

The Labour Supply of Mothers

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Abstract

This chapter surveys recent literature on the drivers of mothers' labour supply in OECD countries. We present a number of facts on the variations across time and across countries of family composition and mothers' employment. We aim to answer key questions on their decision to return to work after childbirth: How is the decision taken within the household? What are the contemporaneous and longer term determinants of this decision? What other lifecycle choices are interrelated with the labour supply choice? How do social norms and policy influence this decision? What role is there for policy to play in households' decision regarding mothers' participation in the labour force? We aim to summarise the main results from recent research on these questions. We will see that there are large variations in the policy choices made in different countries, which may reflect both the difficulty of designing an optimal mix of policies and the diversity of societies' perceptions of women combining motherhood and career.

Keywords: Labour force participation, hours of work, children, collective model, wages, childcare, social norms.

1 Introduction

Even in OECD countries where fertility rates have declined over the last decades, over 80% of women will become mothers at some point in their working age. The majority of these will have two children around 2 or 3 years apart and thus spend at least 20 years of their adult lives with a child under 18. It has been well documented¹ that the presence of children impacts most on mothers' labour supply in the first 6 years. In other words, 80% of women will face a large childcare need for at least 8 years of their working age, i.e. 16% of their potential career. Mothers of young children are thus a sizeable fraction of the working age population and the analysis their labour supply behaviour is an important component of our understanding of the labour market as a whole.

This chapter will survey recent work on the determinants of labour force participation and hours worked by mothers. We will explore stylised facts, theoretical considerations, empirical results and policy implications. Our review of the literature does not aim to be exhaustive –the literature is too ample for this– neither in terms of the articles mentioned nor in terms of the angles from which economists have tackled our central question. Rather it will be the author's take on the main lines of research and approaches taken to analyse and understand the determinants and consequences of the labour supply of mothers. We will recognise that labour force participation decisions are intertwined with other important decisions in the woman's lifecycle such as education, occupation, marriage, fertility and divorce. We will also explore the ways in which policy may have a role to play –with the availability and cost of childcare, the gender wage gap, the availability of part-time work, the mode of taxation and divorce regulations. At the same time, we will recognise that social custom and beliefs about the importance of parental input for child development also play a role in household labour supply decisions and affect labour supply elasticities of mothers.

Earlier surveys on female labour supply can be found in Killingsworth and Heckman [1986] and Blundell and MaCurdy [1999]. Doepke and Tertilt [2016] and Greenwood et al. [2017] provide reviews of the literature on family behaviour within macroeconomic frameworks. A new handbook on family policies, Nieuwenhuis and Van Lancker [2020], surveys recent questions

¹See section 2.

and choices on a variety of government interventions targeted at families and provides very rich historical data on these policies for a number of countries. The focus of the empirical evidence cited in this chapter and of the issues considered relate to developed countries. Another chapter in this handbook, Bhalotra et al. [2021], looks at labour supply and fertility more specifically for developing countries.

This chapter is structured as follows. The next section reviews stylised facts on family composition and maternal employment rates. Section 3 discusses the mode of decision making that is relevant for the labour supply of mothers. Sections 4 (and 5 respectively) survey findings from the literature regarding the contemporaneous (respectively future) determinants of the decision to work in the presence of a child in the household. In Section 6 we look at other lifecycle decisions which are linked to the decision to supply labour, either because they precede it or because the anticipation of these happening in the future has an effect on how much to work. Finally, Section 7 reviews the role of policies, the different kinds of policies implemented, the role of custom. It also discusses the rationale for family policies.

2 Some stylised facts

A wealth of data on families in OECD countries is now available in the OECD Family Database (see OECD [2022], and Adema et al. [2009] for a description of the dataset). We will highlight here some key facts relevant to the focus of this chapter. For the sake of clarity we will only report figures for 10 countries: the US, Japan and 8 large European countries. Data on the same variables for other OECD countries is available in OECD [2022].

As mentioned in the introduction, a large fraction of working age individuals live in households with a pre-school age child. Table 1 shows the fraction of all households with children under 6 in 2015. It is lowest in Germany in Japan at 8.23% and 8.66% respectively and highest in Poland and the UK at about 15%. Among households with children (of any age), the fraction of single parents, most often mothers, varies substantially across countries, from 14% in Japan to 32% in the US (also shown in Table 1). Our analysis of mothers' decision to supply labour thus needs to take into account that approximately 80% of them take this decision within

Table 1: Household composition

	% of all households (2015)	% of households with children (2011)	
	with children under 6	couples	singles
France	12.66	0.78	0.22
Germany	8.23	0.79	0.21
Italy	10.26	0.83	0.17
Japan	8.66	0.86	0.14
Netherlands	10.50	0.82	0.18
Poland	15.02	0.79	0.21
Spain	12.43	0.84	0.16
Sweden	9.36	0.79	0.21
United Kingdom	14.95	0.72	0.28
United States		0.68	0.32

This is an extract of Tables SF1.1.a and SF 1.1.B from the OECD Family Database (OECD [2022]) and author's calculations. For full details on data sources, see https://www.oecd.org/els/family/SF_1_1_Family_size_and_composition.pdf.

Table 2: Maternal Employment

	all mothers	by partnership status		by age of youngest child		
		in a couple	singles	0-2	3-5	6-14
France	73.0	74.5	66.4	60.0	73.8	80.1
Germany	73.2	73.2	72.9	56.4	75.5	82.5
Italy	57.5	56.7	63.6	52.1	56.8	60.3
Japan				55.1	69.4	78.4
Netherlands	80.1	82.1	66.9	77.9	77.4	82.4
Poland	70.3	71.1	65.4	58.1	68.2	78.7
Spain	67.5	67.8	64.9	61.3	68.1	69.9
Sweden	86.1	87.2	80.8	82.0	86.1	88.7
United Kingdom	74.2	76.3	67.4	66.1	71.5	80.6
United States	70.0	68.4	74.9	61.0	67.6	74.7

This is an extract of Chart LMF1.3.A. "Employment rates for partnered mothers and single mothers, 2019 or latest available" from the OECD Family Database (OECD [2022]). For full details on data sources, see https://www.oecd.org/els/soc/LMF_1_3_Maternal_employment_by_partnership_status.pdf.

a couple. This will be discussed more thoroughly in Section 3.

Table 2 suggests that partnership status is correlated with maternal employment as is the age of the youngest child. In all countries in our sample, rates of maternal employment are higher for mothers in a couple, by on average 4 percentage points, and rise with the age of the youngest child, from 63% for mothers of children under 2 years old to 71% (respectively 78%) for children aged 3 to 5 years old (respectively 6 to 14). Variations across countries are sizeable and at their largest for mothers of very young children, where they range from 52.1% in Italy to 82% in Sweden.

These aggregate figures on employment rates may conceal differences on the intensive margin, i.e. on the number of hours worked by employed individuals. Tables 3 and 4 give more detail on the breakdown of employment rates into full-time work and part-time work, for couples with children and single parents respectively.² In 2019, the countries with the highest degree of specialisation within couples, with one spouse working full time and the other staying out of the labour force, are Italy, the US and Spain with around 30% of households choosing this division of labour. Three quarters of couples with children in Sweden choose to have both parents working full time, thus having a more equal allocation of time across spouses between paid work and home production. France and the US also have a large share of households with children where both spouses are in full-time work, with around 50% of households choosing this option. The US shows the greatest of polarisation of labour supply decisions, with large shares of couples with children choosing to have either both parents working full-time or one parent not working at all. The intermediate option, where one spouse, most often the father, works full-time while the other, most often the mother, works part-time, is championed by the Netherlands, where half the couples with children choose this, followed by Germany and the UK where about a third of households with children choose the full-time/part-time combination. The most striking feature of the evolution of these labour supply choices since 2010 is the increase in the share of couples where both parents work full time. This share has increased by nearly 10 percentage points in all the countries in our sample, except Italy and France where this increase has been more modest.

The employment patterns of single parents, who are predominantly mothers, show similar

²Note that this data is missing for Poland and Japan.

Table 3: Couples with Children: Employment Patterns in 2019 and change since 2010.

	both FT		one FT, one PT		one FT, one NP		both NP	
	2019	<i>change</i>	2019	<i>change</i>	2019	<i>change</i>	2019	<i>change</i>
France	52.19	2.66	14.63	-2.25	22.25	-2.34	5.94	1.12
Germany	31.19	9.22	38.02	-1.69	22.47	-7.46	4.42	-0.03
Italy	32.05	1.85	18.85	0.41	36.29	-4.57	7.03	0.53
Japan								.
Netherlands	26.44	9.79	50.10	-7.33	15.69	-2.44	2.71	-0.34
Poland								
Spain	43.84	8.97	14.10	1.25	28.09	-8.38	5.40	-4.28
Sweden	74.89	9.53	7.70	-3.67	11.88	-5.74	2.20	-0.16
United Kingdom	38.37	10.17	31.38	-2.48	19.83	-3.55	3.01	-3.61
United States	50.52	8.71	11.97	-1.63	32.12	-3.05	2.88	-2.37

This is an extract of Chart LMF2.2.A "Patterns of employment in couples with children" from the OECD Family Database (OECD [2022]). For full details on data sources, see <https://www.oecd.org/els/family/LMF-2-2-Distribution-working-hours-couple-households.pdf>.

Change: Percentage point change in the distribution of employment patterns in couples with at least one child aged 0-14 between 2010 and 2019

FT: full-time, PT: part-time, NP: non-participant. The complement to 100% is "Other".

Table 4: Single Parents: Employment Patterns in 2019 and change since 2010.

	FT		PT		NP	
	2019	<i>change</i>	2019	<i>change</i>	2019	<i>change</i>
France	56.69	3.94	12.30	-3.38	29.68	-1.32
Germany	47.61	9.45	26.31	-0.21	26.08	-9.24
Italy	45.77	-2.95	19.85	-1.44	34.17	4.21
Japan						
Netherlands	37.31	6.47	31.64	-5.18	31.05	-1.30
Poland	60.44		6.55		32.96	
Spain	49.63	1.94	14.26	0.48	33.92	-2.95
Sweden	76.06	17.40	10.73	2.43	12.76	-19.14
United Kingdom	33.79	9.52	33.71	6.59	31.86	-16.17
United States	66.54	10.96	8.92	-1.01	24.25	-9.98

This is an extract of Chart LMF2.2.A "Patterns of employment in couples with children" from the OECD Family Database (OECD [2022]). For full details on data sources, see <https://www.oecd.org/els/family/LMF-2-2-Distribution-working-hours-couple-households.pdf>.

Change: Percentage point change in the distribution of employment patterns in single parents with at least one child aged 0-14 between 2010 and 2019.

FT: full-time, PT: part-time, NP: non-participant. The complement to 100% is "Working –no information on hours".

trends. In Sweden and the US, 76% and 67% (respectively) of these households work full-time, while only about a third of them do so in the Netherlands and the UK. These last two countries exhibit the highest shares, also about a third, of single parents working part-time. In Poland and the US, this choice is not as popular –or available– with under 10% of single parents choosing part-time employment. Across our sample, about a third of single parents do not work at all, with Sweden being an outlier at only 13%. Over the decade 2010-2019, the rate of employment of single parents has risen substantially in all countries but Italy, with full-time employment rates gaining up to 17 percentage points in Sweden. In most countries, this shift is accompanied by a decline in non-participation. One exception to the general trend is the UK, where both full-time and part-time employment have risen by 9.5 and 6.6 percentage points respectively.

Table 5: Average number of children born per woman over a lifetime

	1970	1995	2019	<i>Change since 1970</i>	<i>Change since 1995</i>
France	2.48	1.71	1.83	-0.65	0.12
Germany	2.03	1.25	1.54	-0.49	0.29
Italy	2.43	1.19	1.27	-1.16	0.08
Japan	2.13	1.42	1.36	-0.77	-0.06
Netherlands	2.57	1.53	1.57	-1.00	0.04
Poland	2.20	1.55	1.42	-0.78	-0.13
Spain	2.90	1.17	1.23	-1.67	0.06
Sweden	1.94	1.74	1.70	-0.24	-0.04
United Kingdom	2.43	1.71	1.63	-0.80	-0.08
United States	2.48	1.98	1.71	-0.77	-0.27

This is an extract of Chart SF2.1.A. "Total fertility rate, 1970, 1995 and 2019" from the OECD Family Database (OECD [2022]). For full details on data sources, see https://www.oecd.org/social/family/SF_2_1_Fertility_rates.pdf.

Changes: Percentage point change in fertility rates between said year and 2019.

Table 5 shows the evolution of fertility rates since 1970. The average number of children born per woman over a lifetime was around 2.5 for most countries in our sample in 1970 and has decreased to around 1.6 in 2019. The bulk of the decrease occurred between 1970 and 1995, followed by stable birth rates since 1995. Outliers are Sweden, which showed a low fertility rate of 1.94 in 1970 and has only decreased by 0.24 child per woman since then, while for Spain, the

fertility rate was the highest in our sample at 2.90 in 1970 and exhibited the sharpest decline, by 1.73 children per woman, between 1970 and 1995.

Table 6: Marriage and divorce rates

	Marriage			Divorce		
	1970	1995	2019	1970	1995	2019
France		4.4	3.5		2.1	1.9
Germany	7.4	5.3	5.0	1.3	2.1	1.8
Italy	7.3	5.1	3.1		0.5	1.4
Japan	10.0	6.4	4.8	0.9	1.6	1.7
Netherlands	9.5	5.3	3.7	0.8	2.2	1.7
Poland	8.6	5.4	4.8	1.1	1.0	1.7
Spain	7.3	5.1	3.5		0.8	1.9
Sweden	5.4	3.8	4.7	1.6	2.6	2.5
United Kingdom	8.5	5.6	4.4	1.0	2.9	1.8
United States	10.6	8.9	6.1	3.5	4.4	2.7

This is an extract of Chart SF3.1.A and Chart SF3.1.C. "Crude marriage (resp. divorce) rate, 1970, 1995 and 2019" from the OECD Family Database (OECD [2022]). For full details on data sources, see https://www.oecd.org/social/family/SF_3_1_Marriage_and_divorce_rates.pdf.

Rates refer to the numbers of marriages and divorces during the year per 1000 people.

The rates of marriage and divorce for our sample of countries are shown in Table 6. Marriage rates exhibit a continuous decline in all countries, by about two thirds over the whole period. One exception is Sweden, where most of the decline seen between 1970 and 1995 was reversed in the subsequent period 1995-2019. At the end of the period, an average of 4.4 marriages are observed for 1000 people in each country in our sample, with a minimum of 3.7 in Italy and a maximum of 6.1 in the US. Divorce rates were not observed (in OECD [2022]) in France, Spain and Italy in 1970. Among the other countries, divorce rates have increased between 1970 and 1995, most notably in the UK and the Netherlands where they have nearly doubled. In the next 14 years, divorce rates have plateaued or decreased in most countries. In Italy, Spain and Poland however, these rates have increased by 180%, 140% and 70% of their 1995 levels, respectively.

At the end of the period, the average rate indicates that 1.9 divorces occur for 1000 people in the countries observed here.

A number of articles in the recent literature look at long-term trends in female labour supply and family composition.

Attanasio et al. [2008] for the US. They compare three cohorts of American women, born in the 1930s, 1940s, and 1950s. They observe a remarkable change in labour force participation of mothers between the second and third cohorts in particular. While only 47% of mothers of children under 3 were in employment in the former cohort, this figure is 66% in the latter. Doepke and Tertilt [2016] document some of these large changes in family formation, expansion and dissolution as well as in female employment. They comment that given the magnitude of these changes, one should expect changes in the nature of family bargaining and commitment and recognise the impact of this on the analysis of family behaviour within macroeconomic models. Greenwood et al. [2017] linked these changes with the time use of both parents over the period 1960 to 2010. They note that non-market hours devoted to home production (such as house cleaning and maintenance, meal preparation and food shopping) have increased by 26% for men while they have decreased by 42% for women.

3 Decision-making entity

In order to rationalise labour supply choices observed in the data, researchers have modelled the decision to participate in the labour market and how many hours to work for. The first step in this modelisation is to define the entity making this decision, i.e. the objective function that will be maximised in the optimisation process. The majority of the literature adopts one of the following options.

In Blundell et al. [2016a], the decision maker is the woman as an individual, either single or married mother, reacting to tax and benefit reforms in the UK. Lone mothers have been a target for welfare reforms since they are relatively responsive to incentives in terms of their labour supply and relatively vulnerable to poverty. Likewise, Francesconi [2002] and Adda et al. [2017] propose models of individual labour supply, referring to women either living as

singles or married³ and taking the labour earnings of their spouse as given.

Another strand of literature, including Blau and Robins [1988], Bick and Fuchs-Schündeln [2018], Blundell et al. [2016b] Chiappori et al. [2018], Eckstein and Wolpin [1989], Guner et al. [2012a] adopt the unitary model of household decision making. This boils down to assuming either that both spouses have the same preferences or that one spouse makes all the decisions. Either way, the household maximises a ‘unitary’ utility function which is fixed in time. An implication of this model is that household members pool their resources so that decisions made are independent of the shares of household budget brought in by each spouse. This has been empirically rejected by a number of studies, e.g. Thomas [1990] and Browning et al. [1994]. The simplicity and tractability of the unitary approach nevertheless make it a popular choice.

The third option, as developed by Chiappori [1992] and called the ‘collective’ model, assumes that spouses in a marriage enter into bargaining when making decisions, so as to reach Pareto efficient allocations. This applies to consumption decisions as well as labour supply choices. Spouses may have different preferences and whether the household’s behaviour resembles one or the other spouse’s depends on their respective strength in household bargaining. In contrast with the unitary framework, shares of household income brought in by each spouse now matter in the choices made, as does any factor affecting the relative strength in negotiations of the two spouses. In this case, the decision-making entity is a “mythical hybrid” (Basu [2006]) and maximises a linear combination of the utilities of the two spouses.

Empirical evidence lends support to the collective model over the unitary assumption, for example in Fortin and Lacroix [1997]. Using Canadian data, they test the income pooling hypothesis for couples of various ages and different family composition. Their results support the collective model of household labour supply for all sub-groups except young couples with very young children. Examining this exception, the authors point to the possibility that preferences of parents of pre-school children may be non-separable in goods consumed by the two spouses, leading to the rejection of their framework by the data for this sub-group. Exploring this question further, Blundell et al. [2005] introduce public goods into the collective framework, arguing that households with children cannot be adequately described in a model with private commodi-

³In Francesconi [2002], women are always married, whereas Adda et al. [2017] consider changes in marital status over the lifecycle.

ties only. They show that the use of a collective model to understand couples' decisions is a useful tool to assess policies targeting certain benefits or taxes to a specific spouse. Indeed, by affecting the relative shares of household income brought by the two spouses, these policies affect the spouses' weights in the household objective function and thereby the households' decisions. This has consequences in terms of intra-household distribution of welfare, as well as children outcomes, for which the two parents often have different preferences.

While much of the literature on collective decision making regarding consumption choices initially focused on a static setting, Mazzocco et al. [2014] stressed the importance of introducing an inter-temporal dimension to the analysis, particularly to understand the determinants and consequences of labour supply decisions. This however raises the difficulty of redefining the Pareto efficiency inherent to collective models in a dynamic setting. As the authors stress, in order to qualify for efficiency in the dynamic sense, household decisions need to be on the ex ante Pareto frontier. But then this requires spouses to be able to commit to future allocations too. Evidence presented by Mazzocco [2007] with US data rejects the hypothesis that households operate under full commitment and concludes to the need to include limited commitment in models of household decision making.

Indeed, full commitment may not be rational when outside options of the two spouses vary over time. If there is still a positive surplus in the marriage but one of the spouses derives a value from staying in the marriage that is lower than in a potential divorce, he or she will be in a position to force a renegotiation of the Pareto weights in the household decisions and the other spouse will rationally accept the renegotiation rather than proceed with divorce. This 'limited commitment' version of the household model is akin to models of informal mutual insurance within households as in Ligon et al. [2000], recursive contracts in Marcet and Marimon [2019] and mutual consent wage renegotiation as in Postel-Vinay and Turon [2010].

In their survey of the literature on household decision making, Chiappori and Mazzocco [2017] also consider the case where decisions taken within the household may affect outside options. The authors compare the efficiency achieved under a limited or full commitment model when such a feedback channel is present.⁴ The choice of household labour supply and specialisation in childcare and home production is directly concerned with this question since reducing

⁴We will discuss this in more detail in Section 5.2

labour force participation to take care of children will typically decrease the (potential) wage (see below in Section 5.1) and hence the outside option of the spouse reducing labour market hours. In this case, the only way to access the efficiency gains afforded by intra-household specialisation is to renegotiate the post-divorce outcomes.

Turon [2019] also discusses the consequences of household specialisation on mothers' outcomes. In a limited commitment setting, among households who value highly that childcare is delivered by a parent rather than a nursery, the mother drops partially or fully out of the labour force, leading to a decrease of her potential wage and a decrease in her power in household decisions.

The literature has introduced yet other ways to model household decision making. In Goussé et al. [2017] spouses share the surplus between the value in marriage and the divorce outside options by Nash bargaining. Each spouse enjoys a constant share of the surplus. Pareto weights in the household utility function are thus continuously adjusting (when either the value of marriage or the individual values of divorce change), contrasting with the infrequent adjustments of the limited commitment model. While divorce is usually considered as the relevant outside option in household negotiation, Lundberg and Pollak [1993] argued that more realistic threat points in daily bargaining is a non-cooperative equilibrium where each spouse contributes to the household along the 'separate spheres' model, i.e. along a specialisation pattern akin to prevailing social norms. Finally, some authors have raised the possibility that children may have a direct weight in decision making. For example, Dauphin et al. [2011] test within a collective model and with UK data the influence of children in parents' decision making. They conclude that children aged 16 to 21 as well as daughters over 22 have a positive weight in the family utility function.

4 Contemporaneous determinants

The majority of the literature frames women or households' labour supply decisions in a lifecycle model, where the determinants of these decisions are a combination of a contemporaneous trade-off from employment and motherhood and the anticipation of dynamic effects of today's

labour supply decisions. We will review the dynamic effects in Section 5 and focus here on the current period costs and benefits of taking employment in the presence of (young) children, from pecuniary considerations to utility gains of caring for one's child oneself or spending leisure time with one's spouse. While most results reported here for individual countries have policy implications, we are postponing a general policy discussion and international comparison to Section 7.

4.1 Wage and tax treatment

Whatever the mode of household decision described in Section 3 the couple is likely to consider the mother as the secondary earner, either because gender gaps persist (see Blau and Kahn [2017] for a survey) or because women make education and/or occupation choices which yield lower labour market value (see Sections 6.1 and 6.2 below). This is of course a two-way relationship, as highlighted by Gronau [1988], who argues that women, anticipating interruptions in their careers, invest less than men in on-the-job training and end up working in jobs with lower skill intensity, which in turn lowers their potential wage and makes career breaks less expensive. In times of negative shock to household income, adjustment to the labour supply of the female spouse may nevertheless be used to smooth fluctuations in the household budget. With data from the PSID in 1999-2009, Blundell et al. [2016b] find evidence of an insurance mechanism against permanent shocks within the household.

As Guner et al. [2012b] explain, under joint taxation as in the U.S., and depending on the father's income, high marginal tax rates on mothers' potential income are a strong disincentive to work. These authors evaluate the potential benefits of a proposed policy of taxing households in a proportional way, i.e. with a constant marginal rate so as to mitigate the disincentives to work derived from high marginal tax rates when husbands' earnings are substantial, or to tax women at lower rates than men. Their policy experiments with a calibration of their model to US data for 2000 suggest that these proposals would boost the labour supply of married women and increase output. Taxation is another policy tool to influence the financial benefit of mothers' labour supply. Two aspects are relevant: whether spouses in a household are taxed individually or jointly, and the degree of progressivity of the tax schedule.⁵ As Guner et al. [2012b] un-

⁵Progressive taxation was shown to matter in the estimation of labour supply elasticities by Blundell et al.

derline, the widespread evidence that labour supply elasticities are greater for females than for males should induce the policy maker to tax labour earnings for women less than men. The authors calibrate a lifecycle model of household labour supply to US data to assess this statement and do find that such a policy would increase aggregate welfare and gain majority support. In another article Guner et al. [2012a]) evaluate the impact of two revenue-neutral tax reforms. The first one introduces a flat rate of income tax, the second one lets spouses file taxes separately. They find substantial increases in labour supply, particularly for married women with children. These results show that the combination of a progressive tax schedule with a system of joint taxation is a deterrent to the labour supply of married mothers.

4.2 Childcare cost and availability

Now turning to the monetary costs of mothers' labour supply in the presence of young children, we examine the role of childcare costs and of the availability of nursery places. Indeed, as early estimates by Blau and Robins [1988] with US data for 1980 show that the participation decision of married women with young children is sensitive to the price of market childcare, with an estimated elasticity of -0.38. Childcare costs are substantial in the US: Attanasio et al. [2008] report them to range from \$300 to \$700 per month/child, which can mount up to 53% of a woman's average wage. Over time, they have however decreased markedly, and this decrease explains the bulk of the increase in participation of mothers of young children between the generation born in the 1940s and the generation born a decade later. Attanasio et al. [2008] also find evidence that the increase in returns to experience for women account for a large part of the increase in mothers' labour supply over this time frame.

Guner et al. [2012a] examine recent levels of childcare costs in the US with the Survey of Income and Program Participation and find that, in 2005, among childcare-using mothers who are employed and with children under 5, the yearly childcare bill is over \$6000 and is equivalent to about 10% of average household income.

Calibrating their structural model to the US economy, Guner et al. [2020] find that a rise in childcare credit conditional on work does increase the participation of married mothers by [2016b].

10.6% and would be supported by a majority. They explore the relative benefits of policies being conditional on participation or not, universal or means-tested, lump-sum or proportional to childcare expenses. In terms of welfare, they find that means-tested unconditional transfers are best, since they focus on low-income households where women do not work. They find that subsidies that are conditional on work generate large labour supply responses of married mothers, thereby increasing aggregate human capital and output. Increasing (unconditional) child credits however have the opposite effects as the income effect attached to them disincentivises participation.

As mentioned in Section 6.4 Haan and Wrohlich [2011] also find that child care subsidies targeted at working mothers induce sizeable employment effects with data from the German Socio Economic Panel (SOEP). Bick [2016] provides evidence for West Germany of the importance of market childcare availability for maternal labour supply. He finds that many mothers of children under two years old who work part-time would move to full time if more subsidised childcare was available. Koll et al. [2019] evaluate the potential for childcare subsidies to induce maternal labour supply and to be self-financing in the long-run through accrued income tax receipts to the government budget. They calibrate their model to Germany in the period 2000 to 2017 and find that subsidies conditional on full-time work are 75% self-financing in the long run. Comparing the progressivity of the childcare price schedule to that of the income tax rates, they also find that the latter allows for more effective redistribution than the former. In other words, the marginal excess burden attached to the childcare fee schedule is greater than that of the income tax schedule, suggesting that childcare subsidies are too progressive in Germany, i.e. that their gradient with household income is too steep and redistribution through progressive income tax is less distortive.

For some families, the mother's labour supply does not necessarily hinge on the availability or affordability of market childcare: many parents have parents and relatives nearby who can provide informal care for their children at no or little cost. As Blau and Robins [1988] point out, the labour supply decision is then accompanied by a comparison of cost and quality between market childcare and informal childcare. Bick and Fuchs-Schündeln [2018] report an average of 28% pre-school children benefiting from some kind of informal childcare in their sample of OECD countries. They also find a clear negative association between the extent of informal

childcare and the size of public expenditure on childcare provision, suggesting some degree of substitution between the two. Blundell et al. [2016a] include the possibility of informal childcare in their structural model and estimate the probability of access to it to be 42% with their data for the UK from 1991 to 2008. In Koll et al. [2019] access to informal childcare is heterogeneous and unobserved. It is cost-less but households do not value it as much as care of the child by its mother. Its presence affects the sensitivity of mothers' labour supply to childcare reforms.

4.3 Disutility of joint work

Substantial heterogeneity in households childcare and labour supply choices remain once the above factors have been taken into account. As acknowledged in Goussé et al. [2017] structural models need to include unobserved heterogeneity in households' preferences in order to fit the data. In Guner et al. [2012a] this is captured by a term representing the disutility of joint work which may be related to children and coordination costs. Bick and Fuchs-Schündeln [2018] also introduce a utility loss from joint work by the two parents, reflecting either the difficulty of organising joint home production and leisure or time with the children. In Turon [2019] and Koll et al. [2019] this term is understood as a taste for childcare by a parent as opposed to a relative or a market provider. The distribution of this taste is estimated within a structural model and reveals substantial heterogeneity across households in this dimension. This in turn drives some dispersion of households' responses to potential childcare reforms, since some households may be easily enticed to work if childcare is affordable whereas others have a large willingness to pay to have a parent looking after their young children.

While the above suggests substitutability between the spouses' non-work time, Blundell et al. [2016a] find evidence of Frisch complementarity between the leisure times of the spouses with UK data. The results by Cosaert et al. [2020] with data for the Netherlands from 2009 to 2012 also suggest that households value leisure time together, which they name 'togetherness' and reveal that some households are prepared to forego potential benefits of specialisation in home production and work to enjoy time together. Goux et al. [2014] use the natural experiment provided by the reduction of the working week in France – at constant earnings – to look at the response of hours worked by both genders. Husbands of women whose working time was

affected by the reform reduced their own hours worked by half an hour, suggesting a taste for time spent together. Substantial heterogeneity in responses was found by the authors, which suggested that the presence of young children affects the complementarity in the spouses' non-work time.

5 Dynamic determinants

We have reviewed the main determinants of the labour supply decision in the static sense. It is however important to recognise that agents will anticipate the impact on their current decisions on future outcomes. As we will see below, whether the mother works this period or not will influence the wage that she commands on the labour market in future years. Through the lens of the limited commitment model this will have consequences for her power in intra-household bargaining. It may also affect future outcomes for the couple's children. In turn, these changes will affect future household labour supply decisions. As Eckstein and Wolpin [1989] pointed out, a feature of the data is the individual persistence of women's labour market trajectories, in that women who participate in the labour force this period are more likely to participate in the future. The literature on dynamic models of labour supply and other lifecycle decisions⁶ has greatly expanded over the last 30 years and offers a rich understanding of the combination of current and anticipated consequences of the household's decisions. For example, Sheran [2007] argues that dynamic models allow the researcher to apprehend the interdependence of current and future decisions as well as the links between labour supply with other major life decisions such as education, marriage and fertility. This section reviews the three main channels through which the dynamic dimension of the labour supply decision emerges, next section will examine related lifecycle choices.

5.1 Wage penalty

Career breaks in motherhood are the main driver of the increase in the gender gap over child-bearing years. Conversely, the anticipated wage penalty from dropping out of full-time employ-

⁶See Section 6 for more on these other lifecycle choices.

ment is a crucial consideration in the labour supply decisions of forward-looking households. Empirical results on the wage impact of these labour market choices are plenty. With data from the U.S. National Longitudinal Survey of Young Women over the years 1968-1991, Francesconi [2002] finds strong persistence in the decision to work full time. He estimates that remaining in employment on a part-time basis does not allow mothers to accumulate returns to experience comparable to those of full-time work. Blundell et al. [2016a] similarly find that returns to experience are only sizeable in full-time employment, with part-time employment merely slowing down the depreciation of human capital attached to non-participation. Guner et al. [2020] find that these penalty of non-participation depends on skill. With US data, they calibrate these yearly penalties to be 2.5% for unskilled women, and 5.6% for skilled women.

With UK data over the period 1991-2018 Costa Dias et al. [2020] support these findings: they find that only full-time employment leads to wage growth and that differentials in returns to experience across labour market choices depend on skill, being much smaller for women with no university education relative to graduates. The authors document the increase in the gender pay gap over the lifecycle, particularly over the childbearing period and find that around two-thirds of this increase between the birth of the first child and the time it reaches age 20 is due to the drop in accumulated experience for university-educated mothers. The corresponding figure for mothers without university education is one third. Participation in the labour market is not enough to preserve returns to experience: Costa Dias et al. [2020] find that the selection of mothers into jobs that are compatible with childcare timings or into part-time contributes substantially to the widening of the gap between mothers' and fathers' career paths. They identify scope for further research to understand the lack of returns to experience in part-time employment and suggest the lack of on-the-job training and the loss of informal networking opportunities as potential culprits.

It is interesting to look at the evolution of this gap over cohorts. This is what Juhn and McCue [2017] by comparing individuals in the US born between 1936 and 1985. They too find that the gender gap opens up at the time of children's arrival: before children, the gap between married women and single women has decreased markedly. The presence of children remains associated with lower earnings for mothers. This gap is greater for married mothers than for single mothers, even if it has decreased in more recent cohorts, as married mothers

are not reducing their hours of work as much as in the past. A rise in assortative matching in marriage has also occurred, which the authors attribute to the lesser need for specialisation in home production and labour market work in the later stages of the sample period. They however mitigate this statement regarding the specialisation in the care for very young children.

Kleven et al. [2019b] also find that a large part of the gender gap is linked with the presence of children, as mothers reduce labour force participation or hours of work. Using Danish administrative data from 1980-2013 they estimate the resulting long-run earnings gap to around 20%. With other sources of gender inequality having decreased, they find that the fraction of the gap accounted for by ‘child penalties’ has increased from 40% to 80% over their sample period. Besides, their results point to a possible transmission of preferences regarding family and career across generations, more specifically from parents to daughters. In subsequent work, Kleven et al. [2019a] estimate ‘child penalties’ across different countries and find notable differences in the magnitude of the long-run effects of children on mothers’ earnings. Ten years after the birth of the first child, these penalties amount to 25% of pre-children earnings in Denmark and Sweden, 40% in the US and the UK and about 50% in Austria and Germany.⁷

5.2 Endogenous bargaining power

We saw above that mothers’ reduced hours of work in their children’s early years causes their earnings to fall behind their spouse’s in the long run. Thinking back of the bargaining process occurring for example in limited commitment models described in Section 3 gives us a clear intuition as to why this widening earnings gap is likely to yield a decrease in the power of the mother in household bargaining. This feedback effect of previous household decisions on current bargaining strengths within the household is the point developed by Basu [2006]. His argument goes as follows. The household decision-making entity reflects a mix of the two spouses’ preferences, with weights illustrating the current balance of power. When taking labour supply decisions, this entity anticipates that they will have an impact of the spouses’ (potential) wages and thus on their strength in bargaining. This means that the current entity foresees that the future household will have different preferences from itself since the balance

⁷For precise figures see Kleven et al. [2019a] Figures 1 to 3.

of power will have changed –as a result of today’s decision. An interesting detail is that the current entity still evaluate future utility flows in terms of its *own* preferences. Basu [2006] thereby shows how female labour supply is both determined by the current balance of power in the household and bears an impact on the future balance of power.

The endogeneity of bargaining power described above cannot occur under full commitment where Pareto weights in the household utility function are fixed. However, as explained by Mazzocco et al. [2014], full commitment assumes that spouses comply at all times with the allocation of time and resources decided upon at the time of marriage. Given that there may be times when it would be optimal to renegotiate this allocation, this assumption needs to be grounded in legal obstacles to renegotiation, for example if divorce is forbidden or has to be consensual. In many developed countries this is not the case, and non-consensual divorces are commonplace and likely lead to renegotiations of the initial plan, as supported by the evidence presented in Mazzocco [2007].

Whether the endogeneity of the balance of power increases or decreases the efficiency of household decisions is a question raised in Chiappori and Mazzocco [2017]’s review. While the limited commitment model offers a coherent theoretical framework to predict the dynamics of bargaining strengths, finding testable predictions of this model and recovering preferences and balance of power from the data when intra-household allocation of resources is mostly unobservable is a challenge. Mazzocco [2007] is able to reject the full commitment model but does not quantify the magnitude of changes in intra-household bargaining strengths. With Japanese data, Lise and Yamada [2019] find that the cross-sectional heterogeneity in decision power among households at the time of marriage is larger than adjustments to decision power in response to shocks. They conjecture that renegotiations only occur when new information to the household constitutes a large enough shock, i.e. changes in decision power within existing marriages are somewhat infrequent. With UK data, Turon [2019] concludes to the presence of modest variations in Pareto weights in response to changes in the values of spouses’ outside options.

A couple of empirical results reviewed in Doepke and Tertilt [2016] support the premise that bargaining power is key in the labour supply decision of women, particularly mothers. Knowles [2013] finds that a rise in female bargaining power is needed to understand the rise

in female labour supply and the evolution of the relative leisure times between husbands and wives over the later part of the 20th century. Eckstein and Lifshitz [2015] also find empirical support for the importance of bargaining to account for changes in female labour supply, but less so for male labour supply. Using data from the US PSID for the years 1983 to 1993, they estimate the probability of households to belong to three ‘types’ defined by the mode of bargaining prevailing in the household decision making. In the ‘classical’ type, the husband is a Stackelberg leader and the wife takes her labour supply decision on the basis of his choice. In the ‘modern’ and ‘cooperative’ types, spouses play a symmetric and simultaneous game, but the former is non-cooperative while the latter is cooperative and reaches efficient outcomes. Eckstein and Lifshitz [2015] estimate that younger and more educated households are more likely to be of the ‘modern’ or ‘cooperative’ types, where female labour supply is higher, while older households are more likely to be of the ‘classical’ type and opt for non-participation of the wife.

Iyigun and Walsh [2007] go one step further and analyse the impact of household bargaining on decisions taken prior to marriage. They reason that women, anticipating that a strong outside option will yield more power in a future marriage and a greater share of resources in household consumption, undertake more education than would be Pareto efficient for this motive. We will return to pre- and post- marriage decisions in Section 6.

5.3 Child quality

Last but not least of the dynamic considerations in the family’s decision regarding the mother’s labour supply is its impact on long-term children outcomes, from cognitive development and test scores to emotional well-being. The literature often captures this implicitly, for example with the disutility of joint work mentioned above in Section 4.3, be it in Guner et al. [2012a] with the distribution of heterogeneity of dislike for joint labour supply of the two parents or in Turon [2019] and Koll et al. [2019] with the preference for ‘home produced’ childcare.

In Adda et al. [2017], the production of child quality is not modelled directly, since the focus of the paper is on mothers’ careers but the model specification can equally be interpreted as mothers having preferences over parental time inputs because they feed into child outcomes.

Guner et al. [2020] review empirical results on the impact of childcare subsidies on children outcomes and the lack of consensus on the matter. Baker et al. [2008] and Herbst and Tekin [2010] find negative effects –with a childcare reform in Quebec for the former and data on children of single mothers from the US Early Childhood Longitudinal Study (ECLS) for the latter. On the other hand Griffen [2019] estimated small but positive effects when examining the impact of the Headstart and childcare subsidies policies on maternal labour supply and children cognitive skills among families in the ECLS dataset. One difficulty arising in the evaluation of such policies on children outcomes is to disentangle the positive income effect of the mother’s labour supply from the negative impact it has on time available for parental childcare.

A longer term concern is that mothers act as a role model for their children and their labour supply will influence their offspring’s view on maternal labour supply when they become adults. Empirical support for this inter-generational transmission of values, particularly relevant for daughters, has been found by Kleven et al. [2019b]. They find that the hours worked by the mother relative to the father have an impact on the formation of preferences for family and career among girls. They do not find a significant impact on the formation of boys’ preferences with respect to their future household labour supply choices. Fernández et al. [2004] however find that it is the mother-in-law’s participation in the labour market that has an impact on the married woman’s labour supply, via her husband’s attitude on gender roles acquired in his own childhood.

The potential impact of mothers’ absence from the home on children outcomes is a recurring topic of public debate and is closely linked with current social norms on the matter, as will be discussed in Section 7.1. This concern is acknowledged in Fernández [2013] who cites anxiety regarding the mothers at work and children’s test scores and emotional health. Del Boca et al. [2014] estimate a structural model of child cognitive development and find that the time inputs of both parents matter as well as family income. They point to the difficulty of balancing these inputs to achieve optimal child investments.

6 Linked lifecycle choices

Up to this point, we have discussed the labour supply of mothers, while taking as given the couple that they form with fathers,⁸ the fact that they have (a) child(ren), their education level and occupation. These are however all decisions that the woman has taken before becoming a mother and in anticipation of the trade-offs and considerations examined in this chapter. In this section, we review a small fraction of the literature devoted to these choices, in order to give a flavour of the connectedness of these questions. Throughout this section we will start from the premise that women do anticipate these cross-influences with some (unspecified) accuracy. Kuziemko et al. [2018] however show that the changing nature of the world of work and of society's expectations of mothers make this premise fragile. Using an event study method with data from the UK and the US, they find that women born in the late 60s and 70s have overestimated the ease of combining employment and motherhood. When comparing individual attitudes before and after the arrival of the first child, the authors find a significant drop in women's beliefs in the feasibility of combining work and childcare, particularly for educated women.

6.1 Education

Looking at U.S. data, Bronson [2014] reports that female college attendance has become very high, and higher than male college attendance, but that the choices of majors have remained very different. Women tend to choose degrees leading to family-friendly occupations, i.e. offering flexibility and milder penalties for career interruptions. These occupations on the other hand tend to offer lower pay. The author interprets it as a strategy by women anticipating marriage and/or motherhood which guarantees a decent income in case of divorce and preserves the ability to combine work and childcare if children appear.

Such results bear the caveat presented by Kuziemko et al. [2018] that women may make education decisions in a certain belief on the joint demands of employment and motherhood which may turn out to be biased in the following decade's labour market and society, i.e. at the

⁸We only refer to heterosexual couples in this chapter because the bulk of the existing data and research relate to these.

time when these choices become relevant to them.

In a view to improve the understanding of interactions between these lifecycle choices, Chiappori et al. [2018] include education, marriage, labour supply, and consumption choices in their structural model. With data from the UK BHPS over the years 1991 to 2008, they find that an important component of the returns to education lies in the prospect of joint consumption of public good and risk sharing with a spouse whose human capital is correlated with one's own. Indeed, Chiappori et al. [2002] find evidence of positive assortative matching on education levels, with marital surplus as well as the female share of the surplus increasing with female human capital.

6.2 Occupation

In employment, motherhood may affect career development. Albrecht et al. [1999] find that the loss in potential earnings that mothers experience after a career break exceed what one would expect if returns to experience were homogeneous across women. They show that employers hold beliefs regarding women's 'type' as being more or less committed to work versus time with children. Career breaks then act as a signal that the woman is of the latter type and employers update their beliefs accordingly. Consequently they allocate these mothers to jobs with less scope for training and upward trajectory, which explains that the earnings loss is greater than average returns to experience would suggest.

Lundborg et al. [2017] tackle this question with an IV strategy using success of IVF fertility treatment as the exogenous source of variation. They use Danish data on matched employer-employee relationships. As above they find that the drop in earnings in motherhood exceeds that predicted by the drop in hours worked alone. Their data allows them to identify the shift by mothers towards lower-paying jobs that are closer to home as the main culprit.

6.3 Marriage

As is done in the literature we review here, we will refer to marriage as any form of partnership between (potential) parents, from official marriage to simple cohabitation. Two questions are

relevant for the individual: whether to marry and whom to marry, i.e. someone similar or someone different. This will depend on whether future spouses anticipate to be substitutes or complements in household production and income generation. Greenwood et al. [2016] document that the fraction of prime-age (25 to 54 year-olds) individuals who are married has decreased markedly over the last half century in the US. In 2015, only 79% of these were married, down from 86% (respectively 92%) of college-educated individuals (respectively non-college educated individuals) in 1960. Accompanying this change, increases in education and labour force participation of women and a rise in assortative mating⁹ in couples have occurred. Greenwood et al. [2016] explain these secular trends by the arrival of time-saving devices in home production and the evolution of the wage structure, with higher wages, higher college premia and lower gender pay gap.

6.4 Fertility

Many authors argue that understanding the labour supply of mothers can only be done within a framework that considers fertility too. As has been made clear above, having children has an impact on the employment of mothers and this impact is anticipated by the decision making entity (household or individual) at the point of fertility choices. Thus, researchers and policy makers interested in the potential impact of a policy trying to encourage fertility and/or maternal labour supply need to take into account the dynamic interactions between the two decisions. Sheran [2007] stresses the need to model both decisions jointly since the impact of potential policies on one of the decisions maybe be estimated with a bias if the endogenous response of the other decision to the proposed policy is not taken into account. The reduced form approach is to find an instrument which generates exogenous variation in fertility for example. Literature taking this route are surveyed in this handbook in Bhalotra et al. [2021]. The structural approach consists in building a theoretical framework which includes the determinants of both decisions as well as their interactions. Results of research in this vein has produced a range of insights on the impact of various policies targeted at fertility or female labour supply.¹⁰

⁹The tendency to marry into one's own education group.

¹⁰See also the review by Gauthier [2007] on the impact of family policies on fertility.

Gayle et al. [2006] set up a lifecycle model of fertility and labour supply and simulate counterfactual policies aimed at helping mothers to combine career and children. These policies are the following: subsidies to child expenses, childcare provision, remuneration of mother childcare, retraining of mothers re-entering the labour force after a break for childcare. Estimating their model with data from the US Panel Study of Income Dynamics, Gayle et al. [2006] find these policies to have a positive impact on fertility but little effect on labour supply given fertility.

Haan and Wrohlich [2011] also model fertility and employment decisions jointly in a structural framework. They use an exogenous variation in the tax system and data from the German SOEP over the years 2000 to 2007. After estimating the primitives of their model, Haan and Wrohlich [2011] simulate a policy offering subsidised childcare to all children under 3 whose parents are both working. For their sample as a whole, they find positive participation effects but no significant impact on fertility. Some subgroups however react on both margins to the proposed policy: highly educated women and women before their first child. These are shown to increase both their likelihood of increased fertility and employment given fertility, in contrast with Gayle et al. [2006]. They also stress that these joint effects would not occur with a policy of unconditional child benefit.

Also with German data, Bick [2016] shows that the option of informal childcare by relatives for infants is a key element of the fertility and maternal labour supply trade-off, which is neglected in the fertility literature. First, this explains why the labour force participation of mothers of children under two exceeds the rate of childcare enrolment by these households. Second, Bick [2016] estimates that widening the access to subsidised childcare has a significant impact of the intensive margin albeit modest at the extensive margin. He does not find evidence of any sizeable fertility effect.

Jakobsen et al. [2022] argue that it is important to evaluate childcare policies in a framework where fertility is endogenous. Using longitudinal Danish register data since 2009 and step changes in the tax schedule, they find that fertility responds negatively to marginal increases in female net wages but positively to marginal increases in male net wages. Importantly, they show that accounting for fertility responses to policies affecting labour market returns has a sizeable effect on maternal labour supply responses to changes in take-home pay of one or the other spouse.

Lalive and Zweimüller [2009] also find that fertility responds to policy incentives. They examine an Austrian reform in 1990 which extended entitlement to parental leave from one year to two years after the birth of the child. They find both fertility and employment effects of the policy, with an increase in births and in the length of career breaks by mothers, even beyond the expiry of the new parental leave. These employment and earnings effects however mostly vanish three years after the birth.

Over the last half century, a range of external factors has influenced the interactions between fertility and maternal employment, and affected the cost of combining motherhood and labour supply. On one hand, a large decline of this cost has occurred thanks to technological innovations facilitating home production e.g. for cooking and cleaning. This is documented by Greenwood et al. [2016]. Albanesi and Olivetti [2016] also argue that medical progress and the improvement of infant formula milk have decreased the biological costs of motherhood attached to childbirth risks and the necessity of breastfeeding. Both trends make female employment given fertility more viable. On the other hand, other costs of this joint choice have risen in the past decades. Ramey and Ramey [2009] document an increase in time spent with children in the US since the 1990s, and this feeds back on fertility decisions. Doepke and Kindermann [2019] show that, within Europe, women will be more reluctant to have any or more children in countries where the bulk of the responsibility for childcare falls on the female spouse.

The speed at which these changes in the costs of combining work and motherhood feed back into fertility decisions depends crucially on the speed at which women's beliefs about these costs are updated. Kuziemko et al. [2018] report that while only 2% of women in cohorts born after the late 1960s plan to be full-time mums in the future while at high school, about 20% of them turn out to adopt this choice after childbirth. Goldin [1990] develops an argument in the same vein and shows that the gap between expectations and actual choices was not always this way around: in the 1960s, high-school girls predicted that they would be full-time mums in much larger numbers than they actually were once they reached their 30s. In the following decade, the share of women expecting to be housewives dropped sharply and the gap between choices and expectations changed sign.

6.5 Divorce

As we saw in Section 3, under the collective model of household decision making, outside options of the spouses matter for intra-household allocations and labour supply decisions, and these outside options are mostly taken to be divorce. Policies or environmental factors which affect the spouses' valuation of the divorce state in an asymmetric manner will affect their strength in bargaining and thus the decisions made by the household. The four references cited below refer to the U.S. where the law was reformed to allow unilateral and no-fault divorce. As we saw above, this would shift the household bargaining to a model of limited commitment. This reform was first introduced in 1967 and implemented at different times in different states over the next two decades.¹¹

Chiappori et al. [2002] evaluate the role of the marriage market –as in re-marriage following a potential divorce– and of divorce legislation changes on the labour supply decision within marriage. They find that both an increase in the ratio of males to females in the local 'marriage' market, affecting the spouses' chances to re-partner, and the adoption of a divorce regulation in favour of women decrease (respectively increase) the female (respectively male) labour supply.

Stevenson [2007] also finds that the change in divorce law affects marriage-specific investments. Using the quasi-experimental variation of law changes across times and states, she finds that fertility in the first two years and support between spouses for education acquisition are negatively affected by the adoption of unilateral divorce, while the incidence of both spouses working full time is increased. Bronson [2014], using the same setting, finds that these reforms also affect choices prior to marriage, with women more likely to graduate and to choose high-paying subjects at college. Voena [2015] looks specifically at the division of property upon divorce and its impact on savings behaviour during marriage. When courts award women a greater share of assets in the divorce settlement, women have a lower incentive to preserve their human capital by staying in the labour market and supply less labour.

¹¹The number of states allowing unilateral divorces increased from 3 to 35 between 1967 and 1990 (Voena [2015]). Before this reform, divorce was only possible with the joint consent of the two spouses or in the case of fault, such as adultery or domestic violence.

Fernández and Wong [2014] also use US data and compare cohorts born in 1935 and 1955. One of the differences between these cohorts is an increased risk of divorce. The authors seek to quantify the role of this in the increased female labour force participation. Their findings contrast with their prior that the mechanism inducing wives to work more comes from concerns for post-divorce ability to earn labour income and use accumulated savings. Indeed, they conclude that spouses have conflicting desires regarding consumption during marriage following an increase in divorce risk: female spouses would like to save more in marriage, male spouses would like to consume more in marriage, both with a view to smooth consumption across marital states. The household decision is a compromise between these: increase female labour earnings so as to consume more during marriage and save only a little less than with a lower divorce risk (i.e. in a middle ground between the husband’s desire to decrease savings and the wife’s desire to increase them). Fernández and Wong [2014]’s estimation results suggest that increased divorce risk account for about 40% of labour force participation increase among 25 to 40 year-old married women between the two cohorts.

7 Policy discussion

Several dimensions of policy potentially affect households’ decisions regarding mothers’ labour supply and we will review here both the policy choices made in various developed countries and some estimates of their impact from the literature. We will also discuss the rationale for policy in Section 7.4. But first we will acknowledge that social norms play an important role in this household decision and that this affects the scope for policy to influence outcomes, as well as potential political support for such reforms.¹²

7.1 Role of custom

Cultural expectations about gender roles in the family and in the care of children as well as the differences in these expectations across countries are an important source of differences in labour supply choices, as Doepke and Tertilt [2016] stress. Costa Dias et al. [2020] also

¹²Appropriate permissions have been obtained to reproduce material shown in Figures 1 to 5.

highlight the need to understand how these interact with public policies, since both social norms and policies vary across countries and across times in heterogeneous ways.¹³

Fernández [2013] uses US data from the General Social Survey and the Gallup Polls to show the striking increase in individuals' approval of married women's labour supply in the absence of financial need from under 20% in 1936 to over 80% in 1998.¹⁴ She constructs a structural model where the married woman's assessment of the costs of her labour supply in terms of her marriage and her children rests on beliefs derived from a combination of a public and a private signal. The accuracy of the public signal evolves endogenously over time: the more women work in the labour market the more precise –and positive– it becomes. Married women's labour supply and beliefs about the compatibility of work and family thus interact with one another and reinforce the upward trend in both.

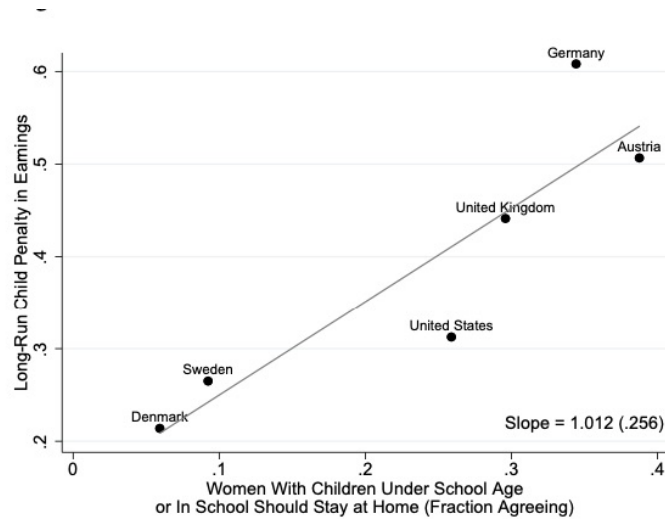
Goussé et al. [2017] include family values in a structural model of marriage formation and household decisions. They use UK data from the British Household Panel Survey, which covers the time range 1991 to 2008 and define an index of family values as a combination of answers to questions related to marriage, cohabitation, divorce and the well-being children when the mother works.¹⁵ This index measures a degree of social conservatism and is found to decline over the sample period. Married males have the highest average index while single females exhibit the lowest average. In the model, individuals decide who and whether to marry, then bargain within the couple to decide on labour market and home production time inputs from both spouses. Estimating their framework, Goussé et al. [2017] find that they can explain changes in labour supply and home production choices with the combination of changes to wages, education and their index of family values.

With a comparison of gender norms across countries plotted against a measure of long-run child penalties in mothers' labour earnings, Kleven et al. [2019a] show a striking correlation, whereby countries with the least tendency to agree that mothers of young children should stay at home, such as Denmark and Sweden, are also the countries where the long-run child penalties are the lowest –see Figure 1.

¹³See also the review by Bertrand [2011] on gender identity norms.

¹⁴The exact wording of the question is "Do you approve of a married woman earning money in business or industry if she has a husband capable of supporting her?", see Fernández [2013] p. 473.

¹⁵For more detail on the list of questions, see Goussé et al. [2017], Table 1.



Notes: The figure plots our estimated long-run child penalties in earnings against elicited gender norms from the International Social Survey Program (ISSP). We focus on responses to an ISSP question of whether women with children under school age or in school should work outside the home (full-time or part-time) or stay at home. The figure plots child penalties against the fraction of respondents who agree that women should stay at home.

Figure 1: Estimated Child Penalties vs Elicited Gender Norms (from Kleven et al. [2019a])

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Even if social norms have become more progressive in many countries, Kleven et al. [2019b] find that a solid belief that mothers should work less during the children's upbringing remains in many places as is shown in Figure 2.

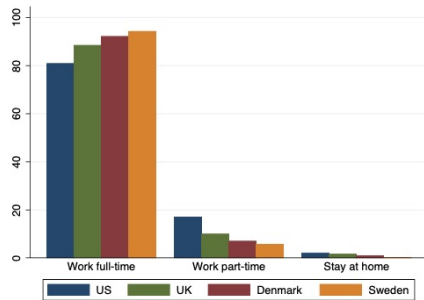
As mentioned in Section 5.2, Eckstein and Lifshitz [2015] attribute the role of social norms to the type of negotiation taking place between spouses. In their framework, households can be of three types depending on what kind of bargaining takes place. The shares of each type in the population evolve exogenously according to observed characteristics such as the relative age and education of the husband and wife and a term capturing social norm. Their quantitative results provide evidence that the shift in the manner in which decisions are taken within the household is an important explanatory factor in the increase in married women's labour supply.

Kuziemko et al. [2018] gain interesting insights into the evolution of gender roles with time use data for the US going back to 1965.¹⁶ The time shared by mother and child describes a U-shape, decreasing in the first decade to reach just 7 hours a week in 1975, increasing mildly

¹⁶The American Heritage Time Use Study (1965 to 2012) and the American Time Use Survey (2013 to 2019).

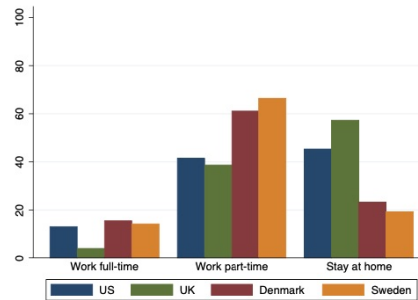
A: Women Without Children

Do you think that women should work outside the home full-time, part-time or not at all when they are married but with no children?



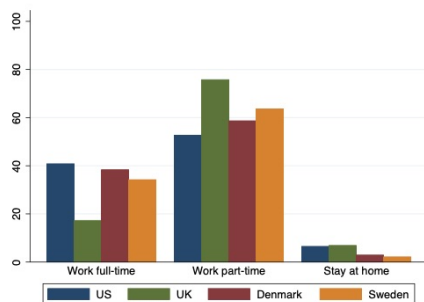
B: Women With Children Under School Age

Do you think that women should work outside the home full-time, part-time or not at all when there is a child under school age?



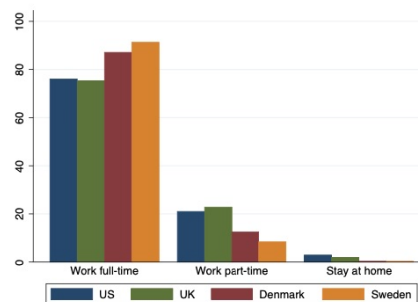
C: Women With Children In School

Do you think that women should work outside the home full-time, part-time or not at all when the youngest child is still in school?



D: Women With Children Who Have Left Home

Do you think that women should work outside the home full-time, part-time or not at all when the child has left the home?



Notes: The figure is based on data from the International Social Survey Program (ISSP) in 2002. Each panel shows shares (in percent) choosing each of the 3 listed categories.

Figure 2: Social Norms (from Kleven et al. [2019b])

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in the subsequent decade, then doubling since 1985. The ratio of time spent on housework and childcare by the mother relative to the father decreased sharply from 4.5 to 2.5 in the first two decades, but is still around 2 at the end of the period. This confirms the findings above that attitudes to gender roles have become much more balanced over the last century but retain a solid traditional leaning.

Ichino et al. [2019] recover information on couples' attitudes to the sharing of childcare responsibility by looking at their response to a tax reform. The setting is the introduction of the Earned Income Tax Credit in Sweden in 2007. Its design generates variations across households' net wages which depends on the two spouses' incomes. These variations allow the authors to identify different preferences among couples regarding specialisation in home production, specifically regarding which parent takes Temporary Parental Leave¹⁷ when a child is off school with illness. A preference for specialisation is characterised by low substitutability between the two parents' inputs in this situation in response to reform-induced changes in their relative net wages. In other words, households with a stronger taste for maternal childcare or traditional roles are willing to forego potential financial gains to stick to their preferred allocation of roles between childcare and paid work. They find that couples with more traditional values, which are more likely to be those with a male breadwinner, a male first-born or immigrant background, exhibit much higher labour supply elasticities to changes in relative wages that pushes them towards a more specialised household labour supply than to those which would induce a more equal division of childcare and work.

7.2 Role of policy

The main tools available to the policy maker to affect the labour supply of mothers or to support the income of households with children are the tax and benefit system, childcare subsidies (and the availability of childcare places) and parental leave legislation. As we saw in Section 6.5, divorce legislation also influence mothers' decision to work. We will review here some international comparisons of the policy choices made by various countries and the findings in the literature obtained with such comparisons.

¹⁷In Sweden, parents of children under 12 years old are entitled to up to 120 days of Temporary Parental Leave per year when the child is sick.

Given the prevailing social norms discussed in the previous section, the policy maker can support mother's attachment to the labour market with three main tools: parental leave, child care places or subsidies, benefits and tax credits. Costa Dias et al. [2020] stress that these policies are bound to interact with the institutions prevailing in a given country and time and should be evaluated as a part of the economy-wide incentive system rather than isolation. Guner et al. [2020] also point out that one can only evaluate the effectiveness of policy against the objective of the policy maker, which may vary from income support to increasing female labour supply. Conditionality on market work is an instrument per se. Indeed, conditional policy instruments, such as childcare subsidies and tax credit will incentivise mothers' labour supply, whereas unconditional policies, such as income support and child benefit alleviate poverty concerns but depress labour supply.

Early literature on the effectiveness of household tax credits conditional on low income and participation shows that credits such as EITC and WTC¹⁸ do increase the participation of single mothers but decrease the labour supply of secondary earners, typically married women. See Blundell et al. [2000], Hotz and Scholz [2006] and a survey in Gauthier [2007]. In the UK, Olivetti and Petrongolo [2017] report that the bulk of the literature on the evaluation of the WFTC concludes that it raised the employment rate of single mothers by 4 to 5 percentage points. Their survey of the literature shows that the most effective time to support families with children is in the early years, both in studies using cross-country comparisons and those using micro-economic data. Evidence gathered by them and shown in Figure 3 show substantial cross-country variations in family-friendly policies such as maternity leave and public childcare spending.

Highlighting that the cost of children can mount up to 36% of household income for single parents, Greenwood et al. [2017] compare policies implemented in various countries to alleviate this cost. Family benefits represent about 4% of GDP in the UK and Denmark but only in the range 1 to 2% in Italy, Spain and the U.S. The type of family support also varies widely, with Denmark offering in-kind services, the UK offering cash transfers, and the U.S. and Germany preferring tax benefits. Greenwood et al. [2017] also report considerable variation in childcare policies across countries. Scandinavian countries spend around 1% of GDP on childcare when

¹⁸Earned Income Tax Credit in the US and the Working Tax Credit in the UK –formerly Working Family Tax Credit.

	<i>Maximum job- protected leave for mothers (weeks)</i>	<i>Total maternity leave (weeks)</i>	<i>Pre-birth leave (% maternity leave)</i>	<i>Total paid leave available to mothers (weeks)</i>	<i>Average payment rate for mothers (% of average, 2014, national earnings)</i>	<i>Total paid leave available to father (% total paid leave for both parents)</i>	<i>Early childhood education and care (% GDP)</i>	<i>Accumulate days off and vary start/ end of daily work (%) companies)</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Spain	166	16	63	16	100	12	0.6	34.07
France	162	16	38	42/110 ^a	44.7	40/33 ^a	1.2	54.29
Germany	162	14	43	58	73.4	13	0.5	62.00
Finland	161.03	17.5	29	161.03	26.5	5	1.1	86.05
Norway	91	13	23	91	50.0	10	1.2	—
Sweden	85	15.6	45	60	63.4	14	1.6	74.18
United Kingdom	70	52	21	39	31.3	5	1.1	46.83
Greece	60.33	43	19	43	53.9	1	0.1	20.60
Japan	58	14	43	58	61.6	47	0.4	—
Australia	52	6	100	18	42.0	10	0.6	—
Canada	52	17	47	52	52.6	0	0.2	—
Denmark	50	18	22	50	54.1	4	2.0	76.91
Italy	47.7	21.7	18	47.7	52.7	0	0.6	39.96
Netherlands	42	16	38	16	100	2	0.9	66.48
United States	12	0	0	0	0	0	0.4	—

Figure 3: Cross-country Variation in Family-Friendly Policies (from Olivetti and Petrongolo [2017])

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the U.S. and Germany less than 10% of this, as a proportion of their GDP.

Rogerson [2007] links the high levels of female labour supply in Scandinavia to the scope and magnitude of child-related transfers there. Of course the price of childcare is only relevant if childcare places are actually available and rationing of these places is indeed the limiting factor in some countries.

The spending figures on childcare related in Costa Dias et al. [2020] also reflect huge variations: from 2% of GDP in Iceland, to 0.7% in the UK and 0.1% in Greece and Turkey. There is no clear empirical conclusion from international comparisons that childcare subsidies make a substantial difference for the labour supply of mothers, however. This is reported both by Bick and Fuchs-Schündeln [2018] and Costa Dias et al. [2020]. The former mention the difficulty of obtaining standardised measures of childcare costs across countries as one possible reason

for this result. The latter point to the likely non-linearity of the impact of childcare subsidies on hours worked and caution against a one-size-fits-all policy as each economy's specificity should be taken into account for childcare policy design. Gauging the impact of childcare costs on maternal labour supply by making international comparisons is difficult because several determinants of the decision to work are difficult to observe (custom, bargaining power in the couple, wage cost of career break) and because comparable measures of childcare costs are not readily available. Bearing these caveats in mind, Bick and Fuchs-Schündeln [2018] do not find supporting evidence that international differences in childcare costs are related to labour supply differences of married women.

On the other hand, Ho and Pavoni [2020] derive an optimal design of childcare subsidies in a welfare model calibrated to the US economy and more specifically to the population of single mothers of children under 6. Relative to the current US policies, they suggest that childcare should be more heavily subsidised for low income individuals and decrease more steeply with income.

If the mother is considered as the secondary earner, the mode of taxation of households will be crucial in the labour supply decision since it will have a large impact on the marginal rate of taxation of her labour income. Bick and Fuchs-Schündeln [2018] document the dispersion of the tax treatment of married couples across countries, from separate to different degrees of joint taxation. This, combined with the degree of progressivity of the income tax system will be a key determinant of the net take-home value of the mother's marginal hour of work. Households are taxed jointly in the U.S. but most OECD countries consider individual spouses' incomes separately (Gayle and Shephard [2019]). Bick and Fuchs-Schündeln [2018] look at the variations in tax system across 18 OECD countries and find that taxation is an important determinant of the labour supply decision. The unit of taxation, i.e. the individual versus the couple, accounts for a bulk of the differences observed.

While childcare subsidies and the mode of taxation are relevant for mothers' decision to return to work after childbirth, parental leave policies will influence mothers' ability to retain their pre-birth employment. If the length of the allowed parental leave is near the time that the mother would like to stay at home with the newborn, it will also have an impact on her desire to return to work. Over a decade ago, Erosa et al. [2010] estimated that the expansion of parental

leave conditions in the US had the potential to increase both fertility and mothers' participation in the labour force. More recently, Kleven et al. [2019a] and Yamaguchi [2019] highlighted the variety of parental leave terms, i.e. duration and generosity, chosen by policy makers in different countries. This dispersion is illustrated in Figure 4 taken from Yamaguchi [2019].

Yamaguchi [2019] uses a structural model of fertility and labour supply choices and data on Japanese women over the period 1993 to 2011 to evaluate the impact of the two benefits afforded by the parent leave legislation: replacement income during the leave and the protection of the pre-birth job. His results show that increasing the duration of the entitlement to job protection from zero to one year increases the labour supply of mothers significantly, but not fertility. Increasing this duration further to 3 years does not offer sizeable additional benefits in his simulations. Yamaguchi [2019] however stresses that these effects of job protection are specific to Japan and may not be so strong in the U.S. for example, where a more flexible labour market is likely associated with lower entry costs to a new job.

7.3 Estimated labour supply elasticities

For the policy maker, a key component to assess the net cost of a proposed reform is an estimate of the labour supply response to this change by current and future mothers. Results on labour supply elasticities are too numerous to review here, so we will just mention a small sample of recent work specifically focused on the labour supply of mothers.

Using data from the UK over the years 1991 to 2008 and the implementation of various reforms to taxes and benefits over this period, Blundell et al. [2016a] estimate rather large elasticities for single mothers. They also find that these vary substantially with women's education level, their marital status (living as a couple or single) and the presence of children. A summary of their findings is shown in Figure 5. With similar data, Goussé et al. [2017]'s estimate of female own-wage labour supply elasticities (0.38 for married and single women) are similar. Female own-wage elasticities are more than twice as large as male own-wage elasticities. Turning to cross-wage elasticities, women's response to a rise in male wage is a drop in labour market hours and an increase in their hours of home production.

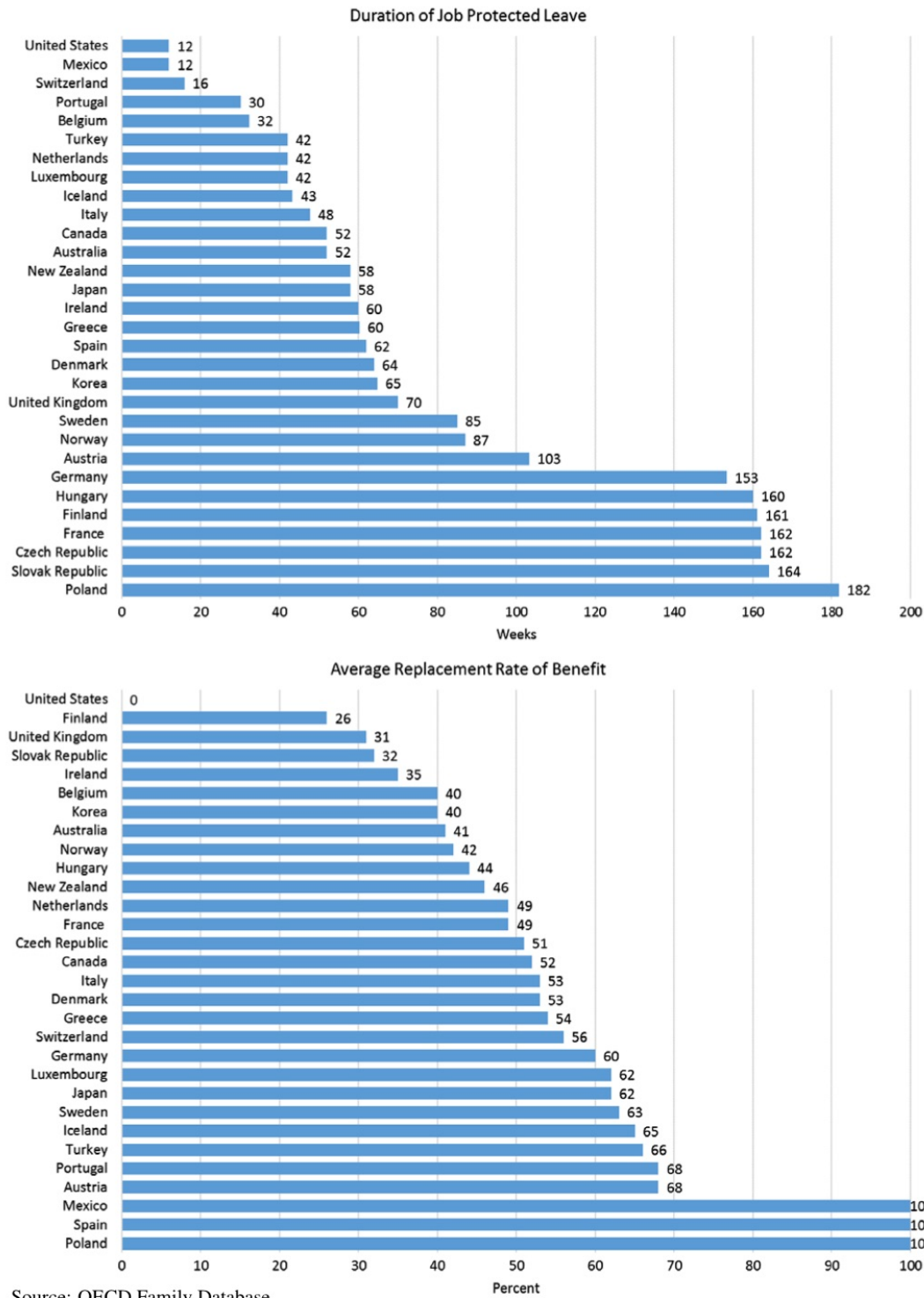


Figure 4: International comparison of parental leave legislation (from Yamaguchi [2019])

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	Frisch			Marshall		
	Extensive		Intensive	Extensive		Intensive
	Elasticity	Derivative		Elasticity	Derivative	
All women	0.627	0.510	0.240	0.475	0.386	0.210
	By education					
Secondary	0.914	0.675	0.327	0.689	0.509	0.280
High school	0.567	0.469	0.223	0.428	0.354	0.198
University	0.427	0.375	0.180	0.331	0.291	0.158
	By family composition					
Single women with no children	0.532	0.486	0.159	0.419	0.383	0.055
Lone mothers	2.240	1.275	0.452	1.362	0.775	0.378
Women in couples, no children	0.264	0.242	0.163	0.220	0.203	0.167
Women in couples with children	0.688	0.522	0.316	0.553	0.419	0.304

^aCalculations based on simulated data under the 1999 tax and benefit system. The derivatives in columns 2 and 5 measure the *percentage point change* in labor supply, in response to a 1% increase in net earnings. All effects are measured in the year the change in earnings occurs.

Figure 5: Estimated Labour Supply Elasticities (from Blundell et al. [2016a])

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Looking at women in couples and comparing their labour supply elasticity to that of their spouse and using data from the US PSID over the years 1999 to 2009, Blundell et al. [2016b] find substantial Frisch labour supply elasticities for both spouses, but show that the implied Marshallian elasticities are much smaller. They also find evidence of Frisch complementarity between the leisure times of the spouses and Frisch substitutability between consumption and hours.

7.4 Rationale for policy

As mentioned above, the optimal design and the evaluation of a policy can only be done within a framework of well-defined policy aims. Family policies can have a number of objectives, depending on the country and the time period –in other words, on the preferences of the relevant social planner.

The first rationale for such policies is the avoidance of poverty for mothers and hence children. As Blundell et al. [2016a] emphasise, many mothers become single mothers at some stage

and are more likely to become poor in the process if their labour market attachment is weak, their education level low and their work experience truncated at the birth of their first child. An objective of work tax credits and benefits is thus to encourage low-skill mothers to remain in the labour market when their children are young.

Olivetti and Petrongolo [2017] explain a number of other grounds for family policies: fertility, gender equality, child development. In the longer term these policies can also alter social norms by promoting the belief that motherhood and employment are compatible and the social acceptability of mothers' work outside the home. This will not only support the decision of mothers to keep working but also the decision of employers to hire women of child-bearing age. Indeed, some of the costs of family-friendly policies affect employers of young women and may depress the labour demand for them. A recent EU directive¹⁹ attempts to mitigate this statistical discrimination by limiting the ability of households to concentrate all parental leave entitlement on one of the parents, so as to entice both parents to contribute to childcare and to decrease the loss of experience of mothers after childbirth. Empirical findings surveyed by Olivetti and Petrongolo [2017] suggest that parental leave up to a year do increase female employment, particularly that of the low skilled, without having much impact on fertility. Besides, increased availability of good quality childcare and early schooling reduces labour market penalties attached to motherhood by offering improved substitutes for maternal childcare.

A recurring conclusion in this literature however is that there exists no unique optimal mix of family policies. The variety of choices of combinations of policy tools adopted in high-income countries displayed in Figure 3 bears witness to this.

8 Summary

The literature on female labour supply is huge. The reason it differs so much from male labour supply, both in its level and in its responsiveness to policy, is the occurrence and anticipation of motherhood. Technical progress has made home production less time consuming and medical progress has made childbirth and childcare in infancy less demanding biologically. Social norms

¹⁹Directive 2019/1158 voted on 20th June 2019 and effective as of 2nd August 2022. See <http://data.europa.eu/eli/dir/2019/1158/oj> for details.

have also evolved markedly over the last half century, together with a sharp reduction albeit not full eradication of the gender pay gap. Over the same period, the labour force participation of mothers has increased greatly. Substantial dispersion in mothers' employment rates and choice of hours worked across OECD countries nevertheless remains.

The decision to work, and whether to work part-time or full-time, can be taken as an individual or within a unitary or collective household. When divorce can be initiated unilaterally, full commitment to initial bargaining stances at the point of household formation cannot be maintained for ever and bargaining power may evolve endogenously. The main ingredients of the current period cost-benefit analysis informing the labour supply decision are the take-home pay, i.e. the market wage and the relevant tax rate, the cost of childcare –or availability of informal childcare, and the disutility of having both parents out of the home and in the labour market. Dynamic considerations are also important to forward-looking households. These include the future wage penalty incurred by mothers who work less than full-time to care for children, the resulting changes in the balance of power within the household, and children cognitive and non-cognitive development.

Before and after having to take this decision as to whether and how much to work while a mother, women make other important life choices: how long to study and what kind of degree to study for if relevant, what occupation to pick, whether to marry and whom to marry, whether to have children and when, whether to divorce or remain married. We show that the determinants and outcome of the labour supply decision are closely interrelated with these other lifecycle choices.

Our policy discussion starts with an acknowledgement that the scope for policy is both limited and driven by the current social norms regarding mothers and work. These norms vary greatly both across countries and over time. We then review the policy choices made by various OECD countries and results obtained with international comparisons. The policy tools that we consider are the mode of taxation, child credits, childcare subsidies and parental leave legislation. Finally, we examine the rationale for policy. This is driven both by political economy considerations and by estimates of the potential impact and costs of proposed policies.

We have explored some of the theoretical underpinning of these questions and the empiri-

cal results obtained by both reduced form and structural models estimation. While we have mentioned a number of articles, we cannot claim to have presented here more than a (partial) snapshot of this rich and lively literature.

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