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Female labour force participation and dynamics of income inequality in Switzerland, from 1992 to 2014

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Neuchâtel, le 24 octobre 2018

Le doyen
Pierre Alain Mariaux

Summary

This thesis explores drivers of female labour force participation and analyses the consequences of an increase in female labour force participation for income inequality at the household level. This study combines these two important macro indicators, namely female labour force participation and income inequality, and investigates their dynamics in the Swiss context from 1992 to 2014.

In the first part of the thesis, particular attention is placed on the determinants of female labour force participation at the macro and micro level. At the macro level, contextual variables are either included in the background to identify the socio-political context in which women live or examined more in detail to determine their influence on women's labour supply. At the micro level, wages and income of women and their partners are studied as main determinants of women's labour supply. These classical determinants are paired with socially constructed ideologies identified through gender role attitudes towards work and family. The first article of this thesis examines the effects of the expansion of childcare provision at the cantonal level with respect to maternal and paternal labour supply, while the second article of this thesis includes taxes and benefits, childcare costs, and culture as contextual variables in a joint labour supply model of women and their partners.

In the second part of the thesis, the focus shifts towards household income inequality. The third and last article of this thesis investigates how the increase in female labour force participation affects household income inequality in Switzerland. The analysis distinguishes between different income sources and household types, including both couples and singles.
All articles focus not only on the extensive participation of women on the labour market, but also on the intensity of this participation in terms of part-time rates.

The main databases used in this thesis are the Swiss Labour Force Survey (1992-2014) and the Swiss Household Panel (2000-2014). Each article is built on a specific methodology. The first article identifies the effect of family policy reforms that were introduced at the beginning of the 2000s and uses a difference-in-differences estimation. The second article explores the impact of economic and attitudinal endowments of women and their partners with respect to women's labour supply through a discrete labour supply model. The third article investigates the consequences of the expansion in female labour force participation for household income inequality through index decompositions and counterfactual analyses.

Results identify a small but significant impact of the expansion of childcare provision on mothers' high part-time rates. No effects are found for paternal employment. Men play an important role for women's labour supply as partners influence women's decisions both through their economic and their attitudinal endowments. This income effect is particularly relevant for home-oriented women who feel strong moral pressures to stay home and perform childcare. In Switzerland, the total increase of female labour force participation contributed to keep household income inequality low. This effect was mainly due to the reduced variability in women's wages.

Keywords: female labour force participation, childcare, gender roles, household dynamics, income inequality

Résumé

Cette thèse intitulée « La participation des femmes au marché du travail et les dynamiques des inégalités de revenus en Suisse entre 1992 et 2014 » explore les facteurs qui influencent la participation des femmes au marché du travail et analyse les conséquences de la croissance de cette participation en termes d'inégalités de revenu au niveau des ménages. Cette étude combine deux importants indicateurs au niveau macro, la participation des femmes au marché du travail et l'inégalité de revenu, et examine leurs dynamiques dans le contexte suisse entre 1992 et 2014.

Dans la première partie de la thèse, l'attention est portée sur les déterminants de la participation des femmes au marché du travail aux niveaux macro et micro. Au niveau macro, les variables contextuelles sont soit inclues pour identifier le contexte socio-politique dans lequel les femmes vivent soit examinées plus en détail pour déterminer leur influence sur le nombre d'heures de travail effectué par les femmes. Au niveau micro, les revenus des femmes et de leurs partenaires sont étudiés comme déterminants pour le nombre d'heures de travail effectué par les femmes. Ces déterminants classiques sont appariés avec des données relatives aux idéologies socialement construites concernant les attitudes au travail ou à la famille. Le premier article de cette thèse examine les effets de l'expansion de la garde extrafamiliale au niveau cantonal sur le nombre d'heures travaillé par les mères et les pères. Le deuxième article de cette thèse inclut les impôts et les avantages fiscaux, les coûts de garde et la culture des parents comme variables de contexte dans un model commun d'offre de travail basé sur les femmes et leurs partenaires.

Dans la deuxième partie de la thèse l'emphase se déplace sur l'inégalité de revenu au niveau des ménages. Le troisième et dernier article de cette thèse interroge sur l'influence éventuelle d'une augmentation de la participation des femmes au marché du travail sur l'inégalité de revenu en Suisse. L'analyse fait la distinction entre différentes sources de revenu et types de ménages, incluant les couples et les célibataires.
Tous les articles se focalisent non seulement sur la participation extensive des femmes au marché du travail, mais aussi sur la proportion de contrat à temps partiel.

Les principales bases de données utilisées dans cette thèse sont l'Enquête Suisse la Participation Active (ESPA 1992-2014) et le Panel Suisse de Ménages (PSM 2000-2014). Chaque article se base sur une méthodologie spécifique. Le premier article identifie l'effet des reformes de la politique familiale qui ont été introduites au début des années 2000 en employant une estimation de la différence des différences. Le deuxième article explore l'impact des dotations économiques et attitudinales des femmes et de leurs partenaires sur les heures travaillées par les femmes à travers d'un model commun d'offre de travail. Le troisième article s'interroge sur les conséquences de l'expansion de la participation des femmes au marché du travail pour l'inégalité de revenu au niveau des ménages employant des décompositions d'indices et des analyses contrefactuelles.

Les résultats mettent en avant un impact faible mais significatif de l'expansion de l'offre de garde formelle extrafamiliale sur le temps de travail partiel entre les mères. Ces réformes n'ont pas eu un effet sur le travail des hommes. Les hommes jouent néanmoins un rôle important pour le travail des femmes car les partenaires influencent les décisions des femmes avec leurs ressources économiques et leurs attitudes. L'effet du revenu des partenaires est particulièrement pertinent pour les femmes orientées vers les tâches ménagères qui ressentent des fortes pressions morales pour rester à la maison et s'occuper des enfants. En Suisse, l'augmentation de la participation des femmes au marché du travail a contribué à maintenir une basse inégalité de revenu. Cet effet a été produit par la réduction de la variabilité des salaires des femmes.

Mots-clés : participation des femmes au marché du travail, garde extrafamiliale des enfants, rôles de genre, dynamique des ménages, inégalité de revenu

Female labour force participation and dynamics of income inequality in Switzerland, from 1992 to 2014

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Summary

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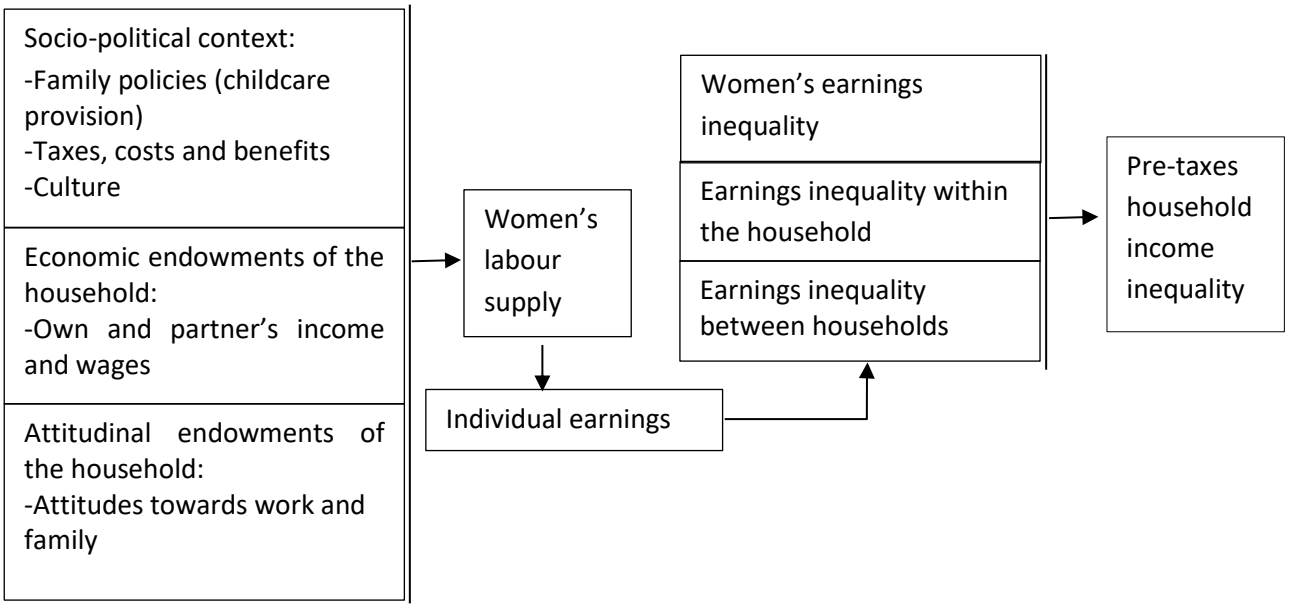
Introduction

Conceptual framework

This thesis analyses the link between changes in female labour force participation and changes in income inequality in Switzerland. This study was supported by the related SNF project "Income and wealth inequality, deprivation and wellbeing in Switzerland, 1990-2013" (project 100017_143320) and has been inspired by a combination of its first two modules, namely "Economic inequality: Macro-level dynamics" (Module 1) and "Micro-level dynamics of income inequality and deprivation" (Module 2). The dynamics of two important macro indicators, female labour force participation and income inequality, are investigated within the Swiss context. Within this context, the determinants of female labour force participation at the macro and micro level are studied more in detail. At the micro level, wages and income of women and their partners are included as determinants of women's labour supply, together with socially constructed ideologies, which are identified through moral attitudes towards work and family. At the macro level, contextual variables (e.g. taxes, childcare costs, culture) are either included in the background to identify where women live, or studied more in detail (e.g. childcare provision) to determine their influence on women's labour supply.

Figure 1: Conceptual framework



How each component analysed in this study is linked to the other components of the conceptual framework is graphically represented in Figure 1. This conceptual framework is supported by recent literature on the different mechanisms that influence labour supply and income inequality.

Apart from childcare availability, the tax system, and childcare costs have been found to be strong institutional predictors of women's labour supply (Attanasio, Low & Sanchez-Marcos 2008; Thévenon 2013; Kabatek, Van Soest & Stancanelli 2014; Cascio, Haider & Nielsen 2015). The implementation of these financial incentives and their response may depend also on the predominant culture of where people live. Mothers' labour supply is, for instance, lowest in the Italian-speaking canton of Switzerland (Giudici & Schumacher 2017) and the equal division of work between men and women is supported in some cantons more than others (Epple et al. 2015). Eugster, Lalive, Steinhauer & Zweimüller (2017) found also that despite similar local labor markets and identical institutions, Romance language speakers in Switzerland search for work almost seven weeks longer than their German speaking neighbours. Culture, in the form of mediatically influenced ideologies, shapes also the demand for social insurance between the main linguistic regions of Switzerland (Eugster, Lalive, Steinhauer & Zweimüller 2011). The list of macro predictors of women's labour supply presented in Figure 1 is not exhaustive. Other important elements are the flexibility and the performance of the labour market, geographical distances and other family policies, such as maternity leaves and after-school regulations (Jaumotte 2003). Even if not directly addressed by this dissertation, robustness checks are performed to test the reliability of the main results controlling for other important macro characteristics.

The determinants of women's labour supply are also at the micro level. At the micro level, these are mainly women's education, fertility, marriage and divorce prospects (Goldin 1990). From an economic perspective, women decide to work (or to work more/less) depending on their wage potential, their partner's wage level and the presence of other income sources in the household (Goldin 2006). In this sense, women's labour supply depends on what might be called the economic endowments of the household. Research has found the presence of this income effect proving that women work less when their partner earns high incomes (England et al. 2012). This is not only a static picture, but also a dynamic adjustment that happens in proximity to fertility decisions. Bredemeier and Juessen (2013) have shown that women living with a high earning partner are more likely to reduce their hours of work and to have children than women living with a low earning partner. On average, women react more strongly to their partner's wage then to their own wage (Devereux 2004; Bargain, Orsini & Peichl 2014). This labour supply reduction is smaller in recent years as research suggests that the link between partner's wage and labour supply is weakening over time (Blau & Kahn 2007; Verbakel & De Graaf 2009). Compared to previous decades, women's

personal motivation and lifestyle preferences have become more important for women's labour supply decisions (Hakim 2000; Goldin 2006).

Going from the drivers of female labour force participation to the consequences on income inequality, this dissertation tests how women's labour supply affects household income inequality through different channels.

First, female labour force participation increases the number of women with positive earnings and decreases the number of women with zero earnings. This makes earnings more homogeneous among women.

Second, more earnings among women can also potentially affect within household inequality. Given the negative gender pay gap for women (which in 2014 was 15.1% in the private sector, see SFSO 2015b and Anastasiade & Tillé 2017), this increase in earnings should reduce within household inequality and increase the correlation of earnings among partners. The total effect depends also on the composition of households and on the proportion of single households. It can be predicted that the household composition changes with an increase in women's labour supply as the likelihood to form a single household may depend on economic independence. Higher earnings may be linked to an increase in the number of single households also through the possibility of divorce (Teachman 2010; Simonsson & Sandström 2011). However, this seems to be a mechanism that happened mainly in the past when many women were not employed. In more recent years, higher earnings increase financial stability, and, in most countries, this reduces the risk of divorce (Poortman 2005; Cooke & Gash 2010; Kanji & Schober 2014) and thus the likelihood of being in single households. In Switzerland where the probability of being a high-earning single woman has declined between 2000 and 2014 (Ravazzini et al. 2017, Figure 3).[1]

Third, more earnings among women can also affect between household inequality. This depends on the correlation between partners' earnings and on which women decide to work (more). On the one hand, if women in income-poor household increase their labour supply contribution, the effect of an increase in women's labour supply should be equalising on total household inequality. On the other hand, if women in income-rich household increase their labour supply, then the effect should be desequalising. The second part of Figure 1 is an essential representation of a much more complex system of relationships that go from working hours to household income inequality. A more detailed figure is illustrated at the beginning of the third article of this thesis (see Figure 12).

[1] Please note that the labels of Figure 3 in Ravazzini et al. 2017 should be Low, Intermediate and High instead of Lower secondary, Upper secondary and Tertiary.

This thesis continues by presenting more in detail the main components of the conceptual framework.

Socio-political context

To sustain dual-earner couples and reduce women's career interruptions linked to childrearing, the welfare state has been reformed in many countries. The revolution began in the 1970s in Scandinavian countries, where family services were prioritised. Among all the family policies that were expanded in many countries, childcare has been found to minimise interruptions after childbirths and to reduce opportunity costs (Esping-Andersen 2009). Compared to other family policies, such as paid maternity leave, this policy comes without producing negative gender stereotypes (Hegewisch and Gornick 2011; Zoch & Schober 2018) and generates further positive effects on children's cognitive abilities independently from the educational level of their parents (Havnes & Mogstad 2011; Crettaz & Jacot 2014; Felfe, Nollenberger & Rodriguez-Planas 2015; Felfe & Lalive 2018). Despite these positive effects and probably due to the high costs associated with these policies, huge disparities still exist in terms of implementation of childcare across countries (Cascio et al., 2015). Given their early start, in Europe, Scandinavian countries are the most performant with respect to all work-family reconciliation policies (Havnes and Mogstad 2011) and other countries have consistently improved their services over time (the latest reform in Spain, for instance, granted public places in childcare facilities for 70% of children and additional private places for another 20% of children, Nollenberger & Rodriguez-Planas 2015).

Switzerland has traditionally intervened only sporadically to rule family matters and because of its liberalism, this country usually ranks among the lasts with respect to the generosity of its family policies. In this country, family reforms started mainly in the first years of the 2000s. In 2005, maternity leave was established, providing a federal minimum of 14 weeks at 80% of normal salary. This federal legislation was largely a legal confirmation of what the vast majority of employers had established in the early 1990s. The experiences of other countries also show that job continuity is not affected if leave entitlements are for up to 17-18 weeks (Baker & Milligan 2008), which is much longer than what has been legally established in Switzerland.

Another reform was childcare. In 2003, some federal subsidies of 200 million Swiss francs were granted to early childcare and after-school facilities for a period of 8 years. This public incentive has been renewed twice for another 240 million francs, and around half of it (133.8 million francs) was claimed by early childcare facilities. Subsidies are expected to last until 2019. The allocated subsidies

did not alter the prices that parents had to pay to enrol their children in these facilities, but they covered some fixed costs that could reduce the profitability of opening or expanding childcare centres. These financial incentives boosted childcare and after-school places in both public and private facilities.[2] Over a period of 13 years, the supply increased by 28,480 places in early childcare facilities and by 22,121 places in after-school facilities. Despite this success, almost half of childcare facilities declared that they could not satisfy the demand due to inadequate time slots, which in most cases meant that there were fewer places than the demand for those places on certain days of the week (OFAS 2016). Given the high share of women working part-time in Switzerland (see Figure 3 in the section on Women's labour supply), it is not surprising that women need childcare slots on some days more than others. Even if the reform has expanded the number of days per slot available, this expansion still seems far from meeting the demand. Additionally, some peripheral regions have not seen notable gains from this expansion (Schmid, Kriesi & Buchmann 2011). Political priorities, intentions to attract highly qualified migrants to the area, and the availability of infrastructure and of childcare providers are some of the reasons that may have led to differences in the implementation of childcare services. Regardless of where the facility is based, it is the responsibility of the (new) childcare facility to request the subsidy. This fact may therefore reduce the importance of cantons in determining the demand for childcare. The effect of childcare reforms on women's labour supply is the first research questions of this thesis.

In addition to these childcare reforms, some cantons reformed their constitutions to establish a legal enforcement of after-school care. As illustrated by Felfe et al. (2016), this legal enforcement, however, had an impact only in the German-speaking part of Switzerland, where after-school care was particularly underdeveloped. Despite these reforms, parental and paid paternity leave are still inexistent in this country (The Fatherhood Institute 2016) and in 2012, childcare coverage in the most performing cantons was only 21.5% adding both private and public institutions (Ravazzini 2018). The decision to rely on the market for a large part of the provision of childcare services is also likely to be accompanied by market failures such as high prices and imperfect information. This appears to be the case in Switzerland, where waiting lists for subsidised places are very long (8.1 children can be enrolled in the same waiting list for each childcare place according to Banfi et al.

[2] Statistics about the number of places provide information regarding what the Swiss Federal Statistical Office has defined as "institutional care." Independently from public funding, institutional care includes pre-school institutions, after-school institutions, nursery schools and associations of trained personnel specialising in day-care services for children.

2009 and Dasoki, Giudici & Le Goff 2011) and the price of childcare is a strong disincentive[3] both for high- (Bütler & Ruesch 2009) and particularly for low-income families (Abrassart & Bonoli 2015; Stern & Felfe 2015).

For female labour supply, childcare prices are clearly an important element, but they represent only a limited part of the story. On the one hand, some mothers, for instance low-educated mothers, are often the disadvantaged groups with respect to childcare accessibility when prices are high; on the other hand, they are also those who are less strongly motivated to take part in the labour market. Investments on this type of policy can be successful in terms of female employment only when there is an intention to become active on the labour market. This depends also on culture and on attitudes towards paid employment and gender roles. These cultural dimensions might prevail on decisions or be more silent in some parts of the life-course of individuals. Studies have found that attitudes become more important when economic incentives created by public policies lose their effect and this is usually when children become older (Hummelsheim & Hirschle 2010; Liechti 2017). Attitudes have also evolved over time and, in parallel to increasing female labour force participation, social norms towards women's work have generally changed towards more egalitarian values (Zuo & Tang 2000).

What has not changed are fertility intentions, which appear to have remained stable at two children per family (Esping-Andersen 2009). In Switzerland, fertility has been lower than the two-child norm since 1972. In 2014, fertility in this country was 1.54. The theory on fertility decisions highlights at least two main decisional factors: the earning capacity of the main breadwinner and the opportunity cost of motherhood in terms of potential lifetime earnings (Hotz et al. 1997). A woman who interrupts her main activity for a period of five years to take care of her children earns 40% less on a lifetime basis than what she would have earned if she did not interrupt her activity (Esping-Andersen 2009). This estimate is calculated without looking at pension entitlements or wealth accumulation. Childcare has been again proposed as a possible family policy to avoid career interruptions and increase fertility. Among the different tools used by the public policy, many countries propose a mix of tax deductions and subsidised care. In Switzerland, many cantons allow for tax deductions for childcare (Ravazzini, Guillet & Suter 2016) in addition to family allowances and new-born supplements (Ravazzini & Chesters 2018). Whether these policies are effective in

[3] According to the OECD Family Database (2014), childcare fees are 67.3% of the average wage. This is the highest proportion among 34 OECD countries. For middle-class two-income families, this corresponds to 23.6% of net household income. Switzerland can be ranked together with other liberal countries with a proportional fee for childcare 2.4 times higher than in Germany or France and almost 9 times higher than in Austria.

changing women's realised fertility might however depend on the returns that women foresee in the short-run. Tax deductions might have a considerable time lag to be considered for this type of decisions, whereas childcare subsidies might have a more sudden impact on household finances.
Even if some family policies could affect the entire household, previous research conducted on the Swiss context and other contexts found that only the employment behaviour of mothers has changed over time. Fathers appear inelastic to changes in policies (Asai 2015; Felfe et al. 2016) and their behaviour towards full-time employment is stable over time. To reach more equality on the labour market, some commentators are suggesting that men should be granted the same rights to childcare that women have (Esping-Andersen 2009). This would imply a more radical reform and the institutionalisation of paternal and parental leave at the national level. Until that time, motherhood penalty reflected in lower salaries for working mothers and other gendered inequalities on the labour market are likely to persist.

Economic and attitudinal endowments

In many European countries, the last years have witnessed an expansion of some household types, namely of single adult households and of recomposed families (Goldschneider, Bernhard & Lappegard 2015). In Switzerland, household types have remained rather stable over time, but new family arrangements in terms of the division of work have altered the "traditional male breadwinner model" (i.e. women do not work, men work full-time) changing it into a "modified male breadwinner model" (i.e. women work part-time, men work full-time) (Blossfeld & Drobnič 2001; Bühler, Brun, Steinmann & Brulhardt 2002). In this country, 75% of couples had a unique male breadwinner in 1970 (Levy Bühlmann & Widmer 2007) and this proportion decreased to only 32% in 2000 and 19% in 2014 (Kuhn & Ravazzini 2017a).
This evolution of dual-earner couples challenges Becker's theory of division of labour based on household production or paid work (Becker 1965, 1991). According to this theory, and to pooled-income approach to household decision-making, the partner with the highest economic potential maximises the time spent in employment, while the other partner maximises the time spent in unpaid activities that could be beneficial for the household (e.g. housework, childcare and other forms of care). With educational expansion, however, economic potentials are becoming more similar between partners and this theory is losing part of its foundations. In addition, instead of a single utility function for the household, other contributors have illustrated how partners could have two different utility functions that are maximized through bargaining (Manser & Brown 1980;

McElroy & Horney 1981). The role of the welfare state is here crucial as the result of bargaining will depend on whether taxes and benefits are placed on the entire household or on one of the two partners (Lundberg & Pollak 1993).

More recently, other theories have been introduced to explain how partners influence women's labour supply. These theories rely less on economic reasons and more on sociological explanations. According to these theories, partners have an influence on women's labour supply also through their social capital and their attitudes towards work and family (Fortin 2005; Kangas & Rostgaard 2007; Steiber & Haas 2009, 2012; van Gameren 2013; Stam, Verbakel & de Graaf 2014). Highly educated men might transfer their positive attitude towards the labour market to their partners. They may also provide resources for their partners to find a suitable job activating their network. On the contrary, men with traditional attitudes toward the gender roles at work and within the family might discourage women from an active participation in the labour market. Women's and their partners' attitudes towards work and family, which could be called the attitudinal endowments of the household, are therefore important elements to consider for labour supply decisions.

Economic resources are only one aspect that explains the division of work within households. Gender role attitudes might be able to explain more.

Considering contextual and economic factors in Switzerland, the mechanisms through which attitudes influence labour supply of women and their partners is the second research questions of this thesis.

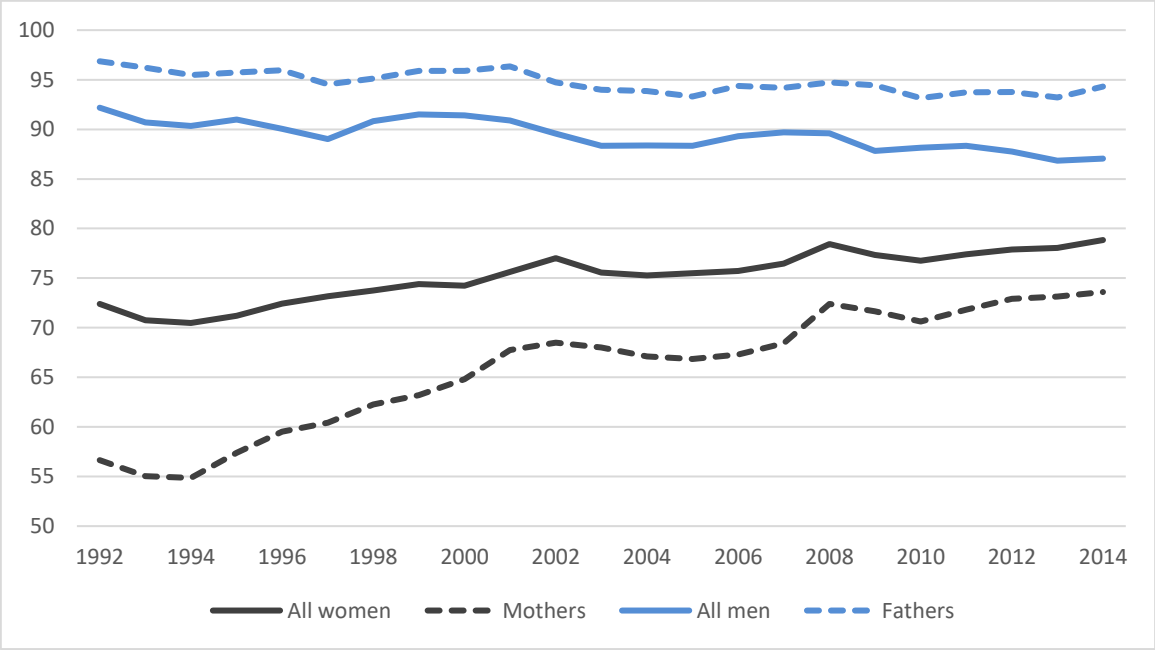
Women's labour supply

In Switzerland, female labour force participation has been steadily increasing since the early 1990s reaching 79% of women active on the labour market in 2014 (Figure 2). In a cross-national perspective, Switzerland has one of the top scores in terms of female labour force participation among all European countries (close to Scandinavian countries like Iceland and Sweden) (Hermann & Murier 2016). The rise in female labour force participation has been associated with higher educational levels, less traditional gender ideologies, more economic freedom and higher contributions to public finances. Due to this last aspect, a high female labour force participation is usually considered a good target for public policies.

In Switzerland, the most rapid increase in employment (25 percentage points) has been registered for mothers of young children, namely for mothers of children below 15 years old (Figure 2). Despite this important increase, Switzerland loses many positions if maternal employment is studied compared to total female labour force participation. For maternal employment, Switzerland

occupies the 11th place among 28 European countries (Hermann & Murier 2016). According to the Europe 2020 targets (European Commission 2018), employment rates should be at least 75% for persons aged 20-64. Switzerland met this target for women in the 2000s, but in 2014 the target was not yet met for mothers of young children. Female labour force participation has always been lower for mothers than for all women, whereas it has always been higher for fathers than for all men. Fathers' employment appears rather stable at 95% and does not show important signs of adjustment to women's employment (Figure 2). Employment remains at high levels also for all men, but it has slightly declined over time (from 92% in 1992 to 87% in 2014). Therefore, the gender employment gap, defined as the difference in employment between men and women, has halved between 1992 and 2014 (going from 40% to 21% for parents and from 20% to 8% for the entire population).

Figure 2: Labour force participation rates for women and men, and mothers and fathers of young children, 1992-2014



Sources: Swiss Labour Force Survey 1992-2014. Notes: The sample includes individuals between 20 and 50 years old. Young children are defined as children below 15 years old.

The particularity of female employment in this country is the high share of women, and particularly of mothers working part-time (Figure 3). The national definition of part-time includes all work percentages up to 90%. According to this definition, Switzerland is the European country where part-time is the most common form of employment. Alternatively, the European definition of part-time work means working for less than 30 hours per week or working at 75% for a week of 40 hours

(van Bastelaer, Lemaître & Marianna 1997). If this definition is applied, then Switzerland becomes the second country for part-time work after the Netherlands (Hermann & Murier 2016).[4] Figure 3 shows that very few men work part-time (less than 15%), whereas many women (45%) and most mothers (81%) who are active on the labour market have a part-time employment. The high increase of part-time work among active women is usually an adjustment to lower percentage rates that happens after the birth of the first child (Levy & Ernst 2002; Le Goff & Levy 2016). This adjustment depends on many factors. Individual characteristics such as women's educational level, the educational level of their partners (Krone-German & de Chambrier 2011; Giudici & Schumacher 2016) and marital status (Hiekel et al. 2014) are particularly important for this labour supply adjustment. Cultural and structural factors are also relevant elements that should be taken into account to understand women's employment decisions (Wood, Kil & Marynissen 2018).

Even if the decision to decrease labour supply after childbirth varies according to women's characteristics and to where they live (Felfe, Lechner & Thiemann 2016), many general factors including the lack of a paid paternity leave (Valarino & Gauthier 2016) and the fact that women earn less than men (Bonjour & Gerfin 2001) lead more women than men to reduce their working hours. This division of labour inside the couple might be what both partners want, but in some cases, and more often in liberal countries such as Switzerland, this division creates psychological tensions and long-lasting gender inequality (Bühlmann 2009).

In the short-term, it is in most cases financially convenient for couples where both partners work to reduce the number of working hours when they have dependent children (Bütler & Ruesch 2009). In the long-term, economic gains from interrupted careers during childrearing might however become inexistent. This is because women become unable to earn according to their initial earning potential due to experience losses and in-job training. Despite high educational and wage homogamy, this inequality between men and women is attested by the decrease in similarity between partners' wages over the partnership (Ravazzini, Kuhn & Suter 2017).

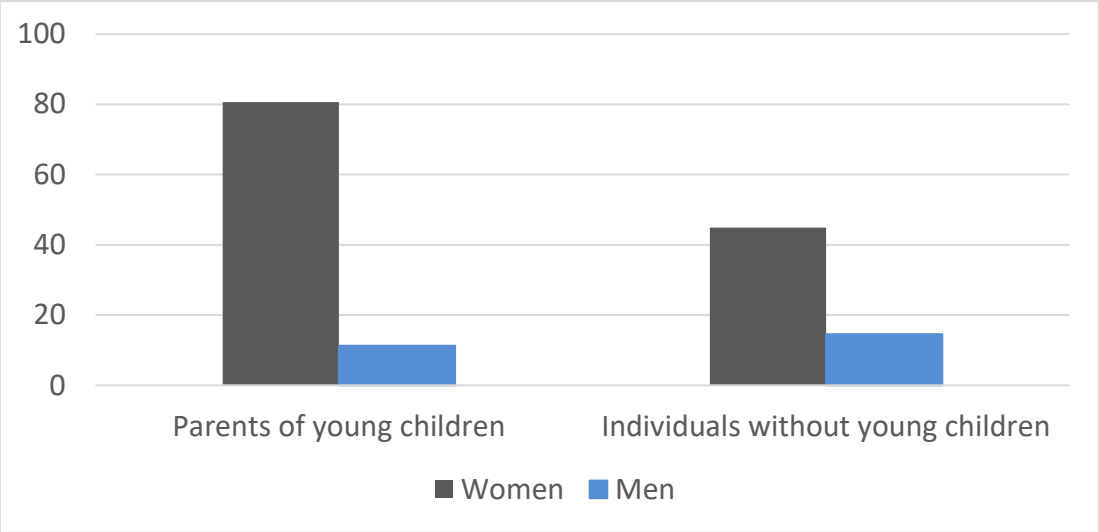
The economic losses due to interrupted careers are difficult to estimate and require specific data that include observations over the entire life-course or pension entitlements and retrospective data. This estimation is still an open question that the literature needs to address in the future, but

[4] It is interesting to notice that in countries where part-time work is common, the percentage of part-time work is defined up to a high work percentage (90% in Switzerland and 87.5% in the Netherlands). Another peculiarity in cross-country comparability is that since the standard hours of work per week are 40, but they can arrive also to 42, in Switzerland, a 90% in this country corresponds to more than a full-time in other countries where the standard hours of work per week are only 35.

preliminary research shows that women cumulate substantially less wealth than men generating a consistent gender wealth gap (Ravazzini & Chesters 2018) and an important gender pension gap (Kucera 2015).

Even if gendered imbalances in earnings are an element tightly linked to women's labour supply, this thesis focuses more on the overall level of income inequality in society.

Figure 3: Proportion of active parents of young children and of active childless individuals working part-time, by gender, 2014



Sources: Swiss Labour Force Survey 2014. Notes: The sample includes individuals between 20 and 50 years old. Young children are defined as children below 15 years old.

Income inequality

Unlike an increase in female labour force participation, a rise in income inequality is generally regarded as a negative socio-economic change. A high level of inequality is usually associated with a higher level of debt, high crime rates, social instability, low levels of subjective well-being[5] and low social trust (Wilkinson & Pikett 2009). The literature has identified many drivers of income inequality both at the macro and at the micro level. In the US, capital gains and the rise of top income shares have been identified as the main drivers of the recent increase of income inequality (Piketty & Saez 2014). In Europe, inequality has remained at comparatively low levels with respect to the US. Still, also in several European countries, inequality has been rising since the 1990s (OECD 2008).

[5] More than an association between countries with high inequality and low subjective well-being, it is an association between the growth in inequality and the decrease in subjective well-being. This means that living in a country with higher inequality than another country does not make people more dissatisfied, but if inequality grows in the same country, then people become more dissatisfied (Schmidt-Catran 2014; Ravazzini & Chávez-Juárez 2017).

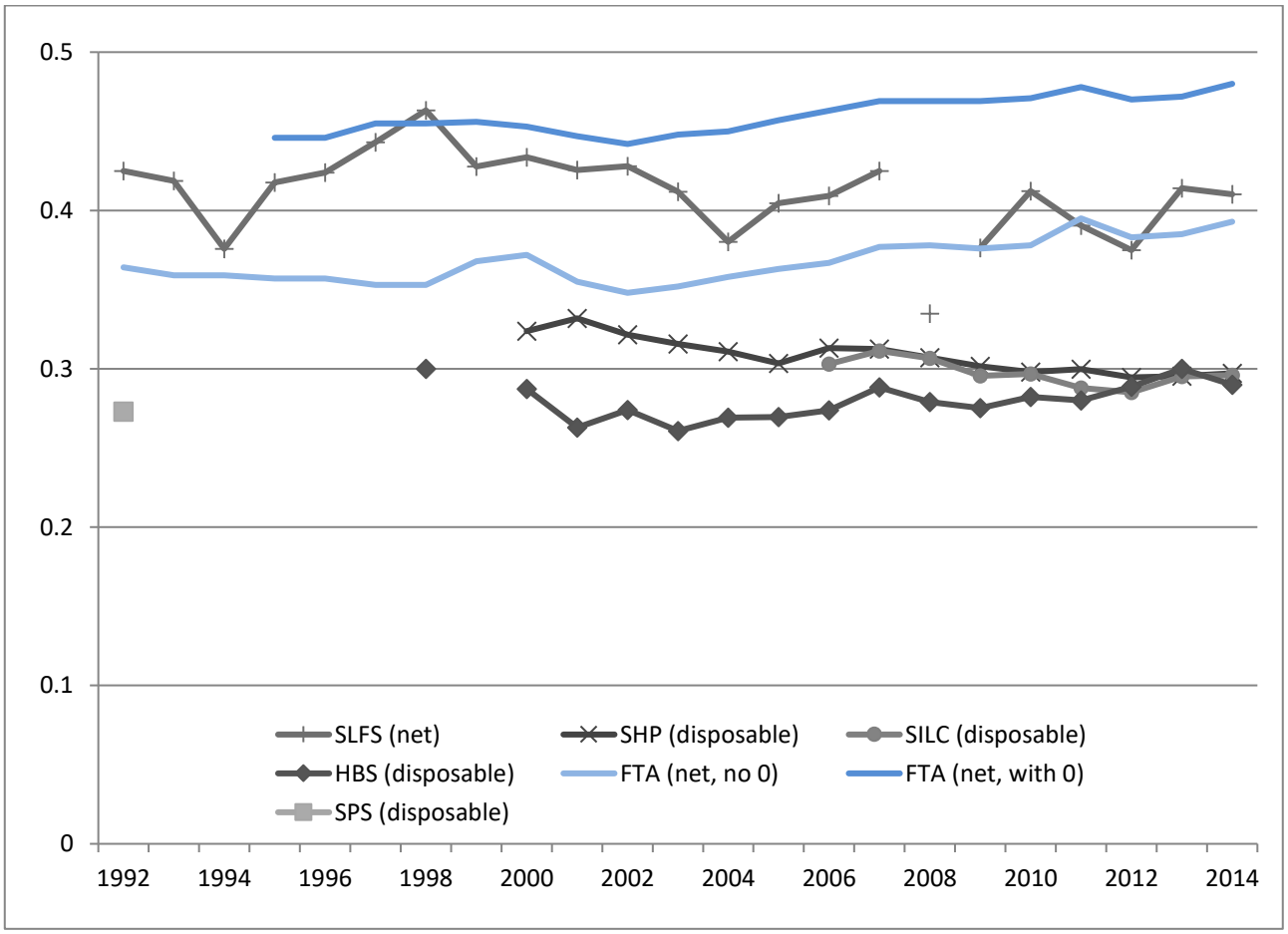
Even if in most countries inequality has been rising, the situation is different in Switzerland where household income inequality has remained rather stable and only inequality linked to top incomes has increased (Suter, Kuhn, Gazareth, Crettaz & Ravazzini 2016). Household income inequality in Switzerland is neither high, nor low. Depending on the data source, in a scale from 0 to 1, inequality in disposable or net household income ranged between 0.29 and 0.48 in 2014 (Figure 4). The main difference in estimates is between tax statistics, which give high values, and estimates of survey data, which suggest a value around 0.30. With this value, income inequality in this country is similar to the income inequality of many other European countries. Based on all countries of the Survey of Income and Living Conditions 2014, income inequality in Europe is estimated at a value of 0.31, with Norway having the lowest value (0.23) and Turkey the highest (0.41) (Eurostat 2015). As previously mentioned, contrarily to many countries where inequality increased due to high earners (e.g. the US, the UK) or to transition from a closed to an open economy (e.g. Russia and other post-communist countries), in Switzerland, inequality in household disposable income remained rather stable over time (SFSO 2015a). Only inequality in market income (Grabka & Kuhn 2012) and tax data suggest a slight increase (Dell et al. 2007). As illustrated by Suter et al. (2016) with the Swiss Earning Structure Survey and by Foellmi & Martinez (2017) with social security data, this increase is probably due to the rise of top incomes. Even if income shares at the very top of the income distribution (top 0.01%) have more than doubled in the last coupes of decades (Foellmi & Martinez 2017), this rise has been moderated compared to other countries and almost invisible when measured with survey data. As these different examples show, income inequality can be measured both with tax registers and with survey data. The two measures give a different picture due to the low representability of the extremes of the distribution (i.e. both people with very low and very high incomes) in survey data. Even if tax registers do not suffer heavily from this under-representation, these data have also some drawbacks such as the distance between tax units and household members and underreporting of income from self-employment. Although estimates of income inequality constructed with tax registers might be considered more representative, the presence of survey data containing income has made possible the analysis through the correlation with many socio-demographic characteristics. The analyses of this dissertation are mainly based on survey data. More details about the data are reported in the section about the data and the methodology.

In terms of labour market changes, the causes of this increase or stability in income inequality have been linked to the technological progress and to the regulations of atypical short-term contracts for young people (OECD 2011). Demographic changes and changes in family formation have also been

studied in some countries (Karoly & Burtless, 1995; Chevan & Stokes 2000; McLanahan & Percheski 2008), but female labour force participation is rarely regarded as a factor that could affect income inequality. Despite the rapid increase in both income inequality and female labour force participation in many countries, the way female labour force participation is linked to household income inequality is an underexplored mechanism in the literature.

The consequences of the modified division of work within households on household income inequality is the last research question of this thesis.

Figure 4: Gini coefficient of household equivalent disposable or net income



Sources: Swiss Labour Force Survey (SLFS) 1992-2014, Swiss Household Panel (SHP) 2000-2014, Statistics of Income and Living Conditions (SILC) 2007-2015; Household Budget Survey (HBS) 1998, 2000-2011, Federal Tax Administration statistics (FTA) 1992-2014 (series including zero-payers 1996-2014), Swiss Poverty Survey (SPS) 1992. Notes: in the SLFS 2008 missing values are imputed and for this reason the series has been broken in the graph; income in SILC refers to the previous year; more details about these surveys can be found in Suter et al. (2016).

Changes in income inequality following crises and particularly the last financial crisis have fuelled analyses that link socio-demographic characteristics to income inequality leading to new international reports (OECD 2008, 2011, 2015), overarching volumes based on in depth country-

specific studies on inequalities and their societal impacts (Nolan et al. 2014; Salverda et al. 2014; Ravazzini 2015) and internationally comparable databases focused on the income distribution (e.g. the Luxembourg Income Study (LIS), see Gornick & Jännti 2013). All these outcomes are possible only because of the pioneering studies on income inequality conducted by A.B. Atkinson (1970, 1971, 1975, 1997). Its contributions highlighted the possibility to distinguish measures of inequality according to different income sources and to the importance we give to different parts of the distribution, and therefore to different population groups. An index named after him, the Atkinson index (Atkinson 1970), represents only a small part of the legacy left by this author.

To measure income inequality, the Atkinson index is one of the alternatives to the mostly used Gini index, but there are many more. As all the aggregated measures, income inequality indices reduce information to provide a straightforward number, which is usually comparable across countries and over time. The choice of this number depends on the focus of the analysis (e.g. the top, the middle or the bottom of the distribution) and on the properties of the inequality index.[6] The Gini index is for instance easy to interpret: 0 corresponds to perfect equality and 1 corresponds to perfect inequality. This index measures the distance of the current distribution of incomes compared to the perfectly equal distribution of incomes. Even if the Gini index has been often criticized for not measuring changes at the extremes of the distribution and this is even more likely if the Gini is measured with survey data, no alternative has so far replaced the Gini index and this index continues to be used at the international level.

To account for changes at the extremes of the distribution, inter-quartiles or inter-decile ratios are however increasingly proposed. One of these ratios is the Palma ratio, which divides the top 10 percent of the distribution by the bottom 40 percent (Palma 2011; Cobham et al. 2016). Following the same line, Eurostat provides the income quintile share ratio as a measure of inequality, which is the top 20 percent divided by the bottom 20 percent. Even if these ratios are easy to construct and simple to use, they maximise the information loss by dividing only a precise position in the distribution over another and if the Gini index can be criticized about the fact that it does not take into account the extremes, these ratios can be criticised about the fact that they do not consider the centre of the distribution.

[6] The most desirable properties are population size independence and scale independence (inequality does not change if income is multiplied by a positive constant), symmetry (inequality does not change if observed individuals are observed in a reversed order) and the Pigou-Dalton transfer principle (inequality should not increase if income is transferred from the rich to the poor). On top of these properties, decomposability by population group is another desirable property of these indices. More on these technical aspects about the decomposability of the inequality indices are explained in the methodology section.

The debate on how inequality is measured does not stop at which index to be used but interests also the degree to which inequality measures poverty. This ambiguity between income inequality and poverty is present already in the Atkinson index, which implicitly includes normative values about the supremacy of the bottom of the distribution. Through a parameter that measures inequality aversion, the Atkinson index can be interpreted as the proportion of total income needed to achieve the same level of social welfare as under an unequal income distribution (De Maio 2007; Suter et al. 2016).

In developed countries, the reduction of inequality is interesting from a policy point of view to produce fair and stable societies in which all individuals could live trusting each other without any fear of crime. The reduction of poverty is of even more importance from a moral and a legal point of view as each country is legally engaged to guarantee the right to an adequate standard of living, at least at the minimum subsistence levels. The superiority of poverty reduction is established in the order of the 2030 Sustainable Development Goals (SDGs) of the United Nations Development Programme (UNDP), which mention poverty reduction in the first place of the agenda and the reduction of inequalities in the 10th position. In addition, the first target of the SDG on income inequality is very close to a poverty reduction and calls for income growth of the bottom 40 per cent of the population at a rate higher than the national average. According to their definition, the SDGs are targeted to developing countries and this might explain their order, but, in their current form, they have the same goals also for developed countries. Not only in the SDGs, but also in the Europe 2020 targets, poverty is one of the most important strategic point. Inequality is in this case not explicitly targeted, but it is implicitly included in the same strategic point. The Europe 2020 target on poverty suggests that the number of people at risk of poverty and social exclusion should be reduced by 20 million. The risk of poverty is measured by Eurostat as having an income below the 60% of median household income. Poverty is currently measured in a relative way and this implies a high correspondence with inequality (Suter, Beycan & Ravazzini 2017). Eurostat indeed found this measure to have a correlation of 0.7 with the Gini index (Bogliacino 2014). According to the current measure of risk of poverty, if median income augments due to an increase in the income of the middle class, then more people are likely to fall into poverty independently of their absolute living standards. In 2011, in Switzerland, the average absolute poverty threshold of 2,224 CHF of disposable equivalised income per month for single person households was only around CHF 200 lower than the relative poverty threshold. However, for couples with children this difference was CHF 1,350 per month (absolute poverty threshold: average of CHF 4,477 per month; relative poverty

threshold: CHF 5,828 per month) (SFSO 2013). Even though the Europe 2020 target on poverty could be technically achieved, the way in which it is measured makes it impossible to eradicate poverty as long as there is inequality. Elevated by the poverty measure, inequality seems therefore of high importance for the European vision of sustainable and inclusive future societies.

The reason why inequality is not expressively mentioned in the Europe 2020 targets might be linked to the fact that poverty reduction has more public consent than inequality reduction. The debate is whether it makes sense to talk about differences in earnings or income as something negative. Differences in income might indeed reflect differences in effort and should not be penalised by the welfare state. For this reason, it seems reasonable to disentangle the part of inequality that individuals are able to determine with their own choices from the part of inequality that goes beyond their control. There are different ways to tackle this issue.

One way is to distinguish the sources of inequality and not only the final outcome. With a measure of inequality of opportunity, Roemer (1998) proposes to distinguish the part of total inequality due to effort from the part due to predetermined circumstances such as gender, ethnicity and parental socio-demographic characteristics. Inequality of opportunity is statistically different from income inequality: the two measures have a correlation of only 0.3 in Europe (Ravazzini & Chavez-Juarez 2017). Inequality of opportunity is also often lower than income inequality in developed country and in Switzerland this measure was 0.20 in 2014 and ranged from 0.18 to 0.27 between 2002 and 2014 (Ravazzini & Chavez-Juarez 2017). The concept of inequality of opportunity is closely linked to social mobility because high levels of inequality of opportunity are generally associated with low levels of social mobility. Previous research found that when there is a perceived probability of positive social mobility, the demand for redistribution decreases (Alesina & La Ferrara 2005; Ravallion & Lokshin 2000, Guillaud 2013, Cojocaru 2014). At the same time, when inequality is high, the demand for redistribution increases (Finseraas 2009).[7]

Social mobility and income inequality are therefore linked (OECD, 2008, Figure 8.1) and have a joint effect on people attitudes. The effect might be different according to the socio-economic status of individuals. With high income inequality individuals at the top might suffer from status anxiety

[7] In 2016, in Switzerland, 65% of people expressed their agreement about the fact that the government should intervene to decrease income inequality (ESS, own computations). Currently, income taxes are progressive (expect for foreign nationals subjected to a lump-sum taxation and in two cantons where income taxes are flat), based on marital status and the number of children and levied at the federal, cantonal and municipal level. No federal tax is levied on individuals with a yearly taxable income below CHF 14,500 and on couples with a yearly taxable income below CHF 28,300. The OECD Taxing Wages 2017 report places the average income tax level for an average Swiss resident earning an annual income of 85,536 francs at 10.7%. This average tax rate is lower than the average tax rate of many other European countries.

(Wilkinson & Pickett 2009; Delhey & Dragolov 2014; Walasek & Brown 2015) and fear to lose considerable amounts if they fall down the social ladder. Conversely, poor people that hope to improve their relative position might consider a certain degree of income inequality as beneficial (Grosfeld & Senik 2010; Kelley & Evans 2017a, b) because potential future gains might be larger (Bénabou & Ok 2001). Contrarily to this expectation, research has found that all people, both the rich and the poor, are negatively affected by an increase in income inequality (Ravazzini & Chavez-Juarez 2017). Apart from normative egalitarian arguments and pure aversion to inequality (Alesina, Di Tella & MacCulloch 2004; Dawes et al 2007; Carlsson et al 2005; Senik 2005; Thurow 1971), the reason why all people might be negatively touched by inequality could be linked exactly to this loss in the capacity to aspire for a better future (Appadurai 2004; Bogliacino 2014). Even if income inequality is a limited measure and could be complemented with other indicators (e.g. inequality of opportunity), its connections with other important social phenomena, such as social mobility and attitudes towards the future, make this indicator fundamental for social policies.

Despite the possible consent about the importance of this indicator, the discussion remains about the degree up to which inequality measures a fair or an unfair society. According to the index inequality of opportunity, the only unfair part should correspond to the outcome that people are not able to control. In line with this approach, some researchers have proposed to measure natural inequality as the part of inequality due to life-cycles profiles of income accumulation and therefore to ageing (Atkinson 1971; Paglin 1975). Natural inequality can be measured through an index decomposition (Mookherjee & Shorrocks 1982) and has been recently quantified by Harvey, Mierau & Rockey (2017) with a Gini index of natural inequality that ranges between 0.2 and 0.35 depending on the country. The analysis of Harvey et al. (2017) does not include Switzerland but shows a large variability across countries in the share of natural inequality over total income inequality measured by classical Gini index. This suggests that inequality levels as they are currently constructed are not perfectly comparable measures of unfair inequality.

Another approach is again proposed in line with the Palma ratio as a measure of distance with the elites. Krozer (2015) suggests using the top 5 percent over the bottom 40 percent (the Palma V.2 index) as a measure of unfair inequality that should be targeted by social policies more than the reduction in inequality among the middle class measured by the Gini index. The measure to be chosen to quantify unfair inequality is still being debated, but there is consent on the fact that an increase in inequality, however it is measured, is a bad sign for social cohesion and for society.

This thesis links inequality with other indicators that are sustained by public policies. Results indicate whether there is a trade-off to accept between an increase in desirable indicators and an increase in income inequality.

Contribution

This introductory section identifies the topic of each article and their contribution to the literature on women's labour supply and/or income inequality.

The first part of this dissertation investigates the determinants of women's labour supply. With women's labour supply it is intended the decision to participate in the labour market (the extensive margin of labour supply) and the number of hours women decide to work (the intensive margin of labour supply). Even though this distinction is a classical approach in labour economics, this is something rarely investigated in the literature regarding the effects of childcare policies on women's labour supply. Studies on this topic have generally researched the impact of family policies only on the engagement in active labour force participation (see Cascio et al. (2015) for a review). So far, the focus has been placed on the possible activation effects that changes in family policies could produce on inactive women. The focus on the intensive margin of labour supply and the number of hours worked by women is however something extremely relevant for countries that have reached high female labour force participation and a high share of women working part-time. Only a few studies so far have investigated whether a change in policy affected the number of hours worked by already working women. These studies have emerged only recently in countries like Switzerland (Felfe et al. 2016) and the Netherlands (Bettendorf, Jongen & Muller 2015), which are indeed countries where the labour market is flexible enough to allow women to work at different part-time rates. Applying an innovative focus on part-time work, the first article of this dissertation aims at replicating the study of Felfe et al. (2016) based on after-school care in the German-speaking part of Switzerland with a new study of childcare in the entire country. The first article of this thesis is based on newly collected administrative data at the cantonal level about childcare provision. More details about these data are exposed in the methodological section.

With more than 2000 municipalities and 26 cantons, the welfare system in Switzerland is one of the most decentralised among modern welfare states. This creates different implementations of the same broader framework set at the federal level. In addition to this important geographical component for childcare provisions, the operationalisation of financial incentives (e.g. taxes, costs and benefits) varies depending on whether individuals are in a formal union. In this case, financial incentives are tailored at the household level. Partners play a more important role for women's

labour supply in this country than in countries where the welfare system is individualised also for married couples (Bennett 2013). Given this economic interdependence between partners reinforced by the institutional level, the second article of this dissertation uses a household dimension where both partners can contribute in terms of labour supply. Most studies so far have considered partners as exogeneous for women's labour supply (Henz & Sundstrom 2001; Verbakel & de Graaf 2009; Verbakel 2010). In this sense, these studies explain how women adjust to men's socio-demographic characteristics and income without considering that labour supply decisions take place at the household level and not between two separate decision makers. Men have usually a constant labour market contribution and for this reason it might make sense to consider their labour supply as given. In the literature, this choice was dictated also by the fact that men were more educated and had higher earning potentials. In more recent years, however, women have acquired high educational degrees (Becker 2014; Breen et al. 2009, 2010; Zangger & Becker 2016) and might have more bargaining power about their labour supply. In addition to this, in Switzerland, the importance of endogenous decision-making of couples concerning working time[8] is visible through the fact that educational assortative mating does not affect income inequality (Wise & Zangger 2017; Kuhn & Ravazzini 2017b). The interdependence between couples in labour supply decisions has already been modelled by Gerfin & Leu (2007), but the sample comprised only income-poor couples in 1998.

One of the innovations of the second article of this thesis is to consider partners decisions as endogenous within all types of heterosexual couples. This is done including not only economic variables of the two partners, but also attitudes.

Although rarely included in the literature that studies reactions to increases in income and wages, moral behaviours are important because financial incentives targeted to increase labour supply might be ineffective if people are not willing to benefit from them. For example, tax incentives and subsidies targeted on second earners might be ineffective if parents think that staying at home is important for their children's well-being. The literature has shown that gender role attitudes have a strong impact on women's working hours (van Gameren 2013; Stam et al. 2014) and this impact is not only produced by own attitudes, but also by partner's attitudes (Fortin 2005; Kangas & Rostgaard 2007; Steiber & Haas 2009, 2012). The interaction between partners is therefore fundamental for both economic and attitudinal variables. The interdependence of these two

[8] By endogenous decision-making of couples concerning working time it is intended the adjustment that each partner makes to adapt to the employment and earning situation of the other partner.

elements is something innovative for the literature on gender role attitudes and for the literature on economic wage elasticities.

The contribution of the second article of this thesis is twofold. First, it specifically models the interdependence of partners in terms of labour supply and updates older studies on Switzerland targeted on specific population groups. Second, it includes also attitudinal variables and investigate how they interact with the economic endowments of women and their partners. More details about how this is done in empirical terms is described in the methodology.

The third article of this thesis adds to the literature on the drivers on income inequality by investigating how women's labour supply affect household income inequality in Switzerland. Although many studies have tested the equalizing effect of an increase in female labour force participation (Del Boca & Pasqua 2003; Daly & Valletta 2006; Pencavel 2006; Breen & Salazar 2010, Larrimore 2014), only a few studies have theoretically considered the intensity of women's labour supply as a driver of household income inequality (Esping-Andersen 2009; OECD 2013) and no study has investigated this aspect in detail in a country where part-time is a widespread form of female employment. All the articles of this thesis share the innovative aspect of focussing on not only on female labour force participation, but also on women's intensity of paid work and particularly on women's part-time work.

The drivers of female labour force participation are studied with the first two articles of this dissertation and the impacts on income inequality with the last article. The data and the methodology used in each article of this thesis are presented in the following section.

Data and methodology

Data

This dissertation is based mainly on two databases. The first database used for the first article of this thesis is the Swiss Labour Force Survey (SLFS). This survey started in 1991 and since then it collects cross-sectional information[9] about work-related aspects of the 15+ population living in Switzerland. The SLFS includes new samples of considerable size every year and since 2009 it allows for a representative analysis at the cantonal level.[10] Since 2010, the survey design is no longer annual, but it consists in four interviews over a period of 18 months. Questions are principally objective, related to the labour market and focussed particularly on employment and unemployment. Additional themes are education, retirement and gender equality.

A special module on childcare is included every year from 2001 to 2010, as well as in 2013. However, the wording of the question changed in 2010, which makes it possible to compare only the answers between 2001 and 2009. Questions ask about the use of institutional forms of childcare and other forms of external childcare. As women prefer to use different types of care when they have enough resources, it is difficult to estimate the full-time usage rate of a childcare places. The SLFS asks about the regular use of external care and the number of days in each type of external care for each child. Official statistics provide some figures regarding the use of childcare from the 2013 SILC (SFSO 2016). From these figures, it appears that 73.8% of children up to 3 years of age are taken care of by an external carer. Of these, 17.6% are exclusively cared for by a non-institutional entity such as grandparents, nannies and daily mothers, and 56.3% by an institutional entity. Thus, by 2013, the majority of young children were at least partly cared for in a childcare facility. Moreover, according to the Federal Social Insurance Office (FSIO, 2016), only 12% of all children using childcare services use childcare facilities 5 days per week (35% of children, for instance, use the service 2 days per week, and 20% use it only 1 day per week). Of all children using childcare at least one day per week, 68% use a daily service, 30% use the service only for the first or the second half of the day, and 2% of children use an hourly service. Even if the majority of children use childcare at a daily basis, 32% of all children use it regularly not a daily basis, but for only some parts of the day. This is an important information to consider in the analysis of childcare use.

[9] Data collection is through computer aided telephone interviews (CATI). Until 2010, the design included also a 5-year rotating panel for employees.

[10] Data at the cantonal level were also available in 1995. A new sample of foreigners has been included in 2003.

The SLFS contains information at the micro level and data at the micro level have to be included from other sources. Administrative data at the cantonal level about the availability of childcare places from 1991 to 2012 have been collected through a separate questionnaire and subsequently paired with the SLFS through the information about the canton of residence of individuals. This separate online questionnaire has been sent to cantonal bureaux in charge of childcare administration. Data have been complemented with information from the website www.berufundfamilie.admin.ch[11] and with three studies: INFRAS's report on childcare and equality (Stern et al. 2013), the SFSO reports on families in Switzerland (SFSO 2004/2008) and COFF's report on external childcare and after-school care (COFF 2008). In terms of data quality, information about childcare availability in the 1990s is extremely scarce because very few cantons had electronic archives. Information about childcare places become more accurate only in the 2000s. Overall, 24 out of 26 cantons have information about the number of childcare places in their public and private facilities for at least two years around 2002 and 2012.[12] If data for these exact two years are not available, information can be retrieved from the years closest to those dates, making the reliable assumption that childcare places do not change radically from one year to the next, but rather over subsequent decades.[13] One of the limitations of the data is the lack of detail at the municipal level, which is important in the Swiss context because municipalities are sometimes more competent than cantons in regulating childcare activities.[14] Another limitation of the data is the lack of information about the price of external childcare. In spite of these limitations, to the best of my knowledge, these data are the only source currently available about the number of childcare places in 24 Swiss cantons between 1991 and 2012. More information about these data can be found in Ravazzini et al. (2016). Data on Vaud, Bern and Neuchâtel have been revised with cantonal statistics before the publication of the first article of this thesis.

Even if the SLFS does not contain information at the macro level, there are other questions at the micro level that this dissertation could exploit. In addition to work-related aspects and childcare use, information about individual earnings collected by the SLFS is very precise and asked with

[11] This website has been deactivated on the first of January 2017 and replaced by the publication "Familienfreundliche Arbeitsbedingungen: Was Machen die Kantone/Gemeinden?" (Ecoplan, 2016).

[12] The only two cantons missing are Uri and Obwalden.

[13] Half of the cantons have information about one or two years before or after 2002, whereas six cantons have information on childcare places in 2010, but not in 2012.

[14] A collection of data on preschool and after-school care at the municipal level was performed by Stern at al. (2013) in 2009-2010. No such previous collection was performed, and this prevents the use of these data in an application with a quasi-experimental design using the number of childcare places. Felfe et al. (2016) employed these data in a two-stage-least-square estimator instrumenting the variation in the cantonal reforms of after-school care. Cantonal reforms were also used in a difference-in-differences framework that did not look at the after-school supply.

several questions where people can indicate their net and/or gross earnings at an hourly, monthly or yearly basis including indications about the 13th and 14th salary. Information about household characteristics and household income is much less precise. This survey asks only one global question about net and/or gross household income and the proportion of missing values is rather high (from 23 to 45%). Except in 2008, missing values are not imputed. The SLFS is a survey based mainly on individuals and not on households. For this reason, the SLFS lacks information on partner's income. Due to the richness in information about household and partners' characteristics, the main database used for the last two articles of this thesis is the Swiss Household Panel (SHP). This database uses representative samples of the Swiss population 14+ since 1999 (SHP I). Refreshment samples were introduced in 2004 (SHP II) and 2013 (SHP III). Migrants that arrived in Switzerland between 2004 and 2013 are not well represented in this survey because the sample was not refreshed in this period.

Compared to the SLFS, the SHP covers a shorter time span. In this sense, the SLFS can be used to evaluate changes at the macro level between two centuries, whereas the SHP can better identify the within-household dynamics since the onset of the major family policies reforms of the beginning of the 2000s. For this dissertation, the fact that the SHP collects[15] information about incomes and labour supply for all household members in every year is extremely important. This information is collected through several questions both at the individual and at the household level. The SHP asks also several subjective questions on attitudes. Gender role attitudes are asked in 2002-2011 and 2014.

Even if not fully exploited in this study, the most distinctive feature of this database is its longitudinal nature. The SHP follows individuals and households over time. Missing values for income are imputed using also the longitudinal information available in the panel. Even though this design opens new research possibilities, a panel design is linked to attrition and this is likely to decrease inequality over time. Part of the effect of attrition, however, can be corrected through weighting. Data of the SHP is particularly useful for the analysis on hourly wages because these data include income and labour supply for all household members over time. This survey design allows for good data imputation on hourly wages (see also Kuhn 2008) and this is particularly important for the imputation of wage potentials in the second article of this thesis. In the second and the third article of this dissertation, hourly wages have been computed for both partners at the basis of monthly

[15] Like for the SLFS, up to know the survey mode has been computer aided telephone interviews. The SHP allows for alternative survey modes for difficult cases.

wages and weekly working hours. The SHP does not apply any top-code for economic variables, but to restrain the influence of outliers, the second and third article of this thesis top-code hourly wages at 10 times the median wage and the highest 0.2(5) percent of total household income.

Sample and working time definitions

Even if the comparability has been searched, the sample selection differs in the three articles of this thesis due to methodological reasons.

The first article focuses on the effect of childcare for women's labour supply. The sample used in this study is therefore more linked to fertility and employability and includes mothers between 20 and 50 years old who have at least one child between 0 and 3 years old. Some tests are performed also on fathers within the same age range.

The second article focuses on intra-household labour supply decisions. As joint decisions become relevant when there is more than one person in the household, the sample of the second article is restricted to cohabiting couples. No sample restriction is placed on marital status or on parenting as these characteristics are interesting to study labour supply behaviours within couples. Given the importance of women and their labour supply, only heterosexual couples within a working-age range (25-64 years old) are taken into account for the analysis.

The same working-age range is applied also to the third article of this thesis. The sample of the third article is however different to the second article because single households are important for the analysis of the impact of women's labour supply on household income inequality. Therefore, the third article of this thesis includes both singles and couples.

Even if the focus is placed on women's labour supply in all three articles of this thesis, men are always present, and the analyses are tailored so that their contribution can always be discussed. In addition, in all the three articles, the samples are not restricted to inactive women, but include selected women independently from their working hours. Working hours are used to create interesting categories for the analysis.

The definition of part-time and women's working hours is particularly important for this dissertation. In the third article, in line with an old definition of the Swiss Federal Statistical Office (SFSO), individuals working at six one hour per week are considered as active,[16] and individuals working at least 36 hours a week as full-time workers. A distinction between low part-time work (6–

[16] The new definition of economically active individuals of the SFSO has adapted to the ILO definition of one hour of work. Currently, in Switzerland, a job of less than six hours per week is called minimal professional activity (translated from the French *activité professionnelle minimale*).

19 hours) and high part-time work (20–35 hours) is made for some analyses. A similar distinction of high part-time work is also used for the first article. In this case, high part-time corresponds to work percentages higher than 50% and lower than 90%. In a normal week of 40 hours, this range corresponds to 20-36 working hours. The second article uses the most elaborated definition of working hours. Under the assumption that working hours have a continuous distribution (Aaberge, Dagsvik & Strøm 1995; van Soest 1995), and this seems to be the case for Switzerland (see Figure 9), women are set to choose between six working alternatives, and namely 0-4, 5-12, 13-20, 21-28, 29-36 and 37+ hours of work. The third and second last alternatives can correspond to a definition of high part-time work. In this thesis, the only article that allows for the same work categories for men and women is the first article, where the focus is on mothers and fathers. Otherwise, men are modelled differently as their hours of work do not depend heavily on part-time. In the second paper of this dissertation, men can choose between inactivity (0-12), part-time (hours range 13-36) and full-time work (at least 37 hours per week). The definition of inactivity for men includes more hours of work than for women and this is due to the very low proportion of men working at low percentage rates. We did not include the possibility for men to work at different part-time percentages within part-time work in the third article of this thesis.

Methodological choices and limitations

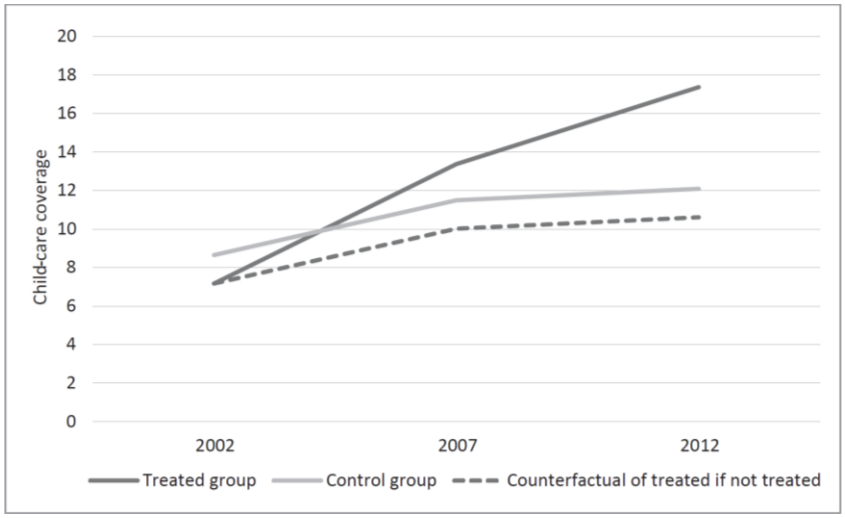
Investigating different research questions, each article of this thesis relies on a different methodology.

The first article is based on a difference-in-differences (DiD) estimation (see Imbens & Wooldridge 2009). This empirical strategy is particularly suited to evaluate the effects of reforms targeted to specific population groups. The empirical model compares the labour market outcomes of a specific group targeted (treated) by a political reform with the outcome of a similar group that is untouched by the reform. The methodology consists of a comparison of the years before and the years after the reform, under the testable assumption that the groups would have reacted in the same way without a reform. The identification strategy used in the first article of this thesis is based on the canton of residence. This article tests the effects of the 2003 introduction of subsidies for childcare facilities on parental, and especially maternal, employment. Mothers (or fathers) living in cantons that have expanded their childcare places more than the national average are considered as treated, whereas parents living in cantons with a relatively small expansion of childcare places are the control group. Figure 5 shows the evolution of childcare coverage among the treated and the control group.

The net increase was of 10 percentage points over 10 years and the increase is, by definition, higher in the treated versus the control group. This empirical strategy has been used by similar studies on other countries, such as Norway and Germany (Havnes & Mogstad 2011b; Bauernschuster, Hener & Rainer 2015).

Apart from the test about parallel trend assumption before the introduction of the reform, other tests must be performed to assure the reliability of the results. In this article, these tests include changes in fertility decisions, inter-cantonal mobility and the use of institutional childcare. Two tests are also performed to estimate possible confounding effects due to the almost simultaneous policies introduced in this period, such as the introduction of paid maternity leave and the legal enforcement of after-school care. Other two alternative specifications provide additional reliability proofs to the results. The first specification excludes years that are too close to the introduction of subsidies. This is done because the expansion of childcare places may have produced nonlinear effects in the years before and after the first introduction of childcare subsidies.

Figure 5: Evolution of childcare coverage, comparison between treated and control groups.



Sources: Administrative data on cantonal childcare places (Ravazzini et al. (2016), 2012 cantonal statistics for Bern, Neuchâtel and Vaud). The dotted line highlights the expected behaviour of the treated group in absence of treatment. A linear trend is assumed to interpolate the missing years.

The second specification is inspired by the method applied by Felfe et al. (2016). This method controls for endogeneity of demand-induced supply through the construction of local labour markets. According to this innovative methodology, only some municipalities are retained in the analysis to gain a comparable set of treated and control cantons. These municipalities are situated inside a spatial mobility area composed of at least two neighbouring cantons and have similar voting preferences regarding family policies. As in Felfe et al. (2016), data regarding spatial mobility regions

and votes for the 2006 referendum on family benefits are retrieved from the Swiss Federal Statistical Office.

The geographical dimension is highly important in the first article of this thesis and it remains an important background characteristic also in the second article of this thesis. This second article applies a discrete labour supply model where both partners can adjust their labour supply depending on the other partner and the place where they live. Discrete labour supply models are increasingly used because they take into account the dependency between partners and the dependency between the decision to become active on the labour market and the decision on the number of hours people work (Steiber & Haas 2012; Bargain et al. 2014; Pestel 2017; Muizon 2018). In these models, people can choose between different options that give them a certain level of consumption, if they decide to work, or a certain amount of time to spend on unpaid activities, if they decide not to work. Consumption corresponds to the disposable income that households could have depending on the labour supply of both partners. In mathematical terms, this could be written as:

$$C = DI = f(w, h, o|X, T, \epsilon) = wh + o - T(wh, o, \epsilon|X) - childcare(wh, o, \epsilon|X) - \epsilon\ (h, X) \quad (1)$$

Where consumption (C) or disposable income (DI) is a function of hourly wages w, hours of work h and other incomes o, given observable socio-demographic characteristics X, simulated taxes and benefits T, simulated childcare costs (which depend on income) and semi-observable working costs ϵ (e.g. all working women have a unitary weekly cost given by transportation).

This model is rather computationally intense because data must be expanded to have all the different options for individuals and their partners. Moreover, given the decentralised Swiss administrative system, taxes and benefits and childcare costs must be simulated given household characteristics and the municipality of residence of individuals. In addition, hourly wages for inactive individuals must also be imputed. The procedure for this imputation is described more in detail in the methodological section of the second article.

Individuals do not have to make a binary decision between work and unpaid activities but can decide on a combination of the two. Given a rather flexible labour market, these decisions might depend on personal preferences, which might depend in their turn on personal characteristics (age, education, marital status, nationality, the number of children and their age), the place of residence (urbanization, linguistic region) and attitudes towards work and family. The inclusion of attitudes in these discrete labour supply models is an innovation of the second article of this thesis. These

attitudes are measured in the SHP with the agreement with these statements: “To have a job is the best guarantee for a woman as for a man to be independent” and “A pre-school child suffers if his or her mother works for pay”. Responses are collected on an 11-point scale, which ranges from 0 to 10. In addition, attitudes might be influenced by the examples observed during adolescence. The literature shows that women whose mothers worked are found to have a strong attachment to the labour market and men whose mothers worked are found to be more tolerant towards the active labour force participation of their wives (Fernández et al. 2004). To measure this intergenerational transmission of attitudes, the SHP provides information on whether the respondent’s mother worked when the respondent was 15.

Given the attention placed on attitudes, these models can be run first excluding and then including attitudes as taste shifters. These models can also be performed on different samples depending on the level of attitudes that individuals express with respect to gender roles applied to work and family. Even if rather demanding in terms of data preparation and settings, these discrete labour supply models give flexible estimations that allow to compare the influence of both partners simultaneously depending not only on objective, but also on subjective characteristics. Compared to other models, such as panel fixed effects, these models do not require long panel data. However, among their disadvantages, they need a large number of observations per year and good data for the simulations. Compared to longitudinal regressions, they also suffer from the limitation of not being able to identify the selection into partnership.

The third article of this thesis is also based on a form of simulation. In this case, inequality is simulated with counterfactual distributions. Before performing counterfactual distributions, the first part of this article decomposes household income inequality in three factors: female labour income (f), male labour income (m) and other income sources (ot). The inequality index chosen for this decomposition is (half) the (squared) Coefficient of Variation (CV). The CV belongs to the family of generalised entropy measures. Like the Atkinson index, the generalised entropy measures have a sensitivity parameter (alpha) that weights the distance between incomes at different parts of the income distribution. This can be mathematically written as:

$$GE_{(\alpha)} = \begin{cases} \frac{1}{\alpha(\alpha-1)}\left[\frac{1}{N}\sum_{i=1}^{N}\left(\frac{x_i}{\bar{x}}\right)^{\alpha} - 1\right] if\ \alpha \neq 0,1 \\ \frac{1}{N}\sum_{i=1}^{N} ln\left(\frac{\bar{x}}{x_i}\right)\ if\ \alpha = 0 \\ \frac{1}{N}\sum_{i=1}^{N} \frac{x_i}{\bar{x}} ln\left(\frac{x_i}{\bar{x}}\right)\ if\ \alpha = 1 \end{cases} \quad (2)$$

In the formula, the higher the alpha, the higher the importance at the top of the distribution. Alpha usually takes the values of 0, 1 and 2. In case of the CV, alpha is equal to two and this gives high importance to the top of the distribution. The CV can be decomposed into three elements (Shorrocks 1982): the inequality of each factor, the correlation between income components, and the share of each component for total household income. Increased female labour force participation might influence income inequality in three different ways: decreasing inequality in female earnings, increasing the importance of women's share of total household income, therefore increasing the importance of women's earnings inequality and changing the correlation of women's earnings with men's earnings and with other income components, therefore changing within and between household income inequality. The impact of each change can be estimated with a shift-share decomposition over time. Using two points over time, inequality can be computed under the assumption that only some elements of the CV have changed and that the other elements have remained at their original levels.

Even if this shift-share decomposition can tell us which factor contributed the most to total inequality if the factors are correlated, a limitation of this approach is that inequality within and between households cannot be identified. If not disentangled, the correlation between men's and women's earnings include both the correlation within and between couples and singles. Moreover, singles and households with a non-working partner are treated in the same way. An alternative approach is to compare inequality using different household types. These types are arbitrary but can identify meaningful mating patters and changes in the division of labour within couples. Typically, the literature based on couples distinguishes between dual-earner couples, male- and female-breadwinner couples, and non-working couples (Pasqua 2008; Harkness 2013). This article adds to the literature by including singles and a further distinction of household types by part-time and full-time work. To do so, it uses the Theil index, an alternative entropy measure with alpha equal to 1. Like the Gini, this index is therefore more sensitive to changes in the middle of the distribution. One drawback of the Theil index and of all inequality measures based on the logarithm is that zeros lead to the index being undefined. Households with no income are, therefore, excluded. Including all income sources and not only labour income, however, this exclusion does not concern many households and is not problematic for the analysis.

Unlike the Gini, both the CV and the Theil are unbounded at the top. This means that these indices can go beyond the value of 1 or any value and their comparability over time can only be studied in relative terms compared to previous periods. Despite this unboundedness, the magnitude of

changes in both indices can be studied with respect to the magnitude of the index. In addition, both indices are able to give indications about whether inequality increases or decreases. This is most important information that the indices must convey for this analysis.

Empirical contributions

Article 1: Childcare and Maternal Part-Time Employment: A Natural Experiment using Swiss Cantons

Abstract

Fuelled by federal stimuli of 440 million Swiss francs, the staggered expansion of childcare in many cantons allows the evaluation of this family policy on female labour supply. With new cantonal data, this study analyses both the decision to participate in the labour market and the intensity of participation. Empirical results of difference-in-differences regressions show that mothers work at higher percentage rates if they live in cantons that have expanded their childcare services more than the national average. The reform stimulated part-time employment of between 20 and 36 hours per week by 2 percentage points. The expansion of childcare particularly affected women with two children and upper-secondary education, who are married or cohabit with their partner.

Keywords: childcare places, maternal employment, policy evaluation, quasi-natural experiment, part-time

JEL codes: J13, J22, H40

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Introduction

Many modern welfare states have prioritised assisting women in their work-family life. One of the tools used by policy makers to stimulate the labour supply of mothers is through the expansion of childcare. In countries in which female labour force participation is already high, the effects produced by childcare are usually minimal (Bettendorf et al. 2015). Recent studies in many Scandinavian countries indeed show that subsidised childcare has had no significant impact on female labour supply (Lundin, Mörk & Öckert 2008; Havnes & Mogstad 2011b).[17] As these studies suggest, this is probably because the services provided in these countries meet the demand for childcare among all social classes almost perfectly. This does not appear to be the case in Switzerland, where, as in Germany (Wrohlich 2008; Bauernschuster & Schlotter 2015), the demand for childcare is much higher than the supply (Banfi, Farsi & Filippini 2009). As illustrated in the introduction of this thesis, in Switzerland, female labour force participation is very high, but the participation of women with children is much lower. As in the Netherlands, the majority of this high rate of work force participation is part-time work. This finding suggests that childcare could

[17] This trend cannot be entirely generalised for Scandinavian countries, because Danish childcare prices and availability, for instance, are highly relevant for female employment (Simonsen, 2010).

potentially influence working hours rather than labour market entry itself. However, there is also room for improvement also for maternal labour force participation.

The extensive margin of female labour force participation linked to the availability of childcare has been studied in many countries, and results appear to differ depending on the national context (see Cascio et al. 2015 and Del Boca 2015 for a review of recent studies). Evidence of the effects on the intensive margin is something that has been studied only recently. This paper contributes in this respect by examining a natural experiment of childcare expansion in Switzerland.

This paper analyses the effects of the increase in the number of childcare places driven by public subsidies, applying a quasi-experimental design in 24 Swiss cantons. The Swiss federal system is peculiar in its characteristics because each canton can legislate over many aspects that affect the socio-economic life of its population. This wide variety of legislation creates variability in the data, which becomes useful for evaluating policies. In addition to this political diversity, the Swiss context is interesting because many aspects of its welfare state have led it to be classified among liberal countries. Unlike modern Anglo-Saxon countries that have promoted women's independence since the beginning of the twentieth century, the values and gender roles of this country have been traditionally anchored in the classical male breadwinner model. This means that the government intervenes only sporadically to regulate family matters and that social norms do not create strong work attachment among women.

In addition to this, many factors intervene in women's decisions to participate in the labour market. These factors include the preferences of the individual and of the partner, culture and discrimination (Milligan 2014). Recent studies show that a gender egalitarian culture is still not widespread in Switzerland (Epple et al. 2015) and that decisions regarding paid employment for mothers are strongly influenced by their partner's income (Gerfin & Leu 2007; Ernst Stähli et al., 2009). As highlighted by Asai (2015), in Japan, the participation of fathers in childrearing could substantially reduce mothers' hardships in reconciling work and family life. In Switzerland, the influence of partner's income on female labour force participation declines four years after childbirth, but not before (Liechti 2017).

In this context, the evaluation of the effect of childcare policies is not a trivial exercise. This is true for several reasons. First, when formal childcare places are rationed, the creation of new slots or the introduction of subsidies might simply substitute other non-institutional childcare arrangements among mothers who are already working (Del Boca & Vuri 2007; Givord & Marbot 2015). If this occurs, the political effort put into the expansion of childcare may appear unsuccessful (Havnes &

Mogstad 2011b). Second, when most women prefer part-time work arrangements,[18] it is difficult to measure full-time equivalents because women may use childcare at different rates. Analyses of the effects of an expansion of childcare places should therefore take into account these preferences and select a variable that can detect subtle changes in working hours. In addition to this, when most women work, changes are expected to be found more on the intensive margin than on the extensive margin. The expansion of childcare places in a country with high labour force participation and widespread part-time work translates into an expansion in the number of days per slot available. Third, prices can be a deterrent for the use of childcare among certain types of households. In this case, when prices are not directly available, it is important to test the assumptions on a broad spectrum of household types in order to have a reliable picture of the overall effects. Fourth, childcare services may be steered by parental demand for this type of service and by political interests based on the specific characteristics of local labour markets. If the supply is driven by demand, then estimates are likely to be biased. It is therefore important to correct for this possible endogeneity.

This study uses data from the Swiss Labour Force Survey (SLFS) and a newly established database with cantonal data on the number of childcare places in recognised private and public childcare facilities for early childcare. The identification strategy consists of a quasi-experiment created by different degrees of expansion of childcare places among 24 Swiss cantons between 2002 and 2012. The target population comprises mothers with at least one child between 0 and 3 years of age. A difference-in-differences analysis is used to evaluate the effect of the expansion of childcare places on the labour market outcomes of these mothers.

The results demonstrate that an expansion in childcare places stimulates part-time employment of between 20 and 36 hours per week by 2 percentage points for mothers of 3-year-olds. The reform has not triggered any change in female labour force participation but has allowed working mothers to work longer hours. The effects appear greater for married or cohabitating mothers with upper-secondary education. Significant effects are registered for mothers of two children. No effects are found for fathers.

The paper is organised as follows. The next two sections introduce the data and the empirical strategy applied for the identification of the link between childcare expansion and maternal labour

[18] In Switzerland in 2012, only 7.6% of part-time working mothers would have preferred a full-time contract, whereas 41.6% of full-time working mothers would have preferred a part-time contract. Similar figures were produced with the ISSP in 1997 (Stier & Lewin-Epstein 2003). This indicates that preferences have not changed over time.

supply. The following two sections present the results of this study and compare them with those of similar quasi-experimental analyses. The last section concludes with some final remarks.

Data

This analysis uses data from the Swiss Labour Force Survey of the Swiss Federal Statistical Office. This is an annual survey that focuses on the employment situation of the permanent resident population aged 15 and older. The survey includes labour supply indicators (participation, income, part-time rates), socio-demographic characteristics (marital status, age, education, nationality) and some limited information about other household members (total household income, age and education of each household member). Repeated cross-sections begin in 1991, and this allows for the study of the pre-reform period for both the targeted group and the control group.[19] A special module on childcare is included every year from 2001 to 2010, as well as in 2013. However, the wording of the question changed in 2010, which made it possible only to compare the answers between 2001 and 2009.

Data on the number of childcare places come from a newly established questionnaire sent to each cantonal administration to collect relevant information about the evolution of childcare services from 1991 to 2012. More information about these data can be found in Ravazzini et al. (2016). Data from the 1990s is extremely scarce, because very few cantons had electronic archives. Only in the 2000s did information about childcare places become more accurate. Overall, 24 out of 26 cantons have information about the number of childcare places in their public and private facilities for at least two years around 2002 and 2012. If data for these exact two years are not available, information is taken from the years closest to those dates, making the reliable assumption that childcare places do not change radically from one year to the next, but rather over subsequent decades. One of the limitations of the data is the lack of detail at the municipal level, which is important in the Swiss context, because municipalities are sometimes more competent than cantons in regulating childcare activities. Another limitation of the data is the lack of information about the price of external childcare. To overcome this problem, the analysis is run for several household types. Moreover, even if it is clear that the federal government authorises and subsidises only those childcare facilities that meet certain standards, there is no particular specification

[19] The stratification of the survey is based on cantons only in 1995 and since 2009 onwards. In all other years, the stratification is limited to macro regions (Nuts II). Nuts II include the following seven macro-regions: Vaud, Valais and Genève; Bern, Fribourg, Solothurn, Neuchâtel and Jura; Basel-Stadt, Basel-Landschaft and Aargau; Glarus, Schaffhausen, Appenzell A.Rh., Appenzell I. Rh., St. Gallen, Graubünden and Thurgau; Luzern, Uri, Schwyz, Obwalden, Nidwalden and Zug; Zürich; and Ticino.

regarding the quality of childcare. This paper assumes that the quality of service in authorised childcare facilities is the same everywhere across the territory and that parents could substitute other forms of care with this one if they were able to do so. This assumption of uniform quality may not hold in countries such as Germany, where there is a large divide between the East and the West (Schober & Spiess 2015), but it should be a reliable assumption for a small country such as Switzerland.

Methodology and sample

The relationship between childcare provision and female labour supply is identified using a difference-in-differences model (DiD) (see Imbens & Wooldridge 2009). This model compares the labour market outcomes of a specific group (treated) targeted by a political reform with the outcome of a similar group (untreated) that is untouched by the reform. The methodology consists of a comparison before and after the reform, under the assumption that the groups would have reacted in the same way without a reform. To rely on this assumption, the common trend is tested in the years preceding the reform. The groups treated in this paper consist of working-age mothers (between the ages of 20 and 50) who have at least one child up to 3 years of age. These mothers could particularly benefit from the expansion of childcare services if they lived in those cantons in which the expansion was higher than the national average.[20] Since the allocated subsidies targeted mothers of children of different ages through both childcare and after-school services, it was not possible to exclude mothers of older children who might have benefitted from the reform. The administrative data collected by Ravazzini et al. (2016) do not include information about the number of after-school places. Mothers who use childcare services for more than one child can also benefit from special prices. The targeted group in the majority of the analyses in this paper is therefore composed of mothers who have at least one child up to 3 years of age and the possibility to have also older children (up to 15 years old, as indicated by the policy). The control group consists of the same type of mothers who reside in cantons in which the expansion was lower than the national average. This definition of treated and control group is the same one used by Havnes & Mogstad (2011b) for Norway and similar to the one used by Felfe & Lalive (2018) and Bauernschuster et al. (2015) for Germany. It is important to remember that, in this empirical setting, all cantons were touched by the reform, but some cantons were more active than others in expanding their childcare

[20] The treated group comprises the cantons of Basel-Stadt, Basel-Landschaft, Schaffhausen, Appenzell A.Rh., St. Gallen, Graubünden, Ticino, Vaud, Valais and Jura. The control group comprises the cantons of Zürich, Bern, Glaris, Zug, Fribourg, Solothurn, Appenzell I. Rh., Thurgau, Neuchâtel, Genève, Luzern, Schwyz, Nidwalden and Aargau. More details are provided in Table A1.

places (see Table A1 in the annexes). The evolution of childcare coverage between the treated and the control groups is represented in Figure 5.

From Figure 5, it appears that the net increase in coverage consists of 10 percentage points over 10 years, a small increase compared to those produced by other similar reforms carried out in Europe (in Spain, for instance, the net increase was 25 percentage points over 6 years).

The econometric model for the difference-in-differences used in the analysis could be written as:

$$Y_{it} = \alpha + \beta P_t + \gamma T_i + \delta PT_{ti} + \rho X_{it} + Z_c + Y_t + \varepsilon_{itc} \quad (3)$$

where Y_{it} is the outcome variable. Given the importance of analysing the extensive and the intensive margins separately, this paper uses three different outcome variables: active participation in the labour market at any participation rate, participation at high part-time rates (>50%), or participation only at full-time rates (90-100%).[21] The reference group changes according to the three outcome variables; it is composed of inactive mothers in the first case, by inactive mothers and mothers who work at low part-time rates in the second case, and by inactive mothers and mothers who work part-time in the third case. This definition of the dependent variable allows the creation of progressive employment statuses without restrictions on participation, which, in this case, could be endogenously determined. In Equation (3), *P* indicates the years prior and post the reform, which are 1992-2002 vs. 2003-2014, and *T* the affiliation to the treatment or to the control group. The intention to treat effect is estimated by the coefficient δ. Canton (Z_c) and year (Y_t) fixed effects are also added, and standard errors are clustered accordingly in order to correct for the specificities of each canton. Personal characteristics (X_{it}) are included in the model to control for possible time varying influences on the outcome variable. These personal characteristics consist of education, income of other family members, age, nationality and number of children.

A further disaggregation of the results is performed according to the educational level of the mother. Table 1 shows that labour force participation is strongly dependent on the educational level of individuals, among other socio-demographic characteristics.

Low-educated fathers have a labour market participation rate that is almost 10 percentage points lower than high-educated fathers. The difference between low- and high-educated mothers is even more dramatic, at more than 34 percentage points. In an analysis based on the effects of childcare,

[21] These thresholds (i.e. 50% and 90%) correspond to national distinction between low and high part-time rates and between high part-time rates and full-time work. In a standard week of 40 working hours, high part-time corresponds to between 20 and 36 hours of work. The continuous variable for the number of hours worked is not used because of the strong differences encountered between the number of hours and the plausibilised variables about the part-time and full-time employment rates constructed by the Swiss Federal Statistical Office.

Stadelmann-Steffen (2007) confirms the importance of this distinction by educational levels, demonstrating that the heterogeneous effects of regional childcare policy in Switzerland mainly affect the behaviour of women with an intermediate education level. Because her analysis used the number of childcare facilities in 2001, which differs from the number of childcare places, her results are not necessarily expected to match those estimated in this analysis. After the introduction of childcare subsidies in 2003, many existing institutions expanded their offerings. For this reason, we see more of an increase in the number of places in each childcare institution than in the number of institutions.

Table 1: Participation in the labour market according to individual and household characteristics.

Characteristics	Maternal labour force participation	Share	Paternal labour force participation	Share
Educational level				
Lower secondary	41.34	9.69	87.96	11.04
Upper secondary	68.97	46.90	94.52	38.36
Tertiary	75.97	43.41	97.47	50.60
Marital status				
Single parent	74.87	17.03	90.98	15.02
Married or cohabitating	67.78	82.97	96.05	84.98
Number of children				
Small family (1-2 children)	70.16	84.79	94.94	83.01
Large family (3+ children)	62.45	15.21	96.96	16.99

Source: Swiss Labour Force Survey, 2014. Note: The sample is restricted to mothers and fathers between 20 and 50 years of age with at least one child up to age 3.

The possible effects of expansion of childcare places on fathers are also tested. Robustness checks of Equation (3) include changes in fertility decisions, inter-cantonal mobility and the use of institutional childcare. Two tests are also performed to estimate possible confounding effects due to the almost simultaneous policies introduced in this period, such as the introduction of paid maternity leave and the legal enforcement of after-school care. The main DiD is further tested with three alternative specifications. The first specification excludes years that are too close to the introduction of subsidies. This is done because the expansion of childcare places may have produced nonlinear effects in the years before and after the first introduction of childcare subsidies. To exclude nonlinearities, the years are restricted to seven years (1992-1998) for the period before the subsidies and to another seven years (2006-2012) for the period after the subsidies. The years after the last data collection on childcare places are intentionally excluded (2013 and 2014). The second specification restricts the analysis the years to close to introduction of the subsidies (1999-2002 vs.

2003-2005) to test whether the expansion in childcare places in treated cantons was demand driven. The third specification is inspired by the method applied by Felfe et al. (2016). This method controls for endogeneity of demand-induced supply through the construction of local labour markets. According to this innovative methodology, only some municipalities are retained in the analysis in order to gain a comparable set of treated and control cantons. These municipalities are situated inside a spatial mobility area composed of at least two neighbouring cantons and have similar voting preferences with regard to family policies.[22] This procedure assures that the restricted sets of municipalities constituting the cantons are comparable in terms of labour market opportunities and of attitudes towards family policies. Cantons that have the majority of the population in the selected municipalities are omitted from the analysis, and this further excludes eight small cantons. As in Felfe et al. (2016), data regarding spatial mobility regions and votes for the 2006 referendum on family benefits are retrieved from the Swiss Federal Office of Statistics.

Results and discussion

Descriptive results on maternal employment

Treated and control cantons do not differ greatly in terms of the socio-demographic characteristics of mothers. Table 2 shows how the sample differs between these two groups before and after the expansion of childcare places. Significant differences between control and treated cantons prior to the reform can be found in educational level and in Swiss nationality. The treated group has a slightly less educated composition of mothers than the control group, whose mothers are more likely to be Swiss and to be more educated. This socio-demographic composition is unlikely to explain the expansion of childcare places in either of the two groups of cantons. As a general trend that can be observed in all cantons, the table shows a clear expansion in those with tertiary education, signalled by the twofold increase in mothers with a tertiary education before and after the introduction of childcare subsidies. Mothers have also become older. This comes as no surprise, as official statistics report that the average age of women at birth of first child has increased from approximately 29.1 in 1992 to 31.7 in 2014. About half of the sample has at least one child between 4 and 15 years of age in addition to at least one child between 0 and 3 years of age. In terms of other socio-demographic characteristics, the number of married women declined by approximately 6 percentage points, but marriage remains the preferred choice among mothers (more than 85% are married in the post-reform period). Mothers with Swiss nationality represent the majority of the

[22] Similar voting preferences refer to intended votes that do not differ by more than 5 percentage points.

sample, even if the percentage is slightly decreasing due to recent immigration and different fertility rates between the native and foreign-born populations. The share of single mothers among the sample also slightly increased over time. Differences in the socio-demographic composition of cantons and fertility rates after the reform are the object of two robustness checks that are performed later in the results.

Table 2: Sample description of mothers with children between 0 and 3 years of age before and after the reform.

	Total	Treated canton		Control canton	
Year		before	after	before	after
Maternal age					
20-30	36.70	41.07	30.67	43.48	31.05
31-40	58.27	55.87	62.40	53.78	61.68
41-50	5.03	3.06	6.93	2.74	7.27
Maternal education					
Lower secondary	15.30	18.26†	14.89†	16.06†	13.23†
Upper secondary	61.80	66.87†	55.23	69.60†	55.10
Tertiary	22.90	14.87	29.88†	14.34	31.67†
Number of children under 4 years old					
1	80.09	80.72	79.65	80.16	79.93
2	19.08	18.34	19.44	19.07	19.31
3 or more	0.83	0.94	0.91	0.76	0.77
Number of children aged 4 to 15					
0	54.19	51.47	55.91	53.58	55.34
1	31.98	32.70	30.77	32.05	32.15
2	11.21	13.22	10.73	11.59	10.05
3 or more	2.62	2.60	2.59	2.78	2.47
Married	89.35	92.35	86.66	92.91	85.79
Swiss	69.14	71.03†	62.26†	75.07†	66.03†
Single mothers	2.60	1.95	3.34	1.85	3.29
Income of other family members	74,319	64,508	72,044	72,456	82,384
N (unweighted)	43,519	4,567	11,283	7,062	20,607

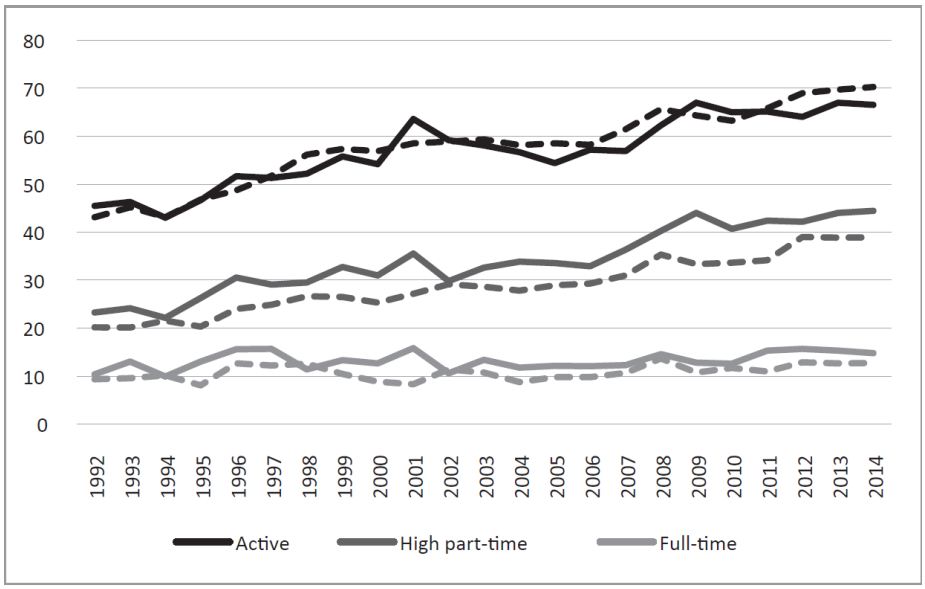
Source: Swiss Labour Force Survey 1992-2014.

Note: All figures are weighted percentages of the corresponding subsample except for income of other family members and the number of cases. Income of other family members is represented in Swiss francs. The sample is restricted to mothers between 20 and 50 years of age. † indicates significant differences at 1% level between treated and control cantons.

In terms of labour market outcomes, the two groups again show very similar trends (Figure 6). Maternal labour force participation has increased enormously over the last 20 years. While less than half of mothers worked in 1992, almost three quarters did so in 2014. In absolute terms, this was

mainly due to an increase in maternal labour force participation. In relative terms, the amount of mothers working at high part-time rates, which means more than a part-time rate of 50% or more than 20 working hours per week, also increased by a large extent. This Swiss distinction regarding part-time rates differs from the standard OECD definition that sets the threshold for full-time employment at 30 usual weekly working hours in the main job (which corresponds to 75% of a standard working week of 40 hours). Therefore, a significant share of mothers who are defined as part-time workers in Switzerland would be included among full-time workers using a European definition. In this paper, national definitions are used in order to highlight the importance of part-time work among women in this country. Although this figure is purely descriptive and does not allow us to spot significant differences, mothers in treated cantons appear to work in high part-time jobs more than mothers in control cantons.

Figure 6: Change of several dependent variables on maternal employment over time depending on the canton of residence.

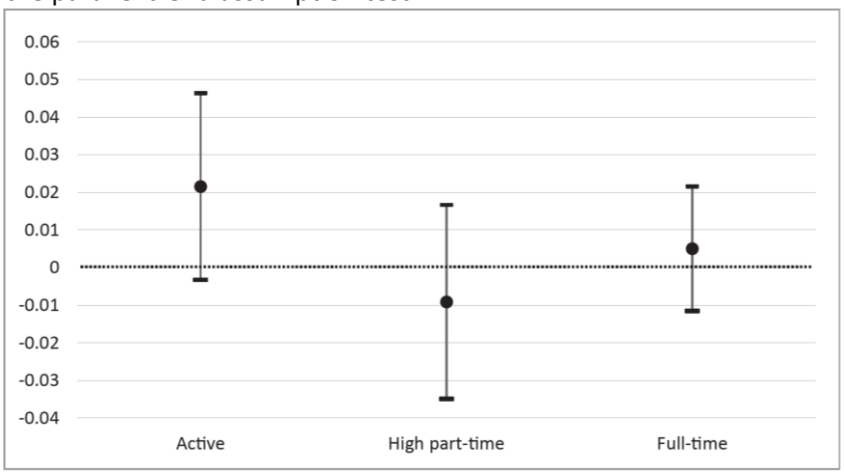


Sources: Swiss Labour Force Survey 1992–2014. The dotted lines indicate control cantons and full lines treated cantons

These figures illustrate trends, but do not provide robust tests on whether the parallel trend assumption was satisfied before the introduction of subsidies. To observe whether the treated and control groups had parallel trends, a regression similar to the main DiD equation (Equation (1)) is performed substituting the post-reform period with the pre-reform period (1992-2002). The results for the equivalent of the coefficient δ for the pre-reform period are illustrated in Figure 7. As none of the coefficients are significantly different from zero, the parallel trend assumption should not be rejected. A test on the pre-reform period year by year yields significant coefficients for participation

and full-time employment only in 2001. This confirms that the common time trend holds for all years for high part-time employment and for all years except for 2001 for labour force participation and full-time employment.

Figure 7: Estimates for the parallel trend assumption test.



Source: Swiss Labour Force Survey 1992–2014. Coefficients are represented with their 95% confidence intervals. Insignificant coefficients validate the parallel trend assumption.

Main results on maternal employment

Descriptive statistics alone do not provide a clear interpretation of the impact of the reform of female employment. The results of the estimates of the DiD model are required, and they are illustrated in Table 3, which is constructed illustrating yearly estimates first and then average effects over the post-reform period. The results of the first three columns are dedicated to mothers who have only children between 0 and 3 years of age, and the following three other columns focus on mothers who have at least one child between 0 and 3 years of age. The columns on active labour force participation and high part-time rate demonstrate that the effects are centred on the years 2009-2011. Before and after this period, the effects are not particularly significant, and the effects on active labour force participation often change in sign. The reform has therefore taken some years to produce significant effects on the labour supply of mothers, and these effects dwindled after the last years in which data on childcare expansion were collected.[23] Overall, it appears that the reform has not increased female labour force participation for inactive mothers. For women who already worked, however, the reform increased the probability of working at high part-time participation rates. The average effect of two percentage points is significant only for mothers who may also have

[23] Data on childcare expansion are available up to 2012, and after this year, other cantons in the control group may have expanded their childcare supply. The exclusion of 2013 and 2014 does not change the magnitude of the coefficients or the significance level of the coefficients. A test without these two years is also shown in Table 7.

older children. This increase did not affect full-time participation. This significant change is therefore attributable to women who increased their working hours.[24] The impact of the reform explains 19% of the overall increase in high part-time work registered between 2002 and 2014.

Table 3: Difference-in-differences estimates of the impact of the reform on maternal employment.

	Only 0-3			Also 4-15		
	Active	High part-time	Full-time	Active	High part-time	Full-time
2003	-0.01	0.01	0.00	-0.01	0.00	0.01
2004	-0.03	0.00	0.00	-0.01	0.02	0.01
2005	-0.03	0.03	-0.02	-0.04	0.01	0.00
2006	0.02	0.04	0.01	0.00	0.01	0.01
2007	-0.04	0.04	0.00	-0.04	0.03	0.00
2008	0.00	0.02	-0.01	-0.02	0.02	-0.01
2009	0.03	0.05**	-0.01	0.03	0.07**	0.00
2010	0.01	0.02	-0.01	0.02	0.02	-0.02
2011	0.02	0.04	0.02	0.00	0.04*	0.02
2012	-0.03	-0.02	0.02	-0.04*	0.00	0.01
2013	-0.02	-0.01	0.00	-0.03	0.00	-0.01
2014	-0.01	0.01	-0.01	-0.03	0.01	-0.01
Average effect	-0.01	0.02	-0.00	-0.02	0.02*	0.00
t-statistic	(-0.28)	(1.11)	(-0.14)	(-1.00)	(1.72)	(0.13)
N	23,357	23,357	23,357	43,519	43,519	43,519

Source: Swiss Labour Force Survey 1992-2014. Notes: the sample is restricted to mothers between 20 and 50 years of age who have at least one child between 0 and 3 years of age. Controls include age, education, marital status, nationality, number of children and income of other family members. In all specifications, clustered standard error at the cantonal level and cantons and years fixed effects are used. T-statistics are reported in parentheses above the number of observations. ***, **, and * denote statistical significance at 0.01, 0.05 and 0.10 levels, respectively.

Table 4 shows average effects of the impact of the reform according to the same socio-demographic characteristics illustrated in Table 1. The results are found to change according to the educational level of mothers.

Similar to what was found by Stadelmann-Steffen (2007), childcare places are found to stimulate labour force participation among mothers with an upper-secondary educational level. In addition to this, the effects of the reform are registered only for women who are married or cohabitating, rather than for single mothers. As seen in Table 3, the effect is significant only for mothers with more than one child. The increase in the number of working hours, however, does not affect mothers with

[24] If mothers who work at high part-time rates are isolated and compared only to mothers who work at low part-time rates, then the effect becomes larger (5 percentage points) and highly significant. This specification (not displayed in Table 3) may however suffer from endogeneity.

large families. To summarise, the increase in high part-time work concerns women with the most common socio-demographic characteristics, namely, those who have completed upper-secondary education, are married or cohabitating and have two children.

Table 4: Difference-in-differences estimates of the impact of the reform on maternal employment by different individual and household characteristics.

	Active	High part-time	Full-time
Disaggregation by educational levels			
Lower-secondary	0.01	0.01	-0.01
	(0.17)	(0.27)	(-0.20)
	6,687	6,687	6,687
Upper-secondary	-0.01	0.05**	0.02
	(-0.35)	(2.62)	(1.52)
	24,446	24,446	24,446
Tertiary	-0.05	-0.02	-0.03**
	(-1.32)	(-0.53)	(-2.31)
	12,386	12,386	12,386
Disaggregation by marital status			
Married or cohabitating	-0.02	0.02*	0.00
	(-1.04)	(1.80)	(0.13)
	41,869	41,869	41,869
Single mothers	-0.08	-0.02*	-0.04
	(-0.89)	(-1.96)	(-0.52)
	1,650	1,650	1,650
Disaggregation by number of children			
1 child	-0.01	0.02	-0.01
	(-0.31)	(0.89)	(-0.21)
	16,845	16,845	16,845
2 children	-0.02	0.02*	0.00
	(-0.65)	(1.72)	(0.20)
	18,937	18,937	18,937
3 or more children	-0.03	0.00	0.00
	(-0.62)	(0.06)	(0.21)
	7,737	7,737	7,737

Source: Swiss Labour Force Survey 1992-2014. Notes: the sample is restricted to mothers between 20 and 50 years of age with at least one child between 0 and 3 years of age. Depending on the disaggregation, controls include age, education, marital status, nationality, number of children and income of other family members. The difference-in-differences corresponds to a model with controls, cantons and years fixed-effects and clustered standard errors. T-statistics are reported in parenthesis above the number of observations. ***, **, and * denote statistical significance at 0.01, 0.05 and 0.10 levels, respectively.

Robustness checks and paternal employment

In this section, the stability of the results is checked by several robustness checks. These checks include a test on the socio-demographic characteristics of mothers in treated and control groups, an analysis of fertility rates, a test on the displacement of other forms of care, an analysis of paternal employment, two analyses over a restricted number of years, and an analysis over a restricted number of municipalities.

The first check tests whether there were changes in the socio-demographic characteristics between the two groups of cantons after the introduction of the reform. Some municipalities tried to attract highly qualified foreign workers through an expansion of childcare services, and if they succeeded, a change in the socio-demographic characteristics of mothers should at least partly signal this effect. Descriptive evidence is provided in Table 2, where many socio-demographic characteristics seem to differ over time between the control and the treated group. A formal test is needed, however, to see whether these differences are significant. This test is performed through a DiD similar to Equation (3), where the dependent variable, instead of being Y_{it}, is one of the X_{it} . Table 5 shows that all the coefficients linked with the socio-demographic characteristics X_{it} are not significant. It can thus be concluded that the composition of mothers residing in the two groups of cantons was not influenced by the reform. As a cautionary note, however, it is important to stress that although the composition of the treatment and control groups has not changed in a systematic way with respect to these observed socio-demographic characteristics, there may be unobserved heterogeneity that could bias the results.

Table 5: Difference-in-differences estimates of the impact of the reform on the socio-demographic characteristics of mothers.

Lower secondary educ.	Upper secondary educ.	Tertiary educ.	Married or cohabiting	No. of children 0-3	No. of children 4-15	Swiss nationality	Age	Income of other family members
-0.01	0.03	-0.02	0.02	0.00	-0.02	0.00	-0.19	-1.19
(-0.35)	(0.77)	(-0.99)	(0.95)	(0.26)	(-0.88)	(0.23)	(-0.80)	(-0.19)
43,519	43,519	43,519	43,519	43,519	43,519	43,519	43,519	43,519

Source: Swiss Labour Force Survey 1992-2014. Notes: the sample is restricted to mothers between 20 and 50 years of age with at least one child between 0 and 3 years of age. Depending on the disaggregation, controls include age, education, marital status, nationality, number of children and income of other family members in 1,000 CHF. The difference-in-differences corresponds to a model with controls, cantons and years fixed effects and clustered standard errors. T-statistics are reported in parenthesis above the number of observations. ***, **, and * denote statistical significance at 0.01, 0.05 and 0.10 levels, respectively.

Overall, this robustness check highlights that the results from Table 3 are robust to international and inter-cantonal mobility with respect to observed characteristics. At least at a cantonal level, the efforts of some municipalities to attract highly qualified workers through childcare services seem to have been unsuccessful.

However, it is important to note that cantonal aggregation might hide the effects of some successful municipalities in big cantons.

If fertility increased with the activity rate of women, then it would be difficult to compare the same set of women over time. The effects of the reform would then reflect changes in employment and in fertility, as illustrated by Nollenberger & Rodriguez-Planas (2015). The normal hypothesis under this particular reform is that women in treated cantons decided to have more children because they could rely on external childcare and did not have to choose between a family and a career. To test this, the same DiD model is employed in a second robustness check. The main dependent variable here is the likelihood of having a child less than one year old. Table 6 shows that women in treated cantons do not have a significantly higher or lower fertility rate than women in control cantons. When performing these regressions with yearly estimates, significant increases in fertility were, however, reported in three years: 2006, 2007 and 2012.

Table 6: Difference-in-differences estimates of the impact of the reform on fertility rates, use of institutional childcare and paternal employment.

Fertility	Institutional childcare use	Paternal participation	Paternal High part-time	Paternal full-time
-0.00	0.02	0.01	0.00	0.01
(-0.12)	(0.77)	(0.52)	(0.29)	(0.54)
43,519	19,017	39,416	39,416	39,416

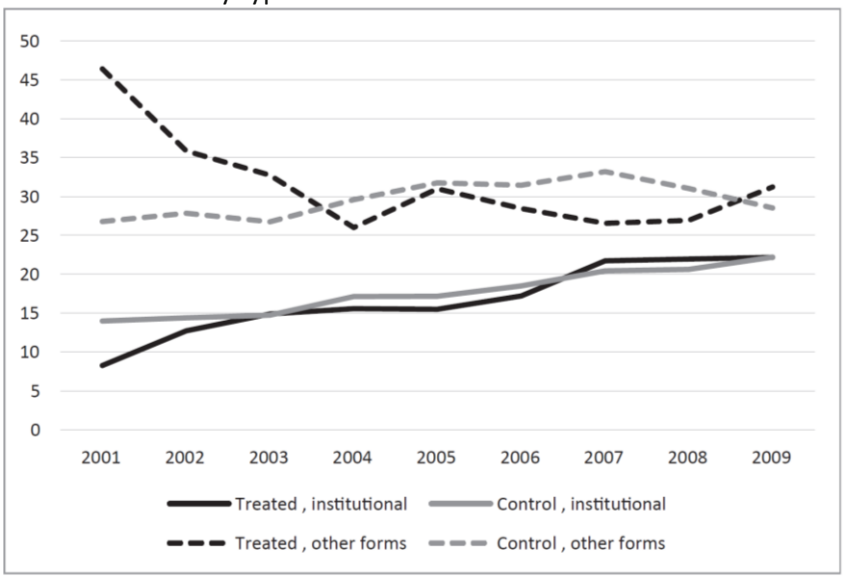
Source: Swiss Labour Force Survey 1992-2014. Notes: the sample is restricted to mothers or fathers between 20 and 50 years of age with at least one child between 0 and 3 years of age. Controls include age, education, marital status, nationality, number of children and income of other family members. The difference-indifferences corresponds to a model with controls, cantons and years fixed effects and clustered standard errors at the cantonal level. T-statistics are reported in parenthesis above the number of observations. ***, **, and * denote statistical significance at 0.01, 0.05 and 0.10 levels, respectively.

A legitimate claim could also be made that users of other forms of childcare switched to institutional childcare[25] once childcare subsidies became effective (Bassok, Fitzpatrick & Loeb 2014). To test whether or not this was the case for the third robustness check, the use of other childcare services

[25] After-school care is not treated in order to provide better comparability with Figure 1. Even if at different levels, time trends in the use of institutional and other types of care are also representative for after-school services.

is compared with the use of formal childcare. Figure 8 shows that the use of other forms of care declined in treated cantons until 2004. The hypothesis that institutional care substituted for other types of care therefore appears more likely prior to the introduction of subsidies. It is also evident that, in both groups of cantons, the expansion in childcare use between 2001 and 2009 concerned mainly institutional childcare. This similar childcare use between treated and control cantons is confirmed by a DiD model on the use of institutional childcare over other forms of childcare, which did not yield a significant coefficient (Table 6). Even if comparable data ended in 2009, what can be drawn from this short analysis is that, until 2009, institutional care was unlikely to have displaced other complementary forms of care. Another quick conclusion that Figure 8 may suggest is that the large expansion in childcare places in treated cantons has been ineffective, because mothers in those cantons have not increased their use. Even if it is true that the use of institutional care has not increased more in treated cantons compared to control cantons, Figure 8 may hide an intensive margin effect on the amount of hours of care used. This interpretation supports the main results regarding maternal employment. Childcare use is not reported at full-time rates in the SLFS, and this means that Figure 8 represents only the number of mothers (weighted by number of children) who regularly use an external service for childcare. As 'regularly' may refer to once a week or once a month, and not every hour of every day of the week, this figure does not take into account frequency of use.

Figure 8: Evolution of childcare use by type of care in treated and control cantons.



Source: Swiss Labour Force Survey 2001–2009. The sample is restricted to mothers between 20 and 50 years of age with at least one child between 0 and 3 years of age.

When exploited at part-time rates, a single childcare place could be used by more than one mother during the same week. For this reason, Figure 5 and Figure 8 are not perfectly comparable. Similar to the insignificant effect on female labour force participation, the increase in the number of mothers that use institutional childcare in treated cantons has not been larger than the increase in control cantons. In this sense, the greater expansion in childcare services in treated cantons has not boosted the number of women who are active on the labour market. Nevertheless, it has allowed more women to work longer hours or more days per week. If there was an increasing engagement of men in childrearing, it would be also possible that an expansion of childcare places changed employment patterns among men. The labour force participation rate among fathers is stable at approximately 95%, and has not changed over time. Unlike for mothers, there is no remarkable difference in male participation between cantons or between fathers of children of different ages. Any DiDs regression applied to fathers with yearly estimates yielded insignificant results. It can thus be concluded that the expansion of childcare places affected only female employment.

To control for the stability of the results, two tests are performed based on the introduction of almost simultaneous policies (i.e., maternity leave and legal enforcement of after-school care), and two tests based on the expansion of childcare. The test on maternal employment and the enforcement of paid maternity leave is based on DiDs that isolate cantons that introduced the policy in a specific year from those that implemented it previously (for maternity leave) or those that never implemented it (for the enforcement of after-school care). For maternity leave, the cut-off year is 2005,[26] whereas the cut-off is 2009 for the legal enforcement of after-school care.[27] The results displayed in Table 7 show that those cantons that introduced paid maternity leave in 2005 do not register significantly different behaviour in terms of maternal employment. This is likely due to both the late introduction of the reform – which happened when all, but four cantons had already established paid maternity leave – and the small number of weeks of paid maternity leave (Baker & Milligan 2008). The second test shows that the enforcement of after-school care did not produce significant effects on mothers with at least one child between 0 and 3 years of age. These mothers

[26] According to Guillet et al. (2016), the cantons that introduced maternity leave in 2005 are Bern, Graubünden, Scaffausen and Uri. We exclude from the comparison those cantons that gradually introduced paid maternity leave between the early 1990s and 2005. This DiDs therefore compares Bern, Graubünden, Scaffausen and Uri to cantons that already granted paid maternity in the early 1990s (Appenzell A.Rh., Basel-Stadt, Jura, Neuchâtel, Schwyz, Ticino, Thurgau, Valais and Vaud).

[27] According to Felfe, Lechner & Thiemann (2016), the cantons that introduced enforced after-school care by 2009 are Bern, Solothurn and Zurich. Geneva already introduced it in the 1990s, and is excluded from the comparison. Basel City, Graubünden, Luzern, Neuchâtel, and Schaffhausen introduced it between 2010 and 2015, and hence they are also excluded from the comparison. This DiD compares Bern, Solothurn and Zurich with all cantons that never introduced the enforcement of after-school care before 2015.

may be jointly affected by after-school care, because they possibly also have older children. With the most appropriate sample, Felfe et al. (2016) found that the effect was indeed significant for those mothers with at least one child between the ages of 4 and 12. With a sample of mothers of younger children, this test shows only that there are no confounding effects of the legal enforcement of after-school care on the main effect found for the expansion of childcare.

Table 7: Difference-in-differences estimates of the impact of the enforcement of maternity leave on maternal employment.

Test	Active	High part-time	Full-time
Paid maternity leave	-0.01	-0.03	-0.00
	(-0.50)	(-1.64)	(-0.12)
	19,744	19,744	19,744
Enforcement of after-school care	0.00	0.02	0.01
	(0.07)	(0.91)	(0.74)
	34,431	34,431	34,431

Source: Swiss Labour Force Survey 1992-2014. Notes: the sample is restricted to mothers between 20 and 50 years of age with at least one child between 0 and 3 years of age. Controls include age, education, marital status, nationality, the number of children and income of other family members. The difference-in-differences corresponds to a model with controls, cantons and years fixed effects and clustered standard errors at the cantonal level. T-statistics are reported in parenthesis above the number of observations. ***, **, and * denote statistical significance at 0.01, 0.05 and 0.10 levels, respectively.

Table 8: Difference-in-differences estimates of the impact of the reform on maternal employment using alternative controls.

Test	Active	High part-time	Full-time
1992-1998, 2006-2012	-0.01	0.03*	0.00
	(-0.45)	(1.97)	(0.23)
	25,371	25,371	25,371
1999-2002, 2003-2005	-0.03	-0.01	-0.01
	(-1.09)	(-0.35)	(-0.26)
	11,601	11,601	11,601
Local labour markets	-0.03	0.03	0.01
	(-1.45)	(1.63)	(0.78)
	33,788	33,788	33,788

Source: Swiss Labour Force Survey 1992-2014. Notes: the sample is restricted to mothers between 20 and 50 years of age with at least one child between 0 and 3 years of age. Controls include age, education, marital status, nationality, number of children and income of other family members. The difference-in-differences corresponds to a model with controls, cantons and years fixed effects and clustered standard errors at the cantonal level. T-statistics are reported in parenthesis above the number of observations. ***, **, and * denote statistical significance at 0.01, 0.05 and 0.10 levels, respectively.

Other tests with restrictions on the expansion of childcare services are reported in Table 8. The first two tests of the table restrict the years of the analysis, and the third test addresses endogeneity, limiting the analysis to mothers who live in areas with similar labour markets and similar preferences for family policies.

The results are quite robust to alternative specifications. The restriction to years that are not close to the introduction of the subsidies causes the coefficient to increase by one percentage point but does not change its significance level. It is notable, however, that the T-statistic of the coefficient increased. The restriction to the years close to the reform suggests that the variation in the expansion of childcare is plausibly exogenous. Therefore, some spikes in women's labour supply observable in Figure 6 for treated cantons, like the one in 2001, are probably due to normal fluctuations in labour supply. The fact that most socio-demographics (Table 2 and 5) and the balance between informal and formal childcare use (Figure 8) do not differ between fast- and slow-expansion cantons is consistent with this claim. The third test yields also insignificant results. Although it does not reach the minimum significance level of 0.10, the coefficient for high part-time rates does not change dramatically in magnitude from the basic specification, and equals the coefficient found in the first alternative specification of Table 7. This indicates that previous coefficients were not severely biased due to endogeneity.

Results in perspective: effects, subsidies and policies

Many studies have addressed the issue of the effects of an expansion in childcare services on female labour supply in different countries. To my knowledge, however, the results of these studies are dependent on the sample selected, years analysed, country studied and methodology chosen (see Bettendorf et al. 2015 for a review). Unlike the studies on Scandinavian countries presented in the introduction, studies on countries in which childcare services are not extremely well developed find a strong increase in female labour supply associated with the creation of childcare places. This is the case in Argentina, for instance, where with every 100 new places created in childcare facilities, 13 mothers began working (Berlinski & Galiani 2007; Berlinski, Galiani & Mc Ewan 2011), in Hungary, where subsidized childcare increases maternal labor supply by 11.7 percentage points or 24% (Lovász & Szabó-Morvai 2018), and in Spain, where reforms granted public places in childcare facilities for 70% of children and additional private places for another 20% of children (Nollenberger & Rodriguez-Planas 2015).

Switzerland is particular in this respect, because childcare coverage is underdeveloped from an international perspective, and coverage remained quite limited even after the reform. Even though

childcare provision is not homogeneous across cantons, those cantons that expanded childcare more rapidly between 2002 and 2012 managed to cover only 17.4% of children on average in both private and public childcare facilities. This expansion has only modestly affected the labour market, even considering that female labour force participation is relatively high. In Switzerland, between 1992 and 2014, there was no significant change in active female labour force participation as a result of the expansion of childcare places. However, a significant change was found in high part-time employment, defined as at least a part-time rate of more than 50%. The increase was indeed small and accounted for two percentage points. Estimates increased to three percentage points in a robustness check that excludes the years close to the reform. These effects are in accordance with those found by Felfe et al. (2016) for after-school care in German-speaking cantons. The results in this major linguistic region of Switzerland pointed to an expansion of full-time employment, defined as more than 36 working hours per week. This evidence suggests that the results can also be extended to pre-school care and to non-German-speaking cantons. Following the definition of part-time work adopted by the Swiss Labour Force Survey, this paper suggests that changes in employment concern mainly high part-time rates.

Regarding socio-demographic groups, this paper supports the results on education found by Stadelmann-Steffen (2007). In Switzerland, the effects of childcare are found to be stronger for mothers with upper-secondary education, but contrary to results from other countries (Blau & Tekin 2007; Goux & Maurin 2010; Fitzpatrick 2010, 2012), married or cohabitating mothers benefit more from childcare than single mothers. This result could be due to the fact that this study takes into account both private and public childcare places. The expansion of private childcare places often does not interest single mothers, because prices are too high. The same argument regarding prices could also be used for large families. Moreover, in Switzerland, single mothers are given priority for subsidised places and are thus less likely to remain on the waiting lists.

As found by Nollenberger & Rodríguez-Planas (2015) in Spain, the reform was more effective for mothers with two children, who may decide to resume work more easily than mothers who desire to have more than one child. This two-children effect is present also in Germany, where childcare availability for under 3-year-olds has been found to reduce mothers' employment interruptions, particularly after a second childbirth, and to increase the probability of returning to part-time or full-time employment as opposed to marginal employment (Zoch & Hondralis 2017).

These results of this study are found to affect only female employment, because male employment was not altered by the availability of childcare. This is similar to the determination made by Felfe et al. (2016).

Regarding the amount of spending for the reform, the results for working mothers in Switzerland are lower than what was found in the Netherlands by Bettendorf et al. (2015). An additional subsidy of 2 billion euros in the Netherlands increased female labour force participation by 2.3 percentage points and hours worked by mothers by 6.2%. This translates into 90,000 euros per additional full-time equivalent position created by the reform (Bettendorf et al., 2015). In Switzerland, total investment between 2003 and 2019 is estimated at 440 million Swiss francs for both pre-school and after-school care between 2003 and 2019. The resources allocated to early childcare in Switzerland are therefore considerably lower than those granted by the Dutch government; thus, it should not be surprising that the effects on maternal employment are not remarkable. The generosity of the subsidy may play a role, yet this remains an interesting comparison because these two countries have similar rates of female labour force participation.

Childcare reforms were accompanied by another family policy, namely, the legal recognition of maternity leave and the enforcement of after-school care in some cantons. A similar joint reform of childcare and maternity leave occurred in Germany in 2007 (see Geyer, Haan & Wrohlich 2015). Despite this similarity, the effects of these policies in Switzerland, mainly on childcare expansion, are minimal compared to the extensive increase in maternal employment found in Germany (7 percentage points, both in part-time and in full-time employment). A similar policy setting is also present in Canada. Confirming results from other countries, childcare subsidies there had a greater impact on the gender employment gap than parental leave (Milligan, 2014).

Conclusions

Childcare expansion is a family policy that many researchers consider non-distortive in terms of gender-oriented discrimination (Hegewisch & Gornick 2011). Childcare has often been proven to produce other desirable effects, such as a fairer distribution of household duties between couples (Epple et al., 2014), and sometimes even higher fertility rates (Del Boca 2002; Bonoli 2008; Haan & Wrohlich 2011). The effects of childcare speak not only to the issue of female labour supply but also to the wellbeing of children. It is indeed found that children who use institutional childcare services benefit from a higher quality of childcare (Haeck et al. 2015) and are better able to develop their cognitive abilities independently of the educational level of their parents (Havnes & Mogstad 2011a; Crettaz & Jacot 2014; Felfe et al. 2015; Felfe & Lalive 2018). The drawback of this powerful policy,

however, is the high cost to governments for such an intervention. Given the significant share of resources at stake, this important issue is relevant to those making decisions at the highest levels. The Swiss federal system offers a very good experimental setting in which to test these policy outcomes, as each of the 26 cantons has broad freedom of action in terms of policy implementation. In this context, the institutionalisation of maternity leave and the expansion of childcare caused a small but significant increase in female high part-time employment. Compared to other European countries, this increase was indeed small, although in line with the small expansion of childcare places (compared to Spain), the amount of subsidies allocated (compared to the Netherlands) and the short duration of parental leave (compared to Germany).

It is important to state that this expansion in childcare did not particularly benefit vulnerable groups, such as low-educated mothers, single mothers or large families. This is likely due to the high cost of institutional childcare in Switzerland. To better test this assumption, a cost-benefit approach should be performed through a labour supply model (as in Müller & Wrohlich 2015), and further research is needed in this regard.

As of the present, it is interesting to note that neither governmental support nor social norms have increased paternal involvement in childcare roles.

Finally, it is important to point out that these results rely on a new collection of data at the cantonal level. Despite being a new source of information, the data can be considered limited, given that it is based on the averaging of childcare among all municipalities within a canton. Although the evidence retrieved from a set of German-speaking municipalities supports the results found in this study (Felfe et al. 2016), whenever possible, new data collections on childcare should focus on the municipal level in order to truly capture the socio-economic diversity of Switzerland.

Appendix

Table A1: Childcare coverage across cantons, 2002 and 2012.

Canton	2002	2012	Expansion in %	Treated or control
Zürich	11.71	19.42	65.83	Control
Bern	12.13	16.64	37.17	Control
Luzern	5.98	7.36	23.05	Control
Schwyz	4.15	5.52	33.14	Control
Nidwalden	2.68	4.70	75.24	Control
Glaris	5.33	10.26	92.34	Control
Zug	10.11	14.61	44.58	Control
Fribourg	6.60	10.24	55.14	Control
Solothurn	6.12	10.84	77.25	Control
Basel-Stadt	18.43	48.56	163.53	Treated
Basel-Landschaft	4.80	17.77	269.95	Treated
Schaffhausen	7.45	19.06	156.04	Treated
Appenzell A. Rh.	2.61	9.80	274.75	Treated
Appenzell I. Rh.	0.87	0.90	3.59	Control
St. Gallen	2.57	6.16	139.73	Treated
Graubünden	2.00	8.42	321.57	Treated
Aargau	7.48	8.98	20.01	Control
Thurgau	4.54	8.39	84.89	Control
Ticino	2.88	11.53	300.87	Treated
Vaud	16.37	29.47	80.04	Treated
Valais	7.45	15.59	109.32	Treated
Neuchâtel	19.50	27.90	43.10	Control
Genève	15.41	23.52	52.66	Control
Jura	3.22	7.32	127.07	Treated

Sources: Ravazzini et al. (2016), 2012 cantonal statistics for Bern, Neuchâtel and Vaud.

Article 2: Moral Pressures for Women to Stay Home: Incorporating Gender Role Attitudes into a Categorical Labour Supply Model of Couples

Abstract

This study investigates the importance of gender role attitudes for the labour supply decisions of couples. To account for the interdependence between partners, categorical labour supply models are applied to 2004 and 2014 data of the Swiss Household Panel (SHP). In addition to the standard specification constructed with wages and incomes of the two partners, taxes, childcare costs, and socio-demographic characteristics, we include also gender role attitudes to the model. Results show that labour supply elasticities are close to zero. The only exception is women's negative cross-wage elasticity, which demonstrates that women react more strongly to their partner's wage than to their own wage. Most importantly, this study shows that gender role attitudes influence labour supply decisions in two ways. First, women's and their partner's attitudes are taste shifters that influence women's preference to stay home. Second, gender role attitudes alter the reaction to financial incentives. In this sense, we find that labour supply elasticities are more negative for women with home-oriented attitudes. Women's utility of staying home is also higher for married women in the Italian-speaking part of the country. This suggests that culture matters for women's labour supply decisions.

Keywords: labour supply, working mothers, couples, division of labour, attitudes

JEL: J20, H31, C35

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Introduction

From a macro-economic perspective, high labour force participation has many desirable consequences. An increase in the activity rate can partially offset the negative effects of population aging on pension systems, better exploit the capacities of the national labour force in case of high demand, decrease vulnerability to poverty, and lower social spending. Because the activity rate is lower for women than for men, almost all governments in Western societies provide incentives to stimulate female labour supply and to reconcile work and family life. Besides all the desirable consequences of an increase in female labour supply at the macroeconomic level, fundamental changes in gender roles and childcare accompany this social transformation.

An extensive literature addresses the determinants of female labour supply. To study couples' labour supply, a strand of the literature of labour economics estimates categorical (or structural) labour supply models because they capture the interdependence of partners' labour supply decisions and the selection into the labour market (Blundell & McCardy 1999). So far, these

structural labour supply models have not integrated attitudes, values and cultural aspects,[28] even if a growing number of studies document the importance of these aspects. This paper fills this gap by including cultural aspects and individual gender-related attitudes into a categorical labour supply model. This approach has two main advantages. First, it compares the relevance of income and wages with the relevance of cultural aspects and individual attitudes. Second, it tests whether reactions to financial aspects are conditional on attitudes. To the best of our knowledge, this aspect has never been assessed before. It is however of great importance to understand the interaction between monetary aspects and attitudes because financial incentives targeted to increase labour supply might be effective only if people are willing to benefit from them. For example, tax incentives and subsidies targeted on second earners might be ineffective if parents think that staying at home is important for their children's well-being.

We analyse labour supply of couples in Switzerland. This country has several particular characteristics that make it well suited to study couple's labour supply. First, women's activity rate is very high (79% in 2014) and part-time work is more common than in any other country.[29] Among part-time workers, work percentages vary strongly, and this creates one of the most uniform distributions of women's working hours in Europe (see Figure 9).

Second, the Swiss federalism constitutes a unique opportunity to estimate the impact of financial incentives on labour supply because taxes, availability of childcare services, and costs of childcare vary between more than 2,000 political municipalities. The different linguistic regions add a layer of diversity to this already diversified system. In comparison with cross-national studies, our analysis has the advantage to exploit differences between linguistic regions within the same data source holding potential macro confounders, such as national policies, constant. Third, the Swiss Household Panel (SHP) has good longitudinal data that involves the socio-economic situation of couples, include gender-specific attitudes and can be linked to municipal variables.

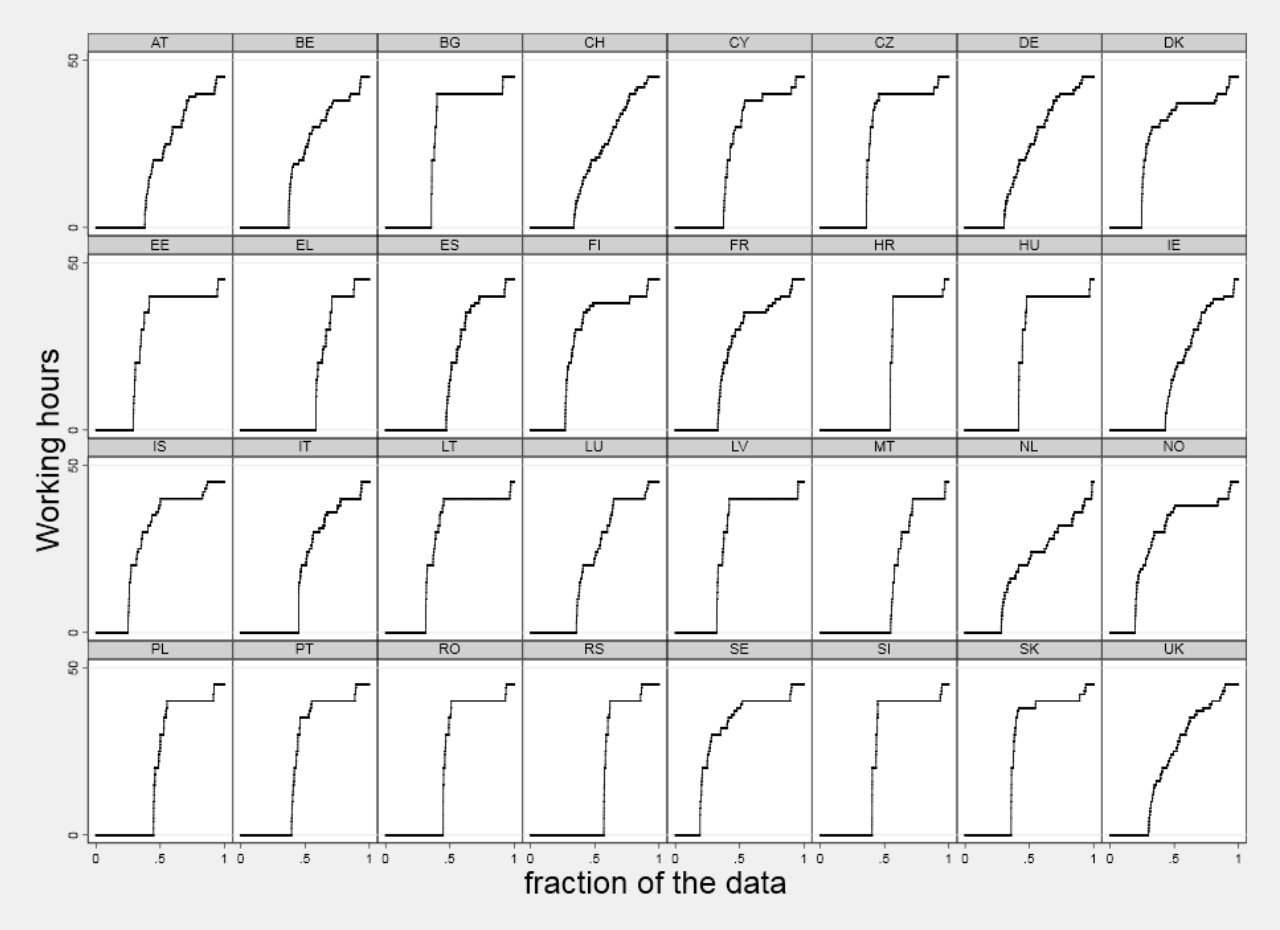
Our contribution to the literature on labour supply is threefold. First, we incorporate subjective attitudes into a categorical labour supply model. This allows us to compare the impact of financial aspects and attitudes within the same model and to better explain differences in preferences. Second, we investigate the interaction between attitudes and wage elasticities, which has remained insofar unexplored in the literature. Third, we add evidence from a country with strong cultural

[28] In this paper, wages and incomes are called economic factors, but it is not excluded that they could be socially or culturally constructed, for instance through discriminatory practices.

[29] According to national definitions, part-time work is defined in this country as work at a lower percentage than 90%.

diversity, fiscal federalism and high female labour supply to the study of the mechanisms of female labour supply.

Figure 9: Women's contractual working hours in Europe.



Sources: SILC 2014 (own calculations). Notes: the sample consists of women between 25 and 64 years old. The number of observations range from 2,245 in Iceland to 13,031 in Italy. Working hours are top-coded at 45 hours per week.

This paper is organised as follows. The next section presents the literature on the mechanisms that sustain labour supply among women and among couples. We then present the hypotheses and explain the data and the methodology. The last two sections illustrate the results of the discrete choice model on labour supply and conclude the discussion with policy recommendations.

Literature review

Previous studies have identified many determinants of female labour supply (Thévenon 2013). At the individual level, these are mainly women's education, fertility, marriage and divorce prospects (Goldin 1990). At the macro level, the tax system, the expansion of the service sector, childcare costs and childcare availability are strong predictors of female labour supply (Attanasio et al. 2008;

Kabatek et al. 2014; Cascio et al. 2015). Partner's characteristics, such as education and income, have also revealed to be important. There is broad evidence that women's labour supply depends negatively on their partner's wage level (Goldin 2006), while men hardly react to their partner's earnings (Aaberge et al. 1999; Blau & Kahn 2007).

In this literature review, we concentrate on studies that focus on couples' labour supply, the influence between partners or the effect of attitudes on labour supply.[30] When comparing results of different studies, it is important to consider the method of analysis because labour supply is selective and many variables of interest, such as partner's labour supply or attitudes, are endogenous to working hours.

In this literature, a recent comparative study by Bargain et al. (2014) estimates wage-elasticities for 18 countries using categorical labour supply models. In all these countries (Switzerland is not included), the authors report negative cross-wage elasticities for women. The strongest effects are in Ireland with an elasticity of -0.22% for a 1% change in partner's hourly wage. At least in Europe, it seems that women react more strongly to their partner's wage then to their own wage (Devereux 2004; Bargain et al. 2014). Bredemeier & Juessen (2013) have also shown that women living with high earning partners are more likely to reduce their hours of work and to have children than women living with low earning partners. This labour supply reduction is smaller in recent years as there is evidence that the link between partners' wage and labour supply is weakening over time (Blau & Kahn 2007; Verbakel & De Graaf 2008).

Some studies have also shown differences between regions of the same country. Giudici & Schumacher (2017) found that mothers' labour supply is lowest in the Italian-speaking canton and Epple et al. (2015) showed that the equal division of work between men and women is supported in some cantons more than others. Language is important as Romance language speakers in Switzerland have been found to search for work almost seven weeks longer and to have stronger ideologies about social insurance than their German speaking neighbours living in similar labour markets (Eugster et al. 2011, 2017). Regional differences are also important in Germany. Pestel (2017) attests that labour supply, both in terms of participation rate and hours worked, is larger in the East than in the West. Steiner & Wrohlich (2008) propose several explanations for the different labour supply and wage elasticities of the two regions. Apart from the institutional diversity, which is tested in their analysis, the authors suggest that previous work experience under socialism (see

[30] A review on the theories linked to couples' labour supply is presented in the Introduction of this thesis, please refer to the section Economic and attitudinal endowments.

also Hummelsheim & Hirschle 2010) and the greater importance of demand–side restrictions on labour supply in the East might contribute to this difference in labour supply behaviours.

In more recent literature, attitudes and values have come more into focus as determinants of female labour supply (Giuliano 2014). Both gender role values and work ethic have been found to make a strong impact on mothers' working hours (van Gameren 2013; Stam et al. 2014). Women are also influenced by the gender role attitudes of their partner (Fortin 2005; Kangas and Rostgaard 2007; Steiber & Haas 2009, 2012). Moreover, positive attitudes towards women's work and egalitarian values have been shown to depend on previous levels of female labour force participation (Zuo & Tang 2000; Fernandez 2013) and childcare (Zoch & Schober 2018) of the country. Fernandez & Fogli (2009) added to this literature by demonstrating that female labour supply of second-generation immigrants in the USA is strongly correlated with female labour force participation in the country of origin. At the macro-level, cross-national evidence suggests that gender role attitudes explain one-fourth of the total variability in female labour supply across countries and that gender role attitudes are more important than institutional factors (Uunk 2015). Boekmann et al. (2015) showed also that gender role attitudes explain the difference in labour supply of mother and childless women.

The causal influence between attitudes and labour supply goes however in both directions. Studies with individual longitudinal data have shown that attitudes adapt to match employment behaviours (Himmelweit & Sigala 2004; Corrigall & Konrad 2007; Kan 2007; Berrington et al. 2008). Moreover, gender role attitudes (Fortin 2005) and patriarchal values (Alesina, Giuliano & Nunn 2013) are not stable over time, but change depending on the macroeconomic situation of the country. Changes are however very slow because attitudes and values are transmitted through generations. Women whose mothers worked are indeed found to have a strong attachment to work and men whose mothers worked are found to be more tolerant towards the active labour force participation of their wives (Fernández et al. 2004). Bühlmann et al. (2009) demonstrated that egalitarian values and practices of couples tend to be coherent in their pre-parental phase, but that there is tension between egalitarian values and gendered practices after the births of their first child. This tension endures in Liberal welfare states like Switzerland, whereas it disappears in socio-democratic regimes.

There has been little research on couples' labour supply in Switzerland. To the best of our knowledge, and despite the unique setting of this country, the most recent study on the joint labour supply of couples in Switzerland is the one written by Gerfin & Leu (2007). For married women, the wage elasticity has been estimated to amount to 0.56, the cross-wage elasticity to -0.43 and the

income elasticity to -0.06. For men, all elasticities are very close to zero.[31] This study is however hardly generalizable to present days because it focuses on data from 1998, when female activity rate was well below the current value, and on households whose income was below the national average. Other studies have found that the correlation of partner's earnings in Switzerland is particularly weak in an international comparison (Cancian & Schoeni 1998; Kuhn & Ravazzini 2017b). This might be the result of a high impact of partner's income on women's labour supply, which implies a strongly negative cross-wage elasticity. Wise & Zangger (2017) have indeed found that there is an endogenous decision-making of couples concerning working time. Financial incentives present the most prominent explanation for the weak correlation of partners' earnings. Due to the progressivity of the tax system and childcare costs, the marginal costs of working more hours is sometimes above 100% (Bütler & Ruesch 2009; Schwegler et al. 2012). Applying a longitudinal perspective, Liechti (2017) found that partner's income is important for mothers of children younger than three years old, but this impact declines when children become older. Ernst Stähli et al. (2009) confirmed the importance of partner's income, and documented the impact of childcare, the urbanisation of the place of residence and lifestyle preferences on women's labour supply. Lifestyle preferences were coded as work centred, adaptive or home centred at the basis of the combination of two questions about career priorities and the ideal role distribution between mothers and fathers. These preferences had however only little impact on mother's labour supply.[32] It is to remark that, like the study of Gerfin & Leu (2007), the analysis of Ernst Stähli et al. (2009) is based on 1998 data.

Hypotheses

At the basis of this literature review, we formulate three hypotheses. The first hypothesis postulates that attitudes and cultural aspects are important for female labour supply. This general hypothesis can be broken into three specific aspects. Given the broad evidence on cultural differences between countries, we expect to find differences in women's labour supply across linguistic regions because they reflect cultural differences that go beyond gender role attitudes and institutional differences (Hypothesis 1a). Several studies have also shown that not only women's attitudes matter, but also

[31] An earlier study by Gerfin (1993) report wage-elasticities from 0.1 to 0.5 for married women but did not report cross-wage elasticities.

[32] The model is a multinomial logistic regression based on answers about the current and the past activity rate of mothers: never reduced or interrupted (working career), reduced at some moment (combined career), stopped for children but currently active (interrupted career), or completely stopped and currently at home or never worked before (homemaker).

attitudes of partners and of other family members. We therefore expect that both women's and partner's gender role attitudes influence women's working hours (Hypothesis 1b). As cultural norms and values are passed through generations, we also suppose that women who grew up with a working mother work more hours for pay than women whose mother was not working (Hypothesis 1c). Similarly, women might work more hours for pay if their partner has grown up with a working mother. In addition to the direct impact of gender role attitudes on labour supply, women's reaction to economic conditions might be conditional on these attitudes. We expect labour supply elasticities (own wage level, the wage level of the partner, non-labour income) in labour supply models that condition on gender role attitudes to differ from labour supply elasticities in labour supply model that do not condition on these attitudes (Hypothesis 2). One of the underlying mechanisms might be that the income effect of a pay rise is particularly important for home-oriented women relative to the substitution effect. Because these women are, by definition, less motivated to engage in paid work than market-oriented women, they might work only as much as it is needed to reach a certain living standard. If this was the case, an income increase (of the hourly wage of women or of their partner, or of other income) is likely to reduce of women's working hours. We therefore expect that wage elasticities of home-oriented women are more strongly negative than wage elasticities of work-oriented women (Hypothesis 3).

Data and methodology

We use data from the Swiss Household Panel (SHP). Beginning in 1999, the SHP is a representative household survey of all household members that contains information on income, employment, socio-demographic characteristics and gender-related attitudes. The design of the Swiss Household Panel (SHP) allows us to treat labour supply as a joint decision of the household.

Our sample is composed of cohabitating heterosexual couples, who are not necessarily married. People with disabilities and people outside the working age range 25-64 are excluded from the sample. Information on family-related attitudes has been collected in the years 2002-2011 and 2014. We analyse the years 2004 and 2014. These two years represent two relatively recent time points and are years close to when new refreshment samples have been added.[33] These refreshments allow for a higher sample size than in other years and reduce the bias that originates from attrition. The full sample in 2004 and 2014 is composed by respectively 2,854 and 3,402 couples with complete information. Attitudes on paid work are available only for a subsample of

[33] No refreshment sample was added in 2014, but the refreshment was in 2013.

these couples (reduced sample). This is due to several reasons: first, to item non-response with respect to questions on attitudes, second, to partial unit non-response when one partner did not respond to the individual questionnaire, and third, to the refreshment sample (SHP III) of 2013 that did not include questions on gender attitudes.[34] The sample size of the reduced sample with valid answers on attitudes for both partners amounts to 1,370 couples in 2004 and to 1,158 couples in 2014. We estimate models both for the full sample and for the reduced sample.

The estimation of the correct labour supply of individuals is complex because of many interactions between policies, societal and economic factors and their behavioural responses. Discrete labour supply models are increasingly used because they take the dependency between partners and the dependency between the decision to participate and the intensity of participation into account (for recent applications see e.g. Steiber & Haas 2012; Bargain et al. 2014; Pestel 2017; Muizon 2018). Discrete labour supply models have the important advantage to estimate choices of couples jointly, without relying too much on assumptions about wage imputations, budget constraints or instrumental variables (Bargain et al. 2014; Löffler et al. 2014). The main disadvantage of this models is the impossible estimation of the selection into partnership. These models can however monitor the adaptation between partners if performed over more than one year.

Discrete labour supply models are constructed considering decisions on a continuous distribution of hours (Aaberge et al. 1995; van Soest 1995). In our implementation, the model maximises household utility given women's and men's weekly wages in a set of 18 choices of hours combinations. Women can choose between six working hours points H= {0, 8, 16, 24, 32 and 40} that correspond to the hour ranges 0-4, 5-12, 13-20, 21-28, 29-36, and 37+ respectively. Men can choose between inactivity (H=0 for hours range 0-12), part-time (H=24 for hours range 13-36) and full-time work (H=40 for at least 37 hours per week). The details of the estimation of the utility function are explained in the Appendix. The results of the first baseline model estimated can be compared to the results of previous studies.

In a second model, we add attitudes towards gender roles as taste-shifters. The first variable is the agreement with the statement: "To have a job is the best guarantee for a woman as for a man to be independent". The second variable is the agreement with a rather home-oriented statement: "A pre-school child suffers if his or her mother works for pay". Responses are collected on an 11-point

[34] The part of the questionnaire on gender attitudes was not asked to the new sample because the questionnaire was judged too long during fieldwork. This strategic decision was taken to avoid excessive attrition within the new refreshment sample. Questions on gender attitudes have been asked to the full sample, including the 2013 refreshment sample, in 2017.

scale, which ranges from 0 to 10. In addition, we add a binary variable indicating whether the respondent's mother worked when the respondent was 15.

The complex part of this model is the measurement of disposable income, which is defined as in Equation 1.

The computation of disposable income involved the following steps. First, we estimate gross hourly wages for all individuals. For employed and self-employed individuals, gross hourly wages are computed at the basis of monthly earnings and weekly working hours. If one of these elements is missing, hourly wage is imputed. The (unobserved) wage potential of inactive women is also imputed.[35] The second step to estimate disposable income is the computation of labour income at the basis of working hours and hourly wages for all 18 alternatives of working hours per couple. The third step is to sum labour income, asset income, imputed rents and private transfers to obtain total gross household income. To restrain the influence of outliers, we top-code the highest 0.2 percent of the total household income. The fourth step is the simulation of taxes for each income alternative. This step is complex due to the federal structure, which includes not only 27 different tax systems (26 cantons and the federal taxes), but also different tax levels for the over 2000 municipalities.[36] Therefore, disposable household income cannot be estimated by a single regression as in other countries. The SHP has developed a procedure to simulate taxes, which can be applied in our labour supply model (see Kuhn & Schmid 2009).

The fifth step is the inclusion of public transfers by defining a minimum disposable household income (Y) according to the thresholds defined by the SKOS (the Schweizerische Konferenz für Sozialhilfe).[37] Social assistance complements household income in a way that all households should reach the defined thresholds. Because dependency on social assistance is likely to weaken the attractiveness of some work-hours alternatives, an indicator of welfare dependence is included in

[35] Thanks to the richness of the questionnaire and the panel structure, the SHP offers a good basis to estimate the wage potentials of all individuals. First, the hourly wage in a previous year is available for many individuals. Assuming that hourly wages remain relatively stable over time and that the potential wage is close to the wage earned in the past, we impute hourly wages from previous waves. This was possible for 51% of individuals with missing hourly wage and for 29% of inactive individuals. If no such information is available, we use information from the next wave (11% of individuals with missing hourly wage, 4% of inactive). Second, still missing values are then imputed using iterative algorithms for men and women separately. The procedure is performed through multiple imputation (MI impute in Stata). As explanatory variable we use education (5 dummies), age, gender, marital status, sector of employment (4 dummies), self-employment status, hierarchical position, ISCO-code (7 dummies), and partner's wage. Information on previous employment is known for inactive individuals because they have been asked about their last job. The R-squared for the imputation of hourly wage is 0.35 for men and 0.28 for women. To exclude implausible values and to limit the impact of outliers, we top-code hourly wages to ten times their median value.

[36] For example, depending on the municipality, the tax burden varies between 3.5% and 13.4 % for the same single household with a gross income of 50'000 CHF.

[37] In line with the study by Gerfin & Leu (2007), we add mean housing costs to the threshold.

the model. The final step to obtain disposable household income for each labour supply option is to estimate childcare costs. This step needs some detailed explanation. Although the SHP collects childcare costs, we cannot include this information as such in the model because costs for formal childcare are income-dependent and therefore vary between the different work alternatives of each couple. We simulate costs for childcare at the basis of observed childcare costs in the SHP. The childcare costs are predicted at the basis of an Ordinary Least Square (OLS) regression on household income, the number of children and various interactions. In 2014, the OLS model explains 47% of the household's childcare cost. The estimated monthly costs of childcare per household amount to 251 CHF for a gross household income of 4,000 CHF, 552 CHF for 8,000 CHF, 852 CHF for 12,000 CHF and 1,153 for 16,000 CHF.

Descriptive statistics for the most important variables are provided in Table 9. We briefly address the changes between 2004 and 2014 by commenting the mean values in these two years. The evolution over time documents the increase in female labour force participation (from 18.3 hours of work in 2004 to 21.8 in 2014). Another important change involves a small rise in real disposable household income, which is in line with more working hours and a higher gross hourly wage among women. We also see the signs of educational expansion, as the share of tertiary educated women went from 25% in 2004 to 37% in 2014, and from 42% to 51% for men. Among demographic changes, we also remark that marriage rates have declined from 90% to 82%. We also observe a shift in gender role attitudes over time. This is highlighted by the stronger agreement with the role of jobs in providing independence and by a weaker moral accusation on working mothers. These attitudes have declined to a similar extent for women and men.

After the estimation of disposable income for each of the working hour alternatives, we can estimate the categorical labour supply model. We use a trans-log utility function. The regression output cannot be directly interpreted because the coefficients refer to the utility function (rather than to working hours) and involve many interaction terms. Moreover, the coefficients for 2004 and 2014 cannot be directly compared because the regression model is non-linear. Therefore, results are usually reported in terms of elasticities (percentage change in working hours assuming a percentage change in hourly wages or income, often displayed for a 1% change). Elasticities cannot be computed directly from the utility function. We need to simulate the working hours assuming an exogenous change in hourly wages or income. We present results both as elasticities and in terms of marginal effects (i.e. in absolute change in working hours).

Results

Figure 10 shows the categories of working hours for women and men in 2004 and 2014. This Figure delivers two main messages. First, the comparison of observed working hours in 2004 with 2014 reveals that women's labour force participation has increased both due to entry into the labour market and to higher work percentage of working women. In 2014, more women tend to work at high rates (100%, 80% or 60%), while lower work percentages have declined over time. Second, the Figure shows the performance of the model by comparing observed labour supply and predicted labour supply for the full sample. We observe that the categorical labour supply model predicts women's hours of work relatively well. The most important difference is the slight underestimation of women who work at around 60% (24 hours) and the overestimation of women who work at around 40% (16 hours) in 2014. Estimating the categorical labour supply model with the reduced sample (only couples with work-attitudes), the fit is somewhat less accurate, but still rather close to observed working hours (see Table A2).

To interpret the discrete labour supply model, simulated changes in working hours are presented in Table 10 (for variations in wage or income levels) and 11 (for variations in socio-demographic variables). Eight different models are estimated to test the hypotheses. Models 1 and 2 show the baseline models without attitudes for 2004 and 2014. These first two models are run on the full sample and their effects can be compared with findings from the literature on joint labour supply decisions. These models are well suited to gauge the labour supply elasticity in Switzerland and to estimate the effect of socio-demographic characteristics. We test Hypothesis 1a on these models. Models 5 and 6 include gender role attitudes and the indication for working mothers. These models are used to test Hypothesis 1b and 1c. Because these models refer to different samples, we cannot directly test Hypothesis 2 according to which labour supply elasticities differ when attitudes are included in the model. To compare the model with attitudes to the model without attitudes, we re-estimate the baseline model (without gender role attitudes as taste-shifters) on the reduced sample (only couples with measured attitudes) in Models 3 and 4. In this way, we can compare Models 3 and 5 for 2004, and Models 4 and 6 for 2014 as they refer to the same subsample of couples. In the last regression that tests Hypothesis 3, we separate couples in 2014 into two groups according to gender role attitudes. We divide the sample according to women's agreement with the statement: "A pre-school child suffers if his or her mother works for pay". We choose this variable because it measures gender roles in a very direct way and has the strongest variation of all attitude variables in the model (see Table 10). To have equally sized groups, women who answer between zero and

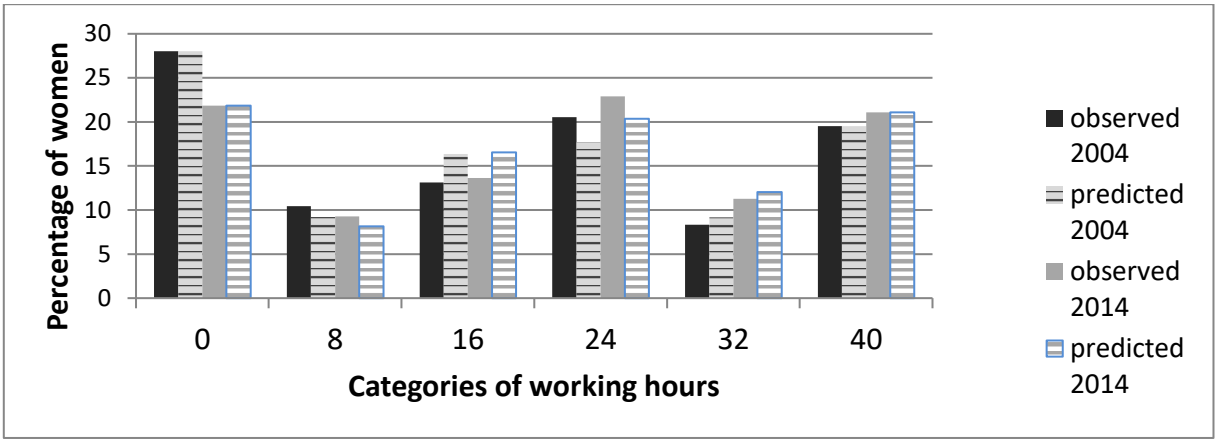
four are coded as paid-work-oriented (47% of all women in 2014) (Model 7), whereas the women who answer between five and ten are coded as home-oriented (53% of all women in 2014) (Model 8).

Table 9: Descriptive statistics of the sample.

			2004		2014	
	Min	Max	Mean	se	Mean	se
Financial variables						
Hours of work, women	0	40	18.32	(14.73)	21.77	(14.08)
Hours of work, men	0	40	36.64	(10.02)	35.49	(11.28)
Real gross hourly wage, women	9.02	360.69	33.96	(18.59)	36.09	(20.34)
Real gross hourly wage, men	9.04	260.87	45.41	(22.28)	45.65	(20.63)
Weekly disposable hh. income/100	6.61	113.61	19.85	(9.19)	21.04	(9.00)
Socio-demographic variables						
Age, women	25	64	43.12	(9.38)	45.63	(9.93)
Age, men	25	64	45.71	(9.54)	48.16	(10.22)
Education: Lower secondary, women	0	1	0.11	(0.31)	0.08	(0.27)
Education: Upper secondary, women	0	1	0.65	(0.48)	0.55	(0.50)
Education: Tertiary, women	0	1	0.25	(0.43)	0.37	(0.48)
Education: Lower secondary, men	0	1	0.03	(0.18)	0.03	(0.16)
Education: Upper secondary, men	0	1	0.51	(0.50)	0.44	(0.50)
Education: Tertiary, men	0	1	0.46	(0.50)	0.53	(0.50)
Swiss nationality, women	0	1	0.88	(0.32)	0.90	(0.30)
Swiss nationality, men	0	1	0.87	(0.33)	0.89	(0.31)
Mother employed at age 15, women	0	1	0.52	(0.50)	0.53	(0.50)
Mother employed at age 15, men	0	1	0.43	(0.49)	0.45	(0.50)
Children 0-6 years	0	3	0.39	(0.71)	0.30	(0.65)
Children 7-12 years	0	3	0.39	(0.71)	0.28	(0.62)
Children 13-18 years	0	3	0.36	(0.69)	0.36	(0.69)
Married couple	0	1	0.90	(0.30)	0.82	(0.39)
Urban municipality	0	1	0.23	(0.42)	0.26	(0.44)
Attitudinal variables						
Child suffers with working mother, women	0	10	5.08	(3.60)	4.37	(2.96)
Child suffers with working mother, men	0	10	6.36	(3.34)	5.36	(2.91)
Job preservers independence, women	0	10	7.85	(2.90)	8.60	(1.73)
Job preservers independence, men	0	10	7.67	(2.89)	8.38	(1.73)
n (couples)			1,370		1,158	

Source: SHP 2004, 2014, own calculations. Only couples where both partners report gender role attitudes (reduced sample). Notes: Standard errors (se) are in parentheses.

Figure 10: Predicted and observed hours of work in 2004 and 2014.



Source: SHP 2004, 2014. Note: The predicted hours refer to the baseline model (without attitudes, full sample).

Table 10: Predicted change in women's working hours according to financial aspects

	Baseline models		Baseline models		Attitude models		Models by attitudes	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
year	2004	2014	2004	2014	2004	2014	2014	2014
sample	full	full	red.	red.	red.	red.	paid-work	home
N (couples)	2854	3402	1370	1158	1370	1158	559	599
Elasticities (% change in women's working hours for a 10% change in income or wages								
Own wage: hours	-0.1	0.2	-0.1	0.3	-0.4	-0.1	0.1	-0.2
Own wage: hours of working women	-0.2	0.0	-0.3	0.0	-0.4	-0.3	-0.1	-0.4
Own wage: participation	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1
Cross wage: hours	-1.5	-0.9	-1.7	-1.4	-2.0	-1.7	-1.0	-2.3
Cross wage: hours of working women	-0.5	-0.3	-0.6	-0.5	-0.7	-0.6	-0.4	-0.8
Cross wage: participation	-0.3	-0.2	-0.3	-0.2	-0.3	-0.3	-0.2	-0.4
Other income: hours	-0.1	-0.1	0.1	-0.1	-0.2	-0.2	-0.1	-0.2

Source: SHP 2004, 2014. Number of couples: n=1370 in 2004, n=1158 in 2014. Note: Working hours refer to the average over the 8 categories (0, 8, 16, 24, 32, 40 hours). Predicted change in working hours have been computed by weighting each of the alternatives by its probability.

Before addressing the hypotheses, we discuss the main results of the baseline model with respect to women's working hours (Models 1 and 2). Table 11 shows the predicted changes in working hours (elasticities) when simulating a 10% increase in wages or income. Overall, the models show that women's labour supply is rather independent from their wages and non-labour incomes. The effect of a 10% increase in hourly wages is very close to zero in terms of working hours (-0.1 in 2004, 0.2

in 2014). The effect on participation (extensive margin) is always positive, showing that women with higher wages are more likely to work. In contrast, working women with higher wages tend to work slightly less than working women with lower wages in 2004 (intensive margin). This finding is in line with Schmid (2016) and Oesch, Lipps & McDonald (2017), who found that women working part-time in Switzerland have a higher hourly wage than women working full-time. In 2014, the work percentage of working women (intensive margin) does not seem to depend on their wage level. In a cross-national perspective, these elasticities appear very weak for both years. The weakest own-wage elasticity documented by Bargain et al. (2014) was found for Estonia in 2005 and amounted to 0.8 (for a 10% wage increase). Nevertheless, the inelastic labour supply in Switzerland is plausible considering that a wage increase is only partly reflected in disposable income due to progressive taxes, health insurance subsidies and income-dependent childcare costs. Cross-wage elasticities are more in line with other European countries. As for example in France and Austria (see Bargain et al. 2014), the cross-wage elasticity in Switzerland is stronger than the own-wage elasticity. While women's labour supply is inelastic with respect to their own wage, cross-wage elasticities are slightly negative. If partner's hourly wage increases by 10%, we estimate that women decrease their working hours by 1.5% in 2004. These results are not far from what was found for Germany in 2001 (1.7) and Austria in 1998 (1.3) (Bargain et al. 2014). Cross-wage elasticities are also declining over time to 0.9 in 2014 confirming that the influence of partner's wages or incomes is becoming less important for women's labour supply.

We now discuss the influence of socio-demographic characteristics on labour supply (Table 11). Predicted changes are marked as significant when the interaction term between the variable of interest and the utility of staying home in the regression model is significant (see Table A3 and A4 in the appendix). The model shows that utility of staying home increases with the number of children, education, age, marital status and is particularly low in the Italian speaking part of the country. The Swiss nationality and living in an urban municipality do not affect labour supply in a significant way.[38] Socio-demographic characteristics linked to the family are the most important taste-shifters. This underlines that many women do not face a trade-off between leisure and consumption as assumed in the classical economic theory, but rather a trade-off between care-work

[38] Giudici & Schumacher (2017) found at the basis of the structural survey 2010-2014 (95.000 couples) that women holding a Swiss citizenship have a slightly higher labour supply than women without a Swiss citizenship. The difference is higher for participation rates than for working 50% or more. This study, however, did not control for wages and did not consider labour supply as a joint decision of the partners. Another reason for this different result could be that foreigners who have recently immigrated in Switzerland are underrepresented in the SHP.

and paid work. As for children, a small child up to six years old decreases working hours on average by 8.2 hours in 2004 and by 5.9 hours in 2014. Each child between 7 and 12 years lowers working hours by about 3.7 hours per week, whereas each child between 13 and 18 lowers it by 1.8 hours. This large effect of children on women's working hours can be explained by different factors, namely by the tradition to consider childcare as part of the private sphere, high childcare costs, limited availability of childcare places and inexistent paternity leave (Giudici & Schumacher 2017). The evolution over time shows that in 2014 small children do not induce women to reduce their working hours as much as they did in 2004. This suggests that mothers of young children have become more attached to the labour market in 2014 and that the reconciliation of work and family has improved. Confirming the predominant gender role model, men with older children (13-18 in 2004, 7-18 in 2014) have a lower utility of staying home than men with no children.

Like children, marriage has a very strong effect on female labour force participation. All else being equal, in 2004 and 2014, married women work about seven hours per week less than unmarried women. This effect is surprisingly high, as it means that marriage affects labour supply to the same extent as a small child. There are different possible explanations for this effect. The joint taxation of married couples may discourage married women to work. This is however unlikely because only a few couples, those where both partners have high earnings, are concerned by a marriage penalty. The share of couples that benefit financially from marriage is indeed higher than the share of couples who lose from marriage (Peters 2014; SFTA 2016). The fact that labour supply is inelastic to a pay rise also speaks against an economic interpretation of the marriage coefficient.[39] Rather than being a causal effect, we suppose that the large effect of marriage reflects different preferences of married and unmarried couples. If mostly couples favouring a male breadwinner model choose to marry, this selection into marriage would explain the fewer working hours of married women. Following this line, Hiekel et al. (2014) have shown that the desire for independency is the most important reason for partners not to marry in Western Europe. Finally, the large coefficient for marriage in the regression model could also be partly due to multicollinearity between marriage and having children.[40]

[39] When we exclude marriage as a taste shifter from the categorical labour supply model, labour supply elasticities do not change.

[40] In 2014, 90% of married couples had children versus only 22 % of unmarried couples.

Table 11: Predicted change in women's working hours according to socio-demographic and attitudinal aspects

	Baseline models		Baseline models		Attitudinal models		Models by attitudes	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
year	2004	2014	2004	2014	2004	2014	2014	2014
sample	full	full	red.	red.	red.	red.	paid-work	home
N of couples	2854	3402	1370	1158	1370	1158	559	599
Change in women's working hours: socio-demographic aspects								
0 child (ref.)								
Child 0-6 years	-8.2*	-5.9*	-7.5*	-6.3*	-7.6*	-6.6*	-6.1*	-7.5*
Child 7-12 years	-3.7*	-3.8*	-3.6*	-3.5*	-3.5*	-3.7*	-3.2*	-4.3*
Child 13-18 years	-1.8*	-1.8*	-1.9*	-2.5*	-1.6*	-2.7*	-2.1*	-3.2*
Age 25-39 (ref)								
Age 40-49	-3.8*	-1.2	-4.4*	-1.2	-4.4*	-1.1	-1.1	-2.1
Age 50-64	-6.8*	-5.6*	-7.6*	-5.9*	-7.1*	-5.9*	-5.3*	-7.6*
Lower secondary education (ref.)								
Upper secondary education	1.6*	2.2*	-0.1	0.7	-0.7	-0.1	-0.8	0.2
Tertiary education	7.0*	7.2*	6.6*	5.5*	4.7*	3.3*	3.7	2.3
Unmarried couple (ref.)								
Married couples	-6.9*	-7.1*	-7.6*	-7.5*	-7.4*	-7.2*	-5.0*	-8.5*
German speaking region (ref.)								
French speaking region	1.4*	1.2*	1.8*	1.3	2.3*	2.0*	2.2	1.9
Italian speaking region	-2.0	-3.5*	-4.7*	-8.7*	-3.6*	-7.6*	-6.1	-8.1*
Change in women's working hours: attitudes								
Child suffers with working mother					-0.4*	-0.6*	-0.1	-0.5
Work important for independence					0.1	0.4*	0.8*	0.3
Working mother at age 15					0.8	-0.3	0.5	-0.7
Partner: Child suffers with working mother					-0.3*	-0.4*	-0.4*	0.4
Partner: Work important for independence					0.1	0.3	0.1	0.4
Partner: working mother at age 15					0.9	1.0	-0.2	2.2*

Source: SHP 2004, 2014.Note: Working hours refer to the average over the 8 categories (0, 8, 16, 24, 32, 40 hours). Predicted change in working hours have been computed by weighting each of the alternatives by its probability. Significance levels refer to the interaction with women's utility to stay home. * Significant at 95% level.

The next paragraph addresses the hypothesis on linguistic regions (Hypothesis 1a). Controlling for basic socio-demographic and economic characteristics, cultural differences between linguistic regions remain visible. In line with Giudici & Schumacher (2017), women in the Italian speaking part of Switzerland are more likely to stay home than women in the other linguistic regions. In terms of

predicted working hours, the difference with women in the German speaking part of Switzerland amounts to 2 hours in 2004 and to 3.5 hours in 2014.

The reason for this growing difference is that women in the Italian part of Switzerland increased their working hours only to a small extent between 2004 and 2014 (0.7 hours), whereas women in the other linguistic regions of Switzerland increased their hours more intensively (3.4 hours in the French part and 3.8 hours in the German part). Therefore, we find clear support for Hypothesis 1a according to which cultural differences affect labour supply. Cultural differences remain or are even amplified when gender role attitudes are controlled in the model (Models 5 and 6).

Turning to the impact of attitudes, Models 5 and 6 show that attitudes are important for women's labour supply and support thus Hypothesis 1b. Women who think that a job is important for independence tend to work more for pay: A shift of one point within the 11-point scale, predicts a shift of 0.4 working hours in 2014. Attitudes towards working mothers play an even more important role. Women who think that pre-school children suffer with a working mother have a considerably higher utility of staying home. For this variable, a shift of one point within the 11-point scale, predicts a shift of 0.6 working hours. In addition, partners' opinion on working mothers plays a role, whereas partners' opinions on the importance of a job for independence do not have a significant impact on female labour supply. This evidence shows that many women feel a moral pressure to stay home. It is also interesting to look at attitudes and men's labour supply. In 2004, men who thought that a job was important to keep independence tended to work less. Probably, these men do not favour a single breadwinner model, but a division of paid labour between both partners. Moreover, men tend to comply to the main breadwinner model if their partner thought that a child suffered with a working mother. In 2014, we do not find any significant influence of attitudes on men's labour supply. Our finding of strong effects of attitudes contradicts relatively old evidence on Switzerland (Ernst Stähli et al. 2009) and is in line with findings on other countries (Giuliano 2014). In both years, having been raised by a working mother has no significant impact on women's labour supply. Neither do women work more hours if the partner has grown up with a working mother. We therefore find no support for Hypothesis 1c. Overall, we can conclude that attitudes play a much stronger role for labour supply than financial aspects.

We now discuss Hypothesis 2 on the interrelation of attitudes and wages or incomes. For this Hypothesis, we compare Model 3 and 5 for 2004 and Model 4 and 6 for 2014 in Table 11, which have been estimated using the same sample. We remark that the inclusion of attitudes makes almost all elasticities become (more) negative. As postulated in Hypothesis 2, the reaction to a pay

rise seems to be conditional on attitudes. When attitudes are controlled for in the model, an increase in wages or incomes brings a stronger reduction on women's working hours. Stated differently, models that ignore gender role attitudes underestimate the negative impact of wage increases on the hours worked by economically active women (intensive margin).

To dig deeper on how attitudes affect elasticities, we test Hypothesis 3 that expects a pay rise to have a different influence on home-oriented and paid-work-oriented women. The results in Table 11 indicate that home- and paid-work-oriented women do not react in the same way in terms of participation. While a pay rise lowers the labour supply of home-oriented women (intensive elasticity of -0.4 for a 10% wage increase), labour supply of paid-work-oriented women is inelastic (intensive elasticity of -0.1 for a 10% wage increase). Home-oriented women react also more strongly to a wage increase of their partner (intensive cross-wage elasticities amount to -0.8 compared to -0.4 for paid-work-oriented women). Nevertheless, a pay rise of their partner also affect paid-work-oriented women negatively. The stronger negative reaction of home-oriented women to an increase in wages or incomes supports Hypothesis 3 and suggests that the income effect is very important for home-oriented women. Home-oriented women seem to work only as much as necessary to cover their household expenses. If the household budget is produced by other sources (e.g. higher own wages or income, higher partner's wages or income, or other household income), these sources substitute women's working hours. The story is different for paid-work-oriented women, whose labour supply is more inelastic to a change in their own wage in particular and in other income more in general.

Conclusion and discussion

Encompassing all dual-earner couples, this paper provides evidence on decisions to labour supply in a multicultural and politically diverse country like Switzerland. This contribution adds to the literature on families' labour supply by analysing gender role attitudes and financial incentives jointly in a categorical labour supply model. In this common framework, it is not only possible to compare the relative influence of determinants of labour supply, but also to analyse the interrelation between attitudes and wages or incomes.

The analysis revealed that gender role attitudes influence women's labour supply considerably. Not only women's gender role attitudes, but also their partners' play an important role in the choice of working hours. Attitudes affect both the utility of staying home and the reaction to financial incentives. Own-wage elasticities of working women and cross-wage elasticities become more

strongly negative if the regression model conditions on gender role attitudes. Women with home-oriented attitudes reduce their working hours more strongly following a pay rise than women with work-oriented attitudes. The same holds for a wage increase of the partner. This means that for home-oriented women, the income effect is stronger than the substitution effect. Moral pressures to stay home have a considerable influence on these women.

Besides gender-attitudes, some additional results on couples' labour supply deserve our attention. Overall, women's labour supply has revealed to be relatively inelastic to the wage level and very similar to men's elasticities.[41] The only exception is the negative cross-wage elasticity of women, which shows an important negative influence of partner's wages on female labour supply. This is in line with Wise & Zangger (2017)'s findings about the endogenous decision-making of couples concerning working time. For socio-demographic characteristics, the analysis confirmed the large impact of the number of children, marital status, and education on labour supply previously found in the literature. Differences are also found between linguistic regions. The most important result with respect to these coefficients is that women in the Italian speaking part of the country have the highest utility of staying home. This evidence reflects cultural differences that could be addressed more in detail in future research also on other countries.

It is important to note that our model focused on couples in general and not on specific groups. Labour-supply elasticities might be stronger for specific groups such as mothers of small children or parents with no access to informal childcare by grand-parents. As most labour supply models, our analysis is static. The interaction between wage level and gender role attitude in the future will depend on several factors. If attitudes continue to shift away from traditional gender roles, we expect negative cross-wage elasticities to become weaker. At the same time, we expect a self-reinforcing mechanism between rising female labour supply and egalitarian gender role attitudes. This process could be studied with panel data.

Overall, the addition of subjective indicators to classical labour supply models has revealed to be a fruitful approach that brings interesting policy implication. If women have moral pressure to stay home, policies that aim to stimulate labour supply via financial incentives might have little effect or

[41] Preliminary research has also showed that earnings are not highly influential for women's SWB. Even if women compare their income more than men independently from the gender composition of the sector of employment, women's SWB is not affected by an income increase of their reference group. There might be two explanations for this. On the one hand, women's SWB could benefit from a possible tunnel effect with future prospects of upwards mobility when the average income of their reference group increases. On the other hand, even though they found income comparisons to be important, women might not weight economic and job-related factors as crucial for their general life satisfaction (Ravazzini & Piekałkiewicz, 2018).

even unintended opposite effects. In a context with a high share of home-oriented women and an inelastic female labour supply, a focus on other factors might be more promising to increase women paid working hours. Alternative policy approaches, such as work-friendly school schedules, flexibility in the workplace, high quality childcare, and more social and financial incentives for fathers to work part-time or to take parental leaves, might be more promising than classical monetary incentives. Our research has contributed in this respect by showing that gender role attitudes are an important non-economic factor that should be taken into account by labour supply models.

Appendix

Estimation of the utility function

The utility function is maximised in a trade-off between consumption (C) and leisure (L), which can be mathematically written as:

$$\max_{h \in H} U(C, L|X, \epsilon, \varepsilon) \quad \text{(EQA1)}$$

we refer to L as the "utility of staying home". In addition to C and L, X refers to individual characteristics, which are also called taste shifters. In line with previous literature, we include age (three age groups), education (three levels), an indicator for urban municipalities, an indicator for marital status, the number of children in three age ranges (0-6 years, 7-12 years, 13-18 years), nationality (Swiss, other nationalities) and the linguistic region (German, French, or Italian, measured by the language of interview) as taste-shifter. All the individual characteristics listed above are interacted with the utility of staying home. For all women and both models, we also control for part-time work. In addition to X, ϵ indicates job availability, which can be approximated by semi-observable working costs (e.g. all working women have a unitary weekly cost given by transportation; other costs could be search costs for part-time jobs or rigidities regarding working hours). In addition, ε is the unobserved taste variation assumed to be i.i.d.

The probability for a couple of choosing a combination of hours *i* can be expressed by:

$$P\big(U_i > U_{h,}, \forall h \neq i\big) = \frac{\exp(U\{C_i, L_i|X, \epsilon\})}{\sum_{h \in H} \exp(U\{C_h, L_h|X, \epsilon\})} \quad \text{(EQA2)}$$

According to this probability, for each family with characteristics X, the likelihood function can be written as:

$$L = \iint_{-\infty}^{+\infty} \frac{\exp(U\{C_i, L_i|\widehat{w}_i, \epsilon\})}{\sum_{h \in H} \exp(U\{C_h, L_h|\widehat{w}_h, \epsilon\})} f(\epsilon) f(\widehat{w}) d(\epsilon) d(\widehat{w}) \quad \text{(EQA3)}$$

Where $\widehat{w}$ are wage predictors. EQA3 is solved using maximum simulated likelihood with random draws from the distribution of ϵ and $\widehat{w}$.

Our model is estimated with the user written command lslogit developed by Max Löffler in Stata 13 (see Löffler et al. 2014).

Tables

Table A2: Distribution of observed and predicted weekly working hours.

Hours category	observed	predicted baseline full sample	predicted baseline reduced sample	predicted attitudinal reduced sample
Year: 2004				
0-3	28.0	28.0	26.4	27.1
4-12	10.4	9.2	13.4	13.5
13-21	13.1	16.4	15.9	15.9
22-29	20.5	17.7	15.3	15.1
30-37	8.3	9.2	10.9	10.7
38+	19.5	19.5	18.2	17.7
Total	100	100	100	100
N (couples)	2,854	2,854	1,370	1,370
Year: 2014				
0-3	21.8	21.8	18.7	18.3
4-12	9.3	8.2	10.5	10.5
13-21	13.6	16.5	16.3	16.3
22-29	22.9	20.4	19.1	19.2
30-37	11.3	12.0	15.0	15.1
38+	21.1	21.1	20.3	20.6
Total	100	100	100	100
N (couples)	3,402	3,402	1,158	1,158

Source: Swiss Household Panel 2004 and 2014.

Table A3: Categorical Labour supply model. Baseline model and attitudinal model.

		Baseline model				Baseline model				Attitudinal model			
		(1)		(2)		(3)		(4)		(5)		(6)	
		2004		2014		2004		2014		value2004		value2014	
EQUATION	VARIABLES	Coef.	tstat	Coef.	tstat	Coef.	tstat	Coef.	tstat	Coef.	tstat	Coef.	tstat
Cx	Constant	-1.054	(-0.3)	-1.843	(-0.5)	-0.846	(-0.1)	8.896	(1.3)	-2.233	(-0.4)	4.770	(0.7)
CxC	Constant	-0.636**	(-3.3)	-0.505**	(-2.7)	-0.743*	(-2.5)	-1.078***	(-3.3)	-0.759**	(-2.6)	-1.014**	(-3.0)
CxL1	Constant	0.304	(0.8)	-0.080	(-0.2)	0.334	(0.6)	-0.430	(-0.7)	0.686	(1.2)	0.389	(0.6)
CxL2	Constant	0.982*	(2.2)	1.450***	(3.4)	1.078	(1.6)	-0.009	(-0.0)	1.061	(1.6)	0.048	(0.1)
L1x	Nb children 0-6 years	2.885***	(14.9)	2.113***	(12.9)	2.783***	(10.2)	2.482***	(8.3)	2.925***	(10.4)	2.739***	(8.8)
	Nb children 7-12 years	1.264***	(8.9)	1.360***	(9.3)	1.302***	(6.4)	1.373***	(5.3)	1.318***	(6.4)	1.509***	(5.6)
	Nb children 13-18 years	0.641***	(4.7)	0.665***	(5.2)	0.684***	(3.3)	0.974***	(4.2)	0.622**	(2.9)	1.104***	(4.6)
	Education: Upper secondary, women	-0.551*	(-2.2)	-0.793**	(-3.1)	0.035	(0.1)	-0.266	(-0.5)	0.246	(0.6)	0.035	(0.1)
	Education: Tertiary, women	-2.338***	(-7.7)	-2.524***	(-8.9)	-2.259***	(-4.8)	-2.120***	(-3.7)	-1.682***	(-3.5)	-1.324*	(-2.2)
	40-50 years, women	1.277***	(5.3)	0.431	(1.8)	1.545***	(4.2)	0.472	(1.0)	1.597***	(4.3)	0.441	(0.9)
	51-64 years, women	2.362***	(8.7)	1.986***	(7.7)	2.754***	(6.7)	2.308***	(4.9)	2.668***	(6.4)	2.437***	(5.0)
	Married couple	2.264***	(8.1)	2.427***	(10.7)	2.574***	(5.7)	2.871***	(6.8)	2.589***	(5.6)	2.886***	(6.6)
	Urban municipality	-0.308	(-1.6)	0.000	(0.0)	-0.376	(-1.3)	0.076	(0.2)	-0.249	(-0.8)	0.302	(0.9)
	Swiss nationality, women	0.471	(1.9)	-0.279	(-1.3)	-0.096	(-0.2)	0.345	(0.7)	-0.179	(-0.4)	0.318	(0.7)
	French speaking	-0.489*	(-2.6)	-0.425*	(-2.3)	-0.641*	(-2.3)	-0.518	(-1.7)	-0.848**	(-2.9)	-0.799*	(-2.4)
	Italian speaking	0.693	(1.7)	1.260**	(3.2)	1.849**	(2.6)	3.674***	(4.4)	1.451*	(2.0)	3.313***	(3.9)
	Mother employed at age 15, women									-0.299	(-1.2)	0.112	(0.4)
	Mother employed at age 15, men									-0.353	(-1.4)	-0.400	(-1.4)
	Child suffers, women									0.140***	(3.6)	0.253***	(4.5)
	Job preservers independence, women									-0.056	(-1.2)	-0.178*	(-2.0)
	Child suffers, men									0.129**	(3.2)	0.147**	(2.7)
	Job preservers independence, men									-0.053	(-1.1)	-0.123	(-1.4)
	Constant	129.074***	(10.1)	139.607***	(12.2)	44.297*	(2.5)	79.699***	(4.3)	40.947*	(2.3)	74.073***	(3.9)
L1xL1	Constant	-18.126***	(-12.1)	-18.799***	(-14.2)	-7.881***	(-3.9)	-11.278***	(-5.3)	-7.966***	(-3.9)	-11.325***	(-5.3)
L2x	Nb children 0-6 years	-0.035	(-0.2)	-0.053	(-0.3)	0.193	(0.6)	-0.356	(-1.2)	0.163	(0.5)	-0.415	(-1.3)

	Nb children 7-12 years	-0.288	(-1.5)	-0.518**	(-2.7)	-0.405	(-1.3)	-0.821*	(-2.4)	-0.422	(-1.3)	-0.861*	(-2.5)
	Nb children 13-18 years	-0.464**	(-2.6)	-0.956***	(-5.3)	-0.705*	(-2.2)	-0.706**	(-2.6)	-0.714*	(-2.2)	-0.731**	(-2.7)
	Education: Upper secondary	-0.707*	(-2.1)	-1.050**	(-3.3)	0.382	(0.4)	0.197	(0.2)	0.136	(0.1)	0.231	(0.3)
	Education: Tertiary	-1.605***	(-4.2)	-1.906***	(-5.6)	-0.524	(-0.5)	-1.108	(-1.4)	-0.951	(-0.9)	-1.278	(-1.6)
	40-50 years, men	-0.232	(-0.7)	0.071	(0.2)	-0.537	(-1.0)	-0.527	(-1.0)	-1.281**	(-2.9)	-0.745	(-1.8)
	51-64 years, men	1.633***	(5.2)	1.237***	(4.1)	1.426**	(2.8)	0.482		0.685**	(2.7)	0.234	(0.9)
	Married couple	-0.382	(-1.2)	-0.398	(-1.6)	-0.392	(-0.7)	-0.235	(-0.6)	-0.481	(-0.9)	-0.270	(-0.6)
	Urban municipality	0.355	(1.6)	0.369	(1.8)	0.640	(1.8)	0.296	(0.9)	0.569	(1.6)	0.238	(0.7)
	Swiss nationality, men	-0.767**	(-2.9)	0.010	(0.0)	0.318	(0.6)	-0.160	(-0.3)	0.308	(0.6)	-0.154	(-0.3)
	French speaking	0.118	(0.5)	0.644**	(3.2)	0.346	(1.0)	0.503	(1.6)	0.437	(1.2)	0.604	(1.8)
	Italian speaking	-0.103	(-0.2)	0.076	(0.2)	0.159	(0.2)	0.393	(0.6)	0.360	(0.4)	0.594	(0.8)
	Child suffers, women									-0.095*	(-2.0)	-0.046	(-0.8)
	Job preservers independence, women									-0.084	(-1.6)	0.013	(0.1)
	Child suffers, men									-0.044	(-0.9)	-0.099	(-1.8)
	Job preservers independence, men									0.135*	(2.1)	0.024	(0.3)
	Constant	-135.456***	(-17.0)	100.856***	(-14.8)	129.543***	(-11.2)	-88.655***	(-7.4)	-129.315***	(-11.1)	-89.855***	(-7.3)
L2xL2	Constant	14.516***	(18.7)	10.489***	(16.8)	13.312***	(11.9)	9.741***	(9.2)	12.958***	(11.4)	9.391***	(8.6)
L1xL2	Constant	3.707***	(6.1)	2.774***	(4.8)	4.074***	(4.5)	2.331*	(2.3)	4.700***	(5.1)	3.282**	(3.1)
IND	Fixed costs, women	0.523**	(3.1)	0.196	(1.4)	0.260	(1.1)	-0.037	(-0.2)	0.255	(1.1)	-0.042	(-0.2)
	Part-time, women	-2.541***	(-11.9)	-2.218***	(-12.3)	-1.253***	(-4.3)	-1.133***	(-4.0)	-1.250***	(-4.3)	-1.129***	(-4.0)
	Welfare	-0.754***	(-4.7)	-0.436**	(-3.3)	-1.029***	(-4.0)	-0.763**	(-3.0)	-0.976***	(-3.8)	-0.702**	(-2.8)
	Observations	51,372		61,236		24,660		20,844		24,660		20,844	
	Pseudo R-squared	0.282		0.249		0.292		0.237		0.298		0.245	

Source: Swiss Household Panel 2004 and 2014.

Table A4: Categorical labour supply model 2014 by attitudes.

		Models by attitudes			
		(7)		(8)	
		Home-oriented		Work-oriented	
		2014		2014	
EQUATION	VARIABLES	Coef.	tstat	Coef.	tstat
Cx	Constant	18.122	(1.6)	-1.672	(-0.2)
CxC	Constant	-1.675**	(-3.0)	-0.712	(-1.6)
CxL1	Constant	-1.261	(-1.1)	1.260	(1.4)
CxL2	Constant	-0.608	(-0.5)	0.308	(0.3)
L1x	Nb children 0-6 years	2.658***	(6.5)	3.211***	(6.1)
	Nb children 7-12 years	1.363***	(3.6)	1.768***	(4.4)
	Nb children 13-18 years	0.898*	(2.4)	1.302***	(3.9)
	Education: Upper secondary, women	0.337	(0.3)	-0.091	(-0.1)
	Education: Tertiary, women	-1.566	(-1.4)	-0.901	(-1.2)
	40-50 years, women	0.469	(0.7)	0.837	(1.2)
	51-64 years, women	2.290**	(3.3)	3.047***	(4.1)
	Married couple	2.148***	(3.3)	3.253***	(5.4)
	Urban municipality	0.228	(0.5)	0.290	(0.6)
	Swiss nationality, women	0.380	(0.5)	0.135	(0.2)
	French speaking	-0.949	(-1.8)	-0.788	(-1.8)
	Italian speaking	2.651	(1.7)	3.612***	(3.3)
	Mother employed at age 15, women	-0.202	(-0.5)	0.290	(0.7)
	Mother employed at age 15, men	0.068	(0.2)	-0.872*	(-2.1)
	Child suffers, women	0.051	(0.3)	0.183	(1.5)
	Job preservers independence, women	-0.360*	(-2.4)	-0.106	(-0.9)
	Child suffers, men	0.191*	(2.3)	0.095	(1.2)
	Job preservers independence, men	-0.038	(-0.3)	-0.156	(-1.3)
	Constant	113.737***	(4.1)	52.635*	(2.0)
L1xL1	Constant	-14.928***	(-4.8)	-9.440**	(-3.1)
L2x	Nb children 0-6 years	-0.497	(-1.2)	-0.422	(-0.9)
	Nb children 7-12 years	-0.866	(-1.9)	-0.959	(-1.7)
	Nb children 13-18 years	-0.444	(-1.1)	-1.058**	(-2.6)
	Education: Upper secondary	2.165	(0.8)	-0.212	(-0.2)
	Education: Tertiary	0.205	(0.1)	-1.522	(-1.7)
	40-50 years, men	-0.456	(-0.8)	-1.144	(-1.8)
	agegr_p3	0.076	(0.2)	0.318	(0.8)
	Married couple	0.017	(0.0)	-0.422	(-0.7)
	Urban municipality	0.094	(0.2)	0.278	(0.6)
	Swiss nationality, men	-1.166	(-1.6)	0.720	(1.0)
	French speaking	0.268	(0.5)	0.991*	(2.2)
	Italian speaking	-1.191	(-0.7)	0.962	(1.1)
	Child suffers, women	-0.102	(-0.6)	-0.009	(-0.1)
	Job preservers independence, women	0.043	(0.3)	-0.012	(-0.1)
	Child suffers, men	-0.207*	(-2.4)	0.005	(0.1)
	Job preservers independence, men	-0.310*	(-2.3)	0.285*	(2.0)
	Constant	-65.759***	(-3.5)	-112.984***	(-6.4)

L2xL2	Constant	7.496***	(4.9)	11.225***	(6.9)
L1xL2	Constant	2.249	(1.4)	4.263**	(3.0)
IND	Fixed costs, women	-0.186	(-0.6)	0.277	(0.8)
	Part-time, women	-1.167**	(-3.0)	-1.289**	(-3.0)
	Welfare	-1.113*	(-2.5)	-0.604	(-1.9)
	Observations	10,062		10,782	
	Pseudo R-squared	0.240		0.270	

Source: Swiss Household Panel 2014.

Article 3: The Impact of Female Labour Force Participation on Household Income Inequality in Switzerland

Abstract

This contribution investigates the link between female labour force participation and household income inequality using data from the Swiss Household Panel (2000–2014). Through index decomposition analyses, we find that female labour force participation has slightly attenuated household income inequality over time. Women's entry into the labour market, higher work percentages within part-time work – but not the shift from part-time to full-time work – and the weak correlation in partner's earnings have contributed to this effect.

Keywords: female labour force participation, income inequality, part-time work, index decomposition, household types

JEL: J20, H31, C43, D63

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Introduction

The growth of female employment is one of the major socio-economic changes in most societies. A changed division of labour within couples, evolving social norms, technological changes and the expansion of education are drivers of this transition from unpaid housework to paid work. The increasing income earned by women has consequences for the household income. Household income includes all income sources by all household members and takes account of sharing of resources among household members. Because it illustrates the economic well-being of individuals, household income inequality is a key inequality measure. Female employment boosts the level of household income, but the effect on its distribution is not a priori clear.

Whether more female employment is good or bad for household income inequality depends on which women work more. If mostly women of low-income households work, inequality should decrease, whereas if mostly women of high-income households increase their working hours, inequality should increase. Although most recent contributions find egalitarian effects at the household level, previous empirical analyses have shown mixed results.

In Switzerland, the link between female labour force participation and household income inequality has not been investigated so far. Considering that comparative analyses stress the importance of the activity rate for household income inequality (Pasqua 2008; Kollmeyer 2012), Switzerland presents an interesting case study. The participation rate is high and part-time work is more

common among women than in any other OECD country.[42] In parallel to the rise of the activity rate from 68% in 1991 to 79% in 2014, the typical household structure has gradually changed from a 1–0 type (men working full-time, women not working) to a 1–0.5 type (men working full-time, women working part-time) (Bühler et al. 2002). Another important characteristic of Switzerland is that, unlike many other countries, its household income inequality has remained at the same level since 2000 (SFSO 2014; Suter et al. 2016) and is now below the European average (Eurostat 2015). Therefore, our research question is whether high and rising female employment has contributed to keeping household income inequality in Switzerland relatively low.

Apart from adding evidence for Switzerland, this article contributes to a better understanding of the impact of part-time work on household income inequality. Although some studies consider part-time work as a driver of household income inequality (Esping-Andersen 2009; OECD 2013), this aspect has never been empirically addressed in detail. Typically, studies look at how earners and non-earners are grouped in households, but do not distinguish between different work percentages. In this contribution, we first discuss the different potential channels through which female employment affects household income inequality. After a brief literature review we discuss methods and data from the Swiss Household Panel (2000 to 2014). To measure inequality in the income distribution we use the Theil index and the Coefficient of Variation. Inequality decompositions and counterfactual simulations serve as main methodological tools. Our main results suggest that women's stronger labour force participation has contributed to keeping household income inequality relatively low in Switzerland.

Theory

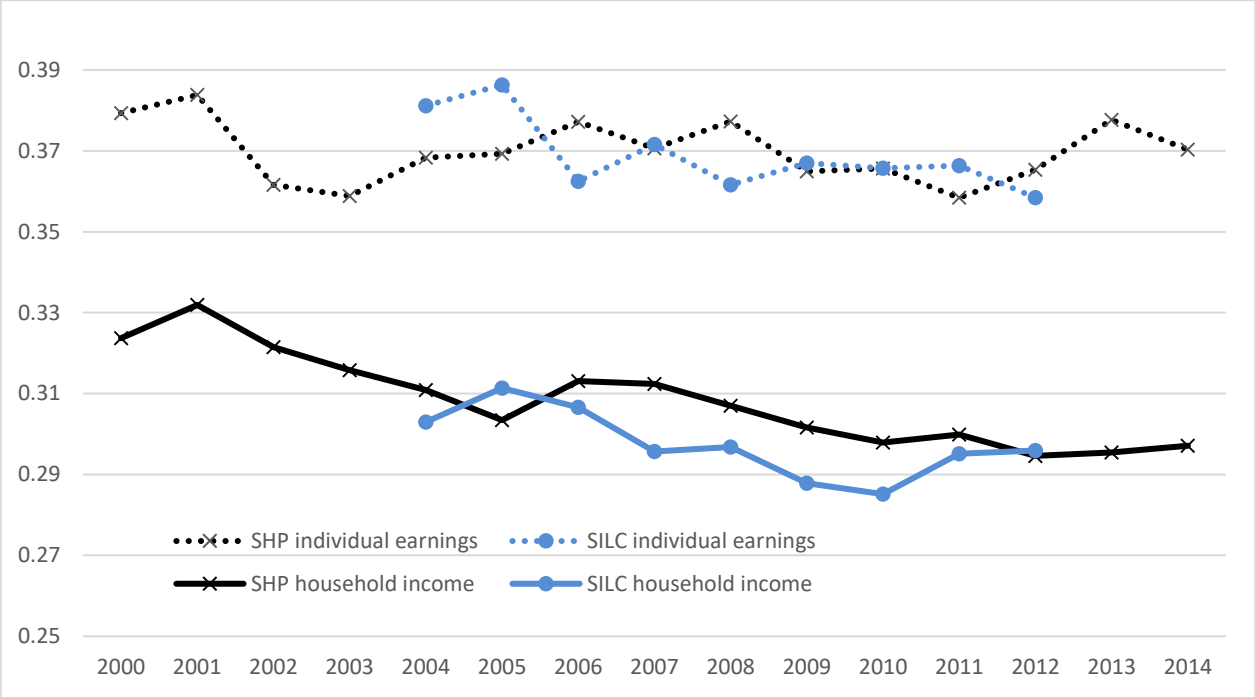
Household income inequality is determined by many different factors (see e.g. Jenkins 1995; OECD 2015), of which we discuss only those related to labour force participation. The main dependent variable of our analysis, household income inequality, includes labour income from employment and self-employment of each household member, asset income, private and public transfers, and imputed rent. Since we are not interested in the effects of the tax system, we do not include direct taxes.

The household is identified by the Swiss Federal Statistical Office as "a person living alone or several persons living in the same dwelling. Family households are divided into single or multiple family households or non-family households." In this sense, household members are not necessarily

[42] The intensity of part-time work is similar for women of different age groups.

involved in the same activities, but they live together, registered under the same address. This means that resources are not necessarily shared among household members. Following this definition, very few surveys provide the share of resources produced and held by each member of the household (one exception is the German Socio-Economic Panel). The distribution of resources within the household is however a key element for inequality. Using two large household surveys, Figure 11 shows the inequality in individual earnings and in total household income in Switzerland.

Figure 11: Earnings and household income inequality (Gini indices).



Sources: Swiss Household Panel (SHP) 2000-2014, Statistics of Income and Living Conditions (SILC) 2007-2015. Notes: for earnings, the data include individuals of all ages, but exclude self-employed, apprentices and inters earnings; earnings constructed with the SHP in 2000 and 2001 include also self-employment; income in SILC refer to the previous year. More details about inequality in individual earnings and in household income can be found in Suter et al. (2016).

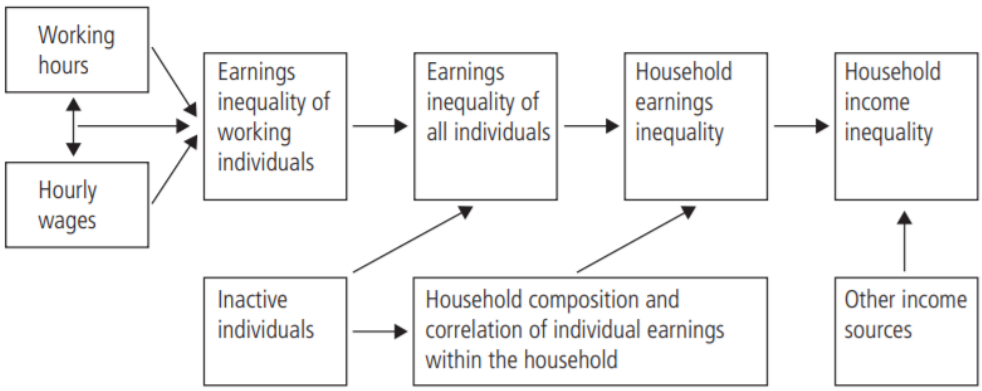
Inequality in individual earnings is on average 0.07 points larger than inequality in household income. Pooling earnings of different household members is therefore equalising. Households can be seen as a social insurance mechanism, where each member contributes to stability.

Earnings are however only one element that could contribute to inequality and the altered behaviour of women with their increase in labour supply could potentially have multiple repercussions on household income inequality.

Figure 12 illustrates the different channels through which increasing female employment may influence household income inequality. We distinguish between effects from changes in the household composition (e.g. more single households) and effects from changing working patterns

within households (e.g. household labour supply). Earnings inequality at the individual level is determined by labour force participation, by the variation in working hours and hourly wages, as well as by the relation between working hours and hourly wages. The correlation of earnings between members of the same household and the correlation between income sources play an additional role.

Figure 12: Determinants of household income inequality.



Looking at the different channels of Figure 12, we can formulate some expectations on how the rise in female labour force participation in Switzerland affects household income inequality. Table 12 summarises these hypotheses. First, if more women work, there are fewer women with no working hours (and thus zero earnings), which means that inequality of working hours among all working-age women shrinks (H1a). Second, the effect on the variation of hours depends on whether women with a relatively low work percentage or with a relatively high work percentage increase their hours. Because working hours are limited at the top (we do not take into account overtime here), we expect that rising work percentages bring a lower heterogeneity in hours (H1b). The lower variation in working hours (H1a and H1b) would clearly have an equalising effect on earnings and on household income.

The equalising effect from the variation in working hours might be amplified or mitigated by a positive or negative correlation between hours and hourly wages. There are two reasons to expect a positive correlation in Switzerland (H2), which offsets the equalising effect of H1b partially. Firstly, part-time work might be worse paid than full-time work. Such a part-time penalty is the reason why the OECD (2013) sees part-time work as a potential driver of income inequality. Secondly, positive wage elasticities in labour supply models suggest that the wage potential positively affects working hours (Gerfin and Leu 2007).

Table 12: Hypotheses on the impact of increasing female labour force participation on household income inequality.

	Type of change	Reason	Effect on household income inequality
H1a	All women: Variation in working hours decreases over time	More women work: Fewer inactive women with zero earnings	Equalising
H1b	Working women: Variation in working hours decreases over time	Women increase their working hours, fewer women with low work percentages	Equalising
H2	Working women: Positive correlation hours- wage level	Positive own-wage elasticity, part-time penalty	Desequalising
H3a	Household: Correlation of partner's earnings more positive over time	Partners have more similar working hours	Desequalising
H3b	Household: Correlation of partner's earnings less positive over time	Women with high earning partners increase their working hours less	Equalising
H4	Household: inequality of income sources: Women's earnings become more relevant for household income	Earnings are more equally distributed than income from other sources (assets, transfers, pensions)	Equalising
H5a	Household structure: More single households	Women in single households work more than women in couple households, no pooling of household income	Desequalising
H5b	Household structure: More single mother households	Single mothers work more than mothers living with their partner, no pooling of household income, generally low income levels	Desequalising

After having discussed the effects on individual earnings inequality, we now turn to the household level. The role of the correlation between the different income sources is a rather complex issue. With working patterns of women and men becoming more similar, we expect that earnings of women and men should resemble each other more over time. Consequently, the correlation between men's and women's earnings should become more positive (H3a). However, the correlation between income sources does not only reflect the similarity in working hours, but also the household structure (e.g. the share of single households), the similarity in wage levels between partners (e.g. due to assortative mating) and the relationship between labour supply and partner's earnings. If mostly women with high-earning partners increase their working hours, household income inequality will increase, whereas if mostly women with low-earning partners increase their working hours, inequality will decrease. In Switzerland, female labour supply depends negatively on

the wage level of their partners (Gerfin and Leu 2007). Other studies show that, due to the tax system and to income-dependent childcare costs, high work percentages are particularly unattractive for women with children and a high earning partner (Bütler and Ruesch 2009; Schwegler et al. 2012). We therefore expect that women with high earning partners have increased their working hours to a smaller extent than women with low earning partners. Consequently, the correlation between couples' earnings should have become less positive over time (H3b). The two hypotheses 3a and 3b point to different directions and might offset each other. Overall, findings from various countries suggest that the correlation between female earnings and other income components has increased over time and therefore had a disequalising effect on household income inequality (Karoly and Burtless 1995; Schwartz 2010).

A straightforward impact of higher female labour supply is that women's earnings contribute more strongly to total household income. If women's earnings are more equally distributed than other income sources, more female earnings reduce household income inequality. Considering that capital income is highly unequal (Piketty 2014; Suter & Ravazzini 2018), and that pensions and social transfers are unequally distributed among the working-age population (because only a small share of households receives these incomes) we expect this to be the case. Therefore, we expect a further equalising impact of female labour force participation on household income inequality (H4).

Our last hypothesis concerns the household composition. Because women living in single households tend to work more than women living in couple households, we can see the rising number of single households as a cause of rising female labour force participation. Because single households tend to be more unequal than larger households (there is no pooling or redistribution of income among household members), more single households amplify household income inequality (H5a). This seems likely to be true in the Swiss context. Although not being focused on female labour force participation, the research conducted by Ernst et al. (2000) on Switzerland shows that inequality among dual-earner households was clearly lower than among single-households. The same reasoning applies to single mothers, who also tend to work more than mothers living with a partner. Moreover, single mothers tend to have particularly low household income and a high variation in earnings, which reinforces this desequalising effect (H5b). This is confirmed by studies in many developed countries, where single parenthood contributed to income inequality (Western et al. 2008; Kollmeyer 2012).

Notwithstanding the multitude of our hypotheses, there might be other potential impacts of female labour force participation on household income inequality, for example on the inequality in hourly

wage. Our discussion has not taken account of other changes occurring over time, such as the tax system, business cycle, changes in the industrial structure or in the unemployment rate. We also neglect the possible effects of more male part-time work as a result of a changed division of labour within couples.[43]

Literature review

Although the issue of female earnings has received considerable attention in the literature on income inequality, contributions have so far focused on few countries. While there is extensive evidence for the USA (Cancian and Reed 1999; Daly and Valletta 2006; Pencavel 2006; Larrimore 2014), there is scarce empirical research for continental European countries (exceptions are Breen and Salazar (2010) on the UK and Del Boca and Pasqua (2003) on Italy). This is surprising, considering that comparative studies show large differences between countries (Cancian and Schoeni 1998; Esping-Andersen 2007; Pasqua 2008; Harkness 2013). Previous findings in the literature show that women's entry into the labour market contributes to a lower household income inequality. The few studies that report the opposite effect have been mostly published more than 20 years ago (Ryscavage et al. 1992; Karoly and Burtless 1995).

An important drawback of comparative studies is that they do not involve an analysis over time. Rather, they test whether observed income inequality is higher or lower compared to a situation where no women work. Such approaches cannot show the direction of the effect of other changes in female employment, most importantly when part-time working women increase their working hours. The same limitation applies to aggregate level analyses that link female employment rates to income inequality (e.g. Kollmeyer 2012). To find the effect of an increase in female labour force participation over time, data on different time points is required.

The study by Breen and Salazar (2010) on the UK was one of the first to include also single households. This is not only important for inference on the (working-age) population, but also to take the relationship between having a partner and labour supply into account. Their study looks not only at female labour force participation, but also at assortative mating and, most importantly, at educational expansion. Their results show that these aspects have hardly contributed to the increasing income inequality between households that, in the case of the UK, was driven by the rise in unemployment among the male population.

[43] We have tested these effects, but we found that the increase in male part-time work is marginal and not relevant for household income inequality.

More recently, Larrimore (2014) has disentangled the different drivers of income inequality in the United States using shift-share decomposition of inequality indices for the 1980s, 1990s and 2000s by employment status, marriage rate and the correlation of spouses' earnings. This last aspect was a main driver of the steep rise in inequality in the 1990s, whereas a rise in female earnings inequality and the unemployment rate made inequality slowly increase in the 2000s. Female employment moderated income inequality growth in the first years of the 2000s but was unable to reduce the growth in inequality in the latest years.

Following Breen and Salazar (2010) and Larrimore (2014), this paper includes different household types according to the cohabitation and the employment status of all their members and, in addition, distinguishes between different work-percentages. Even if we acknowledge the interrelatedness of education, assortative mating, and employment, as illustrated by Blossfeld and Buchholz (2009), we do not go into the different causes of female labour force participation but concentrate on the consequences in terms of household income inequality.

Data and operationalisation

We use data from the Swiss Household Panel (SHP) covering the years 2000 to 2014. Because the SHP includes income and work-percentages of all individuals in the household, it is well-suited for our purpose. Although we analysed the data of all years, we present here results only for 2000, 2004, 2009 and 2014, as female labour participation did not change abruptly from one year to another.[44]

We focus on individuals of working-age and do not limit the analysis to households composed of couples. We include all households where the head is between 25 and 64 years old (n in 2000= 3,589, in 2004=4,307, in 2009=3,261, in 2014= 5,186). The reason for this age range is that by the age of 25 most individuals have finished their education and by the age of 65 most are retired. The main income earner within the household has been designated as the household head. The units of analysis are individuals and weights are used to correct for sample selection and non-response. Household income has been deflated using the 2005 consumer price index and adjusted for household size using the modified OECD scale, which assigns a weight of 1 to the first adult, 0.5 to each additional adult (14 years and older) and 0.3 to each child. We top-coded extremely high values

[44] We selected the years in order to include the first and last available year in the SHP (2000, 2014) and similar time intervals in-between. Even if not reported in the tables, we computed the inequality for all years to assure that findings are not driven by the selection of years. In the few cases, where our results varied between the years, we state this explicitly in the text.

(income above the 99.75 percentile) as these outliers strongly influence inequality measures, in particular the coefficient of variation which is sensitive to high income (Salverda et al. 2009).

For yearly income in the SHP, we use variables provided from the SHP-CNEF file.[45] Hourly wages have been computed at the basis of monthly wages and weekly working hours[46] and are top-coded at 10 times the median wage. The measurement of part-time work is crucial for our analysis. In line with a national definition used by the Swiss Federal Statistical Office, we consider individuals working at least six hours per week as active, and individuals working at least 36 hours a week as full-time workers.[47] For some analyses, we further distinguish between small part-time work (6–19 hours) and higher part-time work (20–35 hours).[48] We are aware that the categorisation of working hours into three (or four) groups has consequences on the results (although not on the main findings). However, considering that previous studies only identified two categories (working vs not-working) and did not consider heterogeneity in working hours among active individuals, we think that our approach is already revealing.

Decomposition methods

The empirical aim of this article is to test how the recent rise in female employment affected household income inequality. We use different decomposition methods and counterfactual distributions. Some of the hypotheses presented in Section 2 will be addressed by descriptive statistics.

Factor decompositions separate household income into different additive income components. In our analysis, we consider three factors: female labour income (f), male labour income (m) and other income sources (ot).

$$Y = Y_f + Y_m + Y_{ot} \tag{4}$$

In line with previous studies, we chose the coefficient of variation (CV) as inequality index due to its easy decomposability. The values of the CV are positive but not limited at the top and are comparable across groups and time points. The coefficient of variation can be decomposed into three elements (Shorrocks 1982): the inequality of each factor (CV_k for factor k), the correlation

[45] Details of income imputation are available from the SHP documentation.

[46] These estimates are produced including both employed and self-employed. The inequality of individual earnings is therefore higher than the estimates reported in Figure 11.

[47] After 1991, the Swiss Federal Statistical Office adapted the definition of economically active individuals to the ILO definition of one hour of work. In this article, we use the old definition proposed by the Swiss Federal Statistical Office.

[48] To distinguish work intensities, we have considered weekly working hours (usual hours and contractual hours), work-percentages and occupational status from the grid questionnaire. Individuals with yearly earnings below CHF 12,000 are considered as inactive, full-time working individuals have yearly earnings of at least CHF 36,000.

between a pair of income components (ρ), and the share of each component in the total income of the household (S_k for factor k). Decomposing the coefficient of variation for our three income components gives:

$$CV_y^2 = S_m^2 CV_m^2 + S_f^2 CV_f^2 + S_{ot}^2 CV_{ot}^2 + 2\rho_{m,f} S_m S_f CV_m CV_f + 2\rho_{m,ot} S_m S_{ot} CV_m CV_{ot} + 2\rho_{f,ot} S_f S_{ot} CV_f CV_{ot} \quad (5)$$

Increased female labour force participation influences income inequality in three different ways: inequality of female earnings (CV_f), women's share of total household income (S_f), and the correlation of women's earnings with men's earnings ($\rho_{m,f}$) and with other income components ($\rho_{ot,f}$). A common misconception regarding the impact of female labour force participation on household income is to draw conclusions about the general effect from just one of these components. Several contributions that found a desequalising effect of women's labour force participation indeed suffered from these methodological problems. For example, higher inequality of women's earnings compared to men's earnings or the increased correlation between spouses' earnings over time are not sufficient to explain the disequalising effect of female employment.

Shift-share analysis can isolate the effect of female labour force participation on inequality by varying one or several of the components of the decomposition. To assess the impact over time using two time points (t, t+1), we compute inequality under the assumption that only some elements of the CV have changed to t+1 values, but the other elements have remained at their previous levels (t).

An alternative approach is to compare inequality in different household types, typically distinguishing between dual-earner couples, male- and female-breadwinner couples, and non-working couples (Pasqua 2008; Harkness 2013). This approach is complementary to factor decompositions, which cannot separate the effects due to changes in the household composition (e.g. more single women or more single mothers) from effects due to changes within groups. For example, single men households and households with a non-working wife were treated in the same way in factor decompositions because both are households with zero female labour income.[49] Similarly, factor decompositions cannot explicitly distinguish between full-time and part-time work. The main disadvantage of decompositions by groups is that discrete groups are necessary.

[49] This has to be taken into account when results from factor decompositions are interpreted. To test hypotheses 3a and 3b, which focus on couples, we will report correlations for couple households in addition. Moreover, our results show relatively stable percentages of single households over time. It is therefore unlikely that changes the household composition explain changes over time.

The decomposition of inequality by groups can tell us to what extent inequality varies due to changes in the proportion of individuals in each group, changes in within-group inequality and changes in inequality between the different groups. Moreover, we are able to compare part-time and full-time work using a counterfactual analysis. We use the Theil index which can be expressed as the weighted sum of inequality between groups plus inequality within each level:

$$T = \frac{1}{N}\sum_{i}^{N}\frac{x_i}{\bar{x}} ln\left(\frac{x_i}{\bar{x}}\right) = \sum_{j}^{J} p_j \frac{\overline{x_j}}{\bar{x}} ln\left(\frac{\overline{x_j}}{\bar{x}}\right) + \sum_{j}^{J} p_j \frac{\overline{x_j}}{\bar{x}} T_j \quad (6)$$

where N is the total number of individuals *i*, x_i the individual earnings and $\bar{x}$ mean earnings, j represents a group, p_j is the proportion of people in group j and $\overline{x_j}$ the mean income of the group. T_j is the Theil within the group j and it takes the form of:

$$T_j = \frac{1}{n}\sum_{i=1}^{n}\frac{x_{i|j}}{\overline{x_j}} ln\left(\frac{x_{i|j}}{\overline{x_j}}\right) \quad (7)$$

where n is the number of people in the j[th] group and $x_{i|j}$ is the individual wage of individual i in group j. One drawback of the Theil index and of all other inequality measures based on the logarithm is that zeroes lead to the index being undefined. Households with no income are, therefore, excluded. This is unproblematic in our case because there are virtually no households with zero total household income.

Results

Individual earnings

We first focus on individual earnings to distinguish the evolution of women's working hours from changes in hourly wages.

Table 13 presents descriptive statistics to assess individual-level hypotheses H1 and H2.[50] First, we look at the evolution of working types. The share of non-working women has declined from 38 % in 2000 to 20% in 2014. In addition, active women have increased their work-percentage and full-time work has risen from 26% of all women in 2000 to 35% in 2014. Similarly, the share of higher part-time (21–35 hours per week) has increased from 22% to 32%, while fewer women have a low percentage (from 14.2 to 12.9). Another indication that part-time working women have intensified their labour supply is the shrinking variation in hours worked (standard deviation declined from 12.6

[50] We opted for simple descriptive accounts rather than for a more formal decomposition into hourly wage, working hours and correlations for two reasons. The first is that the decomposition requires a logarithmic transformation, which we find not appropriate for working hours. The second is that the decomposition relies on the coefficient of variation, which is highly sensitive to outliers.

in 2000 to 11.4 in 2014). We find thus that both entry into the labour market and shifts within active women (as expected in H1a and H1b) are responsible for decreasing variation of working hours and have contributed to lower earnings inequality at the individual level.

Table 13: Descriptive statistics on women's working hours, hourly wages and yearly earnings, 2000, 2004, 2009 and 2014

Women	2000	(sd)	2004	(sd)	2009	(sd)	2014	(sd)
Working type (in %)								
0–5 hours	38.4		28.6		21.4		19.9	
6–19 hours	14.2		15.5		15.6		12.9	
20–35 hours	21.7		26.5		32.7		32.0	
36+ hours	25.8		29.4		30.3		35.2	
Total	100		100		100		100	
N	2635		2779		2362		3819	
Working hours (weekly)								
Working women: mean	29.4	(12.6)	29.8	(12.2)	29.9	(11.9)	31.3	(11.4)
All women (inc. inactive): mean	18.3	(17.3)	21.5	(16.8)	23.6	(16.1)	25.2	(16.1)
N	2744		2848		2362		3616	
Hourly wage								
6–19 hours: mean	39.1	(30.2)	32.6	(21.4)	34.5	(22.1)	35.5	(24.9)
20–35 hours: mean	36.0	(17.4)	33.0	(12.9)	35.5	(15.6)	35.4	(14.3)
36+ hours: mean	33.1	(12.3)	33.1	(12.4)	34.6	(14.9)	34.2	(13.6)
Theil index	0.121	(0.009)	0.104	(0.008)	0.104	(0.009)	0.107	(0.009)
Correlation hours-wage	−0.12		−0.05		−0.02		−0.09	
N	1599		1913		1760		2664	
Yearly earnings								
All (incl. inactive): Theil index	0.252	(0.016)	0.280	(0.009)	0.258	(0.011)	0.236	(0.009)
Working: Theil index	0.190	(0.015)	0.194	(0.007)	0.180	(0.009)	0.187	(0.008)
N	3416		4062		3119		4929	

Source: SHP 2000-2014, own calculations. Notes: Women between 25 and 64 years of age. Standard deviation (sd) in parenthesis. Working hours have been top-coded at 45 hours. Hourly wages have been deflated using 2005 as the base year. Yearly earnings include imputed values provided in the CNEF-File of the SHP.

The next step is the link between working hours and the wage level. Table 13 shows similar hourly wage levels for smaller part-time, higher part-time and full-time work. Although we cannot formally test whether there is a part-time penalty with these descriptive statistics, results illustrate that part-time work is not restricted to low-qualified jobs in Switzerland.[51] Accordingly, there is no correlation between hourly wage and working hours, which means that the channel proposed in H2 seems not

[51] Further confirmation is provided by decomposition of the Theil index by work-type, where the distinction between small part-time, high part-time and full-time explains less than 0.3% of wage inequality.

relevant for Switzerland.[52] Summing up our findings on women's earnings inequality, we see that rising female labour force participation has clearly reduced women's earnings inequality.

Household income: Income sources

We now switch to the household level to test our remaining hypotheses (H3–H5). Before addressing the hypotheses, we first discuss the inequality decomposition by income source (men's earnings, women's earnings and other income components) as presented in Table 14.

Total household inequality seems to have slightly decreased since 2000 (both significant for Theil and CV), which is in line with official statistics on income inequality (SFSO 2014). Looking separately at the trends of the three income sources, we notice that inequality of men's earnings has remained constant over time, whereas women's earnings and other household income have become more equally distributed.[53] From the analysis at the individual level, we know that the decline in women's earnings can be uniquely attributed to the variation in working hours rather than to the distribution of the wage level, as the latter has remained stable.[54] The analysis at the individual level has also shown that both entry into the labour market and increasing work-percentages contributed to this equalising effect. In addition to this, the higher earnings inequality of women compared to men (1.12 vs 0.78 in 2014) can be explained by their higher variation in working hours rather than by a higher variation in wage levels. Comparing all income sources, we notice that the inequality of each separate income source is higher than inequality of household income, reflecting the strong equalising effect of aggregation and income pooling at the household level.[55]

Turning to the correlation between income factors in Table 14, we see that men's earnings are negatively related to women's earnings (−0.16 in 2000 and −0.18 in 2014). Furthermore, the correlation shows no time trend. The negativity can be explained by the fact that the sample

[52] Although the years shown in Table 2 suggest a negative correlation, the coefficient is positive in other years. Distinguishing wage quintiles, we find that women in the middle part of the wage distribution (3rd and 4th quintile) work slightly more than women with lower or higher wages.

[53] A more detailed analysis on other income shows that income inequality has decreased for private transfers, public transfers and to a lesser extent for imputed rent. Inequality of asset income and social security pension show no clear trend.

[54] Although a more detailed analysis on wage inequality is beyond the scope of this article, we want to point to the role of the data sources. While population surveys as the SHP and the Swiss Labour Force Survey suggest a rather stable wage inequality, the Swiss Earnings Structure Survey shows increasing inequality of hourly wage because it covers very high wages (Suter et al. 2016).

[55] As a robustness check, we have performed as far as possible the same analysis with data from the Swiss Labour Force Survey, which has the advantages of dating back to 1991, providing larger sample sizes and fresh samples every year. Because of serious shortcomings of the data (e.g. only one person per household was interviewed and large measurement errors in household income), we just mention that the equalising effect of increasing female labour force participation was also observed during the 1990s and that the evolution since 2000 is comparable to results of the SHP.

includes not only couples, but also single households and other household members (e.g. children and parents, brothers and sisters, flatmates).

To be able to test H3a and H3b (referring to the correlation between partners), Table 14 provides also the correlation for couples in which both partners are between 25 and 64 years old. These coefficients are very close to zero and do not show any time trend. Overall, we can say that neither H3a (which predicted a more positive correlation over time) nor H3b (which predicted a less positive correlation over time) is supported. This is truly a different finding from those reported in other studies (Cancian and Reed 1999; Schwartz 2010; Harkness 2013),[56] which show positive and strengthening correlations between spouses' earnings over time. To understand which women increased their working hours, Figure 13 shows women's working hours by the earnings quintile of their partner. We see that women's working hours clearly decline with the wage level of their partner. In 2014, women with partners in the highest quintile worked six hours less per week than women with partners in the lowest quintile.[57] This difference has remained constant since 2000 because women in all quintiles have increased their working hours in a similar way. Interestingly, such a clear pattern is no longer observed in other countries (OECD 2015). The explanation of the negative relation between women's working hours and partner's wages deserves further analysis for future studies (see Kuhn & Ravazzini 2017b and Ravazzini et al. 2017).

Coming back to the decomposition of household income inequality by income component, we now address H4. Table 14 reveals that men's earnings are still the most important income component accounting for 66.3% of total household income in 2000 and for 59.6% in 2014. In parallel, although this share stagnates since 2009, the contribution of women's earnings to household income has grown from 24.9% in 2000 to 28.6% in 2014.

[56] For example, replicating the sample selection as in Harkness' study, we find more strongly negative coefficients than in any other country. For all households (including non-couple households) the correlation coefficient in Switzerland amounts to −0.15 (for 2005), which is clearly below estimates of any other country (the lowest in Harkness' study is Luxemburg with −0.03). Selecting couples only, the correlation in Switzerland is 0.04 (in 2005), while the others country show correlations from 0.11 in Germany to 0.36 in Finland.

[57] Women with partners in the highest quintile are older (46 years on average,) than women with partners in the lowest earnings quintile (39 years on average). In contrast, having small children is not related to the partner's wage level. The negative relation between working hours and wage of the partner holds both for participation and for the working hours of active women.

Table 14: Decomposition of household income inequality by income source.

	Coefficient of Variation					Income shares			Correlation			
	total	men	women	other	working women	men	women	other	women/ men	women/ other	men/ other	women/ men couple
2000	0.572	0.734	1.313	2.581	0.983	66.3	24.9	8.8	-0.16	0.00	-0.09	0.00
	(0.011)	(0.012)	(0.025)	(0.012)	(0.021)							
2004	0.582	0.789	1.279	2.162	0.980	62.8	26.4	10.9	-0.17	-0.02	-0.09	0.02
	(0.013)	(0.016)	(0.032)	(0.016)	(0.028)							
2009	0.507	0.740	1.141	1.818	0.909	59.9	29.7	10.4	-0.19	-0.02	-0.18	0.00
	(0.011)	(0.015)	(0.027)	(0.071)	(0.024)							
2014	0.528	0.775	1.123	1.655	0.864	59.6	28.6	11.8	-0.18	-0.04	-0.09	0.03
	(0.011)	(0.016)	(0.021)	(0.046)	(0.018)							

Source: SHP 2000-2014. Notes: For correlation of couples, couples where both partners are between 25 and 64 have been selected. n of households: 3589 (2000), 4307 (2004), 3261 (2009) and 5186 (2014).

Figure 13: Weekly working hours of women by wage-quintile of their partner for 2000 and 2014.

Source: SHP 2000 and 2014. Notes: All women 25–64 years of age living with their partner (including inactive); working hours top-coded at 45 hours/week; n: 1410 in 2000, 2178 in 2014.

Whether this change is equalising remains an open question because women's earnings inequality is lower than inequality of other income sources, but higher than inequality of men's earnings. In order to properly test H4 (effect of higher contribution of female earnings to household income), we conduct a shift-share analysis (Table 15), which also tests the overall effect of the increased female labour force participation on household income inequality.

Because the selection of the years influences the results, we show the effect for three different time intervals. The first row shows the CV in t0, the second row shows the CV assuming that only inequality of women's earnings (CV_f) increases to t1 level keeping factor shares, inequality of other factors and correlations among factors constant as in t0. In this scenario, inequality declines by 3.4% from 2000 to 2014. If we adjust the correlation between female earnings and other income sources (men's earnings and other income) to their 2014 values (counterfactual 4), we find that the CV is 2.3% lower than in 2000. In counterfactual 5, we change all the income shares to their 2014 values. This change increases inequality by 3.7%, which is due to a higher importance of (highly unequal) income of other sources for household income. If we change only the share of female earnings while keeping the other factors constant (counterfactual 6),[58] the CV changes by less than 1%, which is against our expectations for H4.

Table 15: Counterfactual distribution of household income for changes between 2000 and 2014 (coefficient of variation).

	2000–2014		2000–2009		2004–2014	
	CV	change since t0	CV	change since t0	CV	change since t0
Coefficient of variation (CV) t0	0.572		0.572		0.582	
(1) women's inequality to t1	0.552	−3.4%	0.554	−11.2%	0.564	−2.9%
(2) men's inequality to t1	0.592	3.5%	0.574	−3.1%	0.575	−1.1%
(3) inequality of other income to t1	0.551	−3.6%	0.554	0.5%	0.567	−2.5%
(4) correlation of female income to t1	0.559	−2.3%	0.559	−3.1%	0.569	−2.1%
(5) all income shares to t1	0.593	3.7%	0.587	−2.3%	0.584	0.4%
(6) share of female earnings to t1	0.575	0.6%	0.577	2.6%	0.582	0.1%
(7) all women's values to t1	0.535	−6.3%	0.537	−6.0%	0.550	−5.5%
Coefficient of variation t1	0.529	−7.5%	0.507	−11.2%	0.529	−9.1%
Change t1–t0 explained by women's labour force participation		84.0%		53.7%		60.1%

Source: SHP 2000 and 2014.

[58] We divided income shares from men's earnings and other earnings in 2000 by 0.95 (100-women's share in 2014)/(100-wome's share in 2000), so that the income shares of the counterfactual distribution add to 100%.

Most importantly, Table 15 shows the inequality level assuming that only elements associated with women's labour force participation changed (correlation, women's share, inequality of women's earnings), while men's earnings and other household income remained constant. For the period 2000–2014, we find that household income inequality declines from 0.57 to 0.53 (−7.5%). This amounts to 84% of the real decrease in income inequality between 2000 and 2014 which can be attributed to female labour force participation. If other years are chosen, female labour force participation however explains only 54% of the change between 2000 and 2009 and 60% of the change between 2004 and 2014. This shows that the rising female earnings have contributed to the small decline in household income inequality in Switzerland.

Household income: Household types

The decomposition by factor shares comes with some limitations, as it can neither show the effect of part-time work nor address the effects of changing household structure. Therefore, we conduct decompositions by household types as described in the methodological part. We distinguish ten groups: male breadwinner couples (1), female breadwinner couples (2), couples where the man works full-time and the woman part-time (3), couples where the woman works full-time and the man part-time (4), full-time working couples (5), and couples where both either work part-time or do not work (6), single women (7), single men (8), single mothers (9) and other households (10), which consist mostly of couples living with children, who contribute to household income.[59]

Results are presented in Table 16. If not stated otherwise, the discussed changes are significant at the 95% confidence level. The ten household types explain 15.7% of total inequality in 2000 and almost the same share (15.1%) in 2014. Most of the inequality is thus within groups.

We first address the role of single and single mother households to test H5. The share of single women has remained relatively stable, which means that H5a can be rejected.[60] Interestingly, more households composed by single women would not even have increased household income inequality because the income level and the inequality of this group are close to the population averages. The situation is slightly different for single men, who show a high average income (ca 23% above the population average) and high (within) inequality level in 2014.

[59] Couples whose children are younger than 18 years old or earn less than CHF. 24,000 per year are considered as couple households.

[60] Although Table 16 suggests an increasing share of single men, a closer examination reveals that this evolution is due to weights provided by the SHP. We choose nevertheless to use weighted data because unweighted data bring other bias.

In contrast, single mother households have the lowest average income of all household types and a high level of within inequality. Given that the share of single mothers has decreased over time, this socio-demographic aspect did not affect inequality (H5b).

Table 16: Decomposition of household income inequality by household types in 2000 and 2014.

	Share 2000	Share 2014	Income 2000	Income 2014	Theil 2000	Theil 2014
Couple: male breadwinner	31.8%	19.1%	0.831	0.791	0.144	0.134
Couple: female breadwinner	2.6%	3.5%	0.692	0.846	0.268	0.129
Couple: man full-, woman part-time	26.8%	30.1%	1.113	1.051	0.118	0.084
Couple: woman full-, man part-time	1.1%	1.9%	1.036	1.192	0.055	0.086
Couple: both full-time	6.9%	9.2%	1.553	1.421	0.080	0.069
Couple: both part-time or inactive	6.2%	7.8%	0.668	0.768	0.227	0.157
Single women	4.2%	4.3%	0.994	0.928	0.136	0.114
Single man	3.6%	4.7%	1.230	1.224	0.105	0.162
Single mother	4.4%	3.6%	0.673	0.709	0.128	0.145
Other households (other earners than couple)	12.5%	15.8%	1.170	1.055	0.091	0.088
Overall	100%	100%	1.000	1.000	0.149	0.122
% between household types					15.7%	15.1%

Source: SHP 2000 and 2014. Notes: Income refers to the ration of mean income of each household type over the population mean income. n of households: 3589 (2000) and 5186 (2014).

After testing the effect of the household composition, we look more closely at couple households. Most importantly, the share of male-breadwinner couples has declined from 31.8% of all working-age households in 2000 to only 19.1% in 2014, whereas the share of full-time working men and part-time working women increased from 26.8% to 30.1%. Full-time working couples have also become more common (6.9% in 2000, 9.2% in 2014), whereas couples with a main female earner remained marginal. It is interesting to compare the inequality and income levels within these household types. Single breadwinner models are more unequal than dual-earner households (the difference is significant in 2014, but it just misses the significance level in 2000) and have a low average household income (83% and 79% of average income). The abandonment of the male breadwinner model contributes thus to a more equal distribution of household income. Turning to the comparison of part-time and full-time working women, we see that the inequality within groups is lower when both partners work full-time, probably reflecting the heterogeneity of working hours among part-time working women. Because full-time working couples have high incomes (1.55 times the average income in 2000 and 1.42 times the average income in 2014), the effect of a switch from

part-time to full-time work on income inequality remains ambiguous and requires additional analyses that we present below. Turning to low work-intense couple households, we notice that their inequality appears quite high. This is probably because the reasons for a low participation in the labour market vary considerably (e.g. from income-rich households whose members do not need to work to unskilled household members excluded from the labour market).[61]

In order to properly estimate the equalising potential of more working women and to compare part-time and full-time work, we have computed a counterfactual analysis with the Theil index in 2000 and 2014 (Table 17).

Table 17: Counterfactual analysis by household type.

	2000	in %	2014	In %
Theil index	0.149		0.122	
1–0 hh. switch to 1–0.5 hh.	0.133	−10.7%	0.107	−11.7%
1–0.5 hh. switch to 1–1 hh.	0.154	3.6%	0.128	5.0%

Source: SHP 2000 and 2014. Notes: 1–0 hh. indicates male breadwinner households; 1–0.5 hh. indicate households where men work full-time and women work part-time and 1–1 hh. indicates household where both partners work full-time.

A limitation of this approach is that selection effects are not taken into account. For example, the counterfactual assumes that inactive women would have similar earnings as women already working. In the first counterfactual, we simulate that all inactive partnered women enter the labour market as part-time workers, which means that all 1–0 type households (group 1) switch to the 1–0.5 type (group 3) keeping other proportions, within-inequality and mean earnings constant. The Theil index in this scenario declines by 10.7 % in 2000 and by 11.7 % in 2014. In the second counterfactual, we simulate that all part-time working women living with a partner switch to full-time, which means that all 1–0.5 type households (group 3) switch to the 1–1 type (group 5) assuming that other elements remain constant. This shows that more full-time work opposed to part-time work has little impact on household income inequality (3.6% in 2000, 5.0% in 2014). Nevertheless, the effect points to more income inequality.[62]

[61] We have also carried out a decomposition of the inequality change proposed by Mookherjee and Shorrocks (1982) for the MLD (mean log deviation). The MLD of household income declined from 0.156 in 2000 to 0.125 in 2014. 75% of this decline can be attributed to inequality within groups, 21% to changes in relative incomes and only 4% to changes in the proportions.

[62] Taking account of the fact that part-time working women tend to have higher earning partners than full-time working women (Figure 12), the adverse effect of more full-time work on inequality is likely to be underestimated in the counterfactuals in Table 6.

Conclusion

This study is a contribution to the growing literature addressing the consequences of demographic changes on household income inequality. While many studies have focused on the rising share of single households, we find that the most striking changes in household types in Switzerland have occurred within couples, as dual-earning couples have replaced the dominant male-breadwinner family. Our analysis has shown that this evolution has kept household income inequality low in Switzerland. Moreover, the small decline in inequality level observed since 2000 can mainly be attributed to increasing female labour force participation. A summary of the hypotheses and the results obtained in this analysis can be seen in Table 18. The first two rows of Table 18 highlight that among the different channels linking female earnings and household income inequality, the homogenisation of women's working hours was the most important. Both women who enter the labour market and part-time working women who augment their work percentage have contributed to the lower variation of working hours, which translates into lower household income inequality. In contrast, potentially offsetting factors, such as a part-time wage penalty or an increasing correlation of partners' earnings, are not relevant for this country. Women over the entire income distribution have increased their participation and their working hours to a similar extent.

The very weak correlation of partner's earnings in Switzerland is striking in comparison to studies on other countries that report positive and strengthening correlations between partner's earnings. One of the reasons for this Swiss particularity is that women with high-earning partners work less than women with low-earning partners. The tax system, progressive childcare costs, attitudes, the gender pay-gap and weak assortative mating could be potential explanations, which need to be addressed in future studies.

While there is extensive evidence that women's entry into the labour market reduces household income inequality, the differences of part-time work compared to full-time work with respect to household inequality has been neglected by previous studies.

Even though our analysis shows clear equalising effects of female labour force participation in general, we find that switching from part-time to full-time work has little impact on income inequality, and that this impact points even towards more household income inequality. Comparative studies are needed to test whether this result is particular to Switzerland. About half of the women in working-age work part-time (between 6 and 35 hours per week) and most of them work more than 50%. Average hourly wages of full-time working women and of women with small and high part-time percentages are very close. This means that part-time work contributes to

income inequality only through the variation in working hours and not through the variation in hourly wages in Switzerland.

Table 18: Hypotheses and results on the impact of increasing female labour force participation on household income inequality.

	Type of change	Effect on household income inequality	Observed result
H1a	All women: Variation in working hours decreases over time	Equalising	Supported
H1b	Working women: Variation in working hours decreases over time	Equalising	Supported
H2	Working women: Positive correlation hours- wage level	Desequalising	Not supported: part-time work is not restricted to low-qualified jobs
H3a	Household: Correlation of partner's earnings more positive over time	Desequalising	Not supported: all women have increased their working hours
H3b	Household: Correlation of partner's earnings less positive over time	Equalising	Not supported: all women have increased their working hours
H4	Household: inequality of income sources: Women's earnings become more relevant for household income	Equalising	Not supported: Women's earnings are slightly more important for household income, but they are more unequal than men's income
H5a	Household structure: More single households	Desequalising	Not supported: single households have not increased, and single women do not display higher income inequality
H5b	Household structure: More single mother households	Desequalising	Not supported: the number of single mothers has declined

While our analysis shows clear equalising effects of female labour force participation up to 2014, the scope for future effects is limited. Considering the high activity rate, the potential of labour market entry is limited. Furthermore, more full-time work opposed to part-time work is not a means

to lower household income inequality further in Switzerland. However, women who increase their working hours from small work-percentages could be beneficial for household income inequality.

Our findings are more than a confirmation of previous studies. The Swiss case shows that increased female labour force participation is equalising even in a context of high female labour force participation. Another important result is that from the perspective of household income inequality, part-time work is not detrimental, but rather beneficial to low household income inequality. We can conclude by saying that high female labour force participation did not come at the price of higher income inequality.

Concluding remarks

Main results

This section highlights the main results of the three articles of this thesis and gives evidence-based suggestions for policy-related issues on female labour force participation and income inequality.

In a country with already high female labour force participation, the first two articles of this study have investigated whether family policies and the economic and attitudinal endowments of households can contribute to expand women's labour supply further. Attention has been paid mainly to the intensity of labour supply and namely to different rates of part-time work.

The first article of this study concluded that the institutionalisation of maternity leave and the expansion of childcare caused a small but significant increase in female high part-time employment (i.e. part-time employment of between 20 and 36 hours per week increased by 2 percentage points). These reforms in family policy were unable to increase maternal labour force participation, but they succeeded in expanding the intensity of participation among already working mothers. However, not all mothers benefitted from this expansion in the same way.[63] Vulnerable groups, such as low-educated mothers, single mothers or large families, were not affected by these reforms,[64] whereas upper-secondary educated mothers of two children, who were married or cohabited with their partner, could benefit from these reforms and increased their labour supply. Vulnerable groups, except for single mothers who have priority access to childcare, were probably not affected by the reform due to the high costs of institutional childcare in Switzerland. Even if childcare availability improved, accessibility might still be difficult for some groups due to high prices (Abrassart & Bonoli 2015). Further studies indicate that childcare costs are likely to be responsible for the reduced saving probability of families in Switzerland (Ravazzini & Kuhn 2018). In West Germany, recent results have also shown that an augmented availability of low-cost, state-subsidized childcare increases mothers' likelihood of returning to employment in the second year after childbirth, when paid leave entitlements expire (Zoch & Hondralis 2017).

Therefore, costs and childcare availability might be the most important obstacles for an increase in the labour supply of all women.[65] Even if the reforms eased labour supply for some population

[63] Recent research has found that more spending leads to higher levels of childcare use, but not directly to lower levels of inequality. For achieving equity in childcare use, government investment should lead to an expansion of childcare places across the income distribution (van Lancker 2018).

[64] Single mothers and large families were particularly touched by the Dot-com crisis (2002-2005) but registered an improvement in their objective and subjective conditions in the years that followed (Simona & Ravazzini 2018). In some cases, this improvement might be linked to more generous family policy after 2005.

[65] For a discussion on the availability vs. affordability of childcare in Germany, see also Kreyenfeld & Hank (2000).

groups, they did not have different effects on natives and migrants.[66] In this sense, the reforms were not discriminatory, but they also did not succeed in satisfying the expectations of some municipalities by attracting high-qualified migrants in cantons that expanded childcare more than the national average. A more refined analysis at the municipal level might however produce different results in terms of mobility. The results indicated also that the reforms did not produce any change in paternal employment. This result would hardly change with a more sophisticated level of analysis. Paternal employment was therefore not touched by the reform and this means that women could work more without needing men to adjust their labour supply. Even if for men it would be difficult to increase their labour supply even further, this different sensitivity of family policies among women and men points to the fact that family remains a women's business.

The second article of this dissertation showed that apart from childcare availability, culture and social norms are important dimensions for women's labour supply in Switzerland. This evidence has been supported by several elements. First, this study found that women's utility of staying home is higher for mothers in the Italian-speaking part of the country and that, controlling for other characteristics, married women prefer to stay home than cohabiting women. Although the lack of childcare in the Italian-speaking part of the country could be an explanation for these results, the combined effect of culture (i.e. the linguistic region) and marital preferences suggests that women with traditional values have stronger preferences for housework than for paid work. Second, the analysis confirmed that gender role attitudes influence women's labour supply in a considerable way. In couples, not only women's gender role attitudes, but also their partners' attitudes play an important role in the choice of working hours. Attitudes affect both the utility of staying home and the reaction to a pay rise. Furthermore, the reaction depends on women's attitudes. Women with home-oriented attitudes reduce their working hours more strongly following a pay rise than women with work-oriented attitudes. The same holds for partners' pay rise: women with home-oriented attitudes reduce their labour supply more than women with work-oriented attitudes if their partner earns more. Therefore, even though the economic impact of partners' income and wages on women's labour supply has reduced over time, partners are still able to affect women's decisions both with their economic and with their attitudinal endowments. For home-oriented women, the

[66] Abrassart & Bonoli (2015) found that childcare use depends also on parents' nationality (e.g. children from South and East European countries are less likely to be found in childcare centres than Swiss children and children from Northern countries. How this is related to the lack of informal childcare (e.g. the proximity of family and grandparents) and therefore to potentially high childcare costs or to home-oriented attitudes and culture is something that remains to be studied in the future.

joint effect of income and of moral pressures to stay home and to take care of children are particularly important.

Within this cultural setting, policies that aim at stimulating labour supply through financial incentives targeted directly on women might thus not produce the expected results. In order to stimulate women's labour supply, it would be better if financial incentives targeted the entire household. Childcare costs are placed on families and might be a good strategy. When costs are low, external childcare is indeed used more also by low-educated households (Abrassart & Bonoli 2015) with more traditional home-oriented values. Financial incentives could also be placed directly on fathers as women's labour supply is responsive to the economic endowment of their partners. Financial incentives for fathers to work part-time might stimulate maternal employment and lead to a more equalitarian division of work within couples. Another strategy to stimulate maternal labour supply could be to shift the focus to non-monetary elements. Among these elements, high quality formal childcare, work-friendly school schedules and flexibility in the workplace and in teleworking might be viable ways to create a more attractive work environment for women with children. From a legal point of view, the constitution of paid paternity leave and incentives to share parental leaves between mothers and fathers could be additional desirable solutions to increase the maternal labour supply and at the same time reach more equality within the household.

The household perspective is not only relevant for the study of female labour force participation, but also for the analysis of the effects of women's labour supply on household income inequality. The last article of this thesis attested the presence of an increasing trend of dual-earning couples compared to the previously dominant male-breadwinner model. Female labour force participation increased between 2000 and 2014 and changes happened mainly within couples, while the proportion single households remained largely unchanged over time. External work duties are therefore more shared among women and men in recent years than before and this had consequences on household income inequality.

Several mechanisms intervened in the relationship between women's labour supply and household income inequality. First, with more female labour force participation, women's earnings inequality declined. Both women who entered the labour market and part-time working women who augmented their hours of work contributed to more homogenous wages among women and to the reduction of inequality. All women increased their working hours, but the scenario could have been different if some groups increased their labour supply more than others. Inequality could have reduced even further if work among potentially low-earning women increased more than among

potentially high-earning women. The first article of this thesis showed that the expansion of childcare was more favourable for the labour supply of women with upper-secondary education who were already working. As the effect on inequality was mainly produced by women who entered the labour market, the expansion of childcare is unlikely to have produced important effects on household income inequality. However, if childcare costs were reduced and more women with low-education entered the labour market, then childcare policies could potentially have an equalising effect on household incomes.

The second mechanism that intervened in the relationship between women's labour supply and household income inequality is the correlation of partners' earnings. In Switzerland, this mechanism has not altered inequality as women over the entire income distribution have increased their participation and their working hours. Despite increasing assortative mating in hourly wages in this country (Ravazzini et al. 2017), the income correlation between partners has remained very close to zero. This could be because after selectivity in the mating process based on wages or wage potentials, wage inequality between partners increases following labour supply adjustments over the duration of the partnership (Ravazzini et al. 2017). If women did not reduce their labour supply over the life course, the correlation between partners' wages could be higher. This would lead to higher income inequality between households. This means that if childcare costs did not only succeed in stimulating potentially low-earning women to work but succeeded also in reducing women's interruptions on the labour market, income inequality could increase. Inequality could increase even further if already working women switched from part-time to full-time work. Even if wages linked to part-time and full-time positions are similar in this country and more women working full-time would not increase the variability in women's wages, inequality between households would increase because of the correlation between partners' incomes. Women living with high-earning partners are currently working less than women living with low-earning partners. If all women became more attached to the labour market and decided to contribute as much as men do, households would probably become more polarised into income-rich and income-poor household. This increase in inequality would not necessarily be driven by a negative phenomenon because women could profit in terms of their realisation on the labour market and in their careers, but it might nevertheless lead to negative externalities, such as high crime rates and low social trust, that must be considered as a social cost. In this case, there would be a trade-off between gendered inequality and total household inequality. Childcare subsidies on one side and taxes on (father's)

incomes on the other side might then be implemented as competing policies to counterbalance these two forms of inequality.

Even if possible, this scenario is however unlikely because housework and childcare responsibilities are difficult to externalise completely. Believing that all women and men could work full-time is also unlikely in the future due to increasing robotization and digitalisation that will substitute part of manual and repetitive jobs. With less traditional gender role attitudes, what could more likely happen in the future is that men will share housework responsibilities and childcare so that both partners would have short career interruptions. If this was the case, income inequality within households would be smaller and therefore gender inequality would be smaller. Yet, the total effect on income inequality is difficult to predict as inequality between households might still increase due to assortative mating. In this scenario, however, inequality would reflect returns to education and be more linked to educational investments than to gender roles. Another question that will remain at that point will be whether different educational fields should have different returns. Currently, it is arguable whether people's effort is represented by educational choices and then fairly rewarded on the labour market. Will we need more programmers or more carers in the future? With more women choosing social disciplines and more men choosing technical disciplines, inequality within and between gender and households will probably depend on which jobs will have the highest demand compared to their supply. In addition, the introduction of new policies, such as a basic income scheme, might shake the rules and alter these socially constructed roles that both women and men are enduring. It is difficult to predict how gender roles, gender stereotypes, returns to education and social policies will change in the next years, but their interactions are clearly something interesting that future research could address.

Future research

The contribution of this study to the overall literature could be extended in several ways.

As previously mentioned, childcare costs are an important element that should be included in the analysis to evaluate why some mothers (e.g. low-educated mothers and mothers with a migration background) do not use external childcare. Like the study of Abrassart & Bonoli (2015) for the canton Vaud, the analysis should go beyond childcare availability and study prices, quality and proximity of childcare places at the municipal level all over Switzerland. This could be done when detailed data about childcare supply and demand become available. In addition to childcare, mothers are affected also by after-school care policies (Felfe et al. 2016). This is particularly important for women with

more than one child and studies that combine childcare and after-school care could provide additional insights on how family policies affect women's labour supply and fertility decisions.

More generally, the conceptual framework illustrated in Figure 4 can establish some new links between separate micro and macro elements, but it represents only a relatively small part of the overall picture. Among the elements that this study has not investigated, it could be examined how gender role attitudes expressed through voting preferences shape the degree of childcare services available to working parents. Although this could be methodologically feasible to study, the path between attitudes and implemented policies is not direct and budget constraints often limit the interpretation. The first article of this study has addressed this concern with a robustness check limiting the analysis to municipalities with similar voting preferences, but a more detailed analysis could be performed in this respect.

Another possible relationship that could be better identified in Figure 4 regarding the socio-political context and gender role attitudes involves female labour force participation. Some studies have found that the level of female labour force participation in the country of origin or in the country of residence shapes the degree of tolerance towards working mothers (Zuo & Tang 2000; Fernandez & Fogli 2009) and is able to predict future levels of female labour force participation (Fernandez 2013). In Figure 4, an arrow could therefore be drawn between female labour force participation at the macro level and gender role attitudes at the micro level. Given the cross-national design that would be required to study this relationship, this dissertation has studied only the direct relationship between individual and partner's attitudes and the number of hours worked by women. A comparative study with many countries would allow for this additional test.

This study has mainly focused on female labour force participation and women's labour supply. Even if the number of hours worked by women could increase, this increase does not necessarily translate into better jobs and better careers. Focusing specifically on women's labour supply and part-time work, this thesis has omitted important indicators about female employment and women's life, such as career progression, job satisfaction and life satisfaction. Future research could address these points and investigate whether external childcare is related to improvements in women's quality of life, careers and self-realisation.

In addition, the impact of partners' economic and attitudinal endowments on other job-related indicators than the number of hours of work worked by women could be something to explore in future research. Although men have a relatively stable labour supply that justifies why many studies consider men as an exogenous element for women's labour supply decision, the repartition of work

and family duties within the household might change in the future and models that are able to capture joint decisions might become the norm. The evolution of work arrangements within couples and the share of single households are likely to determine the most appropriate methodology to use in future research.

More research is needed also in the field of income inequality. Even though income inequality is a source of instability, it is not yet established until which threshold income inequality should be considered normal or even beneficial to stimulate people's efforts. Moreover, an increase in income inequality could be associated with societal changes that could be considered positive from other points of view. Research could go in this direction verifying these trade-offs and finding a threshold of "unfair" inequality that is harmful for the economy and society.

Stable income inequality is a condition that depends also on the stability of the active population. With population ageing and with the baby boomers approaching retirement, other forms of inequality and namely wealth inequality could become more relevant to study the fair distribution of resources within society. Research that focuses on wealth inequality is relevant also from a gender perspective as women accumulate less wealth than men over their life-course. Partners' effects on wealth accumulation are also something that could be investigated more in the future. How pensions could be tailored to decrease this inequality and which political measures could be taken to contain wealth inequality is an open field for future research.

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