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Outsourcing Housework and Highly Skilled Women's Labor Force Participation – An Analysis of a Policy Intervention

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Key words: Belgium, Highly-skilled, Housework, outsourcing, policy, service voucher, time-series, women's employment.

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Abstract

Women in developed countries still bear the brunt of care and household work, often with severe consequences for their professional careers. In addition to policies to promote gender equality in the realm of household work, state-supported outsourcing has the potential to help women reduce work-family conflict in a more optimal way and thus to realize their professional potential. We use the enactment of the Belgian Service Voucher Scheme to examine whether the introduction of a heavily state-subsidized outsourcing option increased women's employment rates at the extensive margins, especially among the highly educated. Using time-series analyses as well as difference-in-differences models, we find both short- and long-term positive changes in the employment rates of highly skilled women in Belgium after the enactment of the scheme in January 2004. Moreover, the results of our difference-in-differences models suggest that highly skilled women's increased ability to outsource housework is the main mechanism driving the change in their employment rates.

Outsourcing Housework and Highly Skilled Women's Labor Force Participation – An Analysis of a Policy Intervention

Introduction

Women in developed countries still bear the lion's share of care and household work (Bianchi et al., 2000, 2012; Lachance-Grzela & Bouchard, 2010; Moreno-Colom, 2017; OECD, 2001). Despite the growing achievements of women in the public sphere, women have not reached gender equality in the private sphere. This “stalled” (Hochschild, 1989; Goldin, 2006; Cotter et al., 2011), “incomplete” (Esping-Andersen, 2009), “unfinished” (Gerson, 2010), and “uneven” (England, 2010) revolution in women's roles is apparent in spouses' unequal division of housework and care tasks (e.g., Bianchi et al., 2000; Bittman et al., 2003), leisure time (Bittman and Wajcman, 2000), and household management tasks (Winkler and Ireland, 2009) in most western countries. Goldscheider et al. (2015) suggest that the gender revolution continues to evolve and has reached its second stage, where men's contribution to childcare and housework increases. However, while this has taken place over time, and despite a decline in the amount of time women spend doing housework, women continue to perform the vast majority of household labor across the board, and men fail to substitute fully for the decline in women's domestic work (Esping-Andersen, 2009; Raz-Yurovich, 2016). This gender gap widens after spouses establish a family, and results in long term occupational penalty (Abendroth et al., 2014; Härkönen et al., 2016; Stier &

Yaish, 2008) and wage penalty (Budig and England, 2001; Budig and Hodges, 2010; Gangl & Ziefle, 2009; Harkness, 2016; Staff and Mortimer, 2012) for mothers, which is due to labor market withdrawal or occupational sorting.

Previous literature suggests three main mechanisms to improve work-family conflict for women. An increase in men's contribution to domestic labor and greater gender equity in the domestic sphere is one such mechanism (e.g., Cooke, 2008; McDonald, 2000; Torr and Short, 2004). Another mechanism to reduce work-family conflict is governmental policies. Welfare states can actively act to remove the barriers that limit women's ability to combine their demanding roles as workers and care givers (Brewster and Rindfuss, 2000; Engelhardt and Prskawetz, 2004). Such initiatives include, for example, longer maternity leave with protection against dismissal, access to affordable childcare, shorter working hours, etc. (for a review, see Neyer, 2003). The (partial) outsourcing of domestic labor is another mechanism (e.g. Raz-Yurovich, 2014; De Ruijter et al., 2005; Van der Lippe et al., 2004). The ability of women to purchase services such as childcare, elderly care and cleaning services may relieve some of the burden they have in the domestic sphere, and therefore might affect their professional and family decisions.

The current research aims to contribute to literature related to both the second and the third mechanisms, by analyzing whether a policy, which gives incentives to households to outsource housework, affect employment rates of highly skilled women at the extensive margins. Specifically, this article focuses on the Belgian Service Voucher Scheme. Introduced in 2004, this policy is probably the most generously subsidized scheme of its kind in the rich world and Belgian households have come to use it on a massive scale. While many countries have

instituted various measures to make housework outsourcing financially more attractive, particularly through making such services tax deductible at various levels of generosity (see Carbonnier and Morel, 2015) the Belgian scheme is fairly unique in that it offers a large, direct financial stimulus to households to outsource housework. With the service vouchers Belgian households can buy a range of household services, including cleaning or ironing, at an effective discount of about 70 percent, vastly reducing their cost.

The question we seek to answer here, is what has it done for highly-skilled women's labor force participation? In 2003, one year before the enactment of the scheme, employment rates of Belgian women in general, and of highly skilled women, in particular; ranked below the EU average. It is possible that highly skilled women are inactive, unemployed or postpone their first entrance to the labor market, due to the burden experienced in the domestic sphere. If this is the case, greater incentives to outsource housework may result in an increase in the employment rates of highly skilled women, if the reduced burden in the domestic sphere due to outsourcing allows for more family-work balance.

Previous macro-level studies assessed the relationship between outsourcing and women's labor supply by using outsourcing measures related to the availability of low-skilled migrants (Barone and Mocetti, 2011; Chan, 2006; Cortès and Pan, 2013; Cortès and Tessada, 2011; Estévez-Abe, 2015; Farrè et al., 2009; Forlani et al., 2015; Yeoh et al., 1999) or to the availability of formal childcare (see a review in Dujardin et al., 2018). Studies relying on the spatial availability of low-skilled migrants cannot treat the endogeneity between outsourcing and women's labor force participation. Moreover, most of these studies could not distinguish between the outsourcing of childcare and the outsourcing of housework.

The SVS subsidizes the outsourcing of housework (but not of childcare) by allowing households to purchase subsidized vouchers with which they pay to domestic workers who work under the SVS. Previous studies find that the time spent on housework is higher than the amount of time spent on childcare across gender, employment status, countries, and time (Raz-Yurovich, 2016; Bianchi et al., 2012), therefore, most of the burden in the domestic sphere is caused by the housework chores and not by the childcare tasks. Analyzing the policy intervention effect of the SVS on women's employment better treats the mentioned endogeneity and also allows to measure the unique effect of the outsourcing of housework. By using time-varying policy take-up measures, and by employing time-series analyses as well as difference-in-differences models, this study used the SVS enactment and its extended intervention period as a research time-window in which to examine the potential relationship between outsourcing housework and women's labor force participation at the extensive margins.

Halldén and Stenberg (2014), who assessed the impact of the Swedish tax discount scheme of 2007, which reduced prices of outsourced domestic services, on women's annual earnings, used micro-level longitudinal register data on households. In Belgium, micro-level data on households who purchased service vouchers is not currently available. Also, detailed information on the number of hours worked by each educational group is also not available. Because of that, and similar to Dujardin et al. (2018) who analyzed the effect of a childcare reform on women's employment rates in Belgium, we conduct macro-level analyses of employment rates only at the extensive margins. That is to say, we look at labor force participation rates. Although macro-level analysis does not have the merits of a longitudinal register-based micro-level analysis (see discussion on pages 3-4, in Halldén and Stenberg (2014)); and although it is limited in sample size, we believe that the use of state-of-the-art

econometric techniques will provide us with strong clues on the impact of the scheme. When new data will become available, econometric methods that better detect causal relationships can be used to more accurately assess the impact of the SVS on women's employment at the individual level.

Background

Outsourcing domestic labor

In his seminal work on the 'welfare triad', Esping-Andersen (1999) suggested that an inter-causal triad of state, market, and family, exists so that families are actors whose decisions and behaviors directly influence, and are influenced by, the welfare state and the labor market. Therefore, if the state provides incentives to outsource housework, for example, by subsidizing the purchase of domestic services, both families and the market might change: There will be fewer housewives, more labor force participation, and new demand by households for such services.

The outsourcing of domestic labor by households is a result of factors related to the demand for and to the supply of such services. Morel (2015) detailed several driving forces behind the increase in domestic outsourcing: the rise in economic inequalities; the growth in unemployment; the development of a reserve of unskilled labor; transnational economic inequalities and migrations, especially the strong rise in female immigration; and public policies which emerged in the last decade in European countries with the aim of actively promoting the development of domestic services. On the demand side, there is evidence that the efficient boundaries of households have become more flexible so that households

in the 21st century are increasingly becoming consumers of services that replace household production (Raz-Yurovich, 2014). This might be driven by changes in the economics of households, from a forum of shared production to a forum of shared consumption (Stevenson and Wolfers, 2008). Moreover, the increase in demand is driven by the sharp increase in women's labor force participation, the transformations in family structures, the rise of new social needs linked to population ageing, the insufficient provision of childcare and eldercare services, changing attitudes toward the domestic division of labor, and the wish for more free time for leisure and family (Cancedda, 2001; Estévez-Abeand and Hobson, 2015; Dukhovnov & Zagheni, 2015; Hellgren, 2015; Morel, 2015).

The relationship between women's ability to outsource domestic and care work and between their labor supply was studied using different empirical approaches and in different contexts. Macro-level studies have demonstrated that, by purchasing services, highly-skilled women with the highest opportunity costs in terms of time can increase their labor supply and reduce the time spent on housework and childcare. This is possible partially because the supply of low-skilled immigrants who work in services that are close substitutes to household production is plentiful. Evidence of the relationship between the availability of low-skilled immigrants and women's labor force participation is available for both industrialized countries, such as the US (Cortès and Tessada, 2011), Italy (Barone and Mocetti, 2011), and Spain (Farrè et al., 2009) and for newly-industrialized societies, such as Hong Kong (Chan, 2006; Cortès and Pan, 2013) and Singapore (Yeoh et al., 1999). Further evidence for this relationship in various countries is also available in Forlani et al. (2015), who found that the share of immigrants working in services in a given local labor market is positively associated with the probability of native born women to increase their labor supply at the intensive margin (number of hours worked

per week), if skilled, and at the extensive margin (participation decision), if unskilled. Micro-level studies also provide support for the relationship between women's ability to outsource housework and childcare, and between their employment characteristics (e.g. Aassve et al., 2012; Halldén and Stenberg, 2014; Lokshin, 2004).

Unlike other macro-level studies who relied on outsourcing measures related to the concentration of low-skilled migrants; the current study uses the enactment of the Belgian SVS and the gradual variation across regions in the uptake of the reform to detect whether the growing ability of highly-skilled women to outsource housework is associated with an increase in their employment rates.

The Belgian Context

According to data extracted from Eurostat's Online Database (European Commission, 2018), in 2003, the year before the enactment of the SVS scheme, the total employment rates of Belgian women aged 25-64 were 57.5 percent, and Belgium was ranked 22nd in the EU, with a below-average employment rates of women. This rate was below the Lisbon employment target for women, which was set to at least 60 percent. The employment rates of highly skilled women at this time were 79.5 percent, and Belgium was ranked 22th, with a below-average employment rates of highly skilled women. In 2014, at the end of the research window, total employment rates of Belgian women had increased to 65.9 percent and located Belgium 20th in the EU, with above-average rates and above the Lisbon target. The employment rates of the highly skilled women had

increased to 82.6 percent in 2014, ranking Belgium 14th in the EU, with above-average employment rates of highly skilled women. In the same year, Belgium was ranked 5th in the EU in its maternal employment rates of highly-skilled women with children aged 0-14 (OECD, 2016). Part-time and full-time employment rates among the highly skilled women were quite stable during the research period, so that on average 32.7 percent of the highly skilled women worked part-time between 2004 and 2014 and about two thirds worked full-time.

The SVS was enacted in a very particular context. One important contextual element is that Belgium's economy has undergone major restructuring over the past decades. An early industrialiser, Belgium recorded among the largest relative job losses in manufacturing industry during the 1970s and 1980s. That collapse in job availability happened exactly when many youngsters (the sizable post war baby boom cohort) and women were entering the labor market. Women's quest for emancipation in the world of formal work started earlier in Belgium than in its neighboring countries Germany and the Netherlands. Faced with a sudden and massive unbalance between labor demand and supply, Belgium resorted to an expansion of early retirement routes in order to drain off excess (male) labor supply (Marx and Verbist, 2018).

A strong decline in male employment was in part compensated by increases in female employment, mostly in the services sector. While labor market institutions and regulations remained relatively inert and therefore in effect breadwinner-biased, provisions to support and accommodate female labor market participation developed alongside early on, making Belgium a case in point of what Knijn and Kremer (1997) called 'optional familism'. That is to say the caregiving mother is supported - notably through an advantageous tax regime and breadwinner

derived social security rights - but at the same time families were given the option of at least partially outsourcing that care. Belgium has had extensive child care facilities for a longer time than its neighboring countries, both in the form of institutionalized child care and through so-called substitute mothers. As a result, Belgium has consistently had among the highest percentages of young children in institutionalized care, especially in the Flemish speaking part of the country. At age 3 up to the mandatory school age, Belgium still ranks at the top in Europe, with a use of formal childcare arrangements of almost 100 percent. Moreover, by 2010, Belgium has exceeded the Barcelona target, as 36 percent of the children aged 0-2 had received at least one hour of formal childcare (European commission 2018). Parental leave, on the other hand, is comparatively less extensive and generous in Belgium than in many other northern European countries. Only in 2012 parental leave was extended to 4 months, so that mothers can take up to 15 weeks maternity leave, receiving benefits equivalent to 80 percent of their salary for the first 30 days and 75 percent for the remainder (subject to a maximum). Fathers can take 10 days paternity leave, seven of which are paid at 82 percent of the salary (subject to a maximum) within the first four months of the birth. There is a provision within the unemployment insurance system that allows workers to withdraw from the labor market for a limited amount of time while receiving a modest benefit.

Outsourcing options employing regular workers have always been limited and expensive in Belgium. In addition to comparatively tight legal restrictions on hiring and firing practices, the use of temporary contracts and other forms of non-standard employment (including night and weekend work) remains subject to comparatively tight restrictions (Marx and Van Cant, 2018). Collective wage bargaining remains extensive, resulting in Belgium having among the most compressed wage distributions in the OECD area. Segments of the labor market that have emerged

in many rich countries remain very small or virtually non-existent in Belgium - particularly relatively low-paid service sector jobs that require little formal training and that come with low wages, few additional benefits or job certainty. As an "institutional choice" such jobs hardly existed, at least in the official economic circuit. That means that, at least in the regular economic circuit, outsourcing options remained very expensive until the advent of the SVS. That is not to say that households did not hire outside help for cleaning or care outside of the regular labor market. By all accounts there was considerable informal employment in Belgium. Indeed, it was the objective of the scheme to bring those people - mostly women - into the regular sector so as to ensure them proper social protections. But it is impossible to gauge what the impact of the SVS on informal employment has been.

For the purpose of this analysis it is important to distinguish between what was in place at the time of the SVS roll-out and what changed around that time. As indicated, Belgium had a multitude of relevant policies in place around the time the scheme was implemented, ranging from extensive child care provisions to parental leave policies. There was a continued expansion of subsidized child care provisions, especially in the French-speaking part of Belgium, but its effect on mothers' employment rates was only marginal (Dujardin et al., 2018). There were however few institutional changes in the labor market and no major shifts in parental leave or active labor market policy. The same applies to benefit rules with the possible exception of a gradual tightening of practices regarding long-term unemployment benefit dependence.

The Belgian Service Voucher Scheme

The Belgian Service Voucher Scheme (the 'Dienstencheques'), which was enacted in January 2004, is one of the 'housework policies' that were introduced by various European countries in the last decade. Among these countries are France, Germany, Denmark, Finland, the Netherlands, Austria, and Sweden (Carbonnier and Morel, 2015; Eurofound, 2014; Halldén and Stenberg, 2014; Jaehrling, 2003; Raz-Yurovich, 2016; Raz-Yurovich and Marx, 2018; Windebank, 2007). It is a universal scheme which is oriented toward all Belgian households, regardless of their income or their care needs. According to Marx and Vandelannoote (2015), the principal objective of the scheme is to reduce informal economy activity and raise employment levels among the less skilled, particularly women. Another major objective is to help workers achieve a better work-life balance, potentially also increasing their effective labor supply and productivity. Under this scheme, households can purchase subsidized vouchers with which they can pay for a limited range of domestic services, but not for childcare or for elderly care. These services can take place both inside the consumer's house (cleaning, ironing, preparing food, and doing occasional sewing work) and outside of it (ironing, shopping, and supervised transport of persons with reduced mobility). The SVS users buy vouchers that currently have a total value of around 22 Euro per hour. Because the government subsidizes the social security contribution part the consumer pays only 9 Euro. The actual cost to the consumer is even lower, because this expenditure yields an additional personal tax deduction of 30 percent, up to a limit, bringing the effective cost on one hour of household work to just under 7 euro. Overall, the government subsidizes more than 70 percent of the total cost of the SVS (Marx and Vandelannoote, 2015). Not only monetary costs are being reduced for households by this system. In the Belgian system, the households are not the direct employers of

the domestic helpers. The domestic workers are employed by service voucher companies who get the subsidies and are subject to regular controls. The consumer deals with and pays to the service voucher company. Because the households are not the direct employers of the service voucher employees, they are not required to tend to bureaucratic issues related to issuing an employment contract, providing insurance to the employees, etc., further reducing various transaction costs for them (Raz-Yurovich and Marx, 2018).

As Table 1 demonstrates, the SVS successfully increased the number of employees and users since its enactment in 2004. The number of users increased to almost 900,000 in 2012, about 9 times higher than in 2004. Moreover, the number of employees working under the scheme in 2012 was 151,137 employees, 10 times greater than in 2004. The number of employing companies also grew, and numbered 2,753 in 2012.

[Table 1 here]

Table 2 presents regional variation in the employment rates of highly skilled Belgian women and in the number of SVS users. As this table demonstrates, both the policy's take-up rate and the employment rates differ between regions, so that the highest number of users and the highest employment rates are found in Flanders and the lowest rates in both measures are found in Brussels. Table 2 further demonstrates that between the years 2004 and 2005 there was an increase of almost four percent points in the employment rates of highly skilled women in Flanders (from 79.98 percent to 83.83 percent, respectively) which further increased to 85.3 percent in 2014. In Wallonia we also see an increase of 3 percent points between 2004 and 2005 (74.74 percent and 77.75 percent, respectively), which further increased to 80.33 percent in 2014. Such an increase in the

employment rates of the highly-skilled women is not observed between any other consecutive years in Flanders and in Wallonia, and is also not observed in Brussels, where there was a decline of 0.17 percent points between 2004 and 2005 (75.72 and 75.55, respectively) which further declined to 74.54 percent in 2014. Dujardin et al. (2018) analyze the employment effect of a childcare reform, which was enacted in Wallonia, in 2003, on the employment rates of mothers with at least one child under 3, at the extensive margins. They find that the expansion of childcare (8,245 new places were added) and the resulted increase in coverage rate, from 22.4 to 29.2 percent, had only moderately affected the employment rates of these mothers between 2005 and 2009, so that with each 100 new child care places that were opened only 18 mothers took paid work (i.e. an increase of 0.176 percent points in employment rates).

[Table 2 here]

Figure 1 presents a profile of the households that used the SVS in 2010. It shows that the users were predominantly highly-educated married or cohabiting couples of working age, at least one of which was employed, at various levels of disposable income. These characteristics of the SVS users suggest that if indeed women's ability to outsource housework might affect their employment rates, we can expect to find an increase in the employment rates of highly skilled women, of working age, as the number of SVS users increases.

[Figure 1 here]

As for the SVS's employees, Marx and Vandelannoote (2015) show that in 2011, 97 percent of them were women, and most of them (56%) were of lower education, although almost 40 percent had higher secondary education. Moreover, most (73%) were of Belgian nationality, but over a quarter were immigrants.

Previous literature studying the outsourcing effect on women's employment demonstrated an effect on the employment rates of highly-skilled women, as these are the women who can purchase domestic services (e.g. Cortès and Tessada, 2011; Farrè et al., 2009). Similar to this previous research, the profile of the SVS users (see Figure 1) suggests that these are mostly the highly-skilled couples. That is why the relationship between outsourcing and labor force participation is being studied among the highly-skilled women. In addition, due to gender inequalities in the domestic sphere and inequality of opportunities in the labor force, we hypothesize that the Belgian service voucher scheme will mostly affect the employment of female users rather than male users.

It is important to note that the SVS aimed at creating new jobs for low-skilled people at the domestic service sector (more information on the SVS in general and on the SVS's employees, in particular, can be found in Marx and Vandelannoote (2015) and in Raz-Yurovich and Marx (2018)). Because of the multilayer design of the Belgian SVS scheme, in which the employers of the domestic workers are not the households but rather employing companies, it is possible that with the growth of the scheme and with the increase in the number of employing companies (the number of companies grew from 504 to 2,753 between 2004 and 2012), the scheme may as well have created new jobs also for medium- and

highly-skilled women (e.g. in administrative and managerial positions within the companies). Therefore, if our results will demonstrate that the employment rates of both low-, medium-, and highly-skilled women have increased following the enactment of the SVS, the increase in the employment rates of highly-skilled women can as well be attributed to new job opportunities which were brought about by the scheme. Of course, an analysis at the macro level has its limitations in terms of what we can causally establish. However, the relative magnitude of the scheme, as well as the pace of its expansion, was such that any effect ought to be clearly visible at the macro-level.

Method

As is mentioned above, our research question asks whether highly-skilled women's growing ability to outsource housework, driven by the enactment of the SVS, affects their employment rates. Due to unavailability of micro-level data on households which use the SVS, we conduct macro-level analyses, using macro-level indicators of policy measures and employment rates. Following Barone and Mocetti (2011), who also studied women's labor supply at the macro level, we control for additional variables in our analyses. Gross domestic product was used to capture economic growth in Belgium's economy from quarter to quarter. Minimum wage was meant to capture both the demand for work by employees and the supply of work by employers, as well as the overall wage growth. Because migrant women might be a competitive or a supplementary work force, controlling for female migration is important, (Venturini and Villosio 2006). Migrant women might also positively affect employment

rates of native highly-skilled women if they work in services that are close substitutes to household production (Cortès and Tessada 2011; Barone and Mocetti 2011).

Using macro-level indicators of employment rates by educational level we construct time-series, which serves as our dependent variable. The analysis of time-series poses challenges as it can violate the basic assumptions of OLS regression (e.g. autocorrelated errors). In order to address this problem, we employ advanced time-series analyses that are fitted to this type of data. The section below will first describe the data and variables which we used in our analyses. Later, a detailed description of our models is provided.

Data and variables

Policy performance measures

Two quarterly policy measures were derived for our analysis, based on the annual reports of Idea Consult (Marx and Vandelannoote, 2015) for the first quarter of 2004 through the last quarter of 2012.

Service voucher users – The number of people who purchased the vouchers was determined for each quarter. This was originally measured on an annual basis and was converted into a quarterly variable by assuming linear growth within each year.

Policy intervention period – This variable was used to indicate whether the SVS existed in a certain quarter (1=yes; 0=no). All quarters in 1999 through 2003 received a value of 0. Starting with the first quarter of 2004, all quarters received a value of 1.

Macro-level dependent variables and control variables were extracted from Eurostat's online database (European Commission 2015) and the National Bank of Belgium for 1999 through 2014. Overall, we use quarterly data on these measures, which range from the 1st quarter of 1999 until the 2nd quarter of 2014 (n=62).

Dependent variables

Employment rates (%) of highly-skilled women and men aged 25 to 64 years – The fraction employed among those with short-cycle tertiary educations of bachelor or equivalent, master or equivalent, or doctoral or equivalent (ISCED11 = 5-8) was determined for each quarter.

Employment rates (%) of medium-skilled women and men aged 25 to 64 years – The fraction employed among those with upper secondary or post-secondary non-tertiary education (ISCED11 = 3-4).

Employment rates (%) of low-skilled women and men aged 25 to 64 years – The fraction employed among those with not more than primary or lower secondary educations (ISCED11 = 0-2).

The quarterly employment rates of highly-skilled women were used in the time-series analyses. Moreover, annual employment rates of highly-skilled, medium-skilled and low-skilled women and men were used in the difference-in differences models, in the regional level (divided into Flanders, Brussels, and Wallonia).

Control variables

As mentioned above, three macro-level measures are controlled for in our analyses:

Log of gross domestic product –Measured at market prices in millions of Euro and was adjusted seasonally and by working days.

Log of real minimum wage - Converted to 2013 constant prices at US dollar purchasing power parity.

Log of female migration - The flow of foreign females into Belgium.

The minimum wage and female migration variables were originally measured on an annual basis but were converted into quarterly variables by assuming linear growth within each year.

Analytic strategy

Using the STATA software, we present four complementary analyses, using time-series analyses as well as difference-in-differences models, to estimate the effect of the SVS on the employment rates of highly-skilled women in Belgium:

(1) Illustrative macro-level simulations

Using simulations, we *illustrate* three scenarios of the predicted employment rates of highly-skilled women when the growth in the policy's take-up is controlled for (the use of simulations is advanced e.g. in Schellekens and Gliksberg (2018)). In order to analyze the time-series of the employment rates, we fit an ARMA (1,1) model predicting the employment rates of highly-skilled women aged 25 to 64 years, controlling for GDP (log), minimum wage (log), female migration (log), and number of SV users at time t , with robust variance-covariance matrices. The dependent variable is stationary at $I(0)$. The AR(1) and the MA(1) parameters, which were fitted to the model, yielded the lowest Bayesian information criterion (BIC) among alternative pairs of parameters, and they best fit the model.

The regression models take the general form:

$$\hat{Y}_t - \phi_1 Y_{t-1} = \mu - \theta_1 \epsilon_{t-1} + \beta_i (X_{it} - \phi_1 X_{it-1}), \quad (1)$$

where ϕ_1 represents the autoregressive (AR) term, and θ_1 represents the moving average (MA) term. Additionally, X represents the regressors that are added to the equation.

Using the ARMA regression, we simulate the predicted employment rates of highly-skilled women according to our model, and observe their fit to the observed employment rates. Moreover, we use the regressions coefficients to simulate two counterfactuals. Counterfactual A simulates the employment rates of the highly-skilled women in Belgium if there was a take-up of the scheme at the rate observed in the quarter in which it was enacted (the first quarter of 2004), but then no additional growth in the number of users after this quarter, i.e. this rate remains constant in all the quarters that follow. Counterfactual B demonstrates the employment rates of the highly-skilled women if there was no take-up of the policy, i.e. if the number of users was equal to 0 in all the quarters.

(2) Identification of the timing of the policy's effect

We use two time-series analyses - an intervention analysis and an analysis of structural break - to identify the *timing* of the policy's effect on the employment rates of highly-skilled women.

In the *intervention analysis*, we used a series of ARMA (1,1) regressions predicting the employment rates of the highly-skilled women, to estimate the separate effects of quarter-period dummies used beginning with the first quarter of 2003 and ending with the fourth quarter of 2009, controlling for GDP (log), minimum wage (log), and female migration (log). For this analysis, we use robust variance covariance matrix. Because we assumed that the effect of the SVS was not apparent only at the time of its enactment, but continued as the scheme matured, we tested not only the effect in the quarter in which it was enacted, but in quarters believed to be in the extended intervention period. The estimated regression

coefficients β_{it} of the quarter dummies denote whether a change in the *level* of employment rate (i.e., in the constant) was significantly higher or lower in the period after a particular quarter when compared to the previous period. A policy effect on the employment rates of highly-skilled women would result in significant and positive differences during the policy's intervention period. We assumed that the same ARMA structure held both before and after the intervention.

The *structural break analysis* allowed us to identify whether there was a significant change not only in the *level* of the employment rates but also in the *slope* of the time-series in a certain quarter. More specifically, it allowed us to identify the most pronounced break in the series, denoting when significant breaks begin to appear and when they are no longer significant. The break analysis was conducted using the Chow test for known breaks (Stock, 1994), testing the null hypothesis (no break exists) against the alternative hypothesis (a break exists) in all the regression's coefficients, in a certain quarter. We applied this test for both the series of employment rates of highly-skilled women and for the series of the number of users. In the former, we controlled for GDP, minimum wage, and female migration, while in the latter, we controlled only for GDP because of the small sample size in this series. In all structural break analyses, we trimmed 10 percent of the observations at each edge of the distribution to avoid the effects of influential observations on the results.

3) *Estimating the magnitude of the policy's effect*

In order to estimate the magnitude of the effect, we employ *difference-in-differences* approach using region fixed-effect linear regression models. In this analysis, we use regional data on the annual employment rates of low-, medium- and highly-skilled men and women as our dependent variables. The employment rates of men are included in order to test our assumption that the SVS will mostly affect the employment rates of women rather than of men, due to gender inequalities in the domestic sphere and inequality of opportunities in the labor force. A dummy variable of gender is included as explanatory variable in the analysis, and represents the treatment variable, assuming that women are the treatment group (gender=1) and men are the control group (gender=0). The coefficient of an interaction between the gender dummy and a policy intervention dummy measures the change in the men to women employment gap that has occurred between before and after 2004. Moreover, in a separate analysis we include an interaction between gender and the policy's take-up rate (i.e. number of users), by exploiting the regional variation in both employment rates and take-up rates. Preliminary analyses, based on Mora & Reggio (2014) showed that the controls and the treated have common pre-treatment dynamics and the Parallel Paths assumption holds for all three outcome variables (these tests are not presented). Assuming that the Belgian service voucher scheme will mostly affect the employment of female users rather than male users and is mostly targeted toward low-skilled (employees) and highly-skilled (users) (compared to medium-skilled people); we expect the interaction term between the gender and the policy intervention measure in the model to be significant among the low- and the highly-skilled, but not among the medium-skilled. For each dependent variable we present a second model, in which we also account for the possible impact of the global financial crisis (GFC) on women's employment. The second models test an alternative explanation, which suggests that women entered the labor force in order to account for men's

declining wages and not because of the service voucher scheme. They include a dummy variable named GFC that equals 1 in the years 2008-2009 (the years of the GFC in Belgium) and equals 0 otherwise. Apart from its main effect, we also include an interaction between the GFC and the gender dummies, to capture whether there was a change in the men to women employment gap during the GFC.

Results

Macro-level simulations

The ARMA regression, which we use for the simulations, yields a positive and significant effect of the number of users at time t on the employment rates of the highly-skilled women (the coefficients of the regression model are presented in Appendix A). Models that are not presented show a positive and significant effect also for the number of users at $t-1$, $t-2$, and $t-3$. Figure 2 presents the observed yearly employment rates of highly-skilled women in Belgium, and their predicted values, based on the ARMA model. The predicted values are presented in the figure on a yearly basis, based on the quarterly predictions of the regression. As the figure demonstrates, apart from few deviations, the observed and the predicted values of the employment rates follow the same track. Both show a decline of about 1 percent in the employment rates of the highly-skilled women between 1999 and 2003, before the policy came into effect, and an increase of more than 2 percent in their employment rates starting 2004 and until 2012. We further use the regressions coefficients to simulate two counterfactuals. Counterfactual A simulates the employment rates of the

highly-skilled women in Belgium if there was a take-up of the scheme at the rate observed in the quarter in which it was enacted (the first quarter of 2004), but then no additional growth in the number of users after this quarter, i.e. this rate remains constant in all the quarters that follow. Counterfactual B demonstrates the employment rates of the highly-skilled women if there was no take-up of the policy, i.e. if the number of users was equal to 0 in all the quarters. Both counterfactual A and counterfactual B show that the employment rates of the highly-skilled women would have continued to decline after 2004, if there was no take-up of the policy or if there was no growth of it.

[Figure 2 here]

The timing of the policy's effect

Figure 3 presents the results of the intervention analysis and shows the dynamics of the coefficients of the quarter dummies in the ARMA regressions (The explicit values of the coefficients and their significance levels are presented in Appendix B). Square markers on the graph represent those with significant effects. This figure demonstrates the effect of each quarter dummy, starting with the 1st quarter of 2003 and ending with the last quarter of 2009, on the employment rates of highly-skilled women, controlling also for GDP, minimum wage, and female migration. A positive and significant effect was observed in the 3rd and 4th quarters of 2004 (i.e., two and three quarters after the policy was effective). These positive effects show that, on average, the employment rates of highly-skilled women were higher after these quarters relative to those before these quarters. Another positive and significant effect is observed beginning with the 3rd quarter of 2006 and ending with the 2nd quarter of 2007.

[Figure 3 here]

Therefore, both short-term and long-term positive effects are observed. To confirm that the policy's intervention period extends beyond the time of its enactment and that the long-term effects on employment rates can continue to be regarded as a policy outcome, we employed a structural break analysis (see Figure 4). In this analysis, we tested whether there was a significant break in the level and slope of the employment rates of highly-skilled women and in the number of users. We assumed that significant structural breaks would be found in the number of users as long as there was a significant effect of the policy on the growth of this measure. Therefore, we assumed that when the breaks were no longer significant, the policy's meaningful intervention effect came to an end. Therefore, if significant breaks were found in the number of users until the second quarter of 2007, long-term significant effects that were found in the intervention analysis could be considered as related to the SVS. Moreover, we applied the same structural break analysis to the employment rates of highly-skilled women to test whether the timing of the breaks corresponded to those in the number of SVS users. If the users were indeed highly-skilled women, we expected to find similar breaks in the two series. Figure 4 presents the F-values of the Chow test for the known structural break in the number of users (controlling for GDP)¹ and in the employment rates of highly-skilled women (controlling for GDP, minimum wage, and female migration)². The square markers on the two lines represent significant

¹The explicit F-values and their significance levels are presented in Appendix C.

²The explicit F-values and their significance levels are presented in Appendix D.

breaks at the relevant quarters in each series. As the figure shows, the breaks in the number of users are significant until the 3rd quarter of 2008, and they are non-significant starting with the 4th quarter of 2008. Therefore, these results suggest that the policy's intervention period extended well beyond the time of its enactment because the number of users continued to grow immensely 4 years later. Thus, it seems that the positive and significant effects on the employment rates of highly-skilled women seen about two years after enactment of SVS can be related to the policy. Although it is possible that other policy-related factors might have played roles in increasing employment rates among highly-skilled women during this period, we believe that SVS was by far the most important policy stimulus during the period. Figure 4 further presents a structural break analysis for the employment rates of highly-skilled women. Two significant breaks are seen during the intervention period, and they are in the 3rd quarter of 2004 and the 4th quarter of 2006. Interestingly, the most significant break in the number of users is also found in the 4th quarter of 2006, suggesting that the two series represent the same women and that fluctuations in the employment rate are related to changes in the number of users.

[Figure 4 here]

The magnitude of the policy's effect

It is possible that changes in the employment rates were affected not by the growing ability of highly-skilled women to outsource housework (i.e., the outsourcing effect), but rather by new job opportunities that the policy made available to them (e.g., managerial positions) at the employing

companies (i.e., the employment effect). In the difference-in-differences models, the two possible explanations were disentangled. We assumed that if changes in the employment rates among highly-skilled women were driven by the new job opportunities that the SVS made available for them; such effects would also be found among low-skilled women (the main target population of this policy) and medium-skilled women, who could also find new job opportunities (e.g., secretarial positions) as a result of the policy. However, if a positive effect of the policy can be found only among low- and highly-skilled women but not among medium-skilled women, this might ascertain that the outsourcing effect was more pronounced than the employment effect among highly-skilled women. As can be seen in the first models, in Table 3, the interaction term between policy and gender is positive and significant among the low-skilled and the highly-skilled, but is not significant among the medium-skilled. Moreover, among the low-skilled, the model predicts that the employment rates of men will be on average 3.66 percent points lower in the policy intervention period, relative to the pre-policy period ($\beta_{policy} = -3.66^{***}$). However, for women, the model predicts an average increase of 1.8 percent points in their employment rates between the two periods. This gap is found to be significant ($\beta_{policy*gender} = 5.46^{***}$). Among the highly-skilled, the model predicts a non-significant decline of 0.84 percent points in the employment rates of men, in the policy intervention period. However, for highly skilled women the model predicts a significant increase of 1.46 percent points in their employment rates in the policy intervention period, relative to the pre-policy period ($\beta_{policy*gender} = 2.30^*$). Overall, the models' predicted declines in men's employment rates are in line with the secular trends in Belgian men's employment rates. Our own calculations based on data extracted from Eurostat's online database (European Commission 2015) show that employment rates of low skilled men declined from an average of 63.2 percent in the study's pre-policy

period (1999-2003) to an average of 59.4 percent in the post-policy period (2004-2014). Declines are also observed among medium-skilled men (84 percent and 80.8 percent, respectively) and to a lesser extent among highly-skilled men (88.5 percent and 87.5 percent, respectively).

The second models in Table 3 demonstrate a non-significant interaction terms between the GFC and gender, suggesting that there was no change in the men to women employment gap in the global financial crisis, relative to years when there was no crisis.

[Table 3 here]

Finally, because there is no regional variation in the timing of the SVS's enactment, we use the number of SVS users as another policy measure in the difference-in-differences analyses (see Table 4). As can be seen in this table, the interaction effect between the number of users and gender is positive and significant only among the highly-skilled, but not among the low-skilled or the medium-skilled. The results demonstrate a negative and significant effect of the number of users on the employment rates of highly-skilled men, but a positive and significant effect on the employment rates of highly-skilled women. This gap between men and women is found to be significant. As for the global financial crisis, the results in table 4 demonstrate a positive and significant increase in highly-skilled men's employment rates at the time of the crisis, relative to the years in which there was no crisis, but a positive and non-significant effect for women. Therefore, the global financial crisis cannot explain the increase in the employment rates of the highly-skilled women.

[Table 4 here]

Summary and Conclusions

The outsourcing of domestic labor is one strategy to better reconcile work and family life. In some countries, such outsourcing is currently actively stimulated through state-subsidization. Such subsidies have multiple purposes prominent among which are reducing the informal work in the service sector and boosting the demand for low-skilled labor. However, in the current paper we have sought to analyze the impact on labor force participation of women who outsource domestic work. That is worthwhile because there is ample evidence that women have a particularly hard time balancing work and family life due to work-family conflicts and due to gender inequality within households. Highly skilled women in highly demanding professions are perhaps most acutely affected. We used the enactment of the Belgian Service Voucher Scheme in January 2004 and its extended intervention period as a research window in which to detect the relationship between state-subsidized outsourcing and between highly-skilled Belgian women's employment rates at the extensive margins. Under this scheme, households can purchase heavily subsidized vouchers to pay for domestic help. In addition to making domestic outsourcing dramatically cheaper, the scheme also greatly reduces the hiring, monitoring and administrative costs associated with outsourcing. The scheme became exceptionally popular very rapidly. Belgian households started using the SVS on a massive scale shortly after its implementation. The considerable cost of the scheme, accounting for a third of active labor market spending, is often defended on grounds that it has created jobs and that it has made it easier to take up jobs, especially for women. Using time-

series analyses, we identified both short-term and long-term positive effects of the policy on the employment rates of highly skilled Belgian women. Moreover, using difference-in-differences models, we found indications that the policy most strongly affected the employment rates of the low skilled and the highly skilled women as it significantly increased their average employment rates after the enactment of the policy. We could not find indications for a similar effect for the medium-skilled women or for men. Therefore, the results are consistent with the interpretation that the increase in the employment rates of highly-skilled women is related primarily to their growing ability to outsource housework and not to new job opportunities brought about by the SVS. One possible mechanism that can explain why outsourcing will affect women's employment rates at the extensive margins is the increase in their participation rates, i.e. that by outsourcing housework, non-employed women can reenter the labor force more rapidly. This mechanism should work for both medium-skilled and highly skilled women. However, it is possible that because SVS take-up rates are more than two times higher among the highly skilled (see Figure 1) - at the aggregate level, the effect of outsourcing on employment rates is only apparent among the highly skilled women. This mechanism and other possible mechanism that may increase employment rates (e.g. a decline in inactivity rates or the entrance of a new cohort of workers) should be examined in future research.

Although it is possible that the growth in the take-up rates of the SVS overestimates the true change in the prevalence of outsourcing due to a crowding-out effect – if households who used to outsource to the informal sector began to outsource to the formal sector following the enactment of the SVS – the fact that the take-up rates have continued to rise immensely during the research period and have not stagnated suggests that there was a true “price” effect. The highly subsidized cost may have encouraged new users to begin purchasing cleaning services that were

previously done by the household members and may as well encouraged households, which previously outsourced to the informal sector, to outsource more hours to the formal sector. Therefore, it is reasonable to assume that there was a real change in hours outsourced and a possible real change in the employment rates of low skilled women who work under the scheme as domestic workers, and of highly skilled women who purchase such services.

These findings contribute to our understanding of the implications of a relatively new type of reconciliation policy for women's employment. Raising employment rates among highly-skilled women can narrow gender gaps in employment and is important, especially when the need for highly-skilled workers is growing in the knowledge economy. If women are caught in a bind and experience motherhood penalties in the labor market, this may result in a decline in their labor supply. Greater gender equity within households, which can potentially reduce the burden experienced by women, requires that men will contribute more to unpaid work. Such a solution has the potential to affect also men's labor supply if their opportunity costs change (Okun and Raz-Yurovich, 2018). Therefore, households' ability to outsource domestic labor has the potential to allow both partners to achieve better work-life balance. However, if the growing demand for domestic services by households is not regulated or addressed by the state, it might have multifaceted implications; it might increase undeclared employment and unemployment rates among low-skilled people, thus harming their social integration and social protection. An initiative that will expand the formal domestic service sector should aim to contribute to the well-being of families by providing them incentives to outsource domestic labor. However, it should also have other components that address the welfare and the work conditions of domestic workers, as well as their vocational education and training.

Although the analyses we conducted in this paper allowed us to get as close as possible to identifying the role of outsourcing in explaining the change in employment rates among highly-skilled women, the use of macro-level data has many limitations. A better examination of the effect of the Belgian SVS, or any other similar policy, on the labor supply of both low-skilled and highly-skilled women should include the use of micro-level longitudinal data (based on either register data or on survey data). Such data will allow to identify the effect of the SVS on women's transitions between inactivity or unemployment to employment; its effect on women's working hours and wages; and its effect on fertility decisions. Moreover, it will allow to capture variation between highly-skilled women, and identify whether it is women in couples and women with young children whose employment rates are increasing, or if perhaps more single women or men are taking advantage of outsourcing subsidies. Another concern is the endogeneity between the decision to work and the decision to outsource, because it is possible that women outsource housework in an anticipation of a new job. Although rich administrative data exists, it would require extensive linking and reformatting for research purposes. The technical and legal impediments to actually doing so remain prohibitive at present.

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Table 1: National performance measures of the Belgian Service Voucher Scheme, 2004-2012.

	No. of users	No. of employees	No. of employing companies
2004	98,814	15,077	504
2005	190,734	28,933	840
2006	316,101	61,759	1,162
2007	449,626	87,152	1,504
2008	557,482	103,437	1,892
2009	665,884	120,324	2,292
2010	760,702	136,915	2,576
2011	834,959	149,827	2,708
2012	899,558	151,137	2,753

Source: Idea Consult (2005-2013).

Table 2: Regional variation in the employment rates of highly-skilled women and in the number of SVS users, in Belgium, 2000-2014.

year	Brussels		Flanders		Wallonia	
	ER of Highly-skilled women	No. of users	ER of Highly-skilled women	No. of users	ER of Highly-skilled women	No. of users
2000	79.01		84.34		77.47	
2001	72.89		83.55		77.28	
2002	76.72		79.89		78.10	
2003	70.20		78.68		75.26	
2004	75.72	4,418	79.98	86,541	74.74	29,288
2005	75.55	9,971	83.83	178,467	77.75	62,744
2006	72.81	21,346	83.28	283,414	78.72	115,247
2007	75.22	26,463	84.57	291,781	80.52	131,655
2008	75.89	41,347	84.39	364,429	79.44	175,275
2009	73.83	53,983	84.48	407,794	80.18	204,107
2010	75.56	66,795	84.80	460,957	78.78	232,950
2011	75.32	76,889	83.90	504,259	80.17	253,811
2012	71.73	85,286	85.17	544,239	80.42	270,033
2013	75.25	90,365	83.43	582,108	79.59	278,445
2014	74.54	95,069	85.29	603,132	80.33	277,207

Source: Employment rates – own calculations, based on European Commission (2015).

Number of users – Idea Consult (2005-2013).

Table 3: Results of the Difference-in-Differences analyses estimating the effect of the Belgian service voucher scheme on employment rates by educational groups.

	Employment rates of low-skilled		Employment rates of medium-skilled		Employment rates of highly-skilled	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Policy intervention (1=yes)	-3.66*** (.79)	-3.90*** (.82)	-1.62 (.99)	-1.95 (1.02)	-.84 (.71)	-1.06 (.73)
Gender (1=female)	-26.93*** (.96)	-26.93*** (.96)	-17.07*** (1.20)	-17.07*** (1.20)	-9.01*** (.86)	-9.01*** (.86)
GFC [^]		1.30 (1.06)		1.81 (1.33)		1.20 (.95)
Policy X Gender	5.46*** (1.12)	5.58*** (1.15)	2.37 (1.40)	2.61 (1.44)	2.30* (1.01)	2.42* (1.04)
GFC X Gender		-.62 (1.50)		-1.31 (1.88)		-.64 (1.35)
Region = Brussels	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Region = Flanders	10.53*** (.61)	10.53*** (.61)	15.50*** (.76)	15.50*** (.76)	7.51*** (.54)	7.51*** (.54)
Region = Wallonia	2.89*** (.61)	2.89*** (.61)	7.17*** (.76)	7.17*** (.76)	3.61*** (.54)	3.61*** (.54)
Constant	56.17*** (.76)	56.17*** (.76)	70.64*** (.96)	70.64*** (.96)	83.09*** (.69)	83.09*** (.69)
Adjusted R-square	0.97	0.97	0.92	0.92	0.84	0.84
N	90	90	90	90	90	90

Note: * P<.05 ***p<.001

[^] GFC = Global financial crisis

The results of these analyses are also presented in Raz-Yurovich and Marx (2018).

Table 4. Results of the Difference-in-Differences analyses estimating the effect of the take-up rate of the Belgian service voucher scheme on employment rates by educational groups.

	Employment rates of low-skilled		Employment rates of medium-skilled		Employment rates of highly-skilled	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Number of users (ln)	-1.13** (.40)	-1.21** (.39)	-1.03* (.43)	-1.13* (.42)	-.75** (.26)	-.81** (.26)
Gender (1=female)	-25.12*** (5.01)	-25.18*** (4.94)	-21.09*** (5.50)	-21.22*** (5.38)	-23.37*** (3.33)	-23.45*** (3.23)
GFC^ (1=yes)		1.56 (.91)		2.05* (1.00)		1.37* (.60)
Users (ln) X Gender	.31 (.42)	.33 (.42)	.54 (.47)	.58 (.46)	1.42*** (.28)	1.44*** (.27)
GFC X Gender		-.69 (1.29)		-1.44 (1.41)		-.96 (.85)
Region = Brussels	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Region = Flanders	12.76*** (.97)	12.92*** (.96)	17.52*** (1.06)	17.69*** (1.04)	7.84*** (.64)	7.96*** (.63)
Region = Wallonia	3.59*** (.78)	3.69*** (.77)	8.33*** (.85)	8.44*** (.84)	3.69*** (.52)	3.77*** (.50)
Constant	64.85*** (4.35)	65.39*** (4.29)	80.08*** (4.77)	80.71*** (4.68)	90.87*** (2.89)	91.29*** (2.81)
Adjusted R-square	0.97	0.97	0.95	0.95	.92	.93
N	66	66	66	66	66	66

Note: * P<.05, **p<.01, ***p<.001

^ GFC = Global financial crisis

Appendix A

Table: Results of ARMA (1,1) Regression Predicting Employment Rates of Highly-Skilled Women in Belgium.

	Coefficient
GDP (ln)	-2.74 (4.03)
Female migration (ln)	-2.34 (1.98)
Minimum wages (ln)	8.91 (13.82)
Number of users (<i>t</i>)	4.09e-06*** (1.12e-06)
Constant	30.46
AR L1.	-.96*** (.03)
MA L1.	1.16*** (.08)
Sigma	.61***
N	56

Note: *** $p < 0.001$

Appendix B

Table: Intervention Analysis - β Coefficients of the Quarter Dummies.

Quarter	Employment rates of Highly-skilled women (ln)
2003q1	-0.00442
2003q2	0.001416
2003q3	0.004463
2003q4	0.001617
2004q1	0.006397
2004q2	0.011141
2004q3	0.015321**
2004q4	0.011603*
2005q1	0.009922
2005q2	0.007346
2005q3	0.007754
2005q4	0.010253
2006q1	0.014699
2006q2	0.011474
2006q3	0.02228**
2006q4	0.029904***
2007q1	0.024225*
2007q2	0.018158*
2007q3	0.020897
2007q4	-0.00013
2008q1	-0.00252
2008q2	-0.00109
2008q3	0.000306
2008q4	0.003419
2009q1	0.001406
2009q2	0.000521
2009q3	0.001377
2009q4	0.003189

Note: Controlling for GDP (ln), minimum wage (ln), and female migration (ln).

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The results of this analysis are also presented in Raz-Yurovich & Marx (2018).

Appendix C

Table: F-values from Chow test for a Known Structural Break in Level and Slope.

Quarter	No. of users (ln)	
	F-value	Sig.
2005q3	3.75	0.0216
2005q4	3.71	0.0226
2006q1	1.83	0.1641
2006q2	2.57	0.0734
2006q3	3.8	0.0206
2006q4	5.82	0.003
2007q1	5.1	0.0059
2007q2	5.1	0.0059
2007q3	5.04	0.0062
2007q4	4.77	0.008
2008q1	4.3	0.0126
2008q2	3.61	0.0249
2008q3	2.97	0.0484
2008q4	2.47	0.0821
2009q1	2.43	0.085

Note: Controlled for GDP (ln); data was trimmed 10% on either side.

The results of this analysis are also presented in Raz-Yurovich & Marx (2018).

Appendix D

Table: F-values from Chow test for a Known Structural Break in Level and Slope.

Quarter	Employment rates of highly-skilled women (ln)	
	F-value	Sig.
2003q1	2.22	0.0716
2003q2	1.98	0.1027
2003q3	1.92	0.1132
2003q4	1.96	0.1054
2004q1	1.78	0.1396
2004q2	1.95	0.1078
2004q3	2.75	0.0314
2004q4	1.25	0.3033
2005q1	1	0.4329
2005q2	0.93	0.4694
2005q3	0.88	0.5059
2005q4	0.88	0.5059
2006q1	1.01	0.4267
2006q2	0.61	0.6905
2006q3	1.73	0.1502
2006q4	2.5	0.0461
2007q1	2	0.0999
2007q2	1.05	0.4025
2007q3	1.82	0.1306
2007q4	0.67	0.6513
2008q1	0.69	0.6344
2008q2	0.58	0.7181
2008q3	0.28	0.9225
2008q4	0.24	0.943
2009q1	0.24	0.9408
2009q2	0.61	0.6947
2009q3	0.34	0.8825
2009q4	0.18	0.9692

Note: Controlled for GDP (ln), minimum wage (ln), and female migration (ln); data was trimmed 10% on either side.

The results of this analysis are also presented in Raz-Yurovich & Marx (2018).

Figures

Figure 1: Profile of the Service Voucher Users, 2010.

Source: Marx and Vandelannoote (2015).

Figure 2: Employment Rates of Highly-Skilled Women Aged 25-64, in Belgium

Note: Predicted - Controlling for the number of SV users in every quarter

Counterfactual A - Assuming the number of users remains at its 2004Q1 level

Counterfactual B - Assuming 0 users in all periods

Figure 3: Dynamics of the β_t coefficient of the quarter dummies – ARMA (1, 1) model for employment rates of highly skilled women.

Note: Controlling for GDP, minimum wages and female migration.

Squared markers represent significant effects.

Figure 4: F-values of Chow-Test for Structural Break in Level and Slope, in the series of employment rates of high-skilled women and the series of the number of Service Voucher users.

Notes: 1) The two series are trimmed by 10%. Square markers on the graph represent a significant break at the relevant quarter.

2) The series of the number of users controls for GDP.

3) The series of the employment rates of highly-skilled women controls for GDP, minimum wages and female migration

4) The results of this analysis are presented also in Raz-Yurovich and Marx (2018).