

Policies Affecting Work Patterns and Labor Income for Women^{*}

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1 Introduction

Ten years ago, Sherwin Rosen presented theory and evidence that suggested that the childcare subsidies in Sweden were inefficiently high from a welfare perspective (Rosen, 1997). Although childcare subsidies tend to stimulate labor supply, which improves efficiency as labor supply is suppressed by taxes, it also distorts the consumption choice between child care services and other types of goods. As the subsidy reduces the relative cost of child care services, it stimulates a socially excessive consumption of child care at the expense of other types of goods.

As Rosen pointed out, finding the most efficient child care subsidy is a matter of balancing the two distortions against each other. The economic literature on taxes and household production seem to be rather coherent on this issue. It is welfare improving as a second best to introduce subsidies or tax relief on substitutes for mother's time in the household, but too large subsidies will eventually reduce welfare. Rosen estimated the child care subsidy in Sweden to be excessive, suggesting that too many mothers are involved in taking care of other women's children and too few are involved in production of non-household goods and services.

This paper takes a different route. We believe that some important aspects of policies that distort female labor supply decisions have not been fully considered in the previous literature. A concern is that labor market decisions today may affect the standard of living of females later on in life. For example, consider a woman who chooses not to work at all from the time she leaves school on. She devotes her time to her family and children instead. Now suppose that an unforeseen dissolution of her marriage occurs. At that point, she is without the skills necessary to earn a decent living in the labor market. She specialized on the assumption that she would likely remain with her husband but ex post has made the wrong decision. Even if women make correct ex ante decisions, which take into account the possibility of being single later in life, this may be a concern at a social level. For a variety of reasons, society is likely to transfer resources to her in her poor state. Had she made a different choice earlier in life society would be spared the need to support her. Because social assistance cushions the blow to women who find themselves without the husband's source of support, women choose to work too little in the market and too much in the household from a welfare perspective. Previous literature may consequently have underestimated the efficient level of female labor supply.

With this in mind, we want to return to the basic research question of how policies affect female labor supply. Because labor supply can be viewed as an investment in the sense that a woman's labor market attachment today may be crucial for her economic situation tomorrow, we consider how policies are likely to affect the economic situation of women in case of divorce. We consider four policies that we believe are most relevant for women's labor supply, namely paid parental leave, child care subsidies, in-work benefits, and tax relief on household substitutes. Whereas the first two policies have a rather long history and are considered to be cornerstones of the Swedish welfare state, the last two policies have only recently been implemented in Sweden. When considering the impact on female labor supply we are, in particular, interested in the effects on labor force participation, work time, and time in parental leave. In the analyses of how supply is affected by these policies we rely both on descriptive data from the labor force

surveys, a theoretical framework which we develop, and earlier theoretical and empirical research.

In contrast to Rosen's 1997 analysis, this study does not explicitly undertake a formal welfare analysis in order to pin down an optimal policy. However, at the end of this paper we return to Rosen's welfare analysis of childcare subsidies and discuss if another policy instrument can stimulate the labor supply of women with children as effectively as childcare subsidies but without inducing a distortion in terms of an over consumption of childcare services.

2 Empirical Background

This section will present data on the outcome variables of importance for this paper. We will whenever possible make comparisons between Sweden and the United States. Comparisons between these countries are of special interest since the two countries are at nearly opposite ends when it comes to labor taxation, the benefit levels if not working, as well as the generosity of family policies. Sweden's family policies are among the most generous, while at the same time the average tax rate and the benefits when not working is among the highest, in the developed world. The US rank much lower in this respect. As heavy taxation and generous benefits for the non-working population tend to reduce labor supply, we should expect labor supply to be much lower in Sweden than in the US. In general, this is also what we observe. However, a closer look at the differences and similarities in the labor supply of women with children turns out to be suggestive of the role of family policies in the two countries.

Table 1 provides an overview of the employment patterns for men and women in Sweden and the US. The table reveals that labor force participation among women is higher in Sweden than in the US, but American women are more likely to be at work. By multiplying the first column in Table 1 with the total number of weeks per year, we can calculate the annual average work hours. The annual average work hours of women aged 16-54 in Sweden are 988 compared to 1118 in the US. These numbers for the whole population (women and men) age 16-54 are about 1173 in Sweden and 1329 in the US. These numbers are comparable with what is reported in other studies (see Freeman and Schettkat, 2005).

Table 1. Employment patterns for men and women in Sweden and the US, year 2005, ages 16-54.

	Work hours/ Population	Work hours/ present workers	Present workers/ Employed	Employed/ labor force	Labor force/ Population
Women (Sweden)	19.0	33.3	0.81	0.94	0.78
Women (US)	21.5	33.1	0.95	0.95	0.72
Men (Sweden)	26.1	39.3	0.87	0.93	0.82
Men (US)	29.6	38.3	0.97	0.95	0.84

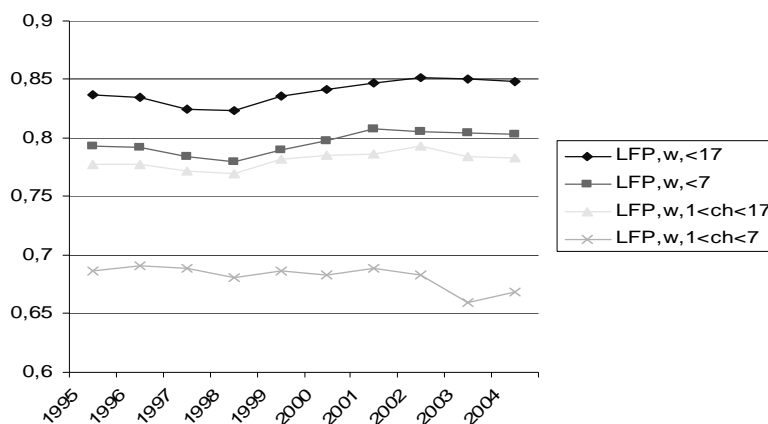
The measures of average actual weekly work hours of those who are present at the work place (column 2) is based on the age group 16-64 for Sweden and the US.

The work hours/present workers for the US is based on March 2005, and not the yearly number. Data source: the labor force surveys, AKU (Sweden) and CPS (US). AKU went through some changes in 2005 (see www.scb.se)

2.1 Labor force participation

Female labor force participation in Sweden increased dramatically from the mid 1960s. The increase ended with the recession in the beginning of the 1990s, and since then the participation rate has been stable showing only cyclical variations. In contrast, male labor force participation has seen a weak decline, but has basically been stably except for cyclical changes, since the beginning of the 1990s. Women's labor force participation at 80 percent is almost as high as that of men (85 percent).

Even women with children have remarkably high rates of labor force participation in Sweden, although the rate is slightly lower for mothers with small children (Figure 1). Some of this may be a statistical artifact. Women who are on paid parental leave from a job are registered as employed also when on leave. To get a better comparison with the numbers for the US, we would like to redefine women who are on parental leave as being out of the labor force. As that is not possible using the aggregate data from the labor force surveys, we instead assume that all women who have children below one year of age are on parental leave and regard them as being out of the labor force. This is of course very crude, but we know that more than 80 percent of mothers who have a child below one year old are reported as not being present at the work place the whole week of measurement.¹ Figure 1 reveals that this correction substantially reduces participation rates.



Figur 1. Labor force participation rate (Labor force/Population) for women with children (children less than 17 years old) and for women with small children (children less than 7 years old). The two lower graphs accounts for that women with children below one year are on parental leave and defined as out of the labor force. Data source: The labor force surveys (AKU), Statistics Sweden.

Parental leave is one reason to be absent from work, but there are also other reasons, such as vacation, sick leave, sick children, etc. Figure 2 shows the employment rate and the rate of presence at the work place for women with children. Counting only women who were present at the workplace some time

¹ Moreover, we know that mothers take about 10 months on average of paid parental leave (Ekberg et al, 2005). Additionally, we know that mothers tends to lengthen their maternity leave by using the low flat rate paid parental leave (Westerlund et al, 2005).

during the week of measurement, the rate falls to around 50 percent for mothers with small children.

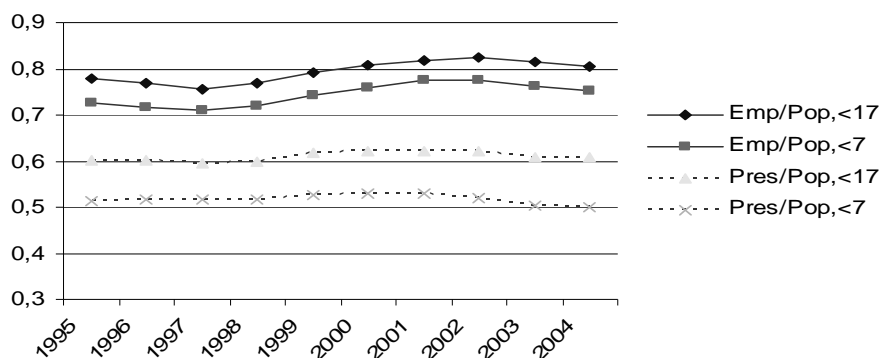


Figure 2. Swedish female employment and presence at work place relative population by category. Data source: The labor force surveys (AKU), Statistics Sweden.

The numbers for labor force participation in the US are similar but at slightly lower levels, as seen in Table 2. Women with children in Sweden have a higher labor force participation rate than their counterparts in the US. Note that this holds even if we assume that all women in Sweden who have a child smaller than one year of age are on parental leave and counted as being out of the labor force.

Table 2. Labor force participation as percent in labor force by women and men (age 16-64), by age of youngest child in household in Sweden and the US. March, 2005.

	With child age<17	With child age<7	All	With child age<17 >1	With child age<7 >1
Women (Sweden)	84	81	74,0	78	67
Women (US)	71	63	69,0	-	-
Men (Sweden)	93	94	78,0	-	-
Men (US)	94	96	81,0	-	-

Note: The first two columns show the labor force participation rate (Labor force/Population) for women and men with children (children less than 17 years old for Sweden and less than 18 years old for the US) and for women and men with small children (children less than 7 years old in Sweden and less than 6 years old in the US). The fourth and fifth column assumes that women with children below one year of age are on parental leave and defined as out of the labor force. Data from the labor force surveys, CPS (US) and AKU (Sweden).

2.2 Working time

Women are less likely to work full time than men although the trend for women has been up slightly over time. Women with children, especially small children, are less likely to work full-time compared to those without children (see figure 3).

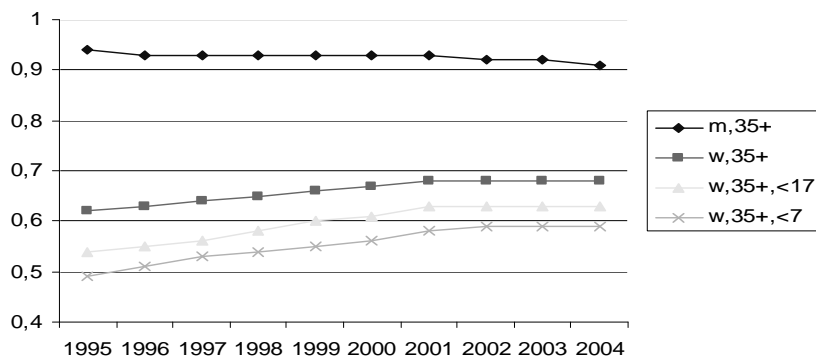


Figure 3. The share working more than 35 hours a week for men, women, women with children less than 17 years old, and for women with children less than 7 years old. Data source: The labor force surveys (AKU), Statistics Sweden.

To see whether women actually reduce their working time when they get a child, however, it is necessary to use micro data sources. Kennerberg (2007) uses matching to compare the working time for women before and after they got a child with their childless counterparts. She shows that women prior to child birth worked about 90 percent of a fulltime job. Also their counterparts, which did end up not having a child, worked about 90 percent of a full time job. After the birth of the first child, however, mothers reduced their work time with about 10 percent when returning back to work after their parental leave time. Women who did not get a child instead increased their work time slightly.

Also Table 3 indicates that women tend to reduce their work time after having children. This pattern holds not only for Swedish mothers, but also for women with children in the U.S.

While women are more likely to work part-time rather than full-time after having children, the reverse is true for men. This suggests that there is some substitutability of male for female work time, and/or that men with children feel more compelled to earn instead of taking leisure time. Selection into marriage could also be an explanation. Potentially part-time working men don't get married to the same extent.

Table 3. Percentage of persons working part time in total employment by category. Year 2004.

	Women				Men		
	No children	One child	Two or more children	Total	No children	With children	Total
Sweden	14.6	16.7	22.2	17.9	5.2	3.4	4.3
U.S.	10.1	15.8	23.6	14.6	3.5	1.8	2.7

Source: Women at Work: An Economic Perspective (2005).

The pattern of weekly work hours in Sweden and the US is also fairly similar, with slightly longer work days for those who actually work in the US (Table 4).

Table 4. Female and male actual average weekly work hours among those who worked in Sweden and the US, age 16-64, March, 2005.

	Actual work hours
Sweden	
Women	31.2
Women with child age<7	28.7
Men	36.5
Men with child age<7	36.5
US	
Women	33.1
Women with child age<6	30.6
Men	38.3
Men with child age<6	41.5

Note: The numbers are average hours worked in preceding week for the US sample. In Sweden they are the actual hours worked among those who worked. Data from the labor force surveys, AKU (Sweden) and CPS (US), March 2005.

2.3 Time on parental leave

Women's labor supply is highly affected by parental leave. This absence may not only have short run effects on women's labor supply but long run effects as well. The average time on paid parental leave is 10 months in Sweden. Although fathers tend to take an increasing share of the family's paid parental leave (up from 10 to 20 percent between 2000 and 2006), it remains the smaller part.

2.4 Work Incentives

Attachment to the labor market is a strong determinant of the economic situation of women with children. In countries where female labor force participation is high, the share of poor among single mothers is also relatively low.² But what incentives to work do single women with children have? And if the incentives to work increased through policy changes, would this groups react on these improved incentives?

A crucial measure to capture work incentives is the replacement rate when not working. In most countries this replacement rate is higher at lower income levels, where single mothers are overrepresented. Flood et al (2007) calculates the average replacement rate for single mothers on social assistance in 1999 to be 91 percent for a half-time job and 79 percent for a full-time job.

Studies on labor supply responses of single mothers in Sweden are scarce. Exceptions are Andrén (2003) and Flood et al (2007) who estimate structural static models of labor supply for this group. The studies suggest that Swedish single mothers do respond positively to increased returns to work. Moreover, the labor supply elasticities are significantly larger for single mothers than for other groups. The study by Flood et al (2004) estimate a structural static model of household labor supply to capture labor supply among two-parent families in Sweden. See Table 5 for the estimated elasticities.

² See Nyberg (2005) and Datta Gupta et al (2006).

Table 5. The labour supply elasticity of single mothers, women, and men, in Sweden.

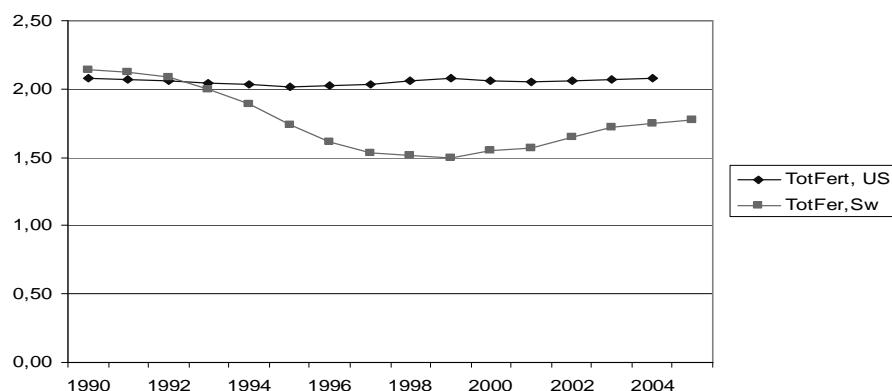
	<i>Single mothers</i>	<i>Women</i>	<i>Men</i>
Labor supply elast.	0,62-0,77*	0,1**	0,05**

* Flood et al (2007) and Andren (2003).

** Flood et al (2004).

2.5 Fertility

Another dimension of labor supply is fertility. The fertility rate in Sweden dipped in the beginning of the 1990s, but the rate is still high and seems to be catching up to its old levels again. Figure 10 records the total fertility rate for Sweden and the United States.



Figur 10. Total fertility rates for Sweden and United States

Although both Sweden and the US face aging populations, the problem is less pronounced for the US and Sweden than for other developed countries in terms of relatively high fertility rates. However, the large welfare state which characterizes Sweden makes Sweden more sensitive to an aging population than the US. The importance of a high female labor supply is then even more crucial.

3 Policies in Sweden: Paid parental leave, subsidized child care, in-work benefits, and tax relief on household substitutes

3.1 The paid parental leave system

Employed Swedish women have had the right to paid maternal leave since 1955. The government pays for it by way of the social insurance system. In 1974, Sweden became the first country to replace the maternity-leave system with a parental-leave system, where the same rules applied to both fathers and mothers. Parental leave initially covered six months of payment, but was gradually extended over the years to cover 15 months by the year of 1990. In 1993, the parents shared 360 days with a compensation corresponding to 90 percent of gross earning up to a ceiling, and another 90 days at the guaranteed flat rate of 60 SEK per day. Table 6 provides a description of the parental leave scheme since 1995.

Table 6. The parental leave scheme.

Year	Total days	Reserved/ Parent	Duration	Replacement rate (%)	ceiling	PBA
1995	450	30	360	80%	7,5*PBA	35 700
1996	450	30	360	75%	7,5*PBA	36 200
1997	450	30	360	75%	7,5*PBA	36.300
1998	450	30	360	80%	7,5*PBA	36.400
1999	450	30	360	80%	7,5*PBA	36.400
2000	450	30	360	80%	7,5*PBA	36.600
2001	450	30	360	80%	7,5*PBA	36.900
2002	480	60	390	80%	7,5*PBA	36.900
2003	480	60	390	80%	7,5*PBA	38.600
2004	480	60	390	80%	7,5*PBA	39.300
2005	480	60	390	80%	7,5*PBA	39.400
2006*	480	60	390	80%	10*PBA	39.700
2007	480	60	390	80%	10*PBA	40 300
2008	480	60	390	80%	10*PBA	41 000

The ceiling was raised for children born after July 1st 2006. The daily flat compensation for the 90 days has been 60 SEK 1995-2005 and 180 SEK from July 1st 2006. The price base amount (PBA) is a yearly adjusted amount used to, among other things, to ensure that various benefits do not decline in value because of an increase in the general price level (inflation). Source: Bergemann and van den Berg (2006) and information from publications of the National Social Insurance Board. See <http://www.forsakringskassan.se/>

The Swedish parental leave system is unique in terms of generosity and flexibility. Parents have the legal right to take parental leave for up to 18 months without the risk of losing their jobs. Parents can use their days of paid parental leave in a flexible way until the child becomes eight years old. In addition, the parents have the legal right to reduce their working time to 75 percent of what is a normal work week at the workplace until the child turns eight years old.

In 1995, a reform, the daddy-month, was introduced. The reform meant that one month of the paid parental leave had to be used by each parent. In practice, it meant that fathers could no longer transfer all their paid parental leave to the mother. At least one month had to be used by the father, or it could not be used by either of the parents. In 2002, a second father quota was implemented. The reform reserved two months for each parent. At the same time, the total days of entitlement to paid parental leave for the family increased by 30 days. In practice this implied that an extra month available only for fathers was added to the existing paid parental leave scheme.

Government expenditures on paid parental leave is about 17 billion SEK or about 0,7 percent of GDP.

3.2 Child care subsidies

Publicly provided childcare was initiated already in the mid 1960s. The pressure for municipalities to provide daycare became larger in the mid-1970s, and by 1983, publicly provided daycare covered 52 percent of preschool children. By 2004 the share of preschool children in public day care was over 80 percent. The share of children aged 6-9 years enrolled in the after-school centers is also high, close to 80 percent.

Gradually increasing fees for childcare in the 1990s and the differences in fees across municipalities led to the imposition of a ceiling on fees,

the Maximum fee system, in 2002. The reform was constructed such that the fees for child care were fixed at a certain percent of parental income, and specified a maximum cost to the household.³ The maximum fee system has led to smaller differences in fees across municipalities, and, for most families with children, a reduction in their childcare fee. The share of childcare costs covered by private fees fell from around 20 percent to around 10 percent.

In 2001-2003 the program was expanded to allow the children of parents who were unemployed and on parental leave the right to pre-schooling of at least 15 hours week. Universal pre-school for four and five year olds was also introduced. Although pre-school is not compulsory, the municipalities are obliged to provide places in pre-school if parents wish it.

The average cost per child in pre school was almost 96 000 SEK in 2004. The total costs for pre-school in 2004 was about 34 billion SEK or about 1.3 percent of GDP.

3.3 In-work benefits

Many countries across the industrialized world have now introduced some kind of in-work benefit, that is, a benefit or tax credit which is conditioned on labor income. They have followed the lead of the US and the UK, where such programs have been in place for some 30 years. The programs aim to improve work incentives and reduce poverty. Belgium, Canada, Finland, France, Ireland, Netherlands, and New Zealand now have such systems.

As of January 2007, Sweden, also has a system of in-work benefits in the form of a tax credit when employed. The tax credit became more generous both as of January 2008 and January 2009. The tax credit in combination with a general income tax allowance implies that no tax needs to be paid on labor income up to yearly earnings of about 39 000 SEK. Then about 25 percent of labor income earned on top of this limit is tax exempt until a yearly income level of 116 000 is reached. For income above this limit only about 6.5 percent of labor income is tax exempt. The maximum tax allowance is reached when the yearly labor income is about 300 000 SEK. The maximum tax credit amounts to about 18 000 SEK per year. The credit is not phased out, and it is more generous for workers above 65 years.

3.4 Tax relief for household substitutes

A number of countries in Europe have introduced various systems of subsidies or tax relief on household substitutes. This applies to Austria, Belgium, Denmark, Finland, and France. After a long debate on the benefits of tax relief on household services, Sweden introduced such a scheme in July 2007. The reform implied that half of the labor costs of the substitute labor which can include cleaning, laundry, ironing, gardening, and babysitting, up to a ceiling is deductible from the income tax payments of the buyer. The service has to be carried out within the home.

³ In 2005, the child care fee for a family with one child in daycare was 3 percent of the family income, with a maximum fee of 1 260 SEK per month. The fee for the second child was 2 percent of the family income with a maximum fee of 840 SEK per month. For the third child, the fee was 1 percent of the family income, with a maximum fee of 420 SEK a month. No fee for the fourth child.

4 A Model of Female Work Behavior

How have Sweden's longstanding and very generous family policies in the form of parental leave and childcare subsidies affected women's labor supply and their economic situation? How can the more recent reforms, in-work benefits and tax relief for household services, be expected to affect these outcomes? This section tries to answer these questions in a simple theoretical model. Section 5 will thereafter try to combine these findings with evidence from earlier theoretical and empirical research.

In order to determine the effects of the four policies described above on women's labor supply we have developed a simple theoretical model of female decision making. This section provides a non-technical presentation of the model and summarizes the main results. See the appendix for a formal analysis of all the policy reforms discussed in this paper.

The model is set in two periods. In the first period women are married. In the second period there is an exogenous probability that the marriage will be dissolved. At the beginning of the first period the woman makes her career choice. By allocating her available time into market work and family work she can decide on how much of a market oriented career, and how much of a family oriented career, she wants to make. As the allocation of time has consequences also for the future, she takes account of the possibility that the marriage may dissolve in the future when making her time allocation decision.

Since labor supply in the first period can be seen as an investment, we let the woman's labor supply in the first period also determine her supply in the second period. This assumption captures the fact that the decision to choose a weak labor market attachment early in life is likely to induce a lower income in the future.

Women derive utility from general goods consumption and from consumption of a family good. The family good can be produced within the household by the use of own time, or it can be purchased in the market. These are perceived to be substitutes, although not necessarily at a one-to-one ratio. The payoff from investing time in the family is then the utility the home produced family good yields. The payoff from investing time into market work is given by the market income net of taxes.

4.1 Paid parental leave

Increased generosity in the paid parental leave system tends to reduce women's investment in a more market oriented career. This follows as there is a direct negative effect on market investment as the payments to additional family time has increased. In addition there is a negative effect on work incentives as the reform has to be financed by increased taxation. The poverty among divorced women increases both because women choose to invest more in a family oriented career and because the reform requires higher taxes.

The effect of the first 'daddy month' reform in 1995, where the leave time for mothers was reduced, depends on whether mothers choose to exhaust the paid parental leave periods or not. The reform is more likely to increase female labor supply if women exhaust their leave periods.

The second 'daddy month' reform in 2002 added an extra month of parental leave, which in practice was only available for fathers. Somewhat counterintuitive, this tends to reduce women's investment in a market oriented career. The reason is that an increase in the father's time at home directly increases the female spouse's consumption of the family good, which induces her

to buy less 'care time' on the market. In fact she reduces her market purchases of the family goods by more than the increased father's contribution. The reason is that the reform needs to be financed. An increase in the paid home time for fathers requires increased tax rates to finance the reform, which reduces the incentives to supply market work. Female market work is therefore reduced, which, in fact, implies that she works more in the household in response to the father increased contribution of the family good. Key is that the marginal care of children is provided by market supplied childcare and not by the mother. Her time is infra marginal so the father's time substitutes for market purchases of childcare, not for the mother's time. The reduction in market demand for childcare coupled with the tax effect cause female market time to decline with the second reform.

Poverty among divorced women increases both because women choose to invest more in a family oriented career and because the reform requires higher taxes.

4.2 Child Care Subsidies

The effect of introducing a subsidy on child care is to increase women's time in the market and reduce poverty among divorced women, provided women finance a minor share of the government expenditures on the child care subsidy. The opposite holds when women have to finance a major part of the subsidy.

Furthermore, the effect of a ceiling on fees has a positive effect on labor supply. This follows as the dampening effect on labor supply is removed when the fee no longer increases with income. Thus women invest more in a market oriented career in case the child-care fee is uniform and fixed instead of income related. However, for low income families the negative effect of income dependent fees remains. Moreover, such a reform increases the welfare gap between married and divorced women. This follows as a ceiling reduces the fee for high income earners relative to low income earners. Note that this concerns the intensive margin.

4.3 In-Work Benefits

The model yields the following result. If women finance a minor share of the government expenditures on the in-work benefit, a steeper phase-in profile increases women's time in the market, reduces poverty among divorced mothers and reduces the welfare gap between married and divorced women for women in the phase-in region. If women, although of less practical relevance, finance a major share of the in-work benefit, the effect is ambiguous. When women can transfer the burden of financing the in-work benefit on to other citizens, the direct effect of the benefit will dominate the tax effect, and women will invest more time in the market. The poverty among divorced women falls both because women choose more of a market career and because the in-work benefit increases.

The more generous in-work benefit, which is only available to divorced women in the model, will reduce the dispersion in wellbeing between married and divorced women. This follows because the in-work benefit directly increases the income of divorced women, and because labor income increases as women invest more in a market oriented career.

A steeper phase-out range has an ambiguous effect on market investments, poverty, and welfare dispersion for women in the phase out region.

4.4 Household substitutes

If the market for household substitutes is small, introducing a price subsidy on the purchased household goods will induce women to invest more in a market career, consume more household goods, reduce poverty among divorced women, and reduce the welfare gap between married and divorced women.

A subsidy reduces the price on the market produced household goods, increasing the total consumption of household goods. As it is the market purchased goods that has become relatively cheaper, the amount of household goods bought from the market increases also at the expense of home produced household goods. Thus women will invest more in a market oriented career as they find it optimal to substitute household goods produced by own time for market produced household goods. This is the distortion that Rosen focused on in the context of market-provided childcare. But noteworthy is that higher market investments also improve women's economic situation in case of divorce, thus reducing poverty among divorced women.

It is also significant that the welfare dispersion between married and divorced women actually falls although married women increase their total consumption of the household goods. The reason is the following. Although married women get higher welfare due to the increased consumption of household goods, they also have to pay for it. The higher welfare following an additional unit of purchased household good is exactly counteracted by the price paid for the unit. The reallocation towards more market work will benefit the divorced mothers in terms of a higher income, but married women will, on top of the gain in terms of a higher income, lose in terms of less own made household goods. Thus welfare dispersion between married and divorced women falls.

However, the subsidy calls for tax increases. This, in turn, discourages women from investing in a market-oriented career. These counteracting effects are, however, small when the market for household goods is small. Then, the cost of financing the subsidy, and the required tax increase, is low. The tax effect on women investment in market work will then also be modest. This no longer holds if the market for household substitutes is large, as in the case of market provided child care itself.

5 Effects of Policies on Work Patterns and Labor Income for Women

Having described the employment patterns of women (Section 2) and used a theoretical model to determine how women's labor market outcomes can be linked to the four policies in focus (Section 4) we combine these findings with theoretical and empirical evidence from earlier research.

5.1 Paid parental leave

The generous parental leave payments in Sweden, both in duration and levels, is most likely a key factor explaining the long time spent in maternity leave in Sweden. This view was supported by our model analysis. It is also supported by empirical evidence (Pylkkänen and Smith, 2004) which shows that a higher compensation rate during parental leave prolongs the break from market work. Mothers in Sweden take on average 10 months off for paid maternity leave in Sweden.

In addition, the right to paid parental leave combined with the legal right to return to previous employment is most likely an important factor explaining the high participation rate among mothers in Sweden. Recall that labor force participation among mothers was higher in Sweden than in the US even if all mothers with children below the age of one is counted as being out of the labor force (see Table 2). This is consistent with empirical research. Ruhm (1998), using data for nine European countries over the period 1969 through 1993, found that the right to paid leave *raises* the percentage of women employed by between 3 and 4 percent. Only about one quarter of this effect can be due to an increase in women being registered as employed but absent from work due to the parental leave program. Ruhm offers two explanations for this result. First, women who would otherwise choose not to participate may search for a job in order to qualify for the paid parental leave scheme. (Since parental leave is disproportionately enjoyed by women, but paid for by men, the policy raises the value of work for women.) Second, the scheme may speed up the re-entry to work. The reason is that some mothers who would have quit their jobs in order to take a long leave period, now find it worthwhile to return to work sooner in order to remain in their old job. Ronsen and Sundström (2002) finds that the right to paid parental leave coupled with the legal right to return back to their previous job speeds up the return to employment. However, once the rights already exists, prolonging the maternity leave period and extending the rights to it may, in fact, reduce labour supply as it prolongs the time in parental leave. This suggests that a slightly less generous parental leave scheme in terms of payment and duration will likely increase female labour supply in terms of a shorter maternity leave without inducing women to drop out of the labour force.

The Swedish parental leave scheme provides parents with the legal right to reduce their work time to 75 percent of a full time job (at their full-time hourly wage) until the child is eight years of age. This rule encourages less work hours, but most likely contributes to higher labor force participation. Cross-country analyses have shown that there is a positive link between part-time job opportunities and female labour force participation (see Del Boca and Pasqua, 2005). Thus, the legal right to reduce work time from full-time to part-time may have a positive effect on the participation decision but potentially a negative effect on the intensity decision.

Consistent with our theoretical analysis, the empirical evaluations of the daddy quota reforms (Ekberg et al, 2004, and Eriksson, 2005) indicate that the first daddy quota reform increased women's labor supply whereas the second reform reduced it. See Table 7 for a comparison of the use of parental leave days before and after each daddy-quota reforms. This suggests that the second reform, which both restricted the number of transferable months and extended the total family leave time, was not successful from a female labor supply perspective.

Table 7. Mean number of parental leave days for the first and second daddy-month reform. The first 17 months.⁴

	<i>1995 reform</i>		<i>2002 reform</i>	
	Before	After	Before	After
Father	23	28	31	34
Mother	311	286	259	264

Source: Eriksson (2005). The total family parental leave days with an income based payment in 1995 and 2002 are 360 and 390.

The parental leave system probably affects the wages of women relative to men. As the parental leave is mainly picked up by the mothers and not by the fathers, the program may reduce human capital of women relative men, which may give rise to earnings differentials. Of course, this does not imply that the women are worse off with the program than without.

Datta Gupta et al (2006) discuss how a differentiated take-up rate of the parental leave may induce a high personal penalty for fathers who take leave. They argue that mothers may be induced to select into relatively low paid jobs in the public sector where it is easy to combine a career with family and the personal penalty of leave is especially low, whereas men sort into the private sector and become the family breadwinner. They also argue that the large employment opportunities in the public sector which supply particularly generous and flexible parental leave schemes, may have induced gender-segmented labor markets in the Nordic countries (see also Albrecht et al., 1999).

One may also ask how family policy and fertility are linked. A generous and flexible parental leave system should affect fertility in a positive way as the paid parental leave reduce the cost of income loss associated with childbearing.

5.2 Child Care Subsidies

There have been a number of empirical studies investigating the effects on labor supply of child care policy. High availability and subsidized fees tends to increase female labor supply. The size of the effects is, however, less clear. (For an overview of the empirical literature see Jaumotte, 2004). A study of the access to and prices of child care in Denmark found that availability had a positive effect on female labor supply, whereas higher fees had a negative effect (Simonsen, 2005). Moreover, the study by Domeij and Klein (2008) show in a calibrated dynamic life-cycle model for Germany, that the labor supply of mothers with small children would be large if Germany expanded the availability of highly subsidized childcare. An evaluation of the Swedish childcare fee reform of 2002, however, shows that the reform did not have a significant effect on female work hours and participation (Mörk et al, 2007). A possible interpretation from these studies is that although childcare subsidies have historically played an important role for female labor supply by reducing the costs of working, further increases in the subsidy, which is already very high, may have only marginal effects on mothers' labor supply. If true, this suggests that a reduction in the childcare subsidy would not cause a major drop-out from the labor market.

⁴ Note that the number of parental leave days in table 7 is measured 17 months after the birth. We know that fathers use their parental leave days to a larger extent when the child is older, which tends to underestimate the number of parental leave days the father is using, as well as his share of the total days. (See Eriksson (2005).

One may also ask how childcare subsidies and fertility are linked. One should expect that childcare subsidies reduce the cost of having children which should increase fertility. This is also sometimes brought forward as the explanation for why the sign of the cross-country correlation between fertility and female labor force participation have changed from negative to positive. See Datta Gupta (2005) and Del Boca and Pasqua (2005) for an overview of the literature on family friendly policies and fertility.

5.3 In-Work Benefits

In-work benefits have only recently been implemented in Sweden so we rely on theory and experiences in other countries to suggest the directions and size of effects.

The Earned Income Tax Credit (EITC) in the US was introduced more than 30 years ago, and has since then expanded significantly. The EITC is now the largest cash transfer program for low income families at the federal level, and in 2003 about twenty million families received a total of \$34 billion dollars in benefits from it. The EITC is targeted towards low income families with children. The largest group receiving the in-work-benefit is single mothers.⁵

The EITC is constructed with a phase-in region, where the size of the tax credit is given as a proportion of earned income. Once the maximum EITC is reached, the credit is held fixed at its maximum level until the phase-out region starts. The tax credit is eventually phased out completely.⁶

The expansion of the EITC in the US has provided researchers with extensive opportunities to evaluate the effects of the EITC on labor supply. The results of these evaluations draw a quite positive picture of the impact of the EITC on labor supply. Eissa and Liebman (1996) compared the labor supply responses of single women with children with the response of single women with no children when the earned income tax credit expanded in 1986. They showed that between 1984-1986 and 1988-1990, single women with children increased their relative labor force participation by up to 2.8 percentage points. Meyer and Rosenbaum (2001) found that 63 percent of the increase in labor force participation of single families in the US between 1984 and 1996 was due to the expansion of the EITC. The evaluations also show that it seems to be the participation decision rather than the hour decision that is affected by the EITC.⁷

A relevant question, however, is whether this type of policy is likely to have a similar effect in Sweden, and other less market oriented economies, as in the US. A number of recent theoretical simulation studies have taken account of European institutional settings when estimating the effect of in-work benefits on labor market performance. One conclusion from these studies is that the

⁵ See Eissa and Hoynes (2005).

⁶ For the year 2006 (tax year 2005), income must be less than \$35263 (\$37263 married filing jointly) with two or more qualifying children, Income must be less than \$31030 (\$33030 married filing jointly) with one qualifying child, Income must be less than \$11750 (\$13750 married filing jointly) with no qualifying children. The maximum credits are: \$4400 with two or more qualifying children, \$2662 with one qualifying child, \$399 with no qualifying children. Source www.irs.gov/eitc.

⁷ The drawback with a tax credit of the EITC-type, is that the increased marginal tax rates in the phase-out region might create disincentives to work for those already in the labor market. The evaluations of the EITC seem to show that these effects exist, but that the magnitude is small. The EITC also tends to reduce incentives to enter the labor market for secondary family earner. Eissa and Hoynes (2004) show evidence for such an effect, but again the effect seems to be small.

motivation for in-work benefits in less market oriented economies is to improve work incentives and to stimulate search effort rather than to fight poverty. This, so far limited literature suggests that in-work benefits are likely to improve labor market performance also in less market oriented economies. See Kolm (2008) and Kolm and Tonin (2006) for a discussion of an earned income tax credit in a Swedish context.

To conclude, theory and experiences in other countries from an in-work benefit, such as the EITC in the US, suggest that this type of policy could be quite successful in Sweden with respect to the effects on labor market outcomes. Although the Swedish construction of the tax credit is slightly different and not targeted specifically toward single mothers, empirical evidence for this group in Sweden show that they are likely to respond to improved work incentives.

5.4 Tax Relief on Household Substitutes

This policy is also so recent in Sweden that we have to rely on theory and experience of other countries. Our model exercise suggested that tax relief on household substitutes enable women to work more in the labor market as they can substitute market purchased household services for own household time.

The argument in favor of such a tax relief is that efficiency can improve. It is, in fact, the same argument as Sherwin Rosen presented ten years ago. The literature is rather coherent in this case. It is welfare improving to introduce subsidies or a tax relief on household substitutes, childcare being the most significant example. However, subsidies that are too large, will eventually reduce welfare (see Rosen, 1995, Sorensen, 1997, and Kleven, 2004).

Sketchy evaluations of the systems in other countries show that the policies have been quite successful in terms of increased employment. However, more careful empirical evaluations are needed in order to clarify the contributions of these policies.

To have access to a market for household substitutes may be important for female labor supply. Freeman and Schettkat (2005) propose this as an explanation for much of the EU-US employment and hour differences that is observed. As they argue, in the US there has been a more extensive shift of traditional household production – food preparation, child care, elderly care, cleaning houses- to the market than in Europe. However, Sweden differs from the EU-average in some important ways. When it comes to child care one could argue that the generous childcare subsidies in Sweden have induced an extensive shift of childcare from the household to the market sector. Freeman and Schettkat (2005) present numbers on the percentage of children under the age of three enrolled in formal daycare. In Sweden, 48 percent use formal day care whereas the number is 54 in the US. The European average is 29 percent. But markets for other types of household services are either non-existing or relatively small in Sweden. Swedes spend about 7.7 hours a week cooking at home, whereas US citizens spend only about 4.1 hours a week cooking at home; see Freeman and Schettkat (2005).

Detailed time use data for Sweden and the US show that women spend more time cooking, cleaning, etc, than women in the US. Employed women in Sweden use 13 hours a week on such tasks compared to 10 hours for women in the US. The corresponding numbers for men are almost 7 for Sweden and a bit over 3 for the US. Employed women in the US do, however, work more on the market and consume less leisure than Swedish women. The same pattern holds for men.

High taxes and relatively high wages at the lower end of the wage distribution make household substitutes expensive in Sweden. The child care subsidy is one notable exception pushing in the direction of increased labor supply, and the question is whether tax relief on household substitutes can further increase women's attachment to the labor market as is suggested by our model. It probably can.

6 Child care subsidies vs in-work benefits

Let us return briefly to Sherwin Rosen's analysis of the Swedish childcare subsidies from an efficiency viewpoint and the issue of second-best solutions. Can childcare subsidies be replaced by another policy instrument which can stimulate the tax distorted labor supply of women with children but without distorting the consumption mix in favor of childcare services? Our answer is yes, although for other reasons it may not be a policy to recommend.

The subsidized childcare in Sweden which, in practice, is available only to employed parents can be viewed as an in-work benefit.⁸ As the mother usually is the primary caretaker, and thus the last person to leave the household for a job, the childcare subsidy can be expected to have a qualitatively similar positive effect on her labor force participation as would a tax credit on earned income.⁹

Childcare subsidies affect labor force participation positively as does an in-work benefit, but the childcare subsidy is in kind. It distorts consumption in favor of childcare, as Sherwin Rosen pointed out. An alternative that would avoid this distortion would be to transform the childcare subsidy into a lump-sum transfer to families with small children conditional on that both parents work a significant number of work hours. Such a policy would provide the same incentives to work but would not distort the consumption mix.

Were the current childcare subsidy, which is about 85 000 SEK per child and year, instead distributed as a check to eligible families, they could spend this transfer on market purchased childcare, or solve their childcare problems through flexible work times, relatives, or some other way, and instead use this transfer for consumption of other goods and services. While this is a policy worth considering, it is not without its own potential distortions.¹⁰

7 Summary and conclusions

We observe that Swedish women work close to full time prior to the birth of their first child (about 90 percent of a full time job). Upon the birth of their first child women remain in the labor force, but move from full-time to part-time work when they return to work after their parental leave. Women take the main part of the family's total parental leave and end up taking a substantial break off from the labor market. Men, on the other hand, seem not to change their employment

⁸ Since the reform 2001, unemployed workers have limited access to childcare (15 h/week).

⁹ As our model analysis revealed, the incentives to choose work hours for those already working will be different if we compare the Swedish childcare subsidy with an in-work benefit of the EITC type. This is a consequence of differences in how they are constructed in terms of income indexation of the benefit.

¹⁰ For example, publicly provided high quality childcare can be viewed as education which potentially has positive externalities.

pattern after the birth of a child. The pattern for women in the US is similar in some dimensions but different in others. The labor force participation among women with children in the US tends to be lower, and the career break following child birth shorter. Women in the US tend, like Swedish women, to reduce their work time when they return to work after child birth.

One may then ask how these observations can be linked to Swedish family policies, especially the paid parental leave system and the childcare subsidies. Based on our theoretical framework, as well as previous theoretical and empirical research, we conclude the following. The Swedish flexible parental leave system with its generous legal rights to return to the previous employer most likely helps to explain the high labor force participation rate among women with children. The heavily subsidized childcare is also most likely a crucial factor in explaining the high labor force participation among mothers in Sweden. However, the generosity of the paid parental leave system, in terms of payment and duration, most likely also explains why we observe such long career breaks for women following child births in Sweden. In addition, the two daddy quota reforms that were carried out in 1995 and 2002 respectively, seem to have encouraged fathers to take longer parental leave but have not, at least not the 2002 reform, induced mothers to work more.

A second question is whether Swedish policies are efficient. This was the key issue examined by Rosen (1997) and we returned to it briefly. Rosen concluded that childcare subsidies in Sweden, although justified as a second-best solution to offset the effects of taxes on labor supply, were socially excessive. One reason was that childcare subsidies distorted the consumption mix by encouraging a socially excessive consumption of child care at the expense of other goods. One could argue that replacing the childcare subsidy by a general in-work benefit would stimulate labor supply as efficiently as childcare subsidies but without distorting consumption. However, such policy is not without its own potential distortions.

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Appendix. A formal model of female work behavior

This section explicitly models the decision making by women. The model is set in two periods. In the first period women are married, whereas in the second period there is an exogenous probability, $1-p$, that the marriage will be dissolved.

At the beginning of the first period the woman makes her career choice. By allocating her available time into market work, L_M , and family work, L_H , she can decide on how much of a market oriented career, and how much of a family oriented career, she wants to make. As the allocation of time has consequences also for the future, she accounts for the future possibility that the marriage will be dissolved when making her time allocation decision. The payoff from investing in market work is given by the net wage income, $wL_M - T(wL_M; \cdot)$, where w is the market wage and $T(wL_M; \cdot)$ is the tax payments. The tax schedule is assumed to be convex in wage income and is, for simplicity, assumed to take the following form: $T(wL_M; \cdot) = B(wL_M)^2 - A$, where A and B are parameters.

Women derive utility from material good consumption, C , and from consumption of a family good, F . The family good can be produced/consumed at home, F_H , or be purchased in the market, F_M , where these are perceived to be perfect substitutes, i.e., $F = F_M + F_H$. The home produced family good is produced by use of own time, L_H , through the concave production function $F_H = L_H^\alpha$, $\alpha < 1$. The payoff from investing time in the family is then the utility the home produced family good yields.

Below we will consider a number of policy experiments concerning the paid parental leave system, child care subsidies, in work benefits, and tax reliefs for household substitutes. In order to consider the particular features of each policy, this basic framework is modified to account for each policy's special features.

Moreover, in order to consider only fully financed reforms, we introduce a government budget constraint which is fulfilled at all times by allowing for adjustments in the parameters of the tax system. More specifically we allow the parameter B in the tax schedule to adjust so to fulfill the government budget at all times. In addition, we introduce a parameter δ , where $\delta \in [0,1]$, which captures the share of the expenditures on the particular policy in question which is financed by the female workers. When $\delta = 1$, the full burden of financing the particular policy falls on women, whereas when $\delta = 0$ the women don't have to take any part of the financing of the policy.

4.1 Paid parental leave

Paid parental leave in Sweden provides income to parents for a limited number of time periods when they choose to stay home with their young children. A parent is only entitled to this income during time periods when not working.¹¹

Paid parental leave thus works as a subsidy to a parent choosing family time rather than time at market work.

The parents share a limited numbers of periods with paid parental leave, which can be divided between them according to their likings. However, a

¹¹ A parent is, however, free to divide a week/month/year into work days and days which are used for taking care of the children. The problem then reduces down to a one variable problem.

number of reforms have been conducted in Sweden where some time periods of the paid parental leave exclusively have to be used by each parent.

We will now specify the basic framework presented above to enable an analyses of how an increased generosity of the paid parental leave system, and of how changed rules on how the periods of paid leave can be transferred between the spouses, affects the economic situation for women. In particular we want to investigate how these policies affect the female career choice, and how these policies affect the future poverty among women who ends up being divorced.

In the model, we now interpret the family good, F , as 'care for children'. As also the father can contribute to the child care by choosing paid parental leave, the family good is expressed as:

$$F = F_M + F_H + \bar{F}$$

where \bar{F} is the father's own supply of time into child care.¹²

The financial aspect of the paid parental leave is accounted for by adding a proportional subsidy for each time unit allocated to family activity in the first period.

The value of the first period can be written as

$v(F) + wL_M - B(wL_M)^2 + A - kF_M + S(L_H; \cdot)$, where $v(F)$ captures the utility from 'care of children' and $wL_M - B(wL_M)^2 + A - kF_M + S(L_H; \cdot)$ captures the utility from material good consumption. Material good consumption is simply given by the income net of taxes and the payment from paid parental leave, $S(L_H; \cdot)$, subtracting the expenses on the market purchased child care, kF_M , where k is the price on market purchased care for children. The payment from paid parental leave is given by $S(L_H; \cdot) = sL_H$ if $L_H \leq \bar{L}_H$ and $S(L_H; \cdot) = s\bar{L}_H$ if $L_H > \bar{L}_H$. Thus, if staying home with children more hours than \bar{L}_H , the ceiling of the paid parental leave is reached. The female spouse can then not reap more paid parental leave by increasing her family time.

In the second period, the children are older (possible grown-up), and the utility is simply given by the income net of taxes which is used for material good consumption, $wL_M - B(wL_M)^2 + A$. Imposing the time constraint, $\bar{T} = L_M + L_H$, and ignoring discounting, the expected present value can be written:

$$EV = v(F_M + \bar{F} + (\bar{T} - L_M)^\alpha) + 2wL_M - 2B(wL_M)^2 + 2A - kF_M + S(\bar{T} - L_M; \cdot)$$

The female spouse chooses both the time allocation and how much of the family good she wants to purchase from the market in order to maximize the expected present value. For an interior solution, $L_M, L_H \in (0, \bar{T})$, and $F_M > 0$, the following first order conditions determine the optimal choices:

¹² It does not matter for the results that \bar{F} is introduced as linear in fathers time although the woman's time enters through a concave function. Moreover, it does not affect the results if we assume that $F_M = L_M - \bar{F}$. That is, if we assume that the demand for child care has to be equal to the time when no-one is at home.

$$\frac{\partial EV}{\partial L_M} = -v'(F)\alpha(\bar{T} - L_M)^{\alpha-1} + 2w - 4Bw^2L_M - S'(\bar{T} - L_M; \cdot) = 0$$

$$\frac{\partial EV}{\partial F_M} = v'(F) - k = 0$$

where $S'(L_H; \cdot) = s$ if $L_M > \bar{L}_M$ and $S'(L_H; \cdot) = 0$ if $L_M \leq \bar{L}_M$. Note that we only focus on the intensive margin.

The objective function is continuous, but has a kink point at $L_M = \bar{L}_M$ in the presence of the paid parental leave system. When consider the effects of the policy experiment, we thus have to consider both cases where female spouses choose to exhaust their periods of paid parental leave, $L_M \leq \bar{L}_M$, and when they do not use all the periods of paid parental leave they are entitled to, $L_M > \bar{L}_M$.

The government budget constraint is given by

$$2[BL_M^2 - A] = \delta[S(\bar{T} - L_M; \cdot) + s\bar{F}] \quad (1)$$

We will conduct three policy experiments concerning the paid parental leave system. First we consider an increase in the payment while on paid parental leave. Then we consider two types of reforms related to changed rules on how the family's periods of paid parental leave can be transferred between the spouses.

Increased payment during paid parental leave

We let an increase in the generosity of the paid parental leave system be represented by an increase in s . An increase in s captures that the cash payment during the limited time periods of paid parental leave increases. The result of such policy can be summarized in the following proposition:

Proposition A1 *Increased payment during periods of paid parental leave reduce, or have no effect, on women investment in a more market oriented career and increases poverty among divorced women.*

Proof. All propositions in section 4 follows from differentiation of the first order condition(s) and the relevant government budget constraint. Poverty among divorced women is for simplicity measured by the disposable income of divorced women, but we could equally well measure the relative difference in disposable income of married and divorced women accounting for that marriage is associated with an economic premium due to having access to the husband's income. Such premium is normalized to zero in the current model for expositional reasons. The welfare gap is measured by the utility difference of married and divorced women. End.

If women choose to more than fully exhaust their periods of paid parental leave by allocating more time into the family than the system pays for, increased generosity of the paid parental leave system reduces the incentives to invest in a market oriented career. This follows as the increased generosity of the

paid parental leave system calls for increased taxation in order to finance the reform.

If women do not fully exhaust their periods of paid parental leave, there is, in addition to the negative tax effect, a direct negative effect on market investments as the payments to additional family time has increased. Thus increased generosity of the paid parental leave system tends to reduce investment in market activities also in this case.

We may, however, also have the case where women bunch at the kink point. That is, women choose to exactly exhaust the periods of paid parental leave, $L_M = \bar{L}_M$, although they would have chosen additional family time if they were entitled to additional periods of paid leave.¹³

As a direct effect, increased generosity of the paid parental leave system reinforces the fact that women bunch at the kink point, i.e., L_M is unaffected and given by $L_M = \bar{L}_M$. However, the higher expenses on paid parental leave calls for tax increases, which tends to reduce the incentives for market work. This may in fact induce women to choose a solution where $L_M < \bar{L}_M$. That is, the tax makes untaxed work in the household relatively more attractive.

The poverty among divorced women increase both because women choose to invest more in a family oriented career rather than in a market oriented career, and because the reform increases the tax payments. Thus the disposable income, $wL_M - T(wL_M; \cdot)$, unambiguously falls with a more generous paid parental leave system.

The 'Daddy month'

Since 1995 some periods of paid parental leave have to be used exclusively by each parent. This implies that parents are no longer free to transfer all the time periods across each other in line with their likings. Two reforms have been conducted. First, the 1995 reform where the Swedish government introduced a rule which implied that one month of the family's total periods of paid parental leave exclusively had to be used by each parent. The number of total periods of paid parental leave the family was entitled to was maintained intact in this reform. As basically all mothers used at least one month of parental leave before the reform, the restriction, in practice, only concerned fathers. However, in case the mother used all the family's paid parental leave prior to the reform, an increase in the fathers leave time reduced the available time periods of paid leave for mothers by one month. The second reform was conducted in 2002, where now two months of the family's total periods of paid parental leave exclusively had to be used by each parent. This reform, however, extended the family's total periods of paid parental leave with one month. In practice this implied that an extra month available only for fathers was added to the family's periods of paid parental leave.

We represent these two types of reforms by letting \bar{F} increase. By increasing \bar{F} , we increase the fathers family time. This will in a reform similar to the 2002 reform have no impact on the mother's available time for paid leave, \bar{L}_M . The results are summarized in the following proposition:

¹³ Clearly, they could also have chosen $L_M = \bar{L}_M$ because it is optimal also in absence of limits on the periods of paid parental leave.

Proposition A2 *Increased paid family time of fathers, \bar{F} , will reduce, or have no effect, on women investment in a more market oriented career and increases poverty among divorced women.*

An increase in the fathers time at home, directly increases the female spouse's consumption of the family good. This induces the female spouse to buy less 'care time' on the market. In fact she will reduce her market buying of the family goods by more than the increased father's contribution. The reason is that the reform needs to be financed. An increase in the paid home time for fathers calls for increased tax rates in order to balance the government budget, which reduces the incentives to supply market work. Female market work is then reduced, which, in fact, implies that she instead work more in the household as a response to that the father increases his contribution of the family good.

The poverty among divorced women increase both because women choose to invest more in a family oriented career rather than in a market oriented career, and because the reform increases the tax payments. Thus the disposable income, $wL_M - T(wL_M; \cdot)$, falls with the prolonged paid parental leave.

We may, however, also have the case where women bunch at the kink point. That is, women choose to exactly exhaust the periods of paid parental leave, $L_M = \bar{L}_M$. Also in this case will the tax increases reduce the incentives for market work, which tends to induce women to choose a solution where $L_M < \bar{L}_M$. However, the budget effect may not be strong enough to counteract that they are bunching at the kink point. In this case, they will continue to bunch at the kink point, and thus leave L_M unaffected and again given by $L_M = \bar{L}_M$.

Now considering a reform of the 1995 reform type, we have to account for that the reform also implies that \bar{L}_M falls by an equivalent amount, leaving the family's total time of paid parental leave periods intact. The results are summarized in the following proposition:

Proposition A3 *Increased paid family time of fathers, \bar{F} , leaving the total time of paid parental leave intact, will: (1) leave women investment in market work, and poverty among divorced women, unaffected if women allocate more time into the family then the paid leave pays for, (2) reduce women investment in market work and increase poverty among divorced women if women do not exhaust their periods of paid parental leave, (3) increases women investment in market work and reduces poverty among divorced women if women bunch at the kink point.*

In case women take more leave than the system pays for implies that there is no need to increase taxes in order to finance the reform. The reform is self financed as the lump-sum parental leave payments to women is reduced by the same amount as the cost of financing a longer paid parental leave for fathers. The career choice and economic situation for divorced women is therefore unaffected in this case.

On the other hand, in case women do not exhaust their periods of paid parental leave, the fact that the maximum periods of paid parental leave available to them falls will have no effect on women investment in a market career. Thus, the result and analyses of the previous proposition holds in this case.

In case the father's paid family time increases in a situation where women bunch at the kink point will increase female investment in a market oriented career. Women who choose to exactly exhaust their periods of paid parental leave face a reduction in the marginal cost of working when their available periods of paid leave is reduced. This is a consequence of that an increased working time is no longer associated with a reduction in the benefits of paid parental leave. Thus, the incentives to invest in a more market oriented career has improved, which also improves the economic situation for divorced women.

4.2 Child Care Subsidies

This section uses the basic framework to consider how the Swedish child-care subsidies affect the female career choice and the future poverty for women who end up being divorced.

The more units the female spouse chose to work, the more units of child-care the family needs. Let cL_M represent the child-care payments for a family where the female spouse allocates L_M time units to market work. With no subsidies to child care we can interpret c as the going unit market price of child-care. Accounting for these child care costs, the present value is written:

$$EV = v(L_M + (\bar{T} - L_M)^\alpha) + 2[L_M - BL_M^2 + A] - cL_M$$

where we have normalized the father's care time to zero and the wage rate to unity.¹⁴ For an interior solution, the optimal time allocation between the market and the family is given by:

$$\frac{\partial EV}{\partial L_M} = v'(F)(1 - \alpha(\bar{T} - L_M)^{\alpha-1}) + 2 - c - 4BL_M = 0 \quad (3)$$

Consider now that we introduce a child-care subsidy which works so to lower the unit price of child care. Let the per child hourly unit cost be equal to \tilde{c} , and let z denote the subsidy rate, child care payments facing the buyer can then be written as $\tilde{c}(1-z)L_M$. An increase in the subsidy rate, z , then corresponds to a reduction in the unit price of child care, i.e., a reduction in $c = \tilde{c}(1-z)$ in (3), which tends to reduce the costs of working.

However, the subsidy needs also to be financed. Assume the following government budget constraint:

$$2[BL_M^2 - A] = \tilde{\delta} z L_M \quad (4)$$

where the tax parameter B adjusts so to fulfill the government budget at all times. The effect of introducing a subsidy on child care is summarized in the following proposition:

¹⁴ This is convenient as a time based fee works in an equivalent way as an income related fee. It is, however, of no importance for the results.

Proposition A4 *Introducing a child care subsidy which reduces the unit price of child care will increase women time in the market and reduce poverty among divorced women, if women finance a minor share of the government expenditures on the child care subsidy. The opposite holds when women have to finance a major part of the subsidy.*

A child-care subsidy which reduces the unit price of child-care tends to improve the incentives to work, although there will be a counteracting effect as the subsidy needs to be financed. However, as long as women can transfer the main burden of financing the reform on to other citizens, women will increase their investment in market work following a child care subsidy.

Next we consider how fully financed increases in the subsidies to child care affect market work and poverty among divorced women.

Income related child-care fees

With an income related child-care fee, the female spouse's optimal time allocation is again given by (3), where $c = \tilde{c}(1-z)$. However, we can now interpret c as the degree of income indexation in the fee system. The government budget constraint is given by $2[BL_M^2 - A] = \delta\tilde{c}zL_M$. The impact of a higher subsidy rate is summarized in the following proposition:

Proposition A5 *With income related child-care fees, a higher subsidy rate increase women time in the market and reduce poverty among divorced women, if women finance a minor share of the government expenditures on the subsidy. The opposite holds when women have to finance a major part of the subsidy.*

When the subsidy rate is increased, the child-care fee falls, which reduces the cost of a market career. Thus the female spouse faces improved incentives to work in the market. This effect is, however, counteracted by that the more generous child-care subsidy needs to be financed with higher taxes. The tax increases, in turn, reduces the incentives to invest in a market oriented career. If women can transfer the main burden of financing the subsidy on to other citizens, the direct effect of the subsidy will dominate the tax effect. Women will then choose a more market oriented career, which, in turn, will make them better off in case the marriage dissolves in the future. However, if women finance the main bulk of the government expenditures on child-care subsidies, the opposite result will materialize.

Fixed child-care fees

With fully fixed child-care fees, the expected value takes the form: $EV = v(L_M + (\bar{T} - L_M)^\alpha) + 2[L_M - BL_M^2 + A] - C$, where C is the fixed fee for child-care use. The first order condition determining the female spouse's optimal time allocation now reduces down to:

$$\frac{\partial EV}{\partial L_M} = v'(F) \left(1 - \alpha (\bar{T} - L_M)^{\alpha-1} \right) + 2 - 4BL_M = 0$$

The government budget constraint in this case is given by:

$$2[BL_M^2 - A] = \delta[\tilde{c}L_M - C]$$

where again the tax parameter B adjusts so to fulfill the government budget.

The effect of a higher subsidy in terms of a lower fee is summarized in the following proposition:

Proposition A6 *With fixed child-care fees, increased subsidies reduce women time in the market and increase poverty among divorced women.*

The increased subsidy has no direct positive incentive effect on women investing in a market oriented career. As the fee is not indexed to income, the increased subsidy will not reduce the price on a more market oriented career, and thus not provide incentives to invest in market time. Instead, investment in market time falls as the more generous subsidies to child care need to be financed with higher taxes. This negative effect on women labor supply holds as long as women take any part of the financing of the reform. Market investment falls and poverty among divorced women increases.

Note, however, that although a reduction in the fixed child-care fee have no direct impact on the intensive margin, the policy may increase female labor force participation. Such analyses of the extensive margin is left out here.

Income related fees with a ceiling

The Swedish child-care system today is characterized by a rather large subsidy and a child-care fee which is fixed if the family income is above a given threshold. Due to the reform 2002 this family threshold income is low enough making basically all families consisting of two working spouses pass the threshold and thus paying the fixed child-care fee. The only persons that basically still have a lower, and income related, child-care fee are single parents with low income. This policy is thus special as families with one parent face a different fee than families with two parents. In order to capture this specific policy feature, we make the female spouse more myopic when making her career choice in this subsection.

We model such system by letting the net pay-off in the first period be: $v(L_M + (\bar{T} - L_M)^\alpha) + L_M - BL_M^2 + A - C$, and the expected net pay-off in the second period be: $v(L_M + (\bar{T} - L_M)^\alpha) + L_M - BL_M^2 + A - pC - (1-p)cL_M$. We can in this case write the present value as:¹⁵

$$EV = 2v(L_M + (\bar{T} - L_M)^\alpha) + 2[L_M - BL_M^2 + A] - (1+p)C - (1-p)\tilde{c}(1-z)L_M$$

where the female spouse's optimal time allocation is given by:

$$\frac{\partial EV}{\partial L_M} = -2v'(F)(1 - \alpha(\bar{T} - L_M)^{\alpha-1}) + 2 - 4BL_M - (1-p)\tilde{c}(1-z) = 0$$

The government budget constraint in this case is given by:

¹⁵ The mother is assumed to continue to pay the full daycare fee upon divorce.

$$2[BL_M^2 - A] = \delta[\tilde{c}zL_M(1-p) + (1+p)(\tilde{c}L_M - C)]$$

where again the tax parameter B adjusts so to fulfill the government budget.

We can conclude the following regarding fixed versus income related fees:

Proposition A7 *Women invest more in a market oriented career in case the child-care fee is uniform and fixed instead of income related for low income families. The welfare gap between married and divorced women is, however, increased.*

This result suggest that an income related child-care fee, although only for low income families, reduces the incentive for married women to choose a more market oriented career. This follows as a more market-oriented career is associated with higher child-care fees in the marital state of divorce. To have different fees for divorce and married women, however, provides an instrument which can reduce the welfare difference between married and divorced women.

Note again, however, that this concerns the intensive margin. A lower child-care fee for low income earners induced by a lower fee for child care may stimulate labour force participation.

The following proposition summarizes the results of increased subsidies to child-care given how the current system is structured:

Proposition A8 *Increased child-care subsidies in term of a reduced rate of the income related fee which face divorced women, increases the investment in a market career and reduces poverty among divorced women, if women finance a minor part of the subsidy. Increased child-care subsidies in term of a reduction in the fixed fee which face married women, reduces the investment in market oriented careers and increases poverty among married women.*

The intuition is straight forward and are described below proposition 5 and 6.

4.3 In Work Benefits

In general, to be able to benefit from in-work benefits, a worker have to be employed in market work and have a family income below a certain threshold.¹⁶

The most common construction of these in-work benefits is that there is a phase-in region and a phase-out region. In the phase-in region the worker get a subsidy or tax deduction which is proportional to the income until a certain income is reached. Then the worker reaches the maximum total benefit or tax deduction, whereafter the phase-out region starts. In the phase-out region, the subsidy or tax relieve is gradually reduced.

In modeling the in-work benefits, we take account of the fact that the female spouse is not entitled to the benefit in case she is married. The family income is then simply too high. However, in case she is divorced in the second period she may be entitled to the in-work benefit. Low time investment in the market is associated with the phase-in region. Increasing the investment in market activities in this region induce a larger in-work benefit. High investments in the

¹⁶ US and UK systems.

market is associated with the phase-out region. Increasing the investment in market activities in this region reduce the in-work benefit. Very high market investments does not make the female spouse entitled to in-work benefits even if she is divorced.

As this policy mainly concerns the wage income, and is not directly associated with a family good, we will disregard from that the family good can be purchased from the market in this section. Thus L_H could in this section be interpreted as leisure. This simplifies the analyses as it reduces the maximization problem down to a one variable problem.¹⁷ However, the results does not change if we also include a market purchased family good.

Let \tilde{L}_M represent the income associated with the maximum available in-work benefit. The in-work benefit received in period two in case of divorce is $S(wL_M) = \phi wL_M$ in case $L_M < \tilde{L}_M$, and $S(wL_M) = w\tilde{L}_M(\phi + \varphi) - \varphi wL_M$ in case $\tilde{L}_M \leq L_M < \frac{\tilde{L}_M(\phi + \varphi)}{\varphi}$, and $S(wL_M) = 0$ in case $\frac{\tilde{L}_M(\phi + \varphi)}{\varphi} \leq L_M$. The expected present value is given by:

$$EV = 2\left[v(\bar{T} - L_M) + wL_M - B(wL_M)^2 + A\right] + (1-p)S(wL_M).$$

For an interior solution, the optimal time allocation between the market and the family is given by:

$$\frac{\partial EV}{\partial L_M} = -2v'(\cdot) + 2w - 4Bw^2L_M + (1-p)S'(wL_M) = 0$$

$$S'(wL_M) = \phi \text{ in case } L_M < \tilde{L}_M, \text{ and } S'(wL_M) = -\varphi \text{ in case } \tilde{L}_M \leq L_M < \frac{\tilde{L}_M(\phi + \varphi)}{\varphi}, \text{ and } S'(wL_M) = 0 \text{ in case } \frac{\tilde{L}_M(\phi + \varphi)}{\varphi} \leq L_M.$$

However, the in-work benefit needs to be financed with taxes. The government budget constraint in this case is given by:

$$2\left[B(wL_M)^2 - A\right] = \delta(1-p)S(wL_M)$$

We summarize the results of increased generosity of the in-work benefits in the following proposition:

Proposition A9 *If women finance a minor share of the government expenditures on the in-work benefit, a steeper phase-in profile increases women time in the market, reduce poverty among divorced mothers and reduces the welfare gap between married and divorced women for women in the phase in region. If women finance a major share of the in work benefit, the effect is ambiguous.*

When women can transfer the burden of financing the in-work benefit on to other citizens, the direct effect of the benefit will dominate the tax

¹⁷ This also implies that we can let $\bar{T} - L_M$ enter linearly into the value of home time.

effect, and women will invest more time into the market. The poverty among divorced women falls both because women choose more of a market career and because the in-work benefit increases.

The more generous in-work benefit, which is only accessible to divorced women, will reduce the dispersion in wellbeing between married and divorced women. This follows because the in-work benefit increases both directly, and indirectly as labour income increase with a more market oriented career.

When women finance the main part of the in-work benefit, women will invest less in a market career. The effect on poverty and dispersion is in this case ambiguous. The fact that less time is invested in a market career tends to increase poverty and inequality between married and divorced women. However, the direct effect of a more generous in-work benefit only accessible for divorced women reduces poverty and the dispersion in welfare.

The effects of a steeper phase-out range has an ambiguous effect on market investments, poverty, and welfare dispersion for women in the phase out region.

4.4 Household substitutes

There has been an ongoing policy discussion for more than a decade now of whether or not Sweden should introduce tax reliefs on goods and services that are considered to be close substitutes to home produced goods and services. Several European countries have seen policy initiatives where a subsidy is introduced on various 'household goods' such as gardening, catering, and cleaning. The argument in favor of such reforms is that the efficiency in the tax system would improve, and that employment would increase. We will now consider how the female spouse's career choice is affected if we introduce tax reliefs on goods that are close substitutes to home produced goods.

In the model, we now interpret family time, L_H , as time allocated into home production. This home time is now used to produce household goods at a decreasing rate of return. Equivalent household goods can, however, be purchased in the market.

The household good is assumed to be marriage specific.¹⁸ We can write the present value as:

$$EV = \left[v \left(F_M + (\bar{T} - L_M)^\alpha \right) - k F_M \right] (1 + p) + 2(w L_M - B(w L_M)^2 + A)$$

where k is the price on market purchased household goods. The female spouse now chooses both the time allocation and how much of the household good she wants to purchase from the market. For an interior solution, $L_M, L_H \in (0, \bar{T})$ and $F_M > 0$, the following first order conditions determine the optimal choices:

¹⁸ This could, for example, be if the family good is various types of household services such as a 'mowed lawn' and a 'clean house'. These goods yields no utility to the woman in case of divorce as the woman then don't have a garden or a house. This assumption is, however, not important for the results except for the welfare dispersion result.

$$\frac{\partial EV}{\partial L_M} = -(1+p)v'(F)\alpha(\bar{T} - L_M)^{\alpha-1} + 2w - 4Bw^2L_M = 0 \quad (??)$$

$$\frac{\partial EV}{\partial F_M} = (1+p)[v'(F) - k] = 0 \quad (??)$$

As is clear from the first order condition in (5?), the time allocation is determined so that the expected marginal payoff of producing own household goods equals the marginal payoff from market work. Equation (6?) alone pins down the optimal consumption of the household good, $F = f(L_H) + F_M$.¹⁹ Thus, the household goods that are not produced at home are bought in the market at the price k so to fulfill (6?).

Consider now that we introduce a price subsidy, τ , for market purchased household goods. The price facing the buyer can then be written as $k = \tilde{k}(1 - \tau)$. Introducing a price subsidy, $\tau \in [0, 1)$, then corresponds to a reduction in the price of the market purchased household goods, i.e., a reduction of k in (6?). However, before considering the policy experiment of a subsidy on market purchased household substitutes we have to specify the government budget restriction so to account for the financing of the reform. The government budget constraint will in the presence of a price subsidy to market produced household substitutes take the following form:

$$2[B(wL_M)^2 - A] = \delta\tilde{\kappa}F_M(1+p)$$

where $\tilde{\kappa}$ is the government subsidy on each market purchased household substitute. The results of the reform is summarized in the following proposition:

Proposition A10 *If the market for household substitutes is small, introducing a price subsidy on the purchased household goods will induce women to invest more in a market career, consume more household goods, reduce poverty among divorced women, and reduce the welfare gap between married and divorced women.*

A subsidy reduces the price on the market produced household goods. This induces an increase in the amount of household good purchased in the market, making the total consumption of household goods, $F = f(L_H) + F_M$, increase. As it is the market purchased goods that has become relatively cheaper, the amount of household goods bought from the market increases also at the expense of home produced household goods. Thus women will invest more in a market oriented career as they find it optimal to substitute household goods produced by own time for market produced household goods. The higher market investments also improve their economic situation in case of divorce, thus reducing poverty among divorced women.

¹⁹ thus with a concave home production function and convex tax function it is possible to have an interior maximum (i keep the convex tax system although it may not be necessary, the concave home production function is however necessary in this particular set-up). Thus possible to have $L_M, L_H \in (0, \bar{T})$ and $F_M > 0$ with the appropriate shape of the utility function.

Interesting to note is that the welfare dispersion between married and divorced women actually falls although married women increase their total consumption of the household goods, F . The reason is the following. Although married women get higher welfare due to the increased consumption of household goods, they also have to pay for it. The higher welfare following an additional unit of purchased household good is exactly counteracted by the price paid for the unit. However, when market purchased household goods replaces own production of household goods, married women face an additional cost in terms of lost home production. This particular loss is compensated by a gain in terms of higher market income. But noticeable this gain favours also divorced women. Thus welfare dispersion between married and divorced women falls.

However, the fact that this subsidy may induce a budget deficit calls for tax increases to balance the government budget. This, in turn, discourages women to invest in a market oriented career. These counteracting effects are, however, small when the market for household goods is small. The government's cost of financing a subsidy on household substitutes is then low. This implies that tax increases due to a subsidy on household substitutes will be modest, and so will the effect on women investment in market work. Clearly, if the market for household substitutes is large, introducing a price subsidy to household substitutes is going to call for tax increases. The impact on women investment in market work, poverty among divorced women, and welfare dispersion is then ambiguous. The only unambiguous conclusion we can make in this case is that consumption of household goods are going to increase when the price on the market produced household good is reduced.