at the macro level. They find that the incidence of overeducation is positively related to the growth of the labor force. Another early contribution was presented by Di Pietro (2002), who use data from a panel of European countries to show that differences in overeducation across countries are related to the educational composition of the labor force, the strictness of employment protection legislation (EPL) and the level of R&D investment. More recently, Verhaest and Van der Velden (2013) investigate country and field-of-study differences in overeducation among European graduates. Their results show that demand and supply conditions within the labor market as well as the institutional setting matter. First, they find evidence regarding the impact of structural imbalances between the demand and supply of educated workers on the incidence of graduate overeducation in a country. The supply of educated workers is not found to be important in itself, indicating that supply may create its own demand. Further, business cycle conditions at the time of labour market entry explain graduate overeducation as well. With respect to the educational institutions, they showed that both the orientation (general versus specialized) of the study program and the quality and selectivity of the study program are important in explaining country and field-of-study differences in overeducation. Finally, with respect to labor market institutions, Verhaest and Van der Velden do not find evidence that EPL influences overeducation. Similar conclusions regarding the role of structural imbalances, the business cycle and EPL are made by Croce and Ghignoni (2012),

who rely on data for the full labor force. Finally, the analysis of Davia, McGuinness and O'Connell (2010) confirms the aforementioned conclusions regarding structural imbalances of the quantity of skilled workers and the selectivity of the educational system. In addition, they find overeducation to be more prevalent among countries with a low union-density rate.

In this paper, we build on the existing literature by investigating what explains the differences in mismatches across countries and fields of study five years after graduation. Our analysis contributes to the literature in four new ways. First, we extend the analysis with horizontal mismatches. Apart from Wolbers (2003), who finds a positive correlation between the incidence of horizontal mismatches and unemployment, few studies have investigated cross-country differences in this type of mismatch. Moreover, no country-level studies have investigated horizontal and vertical mismatches simultaneously. Some research shows that in particular a combination of overeducation and field-of-study mismatch is harmful to wages and job satisfaction (see Robst, 2008; Bédoué and Giret, 2011). However, no evidence exists demonstrating a wage penalty for a mere field-of-study mismatch without overeducation. Hence, it seems that this last type of mismatch is less problematic for individuals, perhaps because it also indicates that workers are employable in a large range of occupations. Therefore, it is important to determine whether different combinations of horizontal and vertical mismatches are driven by different underlying mechanisms. Second, the present study accounts for differences in union bargaining coverage, rather than union density. The aforementioned finding that unionized countries have lower overeducation incidence seemingly contradicts the assumption that more rigid wage formation impedes labor market clearing. However, union density is only loosely correlated with the impact that unions have on the bargaining process. Union bargaining coverage is therefore likely to be a better indicator of wage rigidity. Third, our study considers the role of unemployment benefit policies. We hypothesize that countries with more generous unemployment benefits face lower levels of mismatches. Fourth, we much more deeply investigate what explains differences in mismatches between fields of study. The lower incidence of mismatch generally observed among individuals with a technical degree (in comparison to those with a humanities degree) may indeed be explained by technological change. An alternative explanation, however, may be that study programs differ across fields of study in terms of quality or selectivity and the extent to which they are vocationally or rather generally oriented. We disentangle the effect of differences in study program characteristics from the effect of structural imbalances between the demand and supply of field-of-study-specific labor.

For these analyses, we use REFLEX and HEGESCO data on graduates in 17 European countries and Japan. We apply multilevel analysis and consider a three-level nested structure: the individual level, the field-of-study level and the country level. We estimate a multinomial logit model with four outcome categories: —full match (reference), —mere vertical mismatch (only vertical but not horizontal), —mere horizontal mismatch (only horizontal but not vertical) and —full mismatch (both vertical and horizontal). The remainder of the paper is structured as

follows. First, we develop our theoretical framework and hypotheses. Next, we explain the methodology, then give an overview of our results. Finally, we discuss the findings and offer conclusions

THEORETICAL FRAMEWORK AND HYPOTHESES

Demand and supply context

A first potential source of cross-country differences in mismatches is variation in the extent to which there is an overall imbalance between the demand and supply of skilled workers, either structurally or cyclically. There are two theoretical effects, which sometimes oppose each other (Bowlus, 1995). On the one hand, an oversupply of skilled workers may force job seekers to accept jobs below their level of education and outside their field of study. On the other hand, it allows employers to be more discriminating. Employers may prefer more highly educated and thus overeducated individuals (cf. Thurow, 1975; Okun, 1981), as well as individuals with the correct field of study (cf. Bowlus, 1995). This means that graduates with an “incorrect” field of study are forced to remain unemployed. Hence, an oversupply of skilled workers will lead to more overeducation, while the impact on horizontal mismatches is theoretically ambiguous. Several studies have shown that a structural oversupply of skilled workers indeed results in more overeducation (see Davia *et al.*, 2010; Ghignoni, 2011; Croce and Ghignoni, 2012; Verhaest and Van der Velden, 2013). In addition, Croce and Ghignoni find that at the country level, the business cycle affects the overall incidence of overeducation. Similarly, Verhaest and Van der Velden (2013) find that the business cycle in the year of labor market entry explains cross-country differences in overeducation up to five years after graduation; graduates find it difficult to find a vertically-matched job during an economic downturn. Only Wolbers (2003) investigates cross-country differences in horizontal mismatches; he finds that a high unemployment rate in the year of labor market entry increases the likelihood of horizontal mismatch. Following our theoretical considerations, we expect that the latter particularly results from the increased likelihood of a full mismatch. We thus test the following hypotheses.

Hypothesis 1: Countries with a structural oversupply (undersupply) of skilled workers face a higher (lower) incidence of mere vertical and full mismatch.

Hypothesis 2: Countries in a recession (economic boom) at the time graduates entered the labor market have a higher (lower) incidence of mere vertical and full mismatch.

Imbalances in supply and demand in terms of fields of study are also likely to explain mismatches. Individuals who face fierce competition for jobs within their field-of-study segment may be forced to accept jobs in other field-of-study segments with labor shortages or in labor market segments at lower job levels. Evidence for this

hypothesis is provided by Wieling and Borghans (2001), who shows that a supply surplus for an educational type results in a higher percentage of overeducated graduates. More indirect evidence that educational mismatches result from imbalances in terms of fields of study is the finding that a graduate's field of study is a strong predictor whether he or she is likely to be overeducated or horizontally mismatched (see Dolton & Silles, 2003; Wolbers, 2003; Frenette, 2004; Ghignoni & Verashchagina, 2013). It is often reported that these mismatches are relatively infrequent among individuals in technical fields of study, and relatively frequent among those with a humanities or arts degree. A first cursory reason for this finding is that the differences in mismatches indeed result from pure quantitative imbalances. Most countries have a relatively low share of graduates choosing technical fields of study in comparison to humanities and arts (Oosterbeek & Webbink, 1997). Moreover, skill-biased technological change and the increasing importance of innovation may have further increased the demand for engineers and computer scientists. A second interpretation, however, is that differences in mismatches across fields of study are related to more qualitative differences between fields of study. Technical fields of study typically have more specialized programs (Wolbers, 2003) and are more selective (Rochat & Demeulemeester, 2001) than programs in the arts or humanities. Therefore, we test whether the differences in mismatches prevail even after accounting for differences in study program characteristics such as their orientation (general versus specialized) and their quality and selectivity.

Hypothesis 3: Graduates with a technical degree are, irrespective of the orientation and the quality and selectivity of their program, less likely to have any type of mismatch.

Hypothesis 4: Graduates with a Humanities and Arts degree are, irrespective of the orientation and the quality and selectivity of their program, more likely to have any type of mismatch.

Educational institutions

With respect to the role of these study program characteristics, we differentiate between within- and between-country effects. At the country level, we expect a negative relationship between the quality and selectivity of the educational system and the hiring standards adopted by employers (cf. Green *et al.*, 2002). Accordingly, a high level of study program selectivity and quality at the country level will be associated with a lower amount of formal overeducation. Further, we expect that a high level of selectivity and quality is also associated with a lower prevalence of horizontal mismatches. In a country with a low selectivity and quality of educational programs, employers must rely more on additional training. Consequently, hiring employees whose field of study matches the work becomes less important. Within countries and fields of study, we expect that graduates of study programs that are less challenging and selective will be more inclined to accept any type of mismatch, since those graduates likely receive fewer suitable job offers. Employers confronted with graduates from a low quality study program will be inclined to hire an overeducated one, but not necessarily one with a mere horizontal mismatch. Thus the within-

country effect that study program selectivity and quality has on vertical mismatches is straightforward: the higher the selectivity and quality of the program, the lower the chance of vertical or full mismatch. However, for mere horizontal mismatches, the within-country effect of the quality and selectivity of the study program has a theoretically ambiguous sign. The negative relationship between the quality and selectivity of a study program and the incidence of vertical mismatch is well established empirically, both within countries (Robst, 1995; McGuinness, 2003; Di Pietro & Cutillo, 2006) and between countries (Davia *et al.*, 2010; Verhaest and Van der Velden, 2013). Research regarding the impact of the quality and selectivity of the study program on horizontal mismatches, however, is lacking. We thus test the following hypotheses.

Hypothesis 5: Countries with a more selective and higher quality educational system have a lower incidence of any type of mismatch.

Hypothesis 6: Within countries, graduates from a more selective and higher quality study program are less likely to have a mere vertical or full mismatch.

Regarding the orientation of the study programs (general versus specialized), we primarily expect an impact on horizontal mismatches. General study programs offer a wider array of skills that can be used across occupations. When employed in jobs for which they have a horizontal mismatch, graduates from this type of program will be relatively more productive than graduates from a specialized study program. Conversely, those with a more specialized study program will be relatively more productive in the case of a horizontal match (Wolbers, 2003). Further, general programs usually focus more on learning and analytical skills and less on directly applicable skills. Hence, even if graduates of general study programs manage to find a job that matches their field of study, they are more often required to start in a lower level job to gain some practical work experience before being promoted to a higher position (cf. Sicherman & Galor, 1990). Moreover, given that general degrees provide less clear signals of the occupation-specific skills of graduates, employers may use lower-level jobs as a screening device for the higher-level jobs (cf. Ghignoni & Verashchagina, 2013). The effect that the orientation of the study program has on mere vertical mismatch is thus likely to be stronger for graduates who recently entered the labor force than for graduates who finished their program five years ago. Nevertheless, Verhaest and Van der Velden (2013) find that the effect of the study program's orientation on overeducation remains significantly positive five years after graduation. This is likely explained by the fact that graduates of these programs face a higher likelihood of a full mismatch.

Hypothesis 7: Countries with a more generally oriented educational system have a higher incidence of mere horizontal and full mismatch among graduates five years after finishing their program.

Hypothesis 8: Within countries, individuals with a more generally oriented study program are more likely to have a mere horizontal or full mismatch five years after finishing their program.

Labor market institutions

Labor market institutions also deliver a potential explanation for differences in mismatches across countries. First, we investigate the role of EPL. EPL reduces the employers' ability to replace badly matched employees with well-matched job seekers. Employers are likely to anticipate these problems. A job candidate's level of education and field of study provide signals to employers regarding the candidate's level and type of abilities and talents. Therefore, employment of an individual with the wrong field of study carries a huge risk for a firm in terms of productivity losses. Consequently, we expect that employers will not be inclined to hire these kinds of job seekers if firing costs are high. Furthermore, one may expect that employers in countries with strong EPL rely more on internal promotion to place employees in the right kind of job. In these countries, we thus expect higher levels of overeducation for newcomers within the labor market. As stated in the introduction, evidence by Di Pietro (2002), Croce and Ghighnoni (2012) and Verhaest and van der Velden (2013) regarding the impact that EPL has on overeducation is inconclusive. One potential issue is that none of these studies differentiate between merely vertically mismatched individuals and those who are fully mismatched. We thus form the following hypothesis.

Hypothesis 9: Countries with a higher level of employment protection face a lower incidence of mere horizontal mismatch and a higher incidence of mere vertical mismatch.

Second, also differences in unemployment benefit regimes may explain country-level differences in mismatches. More generous unemployment benefits allow job seekers to be more selective, resulting in fewer mismatches. While the analysis of Croce and Ghighnoni (2012) does not confirm this, their analysis is based on data for the full labor force. Given that unemployment is generally higher for young individuals, the unemployment benefit regime may be more important for the sample that is investigated in our study.

Hypothesis 10: Countries with more generous unemployment benefits have a lower incidence of any type of mismatch.

Finally, we investigate the role of collective bargaining coverage⁴⁵ as indicator for wage rigidity. As McGuinness (2006) argues, wage rigidity impedes market clearing, resulting in more mismatches. Croce and Ghighnoni (2012) also point to another effect resulting from the impact that relative wages have on the opportunity cost of mismatches (cf. Gottschalk and Hansen, 2003). This effect may work in two directions. On the one hand, unions may bargain above-competitive wages for high-skilled jobs, resulting in increased opportunity costs of overeducation. On the other hand, unions may have a preference for wage compression and bargain for above competitive wages for low-skilled jobs, resulting in decreased opportunity costs. Croce and Ghighnoni provide evidence that

⁴⁵ Collective bargaining coverage is an indicator of the extent to which the terms of workers' employment are influenced by collective negotiation.

the latter mechanism dominates. They show that the relative wages of tertiary education graduates have a negative impact on the incidence of overeducation, while relative wages are in turn found to be negatively affected by union bargaining coverage. This conclusion seems to conflict with the results of Davia *et al.* (2010), who find that higher union density may result in lower levels of overeducation. However, as previously stated, union density is an imperfect measure of unions' influence on the bargaining process. Hence, we hypothesize that collective bargaining coverage has a positive effect on mere vertical and full mismatch⁴⁶. Regarding the impact of collective bargaining coverage on mere horizontal mismatch, similar mechanisms can be considered. On the one hand, flexible wages may help labor market clearing, thus reducing the incidence of mismatch. On the other hand, flexible wages may facilitate the assignment of individuals to the occupations most in demand on the labor market, even if those job seekers do not have a matching field of study. The overall effect is thus theoretically ambiguous. Given that previous empirical evidence is lacking, we therefore do not formulate a hypothesis regarding this type of mismatch:

Hypothesis 11: Countries with higher collective bargaining coverage have higher incidence of mere vertical mismatch and full mismatch.

M E T H O D O L O G Y

Data and mismatch measurement

The analysis is based on data from the REFLEX and HEGESCO surveys. The REFLEX survey was conducted among graduates in 15 countries: Austria, Belgium – Flanders, the Czech Republic, Estonia, Finland, France, Germany, Italy, Japan, the Netherlands, Norway, Portugal, Spain, Switzerland and the UK⁴⁷. The survey was conducted in 2005 using a representative sample of graduates of higher education programs who received their degrees in the 1999-2000 academic year. HEGESCO is a related survey that was carried out in 2008 among individuals who graduated during the 2002-2003 academic year in five Central- and Eastern-European countries: Hungary, Lithuania, Poland, Slovakia and Turkey (see for more information Allen, Pavlin and Van der Velden, 2011). The data include detailed information about each respondent's study program, first employment after graduation and employment at the time of the survey (see Allen and Van der Velden, 2011). We exclude Lithuania and Turkey from our analysis, because not all aggregate indicators used in this study are available for those two countries. Further, we focus on individuals who are employed five years after graduation and exclude those who attend any other tertiary program after graduation. Finally, in order to avoid overrepresentation of certain countries, we

⁴⁶ An alternative approach may be to include relative wages and to use collective bargaining coverage as an instrumental variable to account for endogeneity, following Croce and Ghignoni (2012). However, comparative data on wages for lower segments by field of study are lacking. Moreover, applying an instrumental variable approach within a multilevel multinomial logit model would significantly complicate estimation. Therefore, we elect to estimate a reduced-form specification in which collective bargaining coverage is directly included.

⁴⁷ Sweden took also part in the REFLEX project, but using a different experimental design; Swedish data are hence not comparable.

confine the sample of the multivariate analysis to a maximum of 2,000 randomly chosen cases per country. Omitting observations with missing values leaves a final sample of 14,398 individuals.

To determine the match status, we rely on self-assessments. To identify vertical mismatches, respondents were asked: “What type of education do you feel was most appropriate for this work?” The graduates could choose between a number of (sub)levels of education. When the appropriate level as assessed by the respondent is lower than the education level of the graduate, he/she is considered to be overeducated. To simplify the analysis, the undereducated are grouped with individuals whose level of education matched the type they listed as being most appropriate⁴⁸. Horizontal mismatch is identified using the following question: “What field of study do you feel was most appropriate for this work?” Here, respondents could choose between: (1) exclusively own field, (2) own or a related field, (3) a completely different field or (4) no particular field. The first two answers are defined as a horizontal match and the other two as a horizontal mismatch. By combining the two types of mismatches, we obtain the four (mis)match categories defined previously.

Table 5.1 reports the incidence of the different types of mismatch by country for respondents’ jobs five years after graduation. On average, countries had a nearly identical incidence of full mismatch and mere vertical mismatch—each at 8%. The average incidence of mere horizontal mismatch is somewhat higher—just over 10%. However, these numbers differ substantially across countries. On the one hand, countries like Portugal, Norway, Finland, France, Switzerland and Slovenia each have an overall mismatch incidence of less than 20%. On the other hand, countries like the UK, Hungary, Spain, Poland and particularly Japan show a substantially higher incidence of mismatch. There are also substantial differences across countries in the distribution of the incidence of the three types of mismatch. Some countries had a relatively high incidence of one type of mismatch, but a relatively low incidence of another type of mismatch. Japan, for instance, exhibits very high incidence of mere horizontal and full mismatch, but rather low incidence of mere vertical mismatch. Similarly, Estonia faces a relatively high incidence of mere horizontal mismatch and a relatively low incidence of mere vertical mismatch. Unlike Japan however, Estonia’s incidence of full mismatch is relatively low.

⁴⁸ This decision is justified by the finding that the earnings and job satisfaction of undereducated individuals is typically at least as high as that of adequately educated individuals (see Hartog, 2000; Verhaest and Omeij, 2009).

TABLE 5-1 THE INCIDENCE OF MISMATCH FIVE YEARS AFTER GRADUATION

	Full match	Mere vertical mismatch	Mere horizontal mismatch	Full mismatch
Portugal	0.855	0.079	0.040	0.026
Norway	0.829	0.105	0.022	0.043
Finland	0.829	0.073	0.060	0.037
France	0.805	0.061	0.084	0.051
Switzerland	0.804	0.071	0.071	0.054
Slovenia	0.803	0.078	0.065	0.054
Germany	0.793	0.086	0.066	0.055
Belgium	0.777	0.082	0.069	0.073
Estonia	0.776	0.049	0.156	0.019
Czech Republic	0.768	0.064	0.114	0.054
Netherlands	0.761	0.057	0.124	0.057
Austria	0.752	0.070	0.118	0.060
Italy	0.724	0.119	0.074	0.084
Poland	0.707	0.058	0.158	0.077
Spain	0.689	0.116	0.045	0.151
Hungary	0.677	0.143	0.073	0.107
United Kingdom	0.609	0.065	0.184	0.143
Japan	0.399	0.050	0.349	0.203
Country average	0.742	0.079	0.104	0.075

Data source: REFLEX and HEGESCO, own calculations, based on weighted data.

Estimation and model specification

We estimate the determinants of mismatch using a multilevel multinomial logit model. We consider a three-level nested structure: individuals (*i*) are nested in fields of study(*f*), which are in turn nested in countries (*c*). Several models with the following general form are considered:

$$Y_{ifc}^k = \mathbf{X}_{ifc}\boldsymbol{\beta}_1^k + \mathbf{F}_{fc}\boldsymbol{\beta}_2^k + \mathbf{C}_c\boldsymbol{\beta}_3^k + R_{ifc}^k + U_{fc}^k + V_c^k$$

Whereby Y^k is a latent variable for mismatch category k (full match is the reference category), \mathbf{X} is a vector of individual characteristics, \mathbf{F} is a vector of field-of-study-level characteristics, \mathbf{C} is vector of country-level characteristics and R^k , U^k , and V^k are level-specific error terms. The number of groups is 18 countries and 142 fields-of-study segments⁴⁹. While R^k , U^k , and V^k are assumed to be random and thus independent from one another, we account for possible interdependence of errors within levels but across mismatch categories⁵⁰. We also estimate a standard binary logit model that groups the three mismatch categories into one category (i.e., match versus mismatch).

⁴⁹Within each country we delineate a maximum of eight fields of study: (1) education, (2) humanities and arts, (3) social sciences, business and law, (4) science, mathematics and computing, (5) engineering, manufacturing and construction, (6) agriculture and veterinary, (7) health and welfare and (8) services. No observations of subject (8) existed for Japan and Switzerland. Six individuals in the sample followed a general program; these individuals are excluded.

⁵⁰The models are estimated using the `runmlwin` command implemented in Stata by Leckie and Charlton (2011) to fit multilevel models in the MLwiN software package (Rashbash et al., 2009).

In order to assess how different types of variables explain the variances, we build our model iteratively. Model 0, our baseline model, only contains an intercept and the country-level random effect (V_k). In Model 1, we include covariates that are measured at the individual level (\mathbf{X}). The covariates include a dummy for gender, the age of the graduate, a dummy for whether the degree of the graduate provides access to a PhD program⁵¹ and the relative study results within one's country⁵². *Hypotheses 6* and *8* refer to within-country differences in the effect of study programs. These can be related to differences between fields of study as well to differences between study programs in the same field of study. To test the effect of study program characteristics within fields of study on mismatch, we include the deviation of the quality and selectivity of an individual's study program from the average quality and selectivity of the study program of his/her field of study. We also include a similar variable with respect to the orientation (general versus specialized) of the study program. These two variables are derived from a principal component analysis by using orthogonal rotation of the answers of respondents' assessments of six aspects of the content of their study program (see Appendix A for the factor loadings). The factor scores of the two extracted factors are used as proxies for the quality and the relative orientation of the study program.

In Model 2, we include the random effects at the level of field of study (R). Model 3 adds covariates that are measured at the field-of-study level (\mathbf{F}). These field-of-study-level covariates are seven field-of-study dummies (with Education as reference category) and the field-of-study deviations of the field-of-study average quality and orientation of the study program from their country-level averages. Together with the aforementioned indicators of the quality and selectivity of study programs within fields of study, we can test *Hypothesis 6* and *8*. Moreover, by including field-of-study dummies as well as the orientation and quality and selectivity of fields of study within a country, we assess whether differences in mismatches between humanities and technical degrees result from differences in study program characteristics (cf. *Hypothesis 6* and *8*) or from structural imbalances between the demand and supply of field-of study-specific labor (cf. *Hypothesis 3* and *4*).

In Model 4, we also account for the country-level variables (\mathbf{C}). First, to account for differences in educational institutions (*Hypotheses 5* and *7*), we include the average country scores for the quality and selectivity and the orientation of the program. Our measures for the structural supply and demand of skilled workers (cf. *Hypothesis 1*) are the share of highly educated individuals age of 25 or older as measured by Barro and Lee (2001) and the gross

51 This largely coincides with distinguishing between bachelor's and master's programs. Note, however, that the respondents of the REFLEX/HEGESCO survey left education in the pre-Bologna era, so the term bachelor or master is misleading.

52 This last variable is based on the respondents' assessment of their grades in the year of graduation relative to other students. In the Japanese version, individuals were asked about their absolute grade, while in the other versions, respondents were asked about their relative grade. We create a compatible variable by creating a standardized measure for Japanese and non-Japanese self-assessed performance. Missing values are imputed by their expected values using OLS regression.

domestic expenditure on R&D as measured by the OECD (2008)⁵³. The (relative) structural oversupply of skilled workers is assessed by the difference between the standardized values of these two indicators. We also include the output gap – that is, the relative difference between the actual and the potential GDP – as indicator of the business cycle (*Hypothesis 2*). This variable is developed by the OECD and measured in the year of labour market entry (2000 or 2003, depending on the survey). We test *Hypothesis 9* by using a composite measure of the OECD (2004) on the overall strictness of EPL. To measure how generous unemployment benefits are in a country, we include the replacement ratio (cf. *Hypothesis 10*). The replacement ratio is the proportion of expected income from work that is replaced by unemployment and related welfare benefits and is reported by the OECD (2010). Finally, for the measurement of collective bargaining coverage (cf. Hypothesis 11), we rely on data from Venn (2009). This is an indicator of the extent to which the terms of workers’ employment are influenced by collective negotiation.

ESTIMATION RESULTS

Variance decomposition

In Table 5.2 we report the variance decomposition of the estimated multinomial logit models⁵⁴. Our baseline model (Model 0) indicates that the country level is responsible for 14% of the overall variation in mere horizontal mismatch and 10% of the overall variation in full mismatches across individuals. The country level is much less important in explaining the incidence of mere vertical mismatch. The residual country-level variance of mere vertical mismatch and full mismatch increases slightly after including the individual-level variables (Model 1). It thus seems that the importance of country-level effects in explaining the incidence mere vertical mismatch and full mismatch is somewhat underestimated due to compositional effects. The opposite seems to be true for mere horizontal mismatch. In Model 2, we also include the random effects at the field-of-study level. The field of study is found to be a significant driver of full mismatch (13% of the overall variance), but somewhat less important in explaining mere vertical mismatch (5%) and mere horizontal mismatch (6%). After including field-of-study-level variables as well (Model 3), the unexplained field-of-study-level variance is largely eliminated for full and mere horizontal mismatch. In the case of mere vertical mismatch, however, an unexplained field-of-study-level variance of 3.4% remains. Factors other than field of study and program characteristics are thus responsible for differences in mere vertical mismatch across fields of study. Also interesting is the change in the unexplained country-level variance after including field-of-study-level variables and random effects (Model 1 versus Model 3). versus Model 3). This unexplained variance drops substantially both for mere horizontal mismatch (from 11% to 8%) and for

⁵³Both are of the year 2000. Because of missing information, the R&D expenditures of Norway are for the year 2001.

⁵⁴We use the extended version of the McKelvey and Zavoina (1975) R^2 measure for discrete choice models to assess how much of the overall variance can be attributed to unexplained field-of-study-level and country-level effects (see Snijders and Bosker, 2012).

full mismatch (from 11% to 8% as well). This indicates that a substantial part of cross-country variation can be attributed to differences in the extent to which graduates within countries enroll in fields of study that are associated with low mismatch probabilities. Finally, in Model 4, we also include the variables that are measured at the country level. This largely eliminates the unexplained gross variation between countries for all types of mismatches.

TABLE 5-2 VARIANCE DECOMPOSITION FOR ALTERNATIVE MODEL SPECIFICATIONS

	Model 0	Model 1	Model 2	Model 3	Model 4
Variance decomposition of mere VMM					
Unexplained var. individual level	0.977	0.899	0.867	0.864	0.871
Unexplained var. field-of-study level			0.047	0.034	0.034
Unexplained var. country level	0.023	0.024	0.018	0.019	0.001
Explained variance		0.078	0.067	0.083	0.094
Variance decomposition of mere HMM					
Unexplained var. individual level	0.862	0.846	0.819	0.795	0.771
Unexplained var. field-of-study level			0.064	0.007	0.008
Unexplained var. country level	0.138	0.112	0.071	0.081	0.011
Explained variance		0.042	0.046	0.116	0.209
Variance decomposition of full MM					
Unexplained var. individual level	0.901	0.808	0.749	0.744	0.736
Unexplained var. field-of-study level			0.126	0.016	0.012
Unexplained var. country level	0.099	0.109	0.054	0.075	0.014
Explained variance		0.082	0.071	0.165	0.238
Model Specification					
Variables Individual level	No	Yes	Yes	Yes	Yes
Variables Field-of-study level	No	No	No	Yes	Yes
Variables Country level	No	No	No	No	Yes
Random effect Field-of-study level	No	No	Yes	Yes	Yes
Random effect Country level	Yes	Yes	Yes	Yes	Yes

Data source: REFLEX and HEGESCO, own calculations.

Main estimation results

Table 5.3 presents the estimation results for the full multinomial logit model specification (Model 4)⁵⁵. The binary logit model results are reported in Appendix, Table B. Before we turn to the variables of interest, we first briefly describe the other results. Regarding the variance-covariance matrix of our model, we find that most variances remain statistically significant. The inclusion of random effects is thus justified. Further, the covariance estimates indeed suggest some interdependence across mismatch categories.

With respect to the individual level characteristics, we are primarily interested in the impact of the study program characteristics on mismatch. Our results support the hypothesis that individuals who graduate from a study program that is of above average quality are less likely to have a mere vertical or a full mismatch in their current job (cf. *Hypothesis 6*). Our estimates also show a negative impact of the quality of the study program on the likelihood

⁵⁵ To save space, we do not report the estimation results for the other specifications. These results are available upon request.

that an graduate will have a horizontal mismatch. The results with respect to the relative orientation of the study program are only partially in line with *Hypothesis 8*. Individuals graduating with a relatively general oriented study program are more likely to be merely horizontally mismatched. However, we do not find statistically significant evidence for full mismatched. Regarding the other included characteristics, we find that females and older graduates have a higher likelihood of being merely vertically mismatched or fully mismatched. Further, individuals receive a degree that does not provide access to a PhD program show a lower probability of being merely vertically mismatched, but a higher probability of being merely horizontally mismatched. Finally, we find that individuals with better study results have a higher likelihood of finding a good match five years after graduation. This result mirrors our findings on the quality and selectivity of the study program; any variable suggesting a low quality of human capital increases an individual's risk of all types of mismatches.

The results regarding the program characteristics measured at the field-of-study level further corroborate the important role played by signals of quality of human capital. Graduates from fields of study with relatively more selective and higher quality programs experience lower incidence of all types of mismatches. We further find that graduating from a relatively general study program increases the likelihood to having a mere horizontal mismatch. Study program orientation does not have a statistically significant effect on the incidence of full mismatch. However, our results also indicate that graduates in fields of study with a general study program face a lower incidence of mere vertical mismatches. Finally, our results show that individuals with humanities and arts degrees have the highest likelihood of a full mismatch, and rank second and third of all fields of study in terms of mere horizontal and mere vertical mismatch, respectively⁵⁶. This seems largely in line with *Hypothesis 4*. However, our hypothesis regarding graduates with a technical degree (*Hypothesis 3*) is not supported. We indeed find that, conditional on the orientation and quality of the study program, graduates with a degree in engineering, manufacturing or construction are relatively less likely to have a full mismatch (five out of seven fields of study perform significantly worse; the other two have a statistically indistinguishable likelihood of full mismatch). These graduates' likelihood of a mere horizontal mismatch is relatively low, although graduates with a health and welfare degree fare significantly better. However, graduates from engineering fields of study are significantly more likely (than five out of the other seven fields of study) to have a mere vertical mismatch. Moreover, for graduates of science, mathematics and computing, we find an increased incidence of full mismatches. The binary logit results on the likelihood of any type of mismatch reject Hypothesis 3 (cf. Appendix, Table B); while graduates with an engineering, manufacturing and construction degree perform significantly better on this outcome compared to those with a humanities and arts degree, they also perform significantly worse than those with an education degree or health and welfare degree. To assess the extent to which these outcomes can be attributed to the fact that we account for the average quality

⁵⁶ The difference is statistically significant ($p < 0.10$) in comparison to all other fields of study for full mismatches and in comparison to six out of eight other fields of study for mere horizontal mismatches. However, regarding mere vertical mismatch, only the difference with education turns out to be statistically significant.

and orientation of programs in each field of study, we also estimate a reduced-form model that excludes these study program variables (cf. Appendix, Table C). Differences in mere vertical mismatch across fields of study are much less pronounced if we do not control for study program characteristics. Nevertheless, this specification still finds that engineering, manufacturing and construction graduates face higher mere vertical mismatch than education and health and welfare graduates.

TABLE 5-3 THE PROBABILITY TO HAVE A MISMATCH FIVE YEARS AFTER GRADUATION - MULTINOMIAL LOGIT MULTILEVEL COEFFICIENT ESTIMATES – FULL MODEL SPECIFICATION (REFERENCE = FULL MATCH)

	Mere VMM	Mere HMM	Full MM
Constant	-2.261***	-0.232	-2.110***
Level 1 variables: Individuals			
Female	0.133**	0.042	0.157**
Age	0.020***	-0.005	0.019***
Degree not providing access to PhD	-0.848***	0.202***	-0.101
Relative study results	-0.206***	-0.052*	-0.156***
Quality and selectivity: deviation from study field average (a ₁)	-0.305***	-0.454***	-0.611***
General orientation: deviation from study field average (b ₁)	-0.040	0.152***	0.023
Level 2 variables: Fields of study			
Quality and selectivity: dev. from country average (a ₂)	-0.644***	-0.343**	-1.248***
General orientation: deviation from country average (b ₂)	-0.383*	0.365*	-0.217
Field of study: Engineering, Manufacturing and Constr. (Ref)			
Field of study: Education	-0.814***	0.113	0.056
Field of study: Humanities and Arts	-0.253	0.654***	0.993***
Field of study: Social sciences, Business and Law	-0.384**	0.328**	0.364**
Field of study: Science, Mathematics and Computing	-0.213	0.221	0.492***
Field of study: Agriculture and Veterinary	-0.293*	0.521***	0.576**
Field of study: Health and Welfare	-0.552**	-0.763***	-0.232
Field of study: Services	-0.528**	0.726***	0.494**
Level 3 variables: Countries			
Quality and selectivity: country average (a ₃)	-0.184	-1.820***	-0.721**
General orientation: country average (b ₃)	0.023	-0.116	0.538*
Structural imbalance supply and demand of skilled workers	0.408***	0.004	0.565***
Output gap at labour market entry	-0.178***	0.034	-0.361***
Replacement ratio	-0.172	-2.116**	-1.169
Degree of employment protection	-0.334	-0.343*	-0.369
Collective bargaining coverage	0.477	-0.084	0.876**
Chi² statistics			
Chi ² (a ₁ =a ₃)	0.30	24.37***	0.12
Chi ² (b ₁ =b ₃)	0.01	0.94	2.92*
Chi ² (a ₂ =a ₃)	2.72*	21.88***	2.20
Chi ² (b ₂ =b ₃)	1.56	2.15	4.41**
Variance-Covariance matrix random effects			
Level 2: var(A), var (B), var(C)	0.127***	0.035*	0.062**
Level 2: cov(A,B), cov(B,C), cov(A,C)	-0.022	0.043**	0.031*
Level 3: var(A), var(B), var(C)	0.003	0.048**	0.053*
Level 3: cov(A,B), cov(B,C), cov(A,C)	-0.033**	-0.006	0.028

Data source: REFLEX and HEGESCO, own calculations; *: p < 0.10, **: p < 0.05, ***: p < 0.01; N=14398.

Also at the country level, we find that the selectivity and quality of human capital is an important predictor of mismatches. The likelihood of full mismatch or mere horizontal mismatch is lower for individuals in countries

with more selective and higher quality educational systems (cf. *Hypothesis 5*). Regarding mere horizontal mismatch, this between-country effect is even more pronounced than the within-country effects. The opposite seems to be true regarding mere vertical mismatch, as we do not find any evidence that the quality and selectivity of the educational system at the country-level affects this type of mismatch. However, some caution is recommended regarding this conclusion; the difference between the country-level and field-of-study-level effect is only statistically significant at the 10% level. With respect to the orientation of the educational system in each country, we note some differences between the within-country effects and the between-country effect. Countries with more a generally oriented system show a higher incidence of full mismatch. Although this outcome supports *Hypothesis 7*, we do not find any statistically significant evidence for mere horizontal mismatch.

Besides these two characteristics of the educational system, we distinguish two other groups of country-level factors: the supply and demand context and labor market institutions. Our results indicate that countries that face a structural oversupply of skilled workers have a higher incidence of mere vertical and full mismatch (cf. *Hypothesis 1*). The reverse is true for countries that are in an economic upswing (positive output gap; cf. *Hypothesis 2*). We find that neither type of imbalance has a significant impact on mere horizontal mismatch. The outcomes with respect to employment protection and unemployment benefits are only partially in line with our predictions. As expected, we find a higher level of employment protection and higher replacement ratios are both associated with a lower incidence of mere horizontal mismatch (cf. *Hypothesis 9* and *10*), though their estimated effects on the other two types of mismatches are statistically insignificant. The results on the binary logit analysis reveal that employment protection has a statistically significant ($p < 0.10$) impact on the likelihood of full match (see Appendix, Table B). Finally, collective bargaining coverage has a significantly positive effect on the likelihood of full mismatch (cf. *Hypothesis 11*), but does not have a statistically significant effect on the likelihood of mere horizontal or mere vertical mismatch.

Sensitivity and robustness analyses

We end with some sensitivity and robustness analyses. Given that a few pairs of country-level variables have substantial correlations (see Appendix, Table D), some of the results may be responsive to the inclusion of other variables. Therefore, as a first sensitivity analysis, we also estimate a reduced model based on stepwise backward elimination of insignificant country-level variables. Table 5.4 presents the results obtained from this analysis. All results regarding the supply and demand context, the characteristics of the educational system and the replacement ratio are consistent with the outcomes of our full model. However, with respect to EPL and collective bargaining coverage, there are some clear differences. While the full model found that employment protection has only a significant impact on mere horizontal mismatch, the reduced model suggest that employment protection also has

significant positive effects on the other two types of mismatches. The reduced model also shows that collective bargaining coverage has a statistically significant effect on mere vertical mismatch (cf. *Hypothesis 1f*).

TABLE 5-4 THE PROBABILITY TO HAVE A MISMATCH FIVE YEARS AFTER GRADUATION - MULTINOMIAL LOGIT MULTILEVEL COEFFICIENT ESTIMATES – REDUCED MODEL SPECIFICATION (REF = FULL MATCH)

	Mere VMM	Mere HMM	Full MM
Level 3 variables: Countries			
Quality and selectivity: country average	-	-1.894**	-0.613**
General orientation: country average	-	-	0.676**
Structural imbalance demand and supply of skilled workers	0.404***	-	0.583***
Output gap at labour market entry	-0.181***	-	-0.412***
Replacement ratio	-	-1.596**	-
Degree of employment protection	-0.330**	-0.389**	-0.489**
Collective bargaining coverage	0.430**	-	0.949**

Included but not reported variables at level 1 and 2: see table 3; Data source: REFLEX and HEGESCO, own calculations; *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$; N=14398.

As second sensitivity analysis, we re-test our full model specification without Japan. As shown in Table 5.1, Japan scores, in comparison to the other countries, substantially higher on the incidence of mere horizontal mismatches and, to a lesser extent, on the incidence of full mismatches. The main results of this analysis are presented in Table 5.5. The results regarding the supply and demand context and those regarding the labour market institutions are largely consistent with those on the basis of the full set of countries. However, there are some differences with regard to the impact of the educational system characteristics. Whereas the full model reported a statistical significant impact of the quality and selectivity of the educational system on the incidence of full mismatch, we do not find such an effect on the basis of the reduced sample. Further, in opposition with *Hypothesis 7*, also the impact of the orientation on full mismatch turns out to be statistically insignificant.

TABLE 5-5 THE PROBABILITY TO HAVE A MISMATCH FIVE YEARS AFTER GRADUATION - MULTINOMIAL LOGIT MULTILEVEL COEFFICIENT ESTIMATES – MODEL WITHOUT JAPAN (REF = FULL MATCH)

	Mere VMM	Mere HMM	Full MM
Level 3 variables: Countries			
Quality and selectivity: country average	-0.080	-1.484***	-0.357
General orientation: country average	-0.024	-0.372*	0.376
Structural imbalance demand and supply of skilled workers	0.386***	-0.053	0.486***
Output gap at labour market entry	-0.179***	0.089	-0.322***
Replacement ratio	-0.091	-2.859***	-1.751
Degree of employment protection	-0.288*	-0.282*	-0.335
Collective bargaining coverage	0.488	0.190	1.335***

Included but not reported variables at level 1 and 2: see table 3; Data source: REFLEX and HEGESCO, own calculations; *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$; N=13398.

Finally, as a robustness test, we also estimate our full model for the first job after graduation. In Table 5.6, we present the results for a selection of variables⁵⁷. While most of the results fit with those for the job five years after graduation, we also note some clear differences, in particular regarding the impact of the educational and labour market institutions. First, while we did not find that individuals with an above-average general study program within their field of study are more likely to have a full mismatch five years after graduates, these individuals start their career with these types of mismatches. Similarly, while individuals from fields of study with an on average general program seem less likely to have a mere vertical mismatch five years after graduation, this is not yet the case at the start of the career. Further, for the quality and selectivity of the program, we do not find a statistically significant between-country effect on full mismatch and a statistically significant between-field-of-study effect on mere horizontal mismatch. Finally, regarding labour market institutions, we do not find any statistically significant impact for the replacement ratio, while the degree of employment protection has no statistically significant impact on the likelihood to have a mere horizontal mismatch in the first job.

TABLE 5-6 THE PROBABILITY TO HAVE A MISMATCH AT THE START OF THE CAREER - MULTINOMIAL LOGIT MULTILEVEL COEFFICIENT ESTIMATES – FULL MODEL SPECIFICATION (REF = FULL MATCH) (SELECTED RESULTS)

	Mere VMM	Mere HMM	Full MM
Level 1 variables: Individuals			
Quality and selectivity: deviation from study field average (a1)	-0.350***	-0.510***	-0.634***
General orientation: deviation from study field average (b1)	0.036	0.186***	0.142***
Level 2 variables: Fields of study			
Quality and selectivity: deviation from country average (a2)	-0.786***	-0.285	-0.865***
General orientation: deviation from country average (b2)	-0.125	0.381	0.311
Level 3 variables: Countries			
Quality and selectivity: country average	-0.007	-1.767***	-0.465
General orientation: country average	-0.194	-0.193	0.633*
Structural imbalance demand and supply of skilled workers	0.452***	0.014	0.700***
Output gap at labour market entry	-0.167***	0.057	-0.340***
Replacement ratio	-0.473	0.638	-1.076
Degree of employment protection	-0.358***	-0.440	-0.559**
Collective bargaining coverage	0.861***	-0.771	1.011**

Full estimation results: see Appendix, Table E; Data source: REFLEX and HEGESCO, own calculations; *: p < 0.10, **: p < 0.05, ***: p < 0.01; N=10967.

DISCUSSION AND CONCLUSION

This study was designed to determine what explains country and field-of-study differences in educational mismatches five years after graduation. In contrast to other studies, we analyze horizontal and vertical mismatches simultaneously, defining three mismatch categories: mere vertical mismatch, mere horizontal mismatch, and full mismatch. We investigate three types of explanatory factors: those related to the demand and the supply context, educational institutions and labour market institutions.

⁵⁷ The full estimation results are reported in Appendix, Table E.

Regarding the demand and supply context, we find that both cyclical and structural country-level imbalances drive the incidence of mere vertical and full mismatch, but not mere horizontal mismatch. The effect of these imbalances on overeducation is in line with the outcomes of several other studies, and indicates that graduates are prepared to accept lower-level positions when they face difficulties finding jobs aligned with their level of education. Further, the absence of an effect of these imbalances on mere horizontal mismatch suggests that the positive effect resulting from an increased willingness to accept such positions is offset by an equally large negative effect resulting from an increase in employers' selectivity (cf. Bowlus, 1995).

Also differences in mismatch between fields of study seem to be explained by imbalances between demand and supply. In particular, graduates with an arts and humanities degree are more likely to have any type of mismatch. Given that these higher incidences remain even after accounting for differences in the selectivity and orientation of the study programs, it seems that the source of this negative labor market performance is at least partly quantitative—that is, labor supply outstrips the demand for graduates with arts and humanities qualifications. Graduates with a technical degree are less likely to have a mere horizontal or full mismatch. However, after accounting for the selectivity and the rather specialized orientation of the study programs within technical fields of study, we find that graduates of these programs are more likely to have a mere vertical mismatch than graduates from most other fields of study. This suggests that the shortage of job seekers with a technical education is mainly concentrated at more intermediate and undergraduate levels. Still, this requires further investigation.

Concerning educational characteristics, we first consider the quality and selectivity of study programs. Within countries, we find that a lower quality and selectivity of the study program increases graduates' likelihood of having any type of mismatch. Similarly, lower grades increase a graduate's likelihood of having any type of mismatch. The finding that individuals with a lower quality of human capital are more likely to be overeducated was expected, and fits with the conclusions of many other studies in the literature. However, the effect for mere horizontal mismatch was not anticipated and does not match with the idea that a mere horizontal mismatch is a less severe problem because it is a sign of higher employability. It may be likely that employers hire these graduates due to a shortage of candidates with a matching field of study. Also in terms of the differences in mismatches between countries, we find evidence that the quality and selectivity of the educational system matters. However, contrary to our expectations, we find no evidence of between-country effects on mere vertical mismatch. One explanation may be that our quality indicator insufficiently captures quality differences across countries if individuals base the assessment of the quality of their study program only on a within-country comparison. However, in that case, we would not expect to find that the country-level average quality has an effect on the other two types of mismatches either. An alternative explanation may be provided by the subjective nature of our overeducation measure. To the extent that the overall quality of the educational system is perceived to be poor, individuals may adapt upward

their assessment of what is required to execute their jobs. Hence, improving the overall quality of the educational system may result in less formal overeducation, but not in less genuine overeducation (cf. Chevalier, 2003). Further evidence, relying on more objective indicators may resolve this.

The results with respect to the orientation of the educational system are less straightforward. Looking at differences within countries, we find that a general orientation increases the incidence of mere horizontal mismatch. Looking at differences between countries, a general orientation increases the incidence of full mismatch. These effects were expected, since general programs may provide more skills that can be used across occupations. However, our results did not reveal a similar within-country effect on full mismatch or a similar between-country effect on mere horizontal mismatch. With respect to mere vertical mismatches, we find an unanticipated negative within-country effect. This seems to suggest that although graduates with a general education more often face a horizontal mismatch, they are not more likely to be overeducated. This might be explained as follows: if it is the case that graduates cannot find a job that matches their education, those with a general education are more likely to switch to jobs outside their field of study than those with a vocational education. While the implication may be that these generally educated graduates must start their career in a position below their level of education, they are more often promoted to a higher position after several years.

Labour market institutions play an important role in determining cross-country differences in mismatches as well. First, we find that strict EPL decreases the incidence of mere horizontal mismatches five years after graduation. This fits with the expectation that employers are reluctant to hire graduates from non-matching fields of study since these individuals do not provide any reliable signal regarding their productivity. After all, dismissal will be difficult or costly when the result of the screening process turns out to be negative. We expected that in countries with a strong employment legislation, employers would rely more on internal promotions, thus increasing the likelihood of mere vertical mismatches. This was not confirmed in our analyses. It may be the case that employers also perceive employment of merely vertically mismatched individuals to be risky. Individuals may become dissatisfied with their job if they are not promoted (cf. Bédoué & Giret, 2011), thus demotivating these employees and making them less productive. It is noteworthy that our outcomes regarding mere vertical mismatch differ from those of other studies, including Di Pietro (2002), Croce and Ghignoni (2012) and Verhaest and Van der Velden (2013). A possible explanation is that these other studies focus on the full labour force. To the extent that individuals cannot be fired after organizational and technological changes, match quality may be poorer for older than for younger employees. Another explanation is that these studies may not account for other labour market institutions that are correlated with EPL, such as unemployment benefits and collective bargaining coverage.

Our findings are also novel with regards to the effects of the generosity of the unemployment benefit system and collective bargaining coverage. We find that a higher replacement ratio decreases the country-level incidence of

mere horizontal mismatches five years after graduation. This suggests that higher unemployment benefits allow job seekers to be more selective. Note that we did not find an impact on mismatch in the first job. This is not unexpected since, in general, job seekers without work experience are not entitled to unemployment benefits. The finding that there is no impact on mere vertical mismatch is remarkable as well, but fits with the outcomes of Croce and Ghignoni (2012). A partial explanation can be found in the strong scarring effect of overeducation at the start of the career, as found by Baert, Cockx and Verhaest (2013). To the extent that unemployment benefits cannot explain overeducation in the first job, also its impact on overeducation in further jobs will be restricted.

Further, we also find that higher bargaining coverage results in a higher incidence of full mismatch. This conforms with the results of Croce and Ghignoni (2012), and can result both from downward wage rigidity in skilled jobs and from wage compression. The finding that collective bargaining coverage has no impact on the incidence of horizontal mismatches suggests that the positive effect of wage rigidity, which prevents demand to adapt to supply, is compensated by the negative effect of wage compression, resulting in a lower willingness among job seekers to take jobs outside their field of study.

In sum, this study shows that differences in educational mismatches across countries and fields of study are driven by a broad range of mechanisms. This creates a clear challenge for policy makers and indicates that a combination of economic, education, and labor market policies may be needed to successfully reduce mismatches among young workers. This is particularly true for full mismatches, which can be considered the most problematic. A first policy measure may be to invest in the quality of the study programs. Also the provision of study-choice guidance and information regarding the fields of study most in demand on the labour market may be helpful to reduce mismatches. Further, governments may increase financial support for R&D investments (see also Ghignoni and Verashchagina, 2013), which may increase the overall demand for graduates and reduce possible structural imbalances. While the above-mentioned measures may be rather uncontroversial, other measures may conflict with alternative priorities such as combating youth employment. Increasing unemployment benefits, for instance, may help young people finding jobs that match with their field of study. However, this may also reduce the incentive to search for jobs. Similarly, while we found high degrees of EPL to be associated with lower incidences of mismatch, stronger EPL may also increase the bargaining power of insiders on the labour market thus reducing the chances to find a job in the first place. Further research would be helpful in providing more insight into these issues.

REFERENCES

- Allen, J., & van der Velden, R. (2001), 'Educational mismatches versus skill mismatches: effects on wages, job satisfaction, and on-the-job search', *Oxford Economic Papers*, 53, 434-452.
- Allen, J., & van der Velden, R. (2011), *The Flexible Professional in the Knowledge Society: New Challenges for Higher Education*, Higher Education Dynamics, 35, Dordrecht: Springer.
- Allen, J., Pavlin, S., van der Velden, R. (eds.) (2011), *Competencies and Early Labour Market Careers of Higher Education Graduates in Europe*, Ljubljana: University of Ljubljana.
- Baert, S., Cockx B. & Verhaest, D. (2013), 'Over-education at the start of the career: stepping stone or trap?', *Labour Economics*, <http://dx.doi.org/10.1016/j.labeco.2013.04.013>25, 123-140.
- Barro, R., & Lee, J. (2001), 'International data on educational attainment: updates & implications', *Oxford Economic Papers*, 53, 541-563.
- Bédoué, C. & Giret, J. (2011), 'Mismatch of vocational graduates: what penalty on French labour market?' *Journal of Vocational Behavior*, 78, 68-79.
- Bowlus, A.J. (1995), 'Matching workers & jobs: cyclical fluctuations in match quality', *Journal of Labor Economics*, 13, 335-350.
- Chevalier, A. (2003), 'Measuring over-education?', *Economica*, 70, 509-531.
- Croce, G., & Ghignoni, E. (2012), 'Demand and supply of skilled labour and overeducation in Europe: a country-level analysis', *Comparative Economic Studies*, 54, 413-439.
- Davia, M., McGuinness, S., & O'Connell, P. (2010), 'Explaining international differences in rates of overeducation in Europe', *ESRI Working Paper*, 386, 1-21.
- Di Pietro, G. (2002), 'Technological change, labor markets and low skill, low-technology traps', *Technological Forecasting & Social Change*, 69, 885-895.
- Di Pietro, G., & Cutillo, A. (2006), 'University quality and labour market outcomes in Italy', *Labour*, 20, 37-62.
- Dolton, P. & Silles M. (2003), 'The determinants and consequences of graduate overeducation', in *Overeducation in Europe*, ed. by F. Büchel, A. de Grip and A. Mertens, Cheltenham: Edward Elgar, 189-213.
- Frenette, M. (2004), 'The overqualified Canadian graduate: the role of the academic program in the incidence, persistence, and economic returns to overqualification', *Economics of Education Review*, 23, 29-45.

- Ghignoni, E. (2011), 'Demand and supply of skilled labour and persistence of young workers' overeducation in Europe: Mediterranean Countries versus the Netherlands', *Journal of Educational, Cultural and Psychological Studies*, 4, 101-143.
- Ghignoni, E. & Verashchagina, A. (2013), 'Educational qualifications mismatch in Europe. Is it demand or supply driven?', *Journal of Comparative Economics*, 42, 670-692
- Gottschalk, P & Hansen, M.(2003), 'Is the proportion of college workers in non-college jobs increasing?', *Journal of Labor Economics*, 21, 449-471.
- Green, P., McIntosh, S., & Vignoles, A. (2002), 'The utilization of education and skills: evidence from Britain', *The Manchester School*, 70, 792-811.
- Groot, W., & Maassen van den Brinck, H. (2000), 'Overeducation in the labour market: a meta-analysis', *Economics of Education Review*, 19, 149-158.
- Hartog, J. (2000), 'Overeducation and earnings: where are we, where should we go?', *Economics of Education Review*, 19, 131-147.
- Leckie, G. & Charlton, C. (2011), *Runmlwin: Stata module for fitting multilevel models in the MLwiN software package*. Centre for Multilevel Modelling, University of Bristol.
- McGuinness, S. (2003), 'University quality and labour market outcomes', *Applied Economics*, 35, 1943-1955.
- McGuinness, S. (2006), 'Overeducation in the labour market', *Journal of Economic Surveys*, 20, 387-418.
- McKelvey, R., & Zavoina, W. (1975), 'A statistical model for the analysis of ordinal level dependent variables', *Journal of Mathematical Sociology*, 4, 103-120.
- OECD (1994), *Employment Outlook*, Paris: OECD.
- OECD (2004), *Employment Outlook*, Paris: OECD.
- OECD (2008), *Main Science & Technology Indicators*, Paris: OECD.
- OECD (2010), *Indicators on Employment Protection - annual time series data 1985-2008*, Paris: OECD.
- OECD (2013), *Education at a Glance 2013: OECD Indicators*, OECD Publishing
- Okun, A. (1981), *Prices and Quantities: A Macroeconomic Analysis*, Brookings Institution, Washington D.C.
- Oosterbeek, H., & Webbink, D. (1997), 'Is there a hidden technical potential?', *De Economist*, 145, 159-177.
- Robst, J. (1995), 'College Quality and Overeducation', *Economics of Education Review*, 14, 221-228.
- Robst, J (2007), 'Education and job match: The relatedness of college major and work' *Economics of Education Review*, 26, 397-407.

- Robst, J. (2008), 'Overeducation and college major: explaining the definition of mismatch between schooling and jobs', *The Manchester School*, 76, 349-368.
- Rochat, D., & Demeulemeester, J. (2001), 'Rational choice under unequal constraints: the example of Belgian higher education', *Economics of Education Review*, 20, 15-26.
- Sicherman, N., & Galor, O. (1990), 'A theory of career mobility', *Journal of Political Economy*, 98, 169-192.
- Thurow, L. (1975), *Generating Inequality: Mechanisms of distribution in the U.S. economy*, New York: Basic Books.
- Venn, D. (2009), 'Legislation, collective bargaining and enforcement: Updating the OECD employment protection indicators', *OECD Working Papers*, 89, 54 p.
- Verhaest, D., & Omeij, E. (2009), 'Objective over-education and worker well-being: a shadow price approach', *Journal of Economic Psychology*, 30, 469-481.
- Verhaest, D., & Van der Velden, R. (2013), 'Cross-country differences in graduate overeducation', *European Sociological Review*, 29, 642-653.
- Verhaest, D., Van Trier, W., & Sellami, S. (2011), 'Welke factoren bepalen de aansluiting van onderwijs en beroep?', *Tijdschrift voor Arbeidsvraagstukken*, 27, 415-436.
- Wieling, M. & Borghans, L. (2001), 'Discrepancies between supply and demand and adjustment processes in the labour market', *Labour*, 15, 33-56.
- Wolbers, M. (2003), 'Job mismatches and their labour-market effects among school-leavers in Europe', *European Sociological Review*, 19, 249-266.

APPENDIX

TABLE A: DERIVATION OF THE QUALITY AND SELECTIVITY AND THE GENERAL ORIENTATION OF THE STUDY PROGRAM:
PRINCIPAL COMPONENTS ROTATED FACTOR LOADINGS

To what extent did the following descriptions apply to your study program	Component 1: Quality and selectivity	Component 2: General orientation
Program was generally regarded as demanding	,365	,113
Employers are familiar with the content of program	,430	-,092
There was freedom in composing your own program	-,179	,587
Program had a broad focus	,016	,501
Program was vocationally orientated	,407	-,207
Program was academically prestigious	,282	,299

TABLE B: THE PROBABILITY TO HAVE A MISMATCH FIVE YEARS AFTER GRADUATION - MULTINOMIAL LOGIT MULTILEVEL COEFFICIENT ESTIMATES – FULL MODEL SPECIFICATION (REFERENCE = FULL MATCH)

	Full Mismatch
Constant	0.004
Level 1 variables: Individuals	
Female	0.102**
Age	0.010***
Degree not providing access to PhD	-0.242***
Study results	-0.138***
Quality and selectivity: deviation from study field average (a ₁)	-0.443***
General orientation: deviation from study field average (b ₁)	0.054**
Level 2 variables: Fields of study	
Quality and selectivity: deviation from country average (a ₂)	-0.765***
General orientation: deviation from country average (b ₂)	-0.122
Field of study: Engineering, Manufacturing and Construction (Ref)	
Field of study: Education	-0.299*
Field of study: Humanities and Arts	0.420***
Field of study: Social sciences, Business and Law	0.029
Field of study: Science, Mathematics and Computing	0.087
Field of study: Agriculture and Veterinary	0.185
Field of study: Health and Welfare	-0.545***
Field of study: Services	0.145
Level 3 variables: Countries	
Quality and selectivity: country average (a ₃)	-1.011***
General orientation: country average (b ₃)	0.173
Structural imbalance supply and demand of skilled workers	0.376***
Output gap at labour market entry	-0.142**
Replacement ratio	-1.110
Degree of employment protection	-0.285*
Collective bargaining coverage	0.096
Chi² statistics	
Chi ² (a ₁ =a ₃)	4.66**
Chi ² (b ₁ =b ₃)	0.28
Chi ² (a ₂ =a ₃)	0.92
Chi ² (b ₂ =b ₃)	1.19
Variance-Covariance matrix random effects	
Level 2: var(A), var(B), var(C)	0.025**
Level 3: var(A), var(B), var(C)	0.084**

Data source: REFLEX and HEGESCO, own calculations; *: p < 0.10, **: p < 0.05, ***: p < 0.01; N=14398

TABLE C MODEL SPECIFICATION WITHOUT FIELD-OF-STUDY AVERAGE ORIENTATION AND FIELD-OF-STUDY AVERAGE QUALITY AND SELECTIVITY OF THE STUDY PROGRAM INCLUDED (SELECTED RESULTS)

	Mere VMM	Mere HMM	Full MM
<i>Level 2 variables: Fields of study</i>			
Field of study: Engineering, Manufacturing and Constr. (Ref)			
Field of study: Education	-0.439**	0.090	0.571***
Field of study: Humanities and Arts	0.034	0.992***	1.686***
Field of study: Social sciences, Business and Law	-0.192	0.511***	0.828***
Field of study: Science, Mathematics and Computing	-0.110	0.415***	0.807***
Field of study: Agriculture and Veterinary	-0.111	0.502***	0.921***
Field of study: Health and Welfare	-0.483***	-1.032***	-0.364
Field of study: Services	-0.111	0.820***	1.137***

Data source: REFLEX and HEGESCO, own calculations; *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$; N=14398; Full estimation results are available upon request.

TABLE D COUNTRY-LEVEL CORRELATIONS

	Full match	Mere vertical mismatch	Mere horizontal mismatch	Full mismatch	Quality & Selectivity	General orientation	Structural imbalance supply and demand	Output gap	EPL	Replacement ratio
Mere vertical mismatch	-0,484**	1								
Mere horizontal mismatch	-0,838***	0,025	1							
Full mismatch	-0,907***	0,529**	0,801***	1						
Quality & selectivity	0,461*	0,342	-0,610***	-0,333	1					
General orientation	-0,151	0,077	0,064	0,143	-0,173	1				
Struct. imbal. supply & demand	0,030	0,358	-0,113	0,112	0,265	-0,157	1			
Output gap	0,509**	-0,300	-0,443*	-0,524**	0,227	0,352	0,239	1		
EPL	0,429*	-0,073	-0,462*	-0,388	-0,057	-0,055	0,437*	0,321	1	
Replacement ratio	0,570**	-0,280	-0,423*	-0,398	0,056	-0,082	0,481**	0,104	0,733***	1
Collective bargaining coverage	0,455**	-0,051	-0,571**	-0,383	0,172	0,341	0,631***	0,164	0,531**	0,423*

TABLE E THE PROBABILITY TO HAVE A MISMATCH AT THE START OF THE CAREER - MULTINOMIAL LOGIT MULTILEVEL COEFFICIENT ESTIMATES – FULL MODEL SPECIFICATION (REFERENCE = FULL MATCH)

	Mere VMM	Mere MM	Full MM
Constant	-1.995***	-1.797**	-0.964
Level 1 variables: Individuals			
Women	0.145**	-0.032	0.204***
Age	0.017***	-0.003	0.011*
Degree not providing access to PhD	-0.602***	0.125	-0.058
Study results	-0.199***	-0.042	-0.213***
Quality and selectivity: deviation from study field average (a ₁)	-0.350***	-0.510***	-0.634***
General orientation: deviation from study field average (b ₁)	0.036	0.186***	0.142***
Level 2 variables: Fields of study			
Quality and selectivity: deviation from country average (a ₂)	-0.786***	-0.285	-0.865***
General orientation: deviation from country average (b ₂)	-0.125	0.381	0.311
Field of study: Engineering, Manufacturing and Constr. (Ref)			
Field of study: Education	-1.217***	0.067	0.321
Field of study: Humanities and Arts	-0.547***	0.787***	1.196***
Field of study: Social sciences, Business and Law	-0.290**	0.634***	0.823***
Field of study: Science, Mathematics and Computing	-0.456***	0.175	0.433**
Field of study: Agriculture and Veterinary	-0.241	0.531**	0.739***
Field of study: Health and Welfare	-0.560***	-0.678**	-0.067
Field of study: Services	-0.329	1.058***	1.136***
Level 3 variables: Countries			
Quality and selectivity: country average (a ₃)	-0.007	-1.767***	-0.465
General orientation: country average (b ₃)	-0.194	-0.193	0.633*
Structural imbalance supply and demand of skilled workers	0.452***	0.014	0.700***
Output gap at labour market entry	-0.167***	0.057	-0.340***
Replacement ratio	-0.473	0.638	-1.076
Degree of employment protection	-0.358***	-0.440	-0.559**
Collective bargaining coverage	0.861***	-0.771	1.011**
Chi² statistics			
Chi ² (a ₁ =a ₃)	3.65*	10.26***	0.23
Chi ² (b ₁ =b ₃)	1.66	0.89	1.96
Chi ² (a ₂ =a ₃)	11.01***	11.03***	1.05
Chi ² (b ₂ =b ₃)	0.08	1.50	0.65
Variance-Covariance matrix random effects			
Level 2: var(A), var (B), var(C)	0.069***	0.079*	0.075**
Level 2: cov(A,B), cov(B,C), cov(A,C)	-0.044	0.045**	-0.017
Level 3: var(A), var(B), var(C)	0.000	0.097	0.080*
Level 3: cov(A,B), cov(B,C), cov(A,C)	0.000	0.000	0.049

Data source: REFLEX and HEGESCO, own calculations; *: p < 0.10, **: p < 0.05, ***: p < 0.01; N=10967.

CONCLUSION

In this thesis we have focused on educational mismatch: (1) overeducation and (2) field of study mismatch. In the empirical literature, overeducation has been a strongly discussed topic. During recent years, also the focus on field of study mismatch or horizontal mismatch has grown. However, researchers have not yet treated field of study mismatch in much detail. Research on this type of mismatch has been neglected partly due to the unavailability in the data and the difficulty of measuring field of study mismatch based on methods such as job analysis.

The aim of this thesis was to contribute to this area of research and to investigate horizontal mismatch (eventually in combination with overeducation) in more detail. We focused on the following three topics. First, we dealt with the measurement of field of study mismatch (cf. Chapter 1, Chapter 3). Until now, none of the studies within educational mismatch literature have focused on the measurement of field of study mismatch based on different methods. This was our focus in Chapter 1. We also demonstrated that the alternative measures of field of study mismatch lead to slightly different conclusions regarding the consequences of mismatches (cf. Chapter 3). At last, we investigated whether random measurement error influence the estimated impact of mismatches on wages. Secondly, we contributed to the literature that has focused on the determinants of overeducation and field of study mismatch. In Chapter 2, we investigated which individual characteristics could determine the combination of overeducation and horizontal mismatch. In Chapter 4, we assumed that four educational motives to participate in higher education could determine the likelihood of overeducation. In the last chapter, we did not only focused on individual characteristics but also on field-of-study level country level characteristics to explain mismatches. The third aim of this thesis was to find out which combinations of overeducation and horizontal mismatch are problematic by investigating their consequences in terms of wages and job satisfaction (cf. Chapter 2, Chapter 3 and Chapter 4).

In this conclusion chapter we will discuss the main empirical findings regarding these three topics and formulate some theoretical implications and policy recommendations. We end this chapter with a few directions for further research.

CONCEPTUALISATION AND MEASUREMENT OF MISMATCH

In this thesis, we defined field of study mismatch as a mismatch between the attained field of study and the optimal field of study for a job. To measure field of study mismatch, we used four measurement methods that also have been used to measure overeducation. These are (1) direct worker self-assessment, (2) indirect worker self-assessment, (3) job analysis and (4) realized matches. In Chapter 1, we demonstrated that these methods deliver substantial differences in the incidence of horizontal mismatch. In the first job after graduation in Flanders, this incidence lies between 15% and 40%, with the direct worker self-assessment measurement method delivering the lowest incidence of horizontal mismatch and the indirect worker self-assessment method the highest frequency. We also found that on the basis of at least on one measure 63% has a horizontal mismatch and only 5% of the individuals have a field of study mismatch based on every measure. Also the conclusions regarding determinants of field of study mismatch (cf. Chapter 1) and consequences of mismatches (cf. Chapter 3) were found to differ regarding the applied measurement method. We will discuss these specific results in more detail when summarizing the results on the second and third topic.

These differences can partly be explained by differences in conceptualization. Some of these methods clearly measure something different than the mismatch between the attained field of study and the optimal field of study for the job. Mismatch measured by RM is rather determined by the characteristics of the employees in those jobs than by the actual requirements. We might also wonder whether worker self-assessment methods measure our concept of field of study mismatch. An argument in favour of the DSA or ISA method may be that individuals are best placed to assess the optimal field of study for their own job. However, we may wonder whether the optimal field of study from an individual point of view fits with the program delivering the best economic mix of skills from a social point of view. Apart from that, individuals may take their expectations and (dis)satisfactions into account when they assess the quality of their match. This may lead to an underestimation of the incidence of horizontal mismatch. As the DSA method, the JA indicator can be considered as a method being most consistent with our concept of horizontal mismatch. Using a detailed and up-to-date classification system may deliver a more adequate measurement of field of study mismatch. However, in the literature the used classification systems have not always been current.

Nonetheless, there remain clear dissimilarities between the DSA and JA. We found that the incidence of field of study mismatch based on the subjective measure 15.8% and based on the JA method we noted an incidence of 24.6%. The fact that individuals are differently classified by both measures also led to different outcomes regarding the determinants of overeducation (cf. Chapter 1 and Chapter 2). Finally, it also influenced the impact of field of

study mismatch on earnings, suggesting substantial problems of random measurement error and leading to biased estimates of the effects on wages and other outcome variables. So, we can conclude that the incidence, the determinants and the consequences of field of study mismatch are affected by its measurement method.

To answer one of the main questions within Chapter 1, we can conclude that, while none of these measurement methods perfectly measures our concept of field of study mismatch, there are probably two measurement approaches that are relatively closely linked to this concept. These are the JA approach and the DSA approach. The JA approach measures field of study mismatch by identifying for each job the concrete tasks and requirements by using a classification system. Thereby, the classification system also defines for each occupation a required field of study. We examined which fields of study match the competencies required for every occupation. This is largely in line with the underlying assumption of human capital theory (Becker, 1964) that education is an investment in skills and knowledge. To the extent that each job requires certain skills and knowledge, a required field of study can be defined resulting in an optimal investment of these skills needed for the job. To a certain extent, this is also the case for the direct self-assessment approach, which relies on the evaluation of the individual itself regarding the extent to which one's program delivers an optimal preparation for the job. Moreover, this method even allows to differentiate between individuals with different talents and abilities, probably resulting in other optimal pathways to attain the skills required for the job. However, as already explained, the fact that individuals rather assess themselves on an evaluative dimension may just as well be a disadvantage. To evaluate their match status, they based this on their own perception which can be shaped or affected by certain factors for example job characteristics, expectations and job satisfaction. Also an individual may have a perception of himself in the job different from what other people think of him, this might be the reason why individuals with a similar educational background and work in the same job may evaluate their match status differently. At first sight, the realized matches approach of measuring field of study mismatch seems less consistent with our concept of field of study mismatch. Nonetheless, it may be consistent with it in a pure signaling theory framework. The way this approach measures the required field of study is nearly the same as employers use degrees as a measure of ability in screening potential employees according to signaling theory. In the case when education only serves as a signal for ability and, hence, only as a way of sorting individuals to jobs, the optimal educational pathway to a certain job may, from an individual point of view, simply be the one delivering the highest likelihood to enter the job. The same holds true for the indirect worker assessment measure that is based on the required program to get the job. To be sorted in a particular job, it is optimal from a private point of view to have the degree that is used as selection criterion by the employers.

DETERMINANTS OF MISMATCH

The second topic within this thesis is the determinants of educational mismatch. We wondered which determinants could influence the likelihood of the different types of educational mismatch, especially the combination of overeducation and horizontal mismatch. Research on educational mismatch has yet not focused on the factors that could influence this combination. At the micro level, we found that women and older workers have a higher likelihood of mere overeducation and full mismatch (cf. Chapter 5). This can be explained by certain constraints. Women may more likely to give up an adequately educated job because of a compensating difference such as fewer working hours or having a job that is nearby their home or there may not a job available in their highest level or field.

Next, we found that the quality of human capital as well as the type of human capital (measured by field of study) influences both types of overeducation: overeducation with field of study match (= mere overeducation) and overeducation without field of study match (= full mismatch). Further, graduates with a degree in Economics, Business and Law were found to have a higher likelihood to be merely overeducated. Graduates in Arts, Humanities and Social Sciences have a relatively high probability of overeducation without a horizontal match, while graduates in Health and Sciences have a lower likelihood on both overeducation with and overeducation without horizontal mismatch (cf. Chapter 2). This can, amongst others, be explained by the signaling theory; choosing for a less challenging field of study may provide a signal of lower ability. Another explanation may be that there is an oversupply of graduates in Arts, Humanities and Social Sciences. Further, we consistently found that individuals who have better grades have a lower likelihood of overeducation and full mismatch (cf. Chapter 2 and Chapter 5). This is consistent with the job competition framework since these individuals might be in front of the job queue. However, this can also be explained by the human capital theory; individuals with better grades are probably more motivated, which will have a positive effect on their productivity. Finally, also the signaling theory could explain this. Their degrees certifies that individuals are cut out for the 'smart' work. In line with this, we also found that that the selectivity and quality of human capital is an important predictor of mismatches (cf. Chapter 5). We found that graduates from fields of study with relatively more selective and higher quality programs experience lower incidence of all types of mismatches. Finally, we found that having a relatively general study program increases the likelihood to have a mere horizontal mismatch. The cost of entering a horizontal mismatched job is likely to be lower when the attained field of study focuses on general skills since these skills can be easily transferred to jobs in other fields. Yet, the results also indicated that graduates in fields of study with a general study program have a lower incidence of mere vertical mismatches.

Along with individual-level characteristics and characteristics at the level of the field of study, also country level determinants can explain the differences in mismatch between countries (cf. Chapter 5). We found that horizontal mismatch is lower in countries with higher employment protection, higher unemployment benefits and more selective educational programs. For overeducation in combination with horizontal match, particularly differences in imbalances between demand and supply explain cross-country differences. In case of an oversupply of individuals within their educational segment, individuals might find it difficult to find a job in that matches their educational level. Most country-level variables affecting horizontal mismatch or overeducation with horizontal match also affect overeducation without horizontal match. In addition, this last type of mismatch is positively related to collective bargaining coverage.

Besides standard individual characteristics, field of study characteristics and country variables, we also investigated whether motives of attending college could determine the likelihood of overeducation (cf. Chapter 4). We distinguish four educational motives: (1) investment motive, (2) educational consumption motive, (3) student life consumption motive and (4) social norms. We expected that overeducation would rather be a result of educational consumption, but our results did not indicate this. We found that individuals who attend college because of educational consumption motive are less likely to be overeducated, which can be explained by the fact that these individuals have better study results. Our results rather suggested that part of the incidence of overeducation can be explained by student life consumption. This can be explained by a higher likelihood to choose for educational levels and fields of study with a higher probability of overeducation. Also individuals motivated by investment reasons seem to have a higher likelihood of overeducation. This was not in line with our expectations and can be explained by the fact that these individuals rather choose for the field of study 'Economics, Business and Law', which is associated with a relatively high incidence of overeducation in Flanders. We also found that individuals with an investment motive and individuals that choose for 'Economics, Business and Law' earn a positive wage bonus. This seems in line with the human capital theory; individuals that participated in higher education because of investment motives improve their future earnings.

C O N S E Q U E N C E S O F M I S M A T C H

In this thesis we also wondered whether the combination of overeducation and horizontal mismatch have more negative consequences than situations in which individuals combine a mismatch on one dimension with a match on another dimension. We investigated the impact of alternative combinations of mismatch on wages and job satisfaction. In the study of Chapter 2, we found that being overeducated without a horizontal match is more

problematic than other combinations of (mis)match. These individuals earn less and are less satisfied with their job than adequately educated workers. Individuals with horizontal mismatch and without overeducation experience no wage effect, but are less satisfied with their job than adequately educated workers. This suggests that this type of mismatch concerns no real problem in terms of productivity, what seems to be in line with the human capital theory. This theory assumes that the labour markets are able to fully reap the benefits of educational investments. However, the extent to which these findings regarding the impact of mismatches on wages are correct largely depends on the extent to which heterogeneity across workers is adequately accounted for and the extent to which the educational requirements are appropriately measured. If not, the results on the impact of both horizontal and vertical mismatches on wages may be substantially biased. Therefore, we investigated whether and to what extent unobserved heterogeneity and measurement error explain the differential impact of alternative combinations of mismatches (cf. Chapter 3). Our standard panel data estimates were in line with those in Chapter 2 and those in other studies. However, these results were found to be influenced by the two above-mentioned biases. After we control for measurement error and unobserved heterogeneity, we found that overeducated individuals without field-of-study mismatch earn less than adequately educated workers with a similar educational background. However, for individuals who are working outside their field of study, such a wage penalty is not always observed; in some cases, field-of-study mismatch even seems to be financially beneficial to the worker. A possible explanation may be that these individuals are employed in segments that face labour shortages, resulting in upward wage pressure. This positive wage effect may compensate eventual negative effects resulting from skill underutilization. These individuals may also accept a horizontal mismatch because these jobs offers them compensating wage advantages.

Finally, we also expected that the impact of overeducation on wages and job satisfaction would differ regarding the motive of attending college (Chapter 4). For individuals who attended higher education because of an investment motive, we expected that they would only accept a job that did not match their education level if this job offered them a wage compensation. However, our results indicated that these individuals face a higher wage penalty to overeducation. We also found that individuals who took on their tertiary education because of educational consumption motive indeed face a stronger wage penalty to overeducation than other individuals. These individuals also have a stronger job satisfaction penalty to overeducation, which supports the idea that these individuals have a strong aversion towards jobs that not match their educational level. Finally, we also found a stronger wage penalty for individuals that attend college because of social norms. Probably, these individuals accept a job in which they are overeducated but still match their field of study to avoid or reduce a loss in self-image in their social category.

To conclude, the analyses in this dissertation indicate that individuals with overeducation face a wage penalty, although its size differs depending on the educational motive of attending college. For horizontal mismatch conversely, we did not find convincing evidence on a wage penalty, suggesting that such a mismatch is not always problematic.

REFLECTION AND POLICY RECOMMENDATIONS

Within the policy debate on education and work, one of the main questions is whether the different fields of study sufficiently prepare individuals for the jobs that are available. Indeed, in this thesis, we have shown that the educational choices of individuals do not always match with the requirements of the labor market. But is this mismatch such a real problem as many policy makers think?

First, we might question whether education systems prepare individuals sufficiently for the needs in the labour market. It is well known that there is a growing demand for graduates in majors such as Engineering and Sciences, while at the same time there are more graduates in majors such as Social Sciences and Humanities. Under these circumstances, some of these graduates might be hired for jobs in a non-matching sector. Consequently, there will exist a mismatch between the educational attainment of the individual and what the labor market demands. Part of this kind of mismatch is probably due to lack of appropriate information regarding labour market demands.

Second, our research indicates that mismatch should not be a problem in all cases. Being mismatched may be in some scenarios better than being unemployed. Moreover, for some individuals, mismatch might even be a voluntary choice, because the job offers them compensating advantages. Here, a clear distinction needs to be made between being overeducated and having a horizontal mismatch. At least, our findings suggest that those having a horizontal mismatch face no wage penalty or, in some cases, even a wage bonus. At first sight, this cannot be an optimal situation since their skills are not fully utilized. But our results also indicated that individuals with a more general study program have a higher incidence of horizontal mismatch. These individuals are more likely to transfer their skills to jobs in other fields, reducing the degree to which their skills are truly underutilized and the extent to which there is a loss of educational investment.

However, overeducation seems another story. Our findings support previous evidence finding that individuals that are overeducated often earn less and are less satisfied with their job. While it thus seems that overeducation

is associated with lower labour market prospects, we might wonder whether these jobs match their capabilities better than if they would work in jobs that requires their own level of education. Individuals may be not able to do complex jobs and, hence, a job below their educational level in which they can utilize all their skills would be better. Since overeducated workers have, on average, lower grades and lower-quality degrees, it may be the explanation for some of these workers. However, the fact that a negative wage penalty to mere overeducation shows up even after accounting for unobserved heterogeneity clearly refutes that this is the full explanation. In comparison to mere overeducation, full mismatch is often assumed to be even more problematic than mere overeducation. However, our findings suggest that this is not the case. These individuals do not earn less than other mismatched individuals.

A question that remains open is how policy makers can reduce mismatches among young workers. As suggested in Chapter 5, most likely a combination of economic, education, and labor market policies is needed to be successful. Therefore, we formulate a number of more specific policy implications and recommendations.

First, to tackle mismatch, it may be important to better inform and guide young individuals regarding their educational and labour market choices. Individuals need accurate information that can help them to make informed academic choices. Individuals should be advised more properly when choosing a field of study to make sure this is what they want to pursue in their career. It is important that these choices are based on their own abilities since, as suggested in this research, some individuals may lack abilities to perform a high skilled job despite having a higher tertiary educational degree. As a consequence, they may be forced to work in a job that does not match their educational level and/or field of study. Working in a mismatched job not only may have negative consequences in terms of wages, it might also be source of frustration. By informing and guiding students with the choice of a field of study that matches with their abilities, this may be avoided.

Further, we also have to motivate young people to choose a field of study which they find exiting. This is not only likely to foster academic success, it may also increase the labour market prospects of individuals in terms of finding a job in which the attained educational level matches the required educational level. Therefore, focusing on only the needs of the labour market and inform students about these needs is not enough. The best advice for young people when entering tertiary education seems to be to choose a field of study which they find exiting, even if the overall labour market prospects for this field are less favorable.

Apart from that, young labour market entrants should also be guided appropriately in their search for a job. For this guidance, labour market intermediaries may play an important role. These services know both sides of the

labor market and can help individuals with information about job openings to help them in the matching process. These services can also help the educational system providing information about the changes in labor demand and supply. Young graduates have also to be aware of the probability of mismatch related to their fields of study. Accepting a mismatched job just to avoid unemployment seems not a good idea. After all, research has shown that this is likely to increase the likelihood of overeducation persistence (see Baert, Cockx & Verhaest, 2013). However, policymakers are faced with a trade-off between the battle against unemployment and avoiding mismatch.

Another policy suggestion would be to better inform other parties involved about the (possible) changes in the labour market supply and demand. Employers often blame educational systems that they do not provide young individuals with the skills demanded on the labour market. One of the problems is that the course contents of the educational programs insufficiently or only slowly adjust to future skill needs. Educational systems thus have to be more aware of the demands of the labour market and adjust their courses to skill needs. Labor market agencies can also help during this process, for example by sharing their knowledge and information about the supply and demand with (potential) employers and educational systems.

A point of discussion remains the extent to which policy should play a more active role in shaping the overall demand and supply of highly skilled workers. While participation in higher education has increased strongly in the past decades, it was not always possible for these individuals to find a job that matches their education level and/or field of study. These individuals thus may be forced to accept a job that do not matches their educational attainment or being unemployed. However, our research suggests that reducing the participation in higher education should not by definition solve the problem. Moreover, this reduction would clearly conflict with other policy goals. Nevertheless, governments may play an active role by fostering the demand for higher educated individuals by investing in the knowledge economy through investment in research and development.

As our research indicates (cf. Chapter 5) is that the conjuncture also influence the match between education and work. Although, policy makers only have a limited impact in controlling the conjuncture, they have to take this into account because the effect on overeducation seems to be persistent: the business cycle at the labor market entry seems to determine the likelihood of overeducation five years later. The persistence of overeducation is consistent with earlier findings (see Baert et al, 2013).

Further, the results in this thesis also show that the quality and selectivity of educational system influence educational mismatch. Our research indicates that Flanders has a high quality and selective educational systems, which

seems to reduce the incidence of mere vertical mismatch and full mismatch (see Verhaest et al, 2013). However, there seems not much room to reduce the likelihood of mismatch through these characteristics of the educational systems. It is certainly important that policy makers monitor the quality and selectivity of educational to limit the incidence of mismatch. Another point of discussion is what should be the focus of the educational and training systems; should the focus be on more general learning or rather on vocational and work-based learning? The results show that a more specific educational system may reduce the likelihood of full mismatch. However, some caution with this conclusion is suggested. Research have shown that individuals with a more general program are less likely to be overeducated later in their career. A possible explanation is that rather the vocationality than the specificity of the program determines the need for additional experience. A more general program may even provide an advantage since it allows to adopt more quickly to changing needs on the labour market and job-specific skills can be learned within a job. However, for employers there have to be some incentives to hire and train these general skilled individuals. So, to suggest what the focus should be of educational systems, more research is recommended.

Finally, also reforming labour market institutions may help in reducing mismatches. Our research results indicate that more generous unemployment benefit reduces the likelihood of mere horizontal mismatch. Higher unemployment benefits may allow job seekers to be more selective. However, at the start of the career the level of unemployment benefits did not have an impact. The reason is that job seekers without work experience are not entitled to unemployment benefits. For overeducation, we did not find that the replacement ratio influences the likelihood of mere overeducation. However, less selective individuals have a higher likelihood to be overeducated for a longer period. Baert et al (2013) recommend that young graduates have to avoid to accept a job at the start of their search process that does not match with their educational level. Policy makers have to weigh up the fight against unemployment and the avoidance of mismatch. We might wonder whether the changes that have been made in waiting period benefits contributes to avoid young graduates to accept a job that lies under their educational level. On the other hand, being unemployed for a long period may be worse than at all times refusing a job than does not match the educational level. As shown in this dissertation, a higher union bargaining coverage results in more mismatch. Studies also indicate that the earnings in Belgium are relatively rigid. Therefore, a more flexible wage bargaining process may be an instrument to tackle both unemployment and mismatch. But of course, also in this case, other considerations obviously also play a role, such as the impact of a more flexible wage on income inequality.

DIRECTIONS FOR FURTHER RESEARCH

In this thesis, we have tried to fill some research gaps within the literature on the match between higher education and work. Yet, several subjects remain to be investigated. First, in this study we focused on mismatch as a problem from the point of view of the individual graduate and from the point of view of society. An interesting topic would be to focus on mismatch from the point view of the employers as well. Mismatches, as measured in this study, may not be perceived as such by employers. Probably, this also allows to gain more insights in whether the educational systems prepares students with the required basic skills and for changing demands on the labour market. This might deliver some other results and we would be able to compare these results. Interesting to investigate as well is how another alternative definition of field of study mismatch, based on whether individuals would choose another field of study given the information that they have about their career, could influence the results.

Second, as has been mentioned in this thesis, regarding, the returns to (over)education are likely to differ depending on the specificity of a field of study and occupation. Individuals that enter a mismatched job which enables them to transfer their (general) skills may be likely to face smaller wage penalties. Alternatively, for individuals with a more specific field of study, these wage penalties of mismatch may be higher. These individuals obtained field-specific skills that are not transferable to other fields, probably leading to strong negative wage effects if working outside their field of study. It would thus be interesting to test whether mismatch penalties indeed differ depending on the transferability of the skills.

Thirdly, regarding the role of educational motives, we suggest to focus more profoundly on the role of social background in explaining educational motives and their impact on labour market mismatches. Earlier research indicated that individuals from a poorer social background choose differently than individuals from a better social background (cf. Chapter 4). Another interesting path for further research would be to test the impact of the educational motives on overeducation through their impact on job search and acceptance behaviour in a more direct way.

Finally, regarding the differences in labour institutions, educational institutions, and labour market imbalances, we only tested the effect of these country level variables on different forms of mismatch by measuring these variables at one specific moment. Hence, the extent to which the detected relationships are truly causal may be questioned. An alternative approach is to rely on longitudinal country-level data and to identify effects on the different combinations of mismatch through measuring the changes over the years.

REFERENCES

- Becker, G. (1964), *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*, New York: Columbia University Press.
- Baert, S., Cockx, B. & Verhaest, D. (2013), 'Overeducation at the start of the career: Stepping stone or trap?', *Labour Economics*, 25, 123–140.