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# Why Daddy months?

## How a combination of statistical discriminations and norms could explain why fathers take only a small fraction of the parental leave and why forcing them to take a bigger part could be a good idea.

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**Abstract**

Since the first daddy month was introduced in 1994, it has been one of the most discussed issues in Swedish politics. At the bottom of the discussion lies the question of why women still take almost all the parental leave when the choice is free.

In this thesis, I set up a model where I combine the theory on statistical discrimination with the Akerlof and Kranton (2010) identity theory.

The model shows that a combination of statistical discrimination and gender related norms can explain the asymmetric use of the parental leave even in a world without genetic differences between the sexes. Furthermore, this situation could be a suboptimal equilibrium which could motivate government interventions.

Reforms such as the daddy months could be a mean to shift norms toward a more optimal equilibrium. Used as a temporarily policy, daddy months can thus improve welfare in the long run. However, short term welfare losses are a price which must be paid. As long as the policy is active, the welfare effects will be negative.

The thesis does not try to find the correct explanation of the current situation. What I have done is to show one possible way to motivate reforms such as the daddy months and under which assumptions the arguments hold. The current state could as well be an optimal equilibrium due to average genetic differences and the aim of the thesis is not to judge between these possible explanations, but to provide a base for discussions and for future research.

# Contents

# 1 Introduction

One of the more discussed reforms in Sweden the last decades has been the daddy months, which means that a part of the parental insurance is individual and can not be traded to the other parent. The motive for restricting the possibility of trading was that fathers used only a very small share, which was considered negative. Although the reform has had some effect, the use of the parental insurance is still far from equal which has raised demands for further restrictions in tradability.

The most common argument against daddy months is that the parents themselves are best suited to decide what is best for them. This is an argument which is easy to understand and it needs no further explanation. The question is how a government intervention can be motivated.

The economic research on the parental leave has so far been focused on empirical evaluations of the reforms and its effects. No attempts have been made to explain why forcing the parents to share more equally should be a good idea. This has been done from a perspective of gender studies, but not from an economic perspective.

In this thesis, I will show how one can explain this by combining theories on statistical discrimination with identity economics. Doing so, I will show that the current situation can be explained as a suboptimal equilibrium given certain assumptions. Whether these assumptions are realistic or not, I do not try to answer. Average genetic differences can also explain why the parents chose to let the mother take care of the children. And even without genetic differences, it is possible that the current situation is an optimal gender based specialization. Hopefully, the model can be used in future research to test different explanations, but that is beyond the scope of this thesis.

## 1.1 The Swedish parental insurance

The current parental insurance was introduced in Sweden in 1974 (replacing the existing maternity insurance). This insurance means that either of the parents can stay home and take care of small children and get paid for it. The law was already in 1974 formulated so that half of the insurance should go to the father

| Year | Parental insurance days (%), used by | |
|---|---|---|
| | women | men |
| 1974 | 100 | 0 |
| 1980 | 95 | 5 |
| 1985 | 94 | 6 |
| 1990 | 93 | 7 |
| 1995 | 90 | 10 |
| 2000 | 88 | 12 |
| 2005 | 80 | 20 |
| 2006 | 79 | 21 |
| 2007 | 79 | 21 |

**Table 1:** Usage of the parental leave insurance in percentage, as divided between women and men, during the years 1974–2007 (SCB, 2008)

and half of it to the mother, but it was possible to trade part or all of one's own days to the other parent. The insurance currently pays 80 % of the salary up till a limit. The percentage of the wage that is insured has varied between 75 % and 90 %. Also the level of the limit has varied over time.

In 1995 the "daddy month" was introduced. The daddy month is a restriction on the way of sharing the parental leave where 30 days can not be traded to the other parent. This period was later extended to 60 days for children born in 2002 or later. Even though the restriction affects women as well, the non tradable part of the insurance is called daddy months because the motive of the reforms has been to increase father's share[1].

When the current parental insurance was introduced, the mothers took more than 99 % of the parental leave. Since then, the fathers' has increased, but despite the reforms the mothers still use 79 % of the insurance (see Table 1).

The latest policy with regards to the parental leave is the equality bonus which was introduced in 2008 (Försäkringskassan). The equality bonus is a subsidy which is bigger the more equal the parents share the parental leave. So far, the reform have not had any measurable effects (Johansson, 2010).

Ahead of the 2010 year election, newspapers speculate that the socialist coalition wants to increase the restrictions in tradability (Haverdahl et al., 2010). Although this is a quite popular idea among politicians, it is less popular among

[1]For the reader who wants a deeper understanding of the history of the parental insurance and the discussions around it, Klinth (2002) gives an extensive overview of the political discussions between 1974 and 1995.

voters. According to a recent study, 85 % of the population do not want to increase the restrictions (Leijel, 2010).

## 1.2 Why daddy months

The reasons for not putting restrictions on how parents can split the insurance are, at least from an economist's view, obvious. If the mother, or the father, has a comparative advantage for child care vis-à-vis work, it is a Pareto improvement if trading is allowed[2] – as long as the parents' choice does not affect other people negatively.

To understand why two daddy months have been introduced and why there is an ongoing debate on increasing the non-tradable part even more, one must understand the arguments and beliefs behind the reform. These are to a very large extent based on other scholarly fields than the economic. Since this is a thesis in economics, I will here only give a brief and somewhat simplified summary.

The foundations in the argumentation for a non tradable part of the insurance can be found in the field of gender studies. The basic analyzes in gender studies is the separation between sexes and the associated hierarchy[3].

Separation of sexes means that there is a strongly culturally anchored set of beliefs associated with sex and that sex is a very important factor for both one's identity and how one is perceived by others. In the case of the parental insurance, this is manifested by strong beliefs about the responsibilities of a mother, which differs from the responsibilities of a father. To leave most of the parental leave to the father conflicts with the general view of how a good mother should behave. A mother who takes only two months of the parental leave will be perceived as a bad mother whereas a father who takes two months will be perceived as a pretty good father.

The hierarchy related to the gender separation means that characteristics, abilities and tasks which are culturally associated with women have lower status and that the man is the norm in society. This means that men get more power and a bigger freedom of choice than women[4].

How both the gender roles and the different freedom and power associated with them works in the context of parental leave is discussed by Bekkengen

[2]This is true as long as not all individuals are identical, which means that it must not imply average differences between women and men.

[3]See for example Rubin (1975) or de Beauvoir (2010).

[4]See Gemzöe (2004) for a discussion of this and a general introduction to the field of gender studies.

(2002).

She shows that the parental leave is viewed as an option when becoming a father whereas it is a non-negotiable part of becoming a mother. This is also manifested in the attitudes of employers. If a man becomes a father the employer hopes and expects that he will chose not to use a bigger part of the parental leave. When a woman becomes a mother the situation is different. In this case, the employer understands she must be away for a longer time and this is viewed as a problem which the employer must solve.

How these ideas are central for the advocators of a more individualized parental insurance becomes clear in the work by Lorentzi (2004), which is an antology produced by a Swedish union in order to present arguments for more individualization. Already in the foreword it is stated that the current construction of the parental insurance conserves old (and unwanted) gender roles. This is viewed as a problem with regards to gender equality and equal opportunities, but also as a problem of badly used human capital.

The reasoning behind the latter is that the outcome is not efficient since the gender roles force mothers, who otherwise (without taking the gender roles under consideration) would have a comparative advantage for working, to stay at home instead of letting the child's father do so.

One frequently discussed explanation to why fathers use such a small part of the insurance is that they generally have a higher income and that it is thus economically beneficial for the family if the mother stays home. Although this might be a part of the explanation, other studies indicate that it is at least not the entire explanation. Batljan et al. (2004) shows that even in the families where the mother's income is above the limit and the father's below are more equal, the mother still takes more than half of the days. The studies by Andersson and Johansson (2006) also indicate that it is not the factual circumstances which are most important for the parents' decision.

## 1.3 The contribution from economists

The economists who have studied the Swedish parental insurance have done so from an empirical perspective. One example of this is Ekberg et al. (2005) who study if men who take a bigger part of the parental leave also stay home with sick children later on (their answer is no). Eriksson (2005) has also studied the effects of the introduction of the second daddy month, where he found that the increase in the share of the fathers was smaller than when the first daddy month was introduced. His conclusion is that fixed costs are not important for the father's choice and that the marginal utility from parental leave is not increasing. Another example is Albrecht et al. (1999) who study the wage effect of different kind of career interruptions. One conclusion is that men are punished harder than women for staying home with children.

What has, to a large extent, been missing, are theoretical economic models explaining why, and under which circumstances, forcing fathers to take a bigger part of the parental leave is a good idea. The probably most common attitude among economists is expressed by Henrekson (1993) who concludes that if a more equal sharing is wanted individualization is the best way to go, but in the same time has obvious doubts on the aim.

I find the lack of theoretical economic motivation for an individualized parental insurance interesting. One possibility is that the arguments presented for government interventions simply do not hold when forcing them into a mathematical model. At least not with less than the assumption that the government is better suited than the parents themselves to decide what is the best for them.

The other possibility is that economists have left for other fields to explain why reforms are wanted. Economic theory might not be the best for explaining everything in society, but economic models have features which complement more narrative science. First, economic models are good for checking internal consistency in a theory. Used correctly in the discussion an economic model can prove that if particular assumptions are valid they lead to certain outcomes. By doing so, they will put focus on the assumptions which can then be scrutinized. Second, economic models can be quantitatively tested. Considering the last years overall development of economics, where more psychological and behavioral aspects have been included in economic (mostly game theoretic) models, I found it interesting to explore the possibility. Hence, I will in this thesis set up a model which shows one possible way of motivating reforms such as the daddy months.

Given the arguments discussed above, there are two types of arguments which could be transformed to economic models[5]. The first is to assume asymmetric power between men and women which could be balanced by government interventions. The second is to model how the way current parents chose can have negative effects on future norms and expectations, which is an externality to them.

If it, to a large extent, is the father who has the power and chooses how to split the parental leave, the result is optimal only if he is totally altruistic toward the mother. If he is not, their might be reasons to intervene. One way of modeling this has been introduced by Lundberg and Pollak (1993) who sets up a

[5]A combination of both is of course also possible.

bargaining model where the threat point is a non-cooperative equilibrium within marriage. This non-cooperative equilibrium is related to traditional gender roles. Since the threat point is more beneficial for the man, the equilibrium will also be. The focus of the authors is not to evaluate reforms as an individualized parental insurance, but with some additional assumptions I believe their model could be used to motivate government interventions.

The second approach is to model the effect on future norms and expectations as externalities. If the choice of the parents affects others, interventions could be motivated even if they are altruistic toward each other. It is this direction I will explore. I will do so by using two economic theories which incorporate expectations in different ways, statistical discrimination and identity economics. Furthermore, both these theories can be related to arguments frequently used in the Swedish debate. Statistical discrimination explains how women get paid less because they are expected to stay home with children in the future whereas identity economics can be used to model gender roles as an endogenous factor.

Statistical discrimination was introduced by Arrow (1973) and Phelps (1972) in the beginning of the 1970s. They showed that in a world with insufficient information, a statistical difference between two groups will mean that a person from the group which is on average less well suited for a job will be discriminated. This is the case even if the particular person is more suited than the average, as long as she can not fully prove that to the employer. In the case of the parental leave, this means that even women who do not plan to have children at all or have husbands who plan to take the bigger part of the leave, will lose because they can not fully prove that to their employer[6]. The loop of arguments goes as follows: Women get paid less than men in the beginning of their career since employers expect them to have longer parental leave periods (which is costly for the employer). Because of this, they will earn less when they get the child. This makes it less costly for the family to let the mother stay home with the child. And since most women choose to do so employers will continue to pay women less and the circle is closed.

The beauty with statistical discrimination is that it shows that discrimination can be a sustainable equilibrium even though no one dislikes working with the other group (compare theories on taste based discrimination (Becker, 1971)) and there are no default differences between the groups. This introduces an externality to the parent's choice. If historical distribution of parental leave between men and women forms the employers' expectations on how future parents will share, it means that the decisions of today parents do not just affect

[6]This is also a common argument in the Swedish debate. See for example Lorentzi (2004).

themselves. This has also been up for discussion and in (SOU 2005:73) it is stated as a goal for the policies to avoid negative effect on "all women and men in fertile age".

In Becker's theories on division of labor in households, it is the individuals themselves who invest different amounts of time and effort in market related human capital depending on if they have a comparative advantage (compared to their spouse) in household or labor market activities (Becker, 1981, 1985). Becker shows how small initial differences will be multiplied so that the actual difference in wage will be much bigger than the initial difference in characteristics. If women are to a small extent discriminated in the labor market, Becker shows how this can lead to a much greater difference in wages and labor division. In his model, this is a rational and efficient specialization which increases total output. Combining these findings with statistical discrimination one can imagine the following loop of arguments. Women do not invest the same sum of effort at work as men do because they expect a lower return on investment. Employers anticipate this and give women worse career opportunities. Because of that, women do actually get lower return to investment and the circle is closed.

Becker's theories also raise the question if statistical discrimination can have positive effects by allowing specialization. I will later show that this is indeed the case.

In more recent times, Moro and Norman (2003) have built a more general and complex model of statistical discrimination where they also model the policy of affirmative actions.

Even if it can be discussed whether an individualized parental insurance is by definition an affirmative action (since it gives mothers and fathers the same restrictions) both the intention and the effect is the same which qualifies it for Norman's and Moro's framework. In their general framework, Norman and Moro show that affirmative actions can, but do not necessarily, benefit the discriminated group. It is also not certain whether the total welfare effect is positive or not.

Identity economics is a more recent field which was first introduced in an article by Akerlof and Kranton (2000) which was later followed up by a book (Akerlof and Kranton, 2010). In both the article and the book they argue that identity is a factor which to a large extent influence people's choices and behavior and must thus be incorporated in economic models. Identity affects economic activities in many ways and Akerlof and Kranton build a general model which incorporates much of this. First, a person belongs to a number of social categories such as sex, race, etc. Second, there are norms in society which prescribe different behaviors for different social categories. Violating these norms has a social cost.

In the case of the parental leave this means that a father who takes a big share of the parental leave will be viewed as a bad employee and, maybe to a larger extent, a mother who takes a small share of the parental leave will be perceived as a bad mother (and woman). This means that identity economics can be used to model gender roles as described in the field of gender studies. Identity economics does not just introduce a way of modeling norms and the cost of deviating from them. It also provides a way of making norms endogenous to the model. The norms might be changed by the actions of the agents in the model. This introduces the aforementioned externality in the parental leave discussions. The parents' choice on how to share the parental leave does not just affect themselves, but it will also affect the norms faced by future parents.

### 1.4 My contribution

As mentioned earlier, I will not analyze the power relation and equal opportunities between the parents. Instead, I will explore which assumptions are needed to get a sustainable suboptimal equilibrium in a setting where parents behave altruisticly in relation to each other. The mechanisms I will use are statistical discrimination and identity economics. These will be my main tools. In contrast to much of the previous work[7] I will also allow for individual variation in (exogenous) preferences and abilities. I believe that, under the unrealistic assumption of identical individuals, it is easy to overestimate the effects of both statistical discrimination and norms.

My ambition with this thesis is not to provide a very general and thus (by necessity) complex model. What I have done instead is to set up a model which is as simple as possible, but still includes the most important features. This for example means that I have assumed most relations to be linear, which is generally not a perfect description of the reality. Hence, the results are examples of how different mechanisms could work and interact and not a full review of all possibilities. Nevertheless, I think these examples might provide useful insights.

The rest of the thesis is organized as follows. In the next section, I will set up the model. In the two following sections, I will go through simplified examples where I exclude some features. In section 3, I will go through examples with statistical discrimination and in section 4, I will focus on the norms (using identity economics). After that, I will discuss the implications of possible policy options in section 5. In section 6, I will argue that the results could be valid

[7]For example Moro and Norman (2003) who have a very general model in other aspects.

in a bigger context and discuss how the model works in a more complex and heterogeneous reality. Finally, I will conclude the thesis in section 7.

# 2 The Model

## 2.1 The game

The model I will use is a repeated game with several cycles. Each cycle consist of three stages.

**Stage 1** The wages for future fathers and mothers are set. The wages will be influenced by expectations on future parental leave.

**Stage 2** The child is born and the parents decide on how to share the parental leave. They will choose the alternative which maximizes the utility function.

**Stage 3** New expectations are set. The new expectations equal the actual outcome in stage 2 and will be the expectations which affect the wages in stage 1 of the next cycle.

## 2.2 Definitions

In the model, I will assume that all children are born in families consisting of one mother, $M$, and one father, $F$. The mother and the father split the parental insurance between each other. They get one unit parental insurance to share. The mother's share will be denoted $f_M$ and the father's share $f_F$. To simplify, I will assume that the parents always use the entire insurance so that

$$f_M + f_F = 1, \qquad \text{[sharing condition]}$$

where

$$0 \leq f_M, f_F \leq 1. \qquad \text{[boundary condition]}$$

Each individual will have a preference for child care vis-à-vis working, $C$, and a work life ability, $A$, which are exogenous to the model. As will be seen later, the difference, from a model perspective, between $C$ and $A$ is that $A$ is visible to the one who discriminates (the employer).

To denote expectations, I will use $\tilde{f_M}$ and $\tilde{f_F}$. I will assume all actors to have the same expectations given the same information. I will use three types of conditional expectations. When I write $\tilde{f_M}$ and $\tilde{f_F}$, I mean the expected average for women and men respectively.

The employer will only know the sex and the ability of her own employee. She will not be aware of the preferences of her employee and she will know nothing about the employee's husband or wife. Hence, the expectations given only this information are relevant and will be denoted $\tilde{f}_M^{A_M}$ and $\tilde{f}_F^{A_F}$. Finally, the information given complete knowledge of the characteristics of both parents will be relevant. To start with, these expectations will be written $\tilde{f}_M^i$ and $\tilde{f}_F^i$.

The expectations are assumed to be consistent. Hence, the sharing conditions applies to expectations as well, given the same set of information[8].

$$\tilde{f}_M + \tilde{f}_F = 1 \quad \text{and} \quad \tilde{f}_M^i + \tilde{f}_F^i = 1 \qquad \text{[sharing conditions for expectations]}$$

The boundary conditions hold for all expectations

$$0 \leq \tilde{f}_M, \tilde{f}_M^{A_M}, \tilde{f}_M^i, \tilde{f}_F, \tilde{f}_F^{A_F}, \tilde{f}_F^i \leq 1 \quad \text{[boundary condition for expectations]}$$

The expected standard deviation of the expectations will be defined as $\sigma_{\tilde{f}} = \sqrt{\sum(\tilde{f}_M^i - \tilde{f}_M)^2}$. The sharing conditions for expectations gives $\tilde{f}_F = 1 - \tilde{f}_M$ and $\tilde{f}_F^i = 1 - \tilde{f}_M^i$. Hence, $\sum \tilde{f}_M^i - \tilde{f}_M^2 = \sum(\tilde{f}_F^i - \tilde{f}_F)^2$ which is why I can write $\sigma_{\tilde{f}}$ without $M$ or $F$ subscript.

## 2.3 Stage 1 – Wages

The wages set in stage 1 will be denoted $W(A_M, \tilde{f}_M^{A_M})$ and $W(A_F, \tilde{f}_F^{A_F})$. I will use a linear model where I assume the wage to be

$$W(A_M, \tilde{f}_M^{A_M}) = mA_M - k\tilde{f}_M^{A_M}$$

and

$$W(A_F, \tilde{f}_F^{A_F}) = mA_F - k\tilde{f}_F^{A_F}.$$

This means that the wage for a person who is not expected to take any parental leave at all is $mA$.

## 2.4 Stage 2 – The utility function

When parents decide how to share the parental leave, they consider their common utility. I will assume that the parents are altruistic so it does not affect

[8] There is no relation between $\tilde{f}_M^{A_M}$ and $\tilde{f}_F^{A_F}$ since they express different sets of information. Knowing the ability of the mother is not the same thing as knowing the ability of the father.

their choice if it is the mother's or the father's utility which is affected. I will use the general utility function[9]

$$
\begin{aligned}
U(f_M, f_F(f_M), A_M, A_F, C_M, C_F, \sigma_{\tilde{f}}) = \\
&= U_C(C_M, f_M) + U_C(C_F, f_F(f_M)) + \\
&\quad + U_W(W(A_M, \tilde{f}_M), f_M) + U_W(W(A_F, \tilde{f}_F), f_F(f_M)) + \\
&\quad + U_I(\sigma_{\tilde{f}}, f_M) + U_I(\sigma_{\tilde{f}}, f_F(f_M))
\end{aligned}
$$

The terms $U_C(C_M, f_M)$ and $U_C(C_F, f_F(f_M))$ reflect the impact of the exogenous preferences. In the computations and examples below, I will use a linear expression for the preference related utility,

$$U_C(C_M, f_M) = C_M f_M$$

and

$$U_C(C_F, f_F(f_M)) = C_F f_F(f_M).$$

The terms $U_W(W(A_M, \tilde{f}_M), f_M)$ and $U_W(W(A_F, \tilde{f}_F), f_F(f_M))$ reflect the income effect of the parental leave. The parent who stays loses some of her income. I will use a linear factor for this as well,

$$
\begin{aligned}
U\left(W(A_M, \tilde{f}_M), f_M\right) &= W(A_M, \tilde{f}_M)(1 - \ell f_M) = \\
&= (1 - \ell f_M)(mA_M - k\tilde{f}_M^{A_M}) = \\
&= (mA_M - k\tilde{f}_M^{A_M}) - f_M(\ell m A_M - \ell k \tilde{f}_M^{A_M})
\end{aligned}
$$

and

$$U\left(W(A_F, \tilde{f}_F), f_M\right) = (mA_F - k\tilde{f}_F^{A_F}) - f_F(f_M)(\ell m A_F - \ell k \tilde{f}_F^{A_F}).$$

Without loss of generality I can norm the model by setting $\ell k = 1$. Furthermore, since the units of $A_M$ has not yet been defined, the units of $A_M$ can be chosen so that $\ell m = 1$. Using this, the utility effect will be

$$U(W(A_M, \tilde{f}_M), f_M) = (A_M - \tilde{f}_M^{A_M})(\frac{1}{\ell} - f_M)$$

and

$$U(W(A_F, \tilde{f}_F), f_F(f_M)) = (A_F - \tilde{f}_F^{A_F})(\frac{1}{\ell} - f_F(f_M)).$$

[9] I will write $f_F(F_M)$ to show that the relation between $f_M$ and $f_F$ is given by the (referens sharing conditions).

The terms $U_I(\sigma_{\tilde{f}}, f_M)$ and $U_I(\sigma_{\tilde{f}}, f_F(f_M))$ reflect the gain/loss in utility due to how well the way the couple share the parental leave lives up to the norms in society. I will use a quadratic assumption for these terms

$$U_I(\sigma_{\tilde{f}}, f_M) = -\alpha(\sigma\tilde{f})(\tilde{f}_M - f_M)^2$$

and

$$U_I(\sigma_{\tilde{f}}, f_M) = -\alpha(\sigma\tilde{f})(\tilde{f}_F - f_F(f_M))^2$$

where

$$\alpha = \alpha_0 e^{-\beta\sigma\tilde{f}}.$$

Using the sharing condition, one gets $(\tilde{f}_F - f_F(f_M))^2 = ((1-\tilde{f}_M)-(1-f_M))^2 = (\tilde{f}_M - f_M)^2$. Hence, $U_I(\sigma_{\tilde{f}}, f_M) = U_I(\sigma_{\tilde{f}}, f_F(f_M))$

Putting all this together, using the sharing condition, the utility function looks like

$$\begin{aligned} U(f_M) = C_M f_M + C_F(1-f_M) + \left(\frac{1}{\ell} - f_M\right)(A_M - \tilde{f}_M^{A_M}) + \\ + \left(\frac{1}{\ell} - (1-f_M)\right)(A_F - \tilde{f}_F^{A_F}) - 2\alpha(f_M - \tilde{f}_M)^2 \end{aligned}$$

Since the quadratic relation on $f_M$ is negative, the utility function will have a global maximum when the possible values of $f_M$ are not restricted. This means that the parents will chose the $f_M$ which sets the derivative of the utility function to 0, or to a boundary value ($f_M = 1$ or $f_M = 0$). Thus, it is interesting to look at the derivative,

$$\frac{dU}{df_M} = [C_M - C_F] - [A_M - A_F] + [\tilde{f}_M^{A_M} - \tilde{f}_F^{A_F}] - 4\alpha(f_M - \tilde{f}_M) \quad \text{[derivative]}$$

When $\alpha \neq 0$ the mother's share will be

$$f_M = \tilde{f}_M + \frac{[C_M - C_F] - [A_M - A_F] + [\tilde{f}_M^{A_M} - \tilde{f}_F^{A_F}]}{4\alpha}$$

if this value is in the interval $[0, 1]$.

## 2.5 Stage 3 – Forming new expectations

The expectations for the next cycle are set based on the outcome in stage 2. This means

$$\begin{aligned} \tilde{f}_M^i &= f_M^i, \\ \tilde{f}_M &= \frac{1}{n}\sum f_M^i \end{aligned}$$

and

$$\tilde{f}_M^{A_M} = \frac{1}{n}\sum^{i\in\Omega} f_M^i, \Omega \equiv \{\text{families where the mother's ability} = A_M\}$$

## 2.6 How to interpret the game

It is four terms in the derivative. They reflect individual variation in preferences, $C_M - C_F$, and abilities, $A_M - A_F$, statistical discrimination, $\tilde{f}_M^{A_M} - \tilde{f}_F^{A_F}$, and norms, $-4\alpha(f_M - \tilde{f}_M)$.

The two first terms reflects variation in individual characteristics which are exogenous to the model. In this case, exogenous means that they are neither the result of statistical discrimination nor norms (or at least not the norms included in the model). Looking at Equation [derivative], the only difference between $A$ and $C$ is that $A$ is included in the wage forming expectations ($\tilde{f}_M^{A_M}$). This means that $A$ can be a base for statistical discrimination whereas $C$ can not.

Furthermore, since the parents are assumed to be altruistic toward each other, the difference between $C_M$ and $C_F$ could also be interpreted in different way. As I have explained it, $C_M - C_F$ reflects how much the mother enjoys staying home with the child compared to the father (and compared to how much they enjoy working). An alternative interpretation is that $C_M - C_F$ is the difference in ability for child care and both parents benefit from letting the best suited parent stay home.

Even though the individual $C$ can not be a base for statistical discrimination, an average difference between the sexes can. What is visible to the employer is the ability and the sex. Thus, expectations are formed based on the percentage of the parental leave an average person with the same sex and ability as the employee is expected to use. Employers will use these expectations to make rational decisions. Employees with lower expected parental leave will have relatively higher wages when they have their child. The explanation for this is that employers invest more in employees who they expect to be more present at work and/or that the employers pay more in the first place because they prefer hiring people who will not be away for a longer period.

A more extensive interpretation is that it is the entire society which discriminates. Parents, relatives, teachers etc expect girls to be responsible for children in the future and train them for that. Boys are expected to spend more energy on work and are encouraged to develop work life related qualities. This interpretation means that discrimination starts already at birth.

An alternative interpretation is that the statistical discrimination is not really discrimination but a specialization à la Becker (Becker, 1981, 1985). In this version, the individuals themselves invest more time and effort if they do not plan to be home. But if that is the case, the individuals themselves should be expected to have knowledge about their own preferences. This could be incorporated in the model by just excluding the preference term, putting $C = 0$ for all individuals, and instead assume that preferences are also included in $A$. If $C$ should be included in expectations, it could as well be merged with $A$ since the only difference between them is that $C$ is usually not known by the one who discriminates. The new $A$ will in this case represent all exogenous characteristics.

One of the main conclusions in Becker's specialization model is that the specialization increases welfare. Given the alternative interpretation of the statistical discrimination as a Becker specialization, it should come as no surprise that it is welfare increasing to allow specialization. In the next section, I will show that this is indeed the case (when total welfare is measured as sum of all families' utility).

The last term in Equation [derivative] is the norm term, $-4\alpha(f_M - \tilde{f}_M)$. This is a negative term which reflects the social cost for violating norms. In contrast to the other terms, I have here chosen to use a quadratic expression (leading to a linear term in the derivative). There are two reasons for this. First, this means that it will be negative to deviate from the norm in both directions. A father who does not use any parental leave will run the risk of being perceived as a bad father whereas he would be perceived as a bad employee if he took too much. In both cases, there is social cost. Second, a quadratic term has the realistic feature that a small deviation will hardly be noticed, but a large deviation implies a substantial social cost.

The choice of form for the norm term incorporates some of the main beliefs shared by the advocators of daddy months. First, the effects are modeled as negative. The parents perceive a negative pressure which decreases their utility when they are violating the norm, but they do not get any positive utility from not breaking it (compared to a situation without norms regarding this). Second, the norm is assumed to be stronger when the variety of choice is less, which is captured by the parameter $\alpha = \alpha_0 e^{-\beta\sigma\tilde{f}}$. This means that a development where different families chose differently means a weaker norm. What might not be in line with the argumentation of the pro-intervention side, is that the model does not differ between equal and non equal norms. A norm where all couples are assumed to share exactly equally is as strong, and as negative, as a norm where mothers are expected to use all of the insurance.

Another important aspect for how the model should be interpreted is how long a cycle is. If one cycle is nine months it means that we will come to an equilibrium stage rather soon. If one cycle equals one generation, it would take a long time to get to an equilibrium and there might be reasons to speed up the process even if we are heading toward the equilibrium we want.

Unfortunately, there is no obvious answer to the question. To begin with, the division into different stages and cycles is artificial. In reality, it is of course a continuous ongoing process where new children are born and expectations are formed affecting wages and norms simultaneously. What determines the approximate time of the cycle, is when the expectations start to have effect for statistical discrimination and how fast norms change. If it is the employer who discriminates, the time lag between entering the labor market and getting children is a good indication for the length of the cycle[10]. If it is the society which starts to discriminate at birth, the cycle will be much longer.

The norms could also be discussed in similar ways. What has more effect on the norms faced by new parents, how their parents did or how their older siblings did? I will not try to judge between these different interpretations. Instead, I leave the length of the cycle as a question open for discussion.

# 3 Statistical discrimination

To study the effect of different components of the model, I will go through some simplified examples where I have isolated important effects which I want to highlight.

## 3.1 Statistical discrimination and the positive specialization effect

As mentioned previously, there is a positive specialization effect from statistical discrimination which increases total welfate. The easiest way to see this is to ignore the norms and assume that individuals have the same characteristics, $C_M = C_F = C_0$, $A_M = A_F = A_0$ and $\alpha = 0$. Since there are no differences in ability, the expectations can not depend on differences in abilities and we have $\tilde{f}_M^{A_M} = \tilde{f}_M$ and $\tilde{f}_F^{A_F} = \tilde{f}_F = 1 - \tilde{f}_M$. This gives

$$\frac{dU}{df_M} = 2\tilde{f}_M - 1 \quad \Rightarrow \quad \frac{dU}{df_M} \begin{cases} > 0, & \tilde{f}_x > 0.5 \\ < 0, & \tilde{f}_x < 0.5. \end{cases}$$

[10]One could argue that it should be divided by two to get an average of the time left when investments are done continuously.

From this we can conclude that the parent who is expected to take out most of the parental leave will take out all of it. The family's utility will also be bigger in this case due to the specialization effect[11] ($U(f_x = 1) = U(f_x = 0) = 1 + C_0 - A_0$ and $U(f_x = 0.5) = 0.5 + C_0 - A_0$). The employers know who will be home with the kids and can thus invest accordingly. The positive productivity (and thus utility) effect will be a relevant factor also when norms are introduced and differences in characteristics are introduced, although it will affect different families different in these cases. I will get back to the implications of this at the end of this section.

Even though statistical discrimination increases utility, there are cases where we can get stuck in a suboptimal equilibrium. As an example, assume that all mothers have a slightly smaller preference for child care than fathers, $C_M = C_0$ and $C_F = C_0 + C'$ ($C' > 0$). In this case, it is obvious that the optimal solution is that the fathers take all the parental leave. But if we start in a situation where mothers take all the parental leave, $\tilde{f}_M = 1$, we might be stuck there if $C'$ is not big enough, $\frac{dU}{df_M} = 2\tilde{f}_M - 1 - C' = 1 - C' > 0, C' < 1$.

## 3.2 Statistical discrimination and variation in preferences

To see how differences in preferences influence the outcome, I will continue to assume no difference in abilities and no norms, but I introduce a difference in preferences for child care. I will assume that there are two possible values of $C_M$ and $C_F$, $C_0$ and $C_1$, where $C_1 > C_0$. I will also use the notation $C' = C_1 - C_0$.There is no average difference between the sexes and each combination of preferences in the couples has equal probability (25 %). I will write $f_M^{1,0}$ for a couple where the woman has preferences $C_1$ and the man preferences $C_0$. The derivative will now be $\frac{dU}{df_M} = C_M - C_F + 2\tilde{f}_M - 1$ which for the four different types of families will be

$$\frac{dU}{df_M^{0,0}} = 2\tilde{f}_M - 1,$$
$$\frac{dU}{df_M^{1,0}} = C' + 2\tilde{f}_M - 1,$$
$$\frac{dU}{df_M^{0,1}} = -C' + 2\tilde{f}_M - 1 \quad \text{and}$$
$$\frac{dU}{df_M^{1,1}} = 2\tilde{f}_M - 1.$$

[11] Remember that I have assumed altruistic families. Without this assumption it is not obvious that the specialization effect is positive for utility.

| Couple | GS | CS |
|---|---|---|
| $U(f_M^{0,0})$ | $U_0 + 1$ | $U_0 + \frac{3}{4}$ |
| $U(f_M^{1,0})$ | $U_0 + 1 + C'$ | $U_0 + \frac{3}{4} + C'$ |
| $U(f_M^{0,1})$ | $U_0 + 1$ | $U_0 + \frac{1}{4} + C'$ |
| $U(f_M^{1,1})$ | $U_0 + 1 + C'$ | $U_0 + \frac{3}{4} + C'$ |

where $U_0 \equiv C_0 + (\frac{2}{\ell} - 1)A_0 - \frac{1}{\ell}$

**Table 2:** The table compares utilities in different families in gender and characteristics separating equilibria in a model with statistical discrimination and two possible preferences.

There are two kinds of possible equilibria in this case. One type of equilibrium is a gender separating equilibrium (GS) where all the women (or the men) stay home. The other type of equilibrium is a characteristics separating (CS) equilibrium where the parent with most preferences for childcare stays home. In the later case, the sex (and thus the specialization effect) will still determine who stays home when the parents have the same preferences. (It can be either sex who stays home in this case, but it will be the same sex in both cases so that $f_M^{0,0} = f_M^{1,1}$.) In GS it is the statistical discrimination that drives the decision of the parents. In CS, the difference in preferences outweighs the statistical discrimination. How big the differences in preferences are compared to the statistical discrimination will determine if GS, CS or both are equilibria.

If $C' > 1$, GS is not stable and CS will be reached. To see this, assume that we start in GS. This means $\tilde{f}_M = 1$. For GS to be a stable equilibrium, all derivatives must be $> 0$. The first derivative to become negative is for the couples where the man has greater preferences for child care. Here $\frac{dU}{f_M^{0,1}} = -C' + 1$ which means that GS is never stable if $C' > 1$. Hence we have only CS in these cases.

If we start in a CS where $\tilde{f}_M^{0,0} = \tilde{f}_M^{1,0} = \tilde{f}_M^{1,1} = 1$, $\tilde{f}_M^{0,1} = 0$ and $\tilde{f}_M = \frac{3}{4}$ , the equilibrium is stable if $\frac{dU}{df_M^{0,1}} = C' + \frac{1}{2} < 0$. This implies that we will have GS if $C' < \frac{1}{2}$ and CS if $C' > 1$. In the region between, both equilibria are stable and the initial expectations will determine which will be reached.

To see where there might be room for utility improving policies, it is interesting to compare utility. Table 2 does that for different families. The conclusion is that in the region where both equilibria are stable, neither is Pareto improving compared to the other. If we do not care about the distribution effect we can just add them up. Doing so we get $\sum U_{GS} - \sum U_{CS} = 1.5 - C'$. Hence, if one does not care about the distribution within marriage or the distribution between different families[12] and just looks at the total utility the risk is that there is too little statistical discrimination. Furthermore, it would be positive for the total utility to force the women (or the men) to take all the parental leave in the cases where $1 < C' < 1.5$, even though GS is not an equilibrium. The reason for this is that all gains from the difference in preferences are considered by the parents when they decide how to share. What is the externality in their decision is the effect on future expectations and thus the possibility for future statistical discrimination. And, as showed in the previous example, statistical discrimination tends to be positive for total utility in this model.

## 3.3 Statistical discrimination and variation in abilities

To highlight the difference between preferences and abilities in the model, I will also work through an example where I assume difference in abilities instead of differences in preferences. Hence, I assume $C_M = C_F = C_0$ whereas $A_M$ and $A_F$ can have two different values, $A_0$ and $A_1 (> A_0)$. Again, I will use the notation $A' = A_1 - A_0$ and as in the case with differences in preferences, I will assume no average difference between the sexes and each of the four types of couples to be equally probable. I will also use the same notation where $f_M^{1,0}$ means the mother's share in a family where the mother has ability $A_1$ and the father has ability $A_0$[13]. With these assumptions, the expected parental leave share can be written $\tilde{f}_M^{A_M} = \frac{1}{2}(\tilde{f}_M^{M,0} + \tilde{f}_M^{M,1})$ and $\tilde{f}_F^{A_F} = \frac{1}{2}(\tilde{f}_F^{0,F} + \tilde{f}_F^{1,F})$.

Using these reformulations we get

$$
\begin{aligned}
\frac{dU}{f_M^{0,0}} &= \frac{1}{2}(\tilde{f}_M^{0,0} + \tilde{f}_M^{0,1}) - \frac{1}{2}([1 - \tilde{f}_M^{0,0}] + [1 - \tilde{f}_M^{1,0}]) = \\
&= \tilde{f}_M^{0,0} + \frac{1}{2}\tilde{f}_M^{0,1} + \frac{1}{2}\tilde{f}_M^{1,0} - 1, \\
\frac{dU}{f_M^{1,0}} &= -A' + \frac{1}{2}\tilde{f}_M^{0,0} + \tilde{f}_M^{1,0} + \frac{1}{2}\tilde{f}_M^{1,1} - 1, \\
\frac{dU}{f_M^{0,1}} &= A' + \frac{1}{2}\tilde{f}_M^{0,0} + \tilde{f}_M^{0,1} + \frac{1}{2}\tilde{f}_M^{1,1} - 1 \quad \text{and} \\
\frac{dU}{f_M^{1,1}} &= \frac{1}{2}\tilde{f}_M^{0,0} + \frac{1}{2}\tilde{f}_M^{1,0} + \tilde{f}_M^{1,1} - 1.
\end{aligned}
$$

The difference from the case with differences in preferences is that it is not just the sex, but also the abilities that can be a base for statistical discrimination. This is reflected in the utility function by a higher dependence on the expectation

[12] And of course also given the simplified linear utility function.

[13] Note that this has the opposite effect on who is best suited to stay home than in the previous example. To have a bigger preference for child care means that it is more probable to stay home whereas a bigger ability leads to a lesser probability to stay home.

| Couple | GS | CS |
|---|---|---|
| $U(f_M^{0,0})$ | $U_0 + 1$ | $U_0 + 1 - \frac{1}{2\ell}$ |
| $U(f_M^{1,0})$ | $U_0 + 1 + A'(\frac{1}{\ell} - 1)$ | $U_0 + \frac{1}{2} + A'\frac{1}{\ell}$ |
| $U(f_M^{0,1})$ | $U_0 + 1 + A'\frac{1}{\ell}$ | $U_0 + 1 + A'\frac{1}{\ell}$ |
| $U(f_M^{1,1})$ | $U_0 + 1 + A'(\frac{2}{\ell} - 1)$ | $U_0 + \frac{1}{2} + \frac{1}{2\ell} + A'(\frac{2}{\ell} - 1)$ |

**Table 3:** The table compares utilities in different families in gender and characteristics separating equilibria in a model with statistical discrimination and two possible abilities.

for more similar couples. Note that the expectations for the totally opposite couple have no impact at all.

Despite that, the result is quite similar to the case with different preferences. The GS, where $\tilde{f}_M^{0,0} = \tilde{f}_M^{1,0} = \tilde{f}_M^{0,1} = \tilde{f}_M^{1,1} = 1$ is still stable if $A' < 1$.

The difference compared to the previous case is that the CS is now stable for all positive values of $A'$. This means that the difference in ability must not have any other effect than to be an alternative basis for statistical discrimination.

Compared to the case with differences in preferences, there is now also more possible CS. Since $\frac{dU}{df_M^{0,0}}$ does not depend on $\tilde{f}_M^{1,1}$ and vice versa they can go in opposite directions so that the woman stays home in the couples where both have high ability and the man stays home in the couple where both have low ability (or vice versa), for example $\tilde{f}_M^{0,0} = \tilde{f}_M^{1,0} = 0$ and $\tilde{f}_M^{0,1} = \tilde{f}_M^{1,1} = 1$. Comparing the utilities for GS and CS gives Table 3.

As in the case with difference in preferences, no equilibrium is Pareto improving compared to the other in the region where both are possible. Looking at the total utility, we get $\sum U_{GS} - \sum U_{CS} = 1 - A'$. Thus, the conclusion that GS gives higher total utility in the multiequilibria region is still valid, but in this case it is never a good policy to force all women (men) to stay home when this is not a stable equilibrium. The difference here is once again that abilities can be an alternative base for statistical discrimination.

## 3.4 Conclusion on statistical discrimination

In light of the difference between the examples above, I would like to go back to the difference between preferences and abilities and discuss alternative interpretations. One question to ask is who discriminates? So far, I have mainly assumed that it is the employers, but there are alternative interpretations. One possibility is that it is the individuals themselves who invest different amount of human capital depending on how they estimate the likelihood of taking the main share of the parental leave[14]. This is the model described by Becker (1985). Another possible interpretation is that it is the society in general who discriminates. In both of the latter cases, the starting point of the discrimination can also be interpreted differently. If it is the society which discriminates, this can start at the birth. If the parents anticipate a girl to form a household with a man and take the lion's share of the responsibility for household work, it is a rational choice to teach her more about that than her brother who they assume to spend most effort and time in market activities.

The interpretation also affects the impact of the sex based statistical discrimination. If one believes that the default (genetic) correlation between sex and other characteristics is low[15], there might be alternative bases for statistical discrimination of adults. If, on the other hand, discrimination starts already in the maternity ward, there are fewer alternatives.

Looking at the positive specialization effect showed above, it is interesting that this effect exists. That being said, it is wise to not draw too dramatic conclusions from it. First, the statistical discriminating equilibria are not Pareto improving, the utility functions are linear and the utility effect on distribution is not taken into account. Second, as the difference between the examples shows, the gains with sex based statistical discrimination will be much smaller when an alternative basis exists. Nevertheless, it is good to remember that with the assumptions I have made, and the welfare measure I use, the statistical discrimination is indeed positive for the total utility.

This means that the model so far can not explain why there should be any reasons for government interventions such as daddy months. There are also additional arguments for this. If one assumes that there are no average differences between women and men, sex based statistical discrimination is either totally dominating the picture or does not have any impact. Either the mother (or the father) always stays at home or the most able/the one with the strongest preferences always does so. This will be clearer and have bigger impact when going toward a more continuous range of abilities/preferences. If the characteristic gap in one family is big enough to overcome the statistical discrimination, this will change the expectations for the next cycle. If the range of characteristics is continuous, this means that in the next cycle more families will act on characteristics changing the expectations even more and this will proceed until there

[14]From a model perspective this means that everything is abilities since all characteristics are known by the person who discriminates.

[15]This is a very general belief among the advocators of an individualized parental leave insurance and without assuming this, it would be virtually impossible to explain why forcing fathers to take half of the parental leave is a good idea.

is no statistical discrimination left.

Another weakness of the model so far, is that the model predicts that one parent should always take all (or at least as much as allowed) of the parental leave, which is not the case in reality. To change this, I will introduce the effect of norms[16].

# 4 Norms

## 4.1 The gravitational effect of norms

I have chosen to model the norms so that they are first and foremost a gravitational force which drags the end values toward the average of the distribution. This becomes particularly clear when removing the statistical discrimination. Doing so and solve for the derivative gives

$$f_M = \tilde{f}_M + \frac{C_M - C_F}{4\alpha}.$$

If there are no differences in preferences, it is easy to see that the parents will share as they expect the average family to do. In a simple case with only two possible preferences[17] of $C_M$ and $C_F$ (denoted $C_0$ and $C_1$ as in previous examples), the families with different preferences will have the same absolute deviation from the average, $\frac{C'}{4\alpha}$, but in different directions. This will be true as long as the boundary conditions are not violated. Important to note is that the norms do not tend to drag the average of the distribution in any direction[18]. Comparing the first two cases in Figure 1 shows how the distribution drags out around the mean. The size of the deviation will depend on the values of $\alpha_0$ and $\beta$. To see how this work, I will denote the expected absolute deviation $\tilde{D}$. The

[16]Another (complementary) explanation for why parents do not share completely unequally is that the marginal utility from parental leave is decreasing as indicated by the studies of Eriksson (2005). I will come back to this in section 6.

[17]Note that there is no difference between preferences and ability in a world without statistical discrimination.

[18]This is true as long as the boundary conditions are not violated. If they are, the average will be forced toward the middle until the boundary condition is not longer violated. Although this effect will indeed drive the development in absence of statistical discrimination, it is not a particularly strong effect and it will be weaker the closer to the middle the average comes. This behavior is also quite sensitive for how the model is constructed. One could imagine that the choice to let one parent take all the parental leave might send particularly strong signals. This would mean that the impact on norms would be greater increasing the father's share from zero to one month than from increasing his share from one to two months. If that is the case, the average might also be dragged away from the middle.

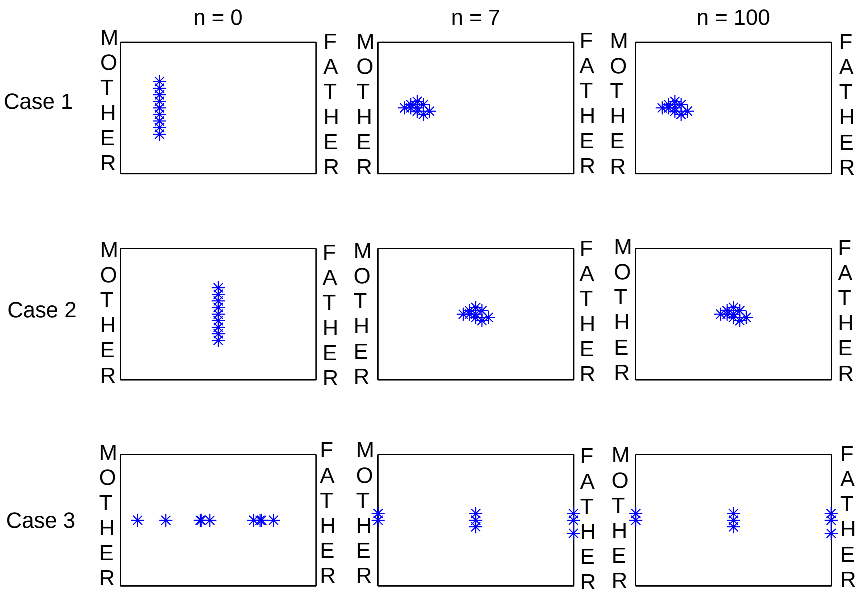


**Figure 1:** The figure shows how the distribution evolves over time starting from different points in a case without statistical discrimination and symmetric distribution of preferences. Each star represents one family. The $x$-axis represents how the parental leave is shared. A star on the left border means a family where the mother take 100 % of the leave whereas a point on the right border means that the father take 100 %. The position on the $y$-axis has no meaning (except from improving visibility). In the first two cases, the converged equilibrium is reached and the distribution around the mean will be the same. Note that the mean is not changed. The third case shows what happens when starting in a more diverged state. Here, the distribution diverges so that the parent with the comparative advantage will always take the entire leave. Due to the way the norm factor is constructed, the utility will be higher in case 3.

expected standard deviation will be $\sigma_{\tilde{f}} = \frac{\tilde{D}}{\sqrt{2}}$ and the actual deviation will be

$$D = \frac{C'}{4\alpha_0} e^{\beta \frac{\tilde{D}}{\sqrt{2}}}.$$

In equilibrium, $D$ should equal $\tilde{D}$. Figure 2 plots $D(\tilde{D})$ along with the straight line $D = \tilde{D}$. The conclusion is that there are two possible inner equilibria, but only one of them is stable. I will call the stable inner equilibrium converged since it is a state where (most of) the outliers do not reach the boundaries because of the gravitational effect of the norms.

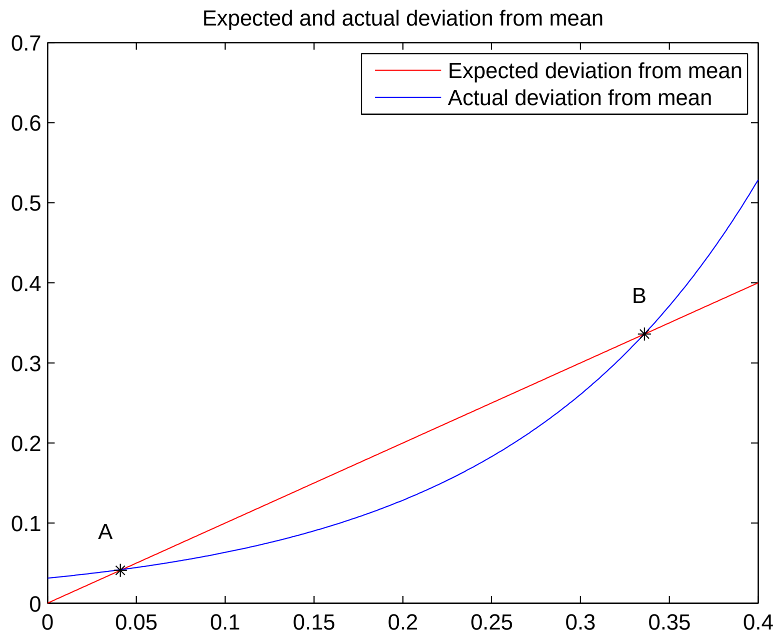


**Figure 2:** The figure shows the absolute actual deviation as a function of absolute expected deviation in a case with only two possible values of $C$, no differences in abilities and no statistical discrimination. There are two equilibria, but just one is stable. Starting from anywhere to the left of $B$, $A$ will be reached. Starting from the right of $B$, the deviation will just increase until stopped by the boundary conditions.

The alternative to a converged equilibrium is a diverged state where just one parent stays home. In this state, the standard deviation will be bigger. Hence, the strength of the norms will be lower and, since the norms are modeled to be negative, the utility will be higher. Thus, the norm externality works so that a bigger deviation from the average has a positive effect for future parents. This is interesting since it can motivate interventions. An intervention which can change the equilibrium in case 1 or 2 in Figure 1 to the equilibrium in case 3 would be welfare improving. Except from giving an explanation for why one parent does not always take the entire leave, identity economics also brings in another realistic feature. As seen in Figure 1, the equilibrium will not be reached immediately, but will be reached gradually with decreasing speed. This opens up for a discussion on how close to an equilibrium we currently are and if something should be done to increase the speed. I will get back to this discussion in the next section.

## 4.2 Combining norms and statistical discrimination

To see how statistical discrimination changes the picture, Figure 3 has the same set of parameters as Figure 1 in other aspects, but includes statistical discrimination. The difference when statistical discrimination enters the picture is that the average will now be moved and we might end up in a situation where one sex takes almost all the parental leave. Even though a similar situation could be an equilibrium even without statistical discrimination, it is now a much more stable one. The difference is that the mean will now be dragged back if disturbed. The utility effect will be more ambiguous than in the previous example. Recall that statistical discrimination has a positive utility effect (measured as the sum of the families' utility) due to specialization. This positive effect will be stronger in a converged gender separating equilibrium such as case 1 or 2. On the other hand, the negative utility effect of strict norms will be more severe in those cases than in the diverged characteristics separating equilibrium. Thus, it depends on the parameter combinations which one is best from a welfare perspective. The conclusion is that it can, but need not, be welfare improving with an intervention which shifts the equilibrium.

In Figure 3, there are differences in preferences, but not in abilities. This means that the only available information for the employers is the sex. Introducing differences in ability in Figure 4 means introducing an alternative way for the employers to estimate the likelihood of a future parental leave. The effect of this is that a diverged equilibrium is more likely to be reached.

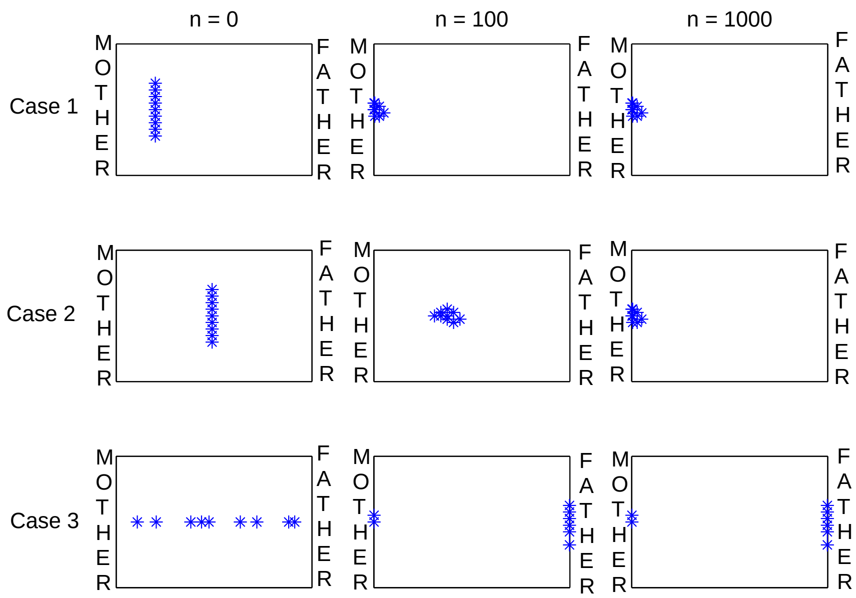


**Figure 3:** The figure shows the same cases as in Figure 1, but in a world with statistical discrimination and norms. Case 1 and 2 shows how the statistical discrimination drags the distribution toward the left ending in a situation where one sex takes almost the entire parental leave regardless of preferences. In case 3, the distribution instead diverges to a state where preferences determine the choice.

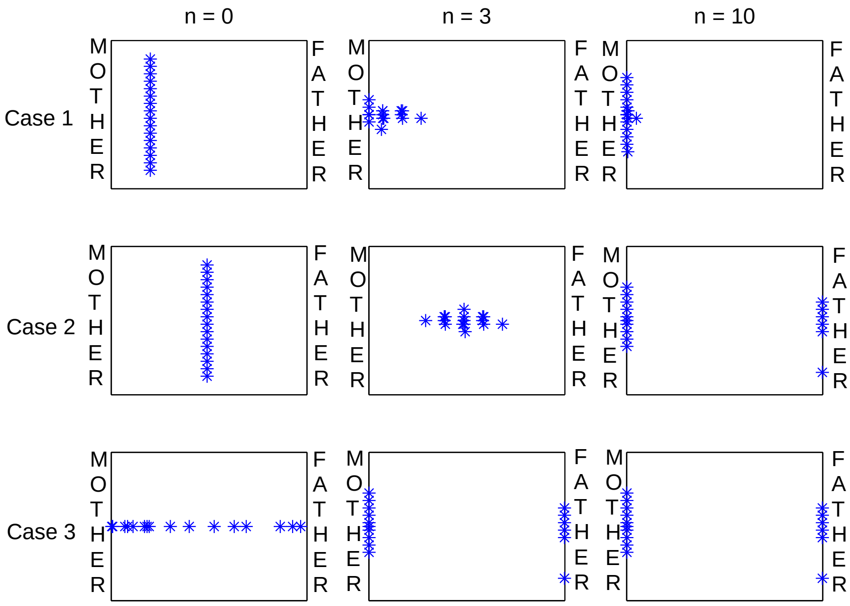


**Figure 4:** This figure has the same settings as Figure 3, but with the difference that there is now a variety in both preferences and abilities which change the development in case 2.

# 5 Daddy months and other policies

## 5.1 The history from the perspective of the model

When introduced in 1974, Swedish fathers used 0 % of the parental insurance. Since then it has increased over time. This is in line with the predictions of the model. In the beginning very few families choose to let the father take any leave at all, but the few who did changed the norms and the expectations slightly. As time went on, the fathers took a bigger and bigger share and this was further increased by the introduction of the daddy months.

What is less obvious is where we are today. The first question is if we are close of far away from a stable equilibrium. This relates to the discussion in subsection 2.2 regarding the length of a cycle. If a cycle is one generation, we can be quite far away. If it is a few years, we are probably quite close.

The second question is which type of equilibrium we are approaching. As seen in the examples, it is uncertain weather there exist more than one stable equilibrium. A possible interpretation is that we are already in a stable equilibrium (given the daddy months). In this case, the big observed difference between the sexes reflects differences external to the model (for example genetic), possibly exaggerated by statistical discrimination. Removing the daddy months would in this case mean that the fathers used even less, but it would be welfare increasing. It is also possible that we are approaching a much more equal equilibrium, but that it will take hundreds of years before we get there.

In the case where there are more than one stable equilibrium, the two main alternatives are a converged GS where one sex take the bigger part in almost all families and a diverged CS where the difference between families is much bigger. Given the starting point in 1974, we were in this case definitely heading toward the converged GS before the introduction of the first daddy month. Whether or not the daddy months have changed the distribution so much that we have changed destination is not clear.

In the cases where two equilibria are possible, it is of interest to compare the welfare. As discussed previously, it is not clear which equilibrium increases welfare. The reason is that the welfare effect[19] from the statistical discrimination is bigger in a GS, whereas the norms will have less negative impact in a diverged equilibrium. Also note that there is no one to one relationship between welfare and exogenous average differences between the sexes. It is possible that the diverged CS is optimal even if there are small average differences and it is also

[19] Using the utility sum as the measure of welfare.

possible that a converged CS is optimal even without such differences[20].

Considering the political discussion and the aim of this thesis, the most interesting cases are when it would be welfare increasing if the share of the fathers increased. This is true if we are stuck in a converged GS when moving to a diverged CS would be welfare increasing. It is also true if we are heading toward an optimal and more equal equilibrium, but have a big distance left and are moving slowly.

## 5.2 Daddy months

The first thing to be concluded with regards to the daddy months, is that the effect on today's parents is negative. To restrict the tradability decreases welfare for the families who would otherwise have traded and there is no mechanism in the model which could offset this. Also in the long run, the model can not explain how permanent restrictions can increase welfare. The gain with a diverged equilibrium is that different families can split very differently reflecting the (exogenous) variation in characteristics. Hence, the gains from shifting equilibrium can to a large extent not be captured as long as the restrictions remain.

However, used as a temporary policy the daddy months could have positive long term effects, either because they shift the path toward a better equilibrium or because they speed up the development.

## 5.3 Dynamic daddy months only for daddies

There are two big problems with the current construction of the daddy months. The first problem is that it is currently a permanent policy. If it should be able to motivate the daddy months by the mechanism described here, it needs to be turned off when the development has come far enough. With the current construction there must be a political decision to do that. Furthermore, depending on how stable the optimal equilibrium is, there might be a risk for some sort of external shock shifting the development in the wrong direction. In this case, the policy needs to be switched on again. The second, and more severe, problem is that the daddy months are currently not only daddy months but also mommy months. The restriction is two sided. Today, this does not matter that much, but if the development continues as intended, more and more fathers will be restricted from taking an even bigger part from the mother. This is negative

[20] In this case, it does not matter if it is the fathers or the mothers who take the lion's share.

both because of the short term loss and because it slows down the speed by which the average moves.

Considering these problems, a dominant policy would be dynamic daddy months only for daddies. This policy could be formulated so that if the average share of one sex is below a limit, persons of this sex will not be aloud to trade a part of the parental leave to persons of the other sex. This policy will both be less costly in the short term and have better effect.

### 5.4 Equality bonus

As with the daddy months, the problem with the equality bonus is that it works on the individual family instead of on the average. The problem, as described in this model, is not that each family does not split equally, but that the average way of splitting is skewed. As long as almost all mothers take more than half of the leave, it has the wished effect. But for families who had otherwise planed to let the father take more than half, it will have only negative effects. A dominant policy would in this case be to just pay the parents more when the father stays home.

## 6 The model and the reality

### 6.1 Generality of the results

I have set up a quite specific model for the parental leave, but the model could be generalized and used in a much wider context. What I have shown is how the combination of statistical discrimination and strong norms could form a suboptimal equilibrium. This result holds for any situation with statistical discrimination and strong norms. Hence, it can very well be a possible explanation for a wide range of discriminating/separating phenomena with regards to sex, race, etc.

### 6.2 Correlation with other norms

As discussed before, exogenous differences in preferences (and/or abilities) are one possible way of explaining reality. These differences can be genetic, but need not be. Another explanation is the correlation between norms regarding parental leave and other norms in society.

The norms regarding parental leave are closely related to other norms regarding division of labor and responsibility between the sexes. One of the strongest arguments for introducing the daddy months was the expected correlation with general responsibility for the child care (Klinth, 2002). If fathers took more of the parental leave they should also take bigger responsibility for the child later on. Later research indicates that this might not be true. Both Ekberg et al. (2005) and Bekkengen (2002) show, with their very different approaches, that it is far from certain that a father who uses a bigger part of the parental leave will also take bigger responsibility for the child later on. But even if forcing fathers to use a bigger part of the parental leave has a limited effect on other norms, it does not mean the correlation with other norms is zero. The interdependence might go the other way.

Imagine a situation where the norms are that parents should share equally and there are no genetic differences between sexes, but there are differences in other norms. For example, the mother is still expected to take the biggest responsibility for the child when both parents are back to work again. In this case, it is very likely that the equal norm for sharing the parental leave would not be stable.

In the context of the division of labor in the family, one possibility might be that the welfare can not be improved by only the daddy months since the situation will be pushed back to the same converged gender separating equilibrium when the restrictions are removed. But, it might at the same time be possible that the logic could be applied to the combination of all norms regarding sex and child care. It could still be welfare improving if it was possible to shift to a diverged characteristics separating equilibrium for all these norms simultaneously.

## 6.3 How the norms are modeled

When interpreting the results, it is important to keep in mind how the norms are modeled. The assumption is that the norms equal the expectations and that the expectations equal the previous outcome. This might not be completely realistic. Especially when reforms such as daddy months are introduced or removed, one could argue that people will understand that future behavior will change and that norms will change accordingly. For the results to hold, it is important that there is a positive correlation between future norms and previous outcome, but the relation need not be one to one. I would argue that at least the norms are not formed mainly from rational expectations, but are slowly changing subconscious processes. This means that norms will not adjust directly to a rational forecast of the future. Hence, I do believe that the conclusions hold.

In addition to policies and previous outcome, norms could change due to many other circumstances. Norms are affected by a trends, movements, etc.

It is reasonable to believe that both organized campaigns from the feminist movement and things such as the choice of celebrities, etc affect the norms. From a model perspective, these kinds of things would be described as external shocks. This is why the combination of statistical discrimination and norms is so interesting. Norms themselves can explain why change comes slowly, and maybe not at all, without these external shocks, but by adding statistical discrimination one can explain why the converged gender separating equilibrium is not only an equilibrium, but also a stable equilibrium. After an external shock, the situation will be dragged back to the equilibrium.

The effect of norms modeled here is that one gets negative utility from breaking them and more so the stronger they are. The norms are also assumed to be stronger when there is less variation in outcomes. This is a view that is shared by the advocates of daddy months, but it is less certain that everyone agrees on the other side. As in the general matter, I do not intend to defend one or another opinion. I just conclude that if one believes that people get as much positive utility from living up to a norm as negative utility from violating it, the results are not valid.

## 6.4 The equality perspective

In the model I have used, the parents are assumed to behave altruistically and maximize a common utility function. This has two major implications. First, it is not obvious how realistic this assumption is. Second, it also means that the equality effects are not included. Much of the political discussion on the topic is based on the belief that the unequal use of the parental insurance disadvantages women. If this is true, there is another argument for government interventions, but it will not change the mechanisms described here. The only conclusion which might not be valid if the equality perspective is included is that it is not longer certain that daddy months never can increase welfare as a permanent policy.

## 6.5 The heterogeneous reality

Theoretical models always involve simplifications of a heterogeneous reality. This one is no different. This is necessary to be able to focus on the core mechanism and I do believe that the results would hold even in a more complex reality.

It is reasonable to believe that a highly educated and well paid woman is more likely to have children with a highly educated man. Introducing this would increase technical complexity, but not change anything else.

The model allows for statistical discrimination based on ability, but it assumes that the identity effects are only based on sex. It is also likely that the highly educated woman identifies herself more with other women in similar situations than with women with no education and low income. Introducing more identities in the model could explain these differences. Technically, this could be done by replacing $\tilde{f}$ in $U_I(\sigma_{\tilde{f}}, f_M) = -\alpha(\sigma\tilde{f})(\tilde{f}_M - f_M)^2$ with a weighted average giving higher weight to more similar families. The current model allows individual variation in exogenous preferences and abilities, but not individual variation in how sensitive one is to the norms. Although there is certainly such a variation, introducing an additional source of variation would not add much explanatory power. The norms would still act as a gravitational force on the overall distribution.

In reality, children are born into a lot of different types of families. In the model, all children are born in heterosexual couples living together. Gay parents would probably not affect the norms so much, at least if there is an equal number of lesbians and gay men who have children. Single parents will probably affect the model more. An overweight of single mothers compared to single men could tilt the average use and influence the norm (both in the model and in reality). Taking it one step further, one could model the choice for parents who are not living together as a binary choice and assume that mothers will take all the parental leave in the cases where she would otherwise have taken more than half. This would introduce an additional feature which would act very conservatively as long as the average mother's share would be high and then has less and less impact (given equal default preferences and abilities) as more and more single fathers appeared.

A simplification that might have impact is that I have assumed that parents always use the entire parental leave, which they do not have to. This limits the effects of reforms such as the daddy months to some extent. Even if the parents are not allowed to trade at all, it is not certain that the sharing would be equal.

## 6.6 Linearity assumptions

Except from the norms, all relations in the model are assumed to be linear. This is a simplification in general, but there are two phenomena which are clearly unrealistic. First, the linear description of the economic loss when staying home does not reflect the income limit in the parental insurance. That means that the economic effect is underestimated in families where at least one parent has an income over the limit (and where there is a significant difference in income). Including this is certainly possible, but it would increase the technical complexity a lot (introducing a discontinued derivative) with a limited increase in explanatory power.

Second, the work by Eriksson (2005) indicates that there might be a decreasing marginal utility for staying home. This could be incorporated in the model by replacing $U_C(C_M, f_M) = C_M f_M$ with $U_C(C_M, f_M) = C_M f_M^\gamma$, where $\gamma < 1$ means decreasing marginal utility. I have explored this way of modeling and it has the realistic effect that less families let one parent take 100 % of the parental leave[21]. Despite that, I decided that the linear assumption worked well enough to prove my points and I will not show these results.

# 7 Conclusion

Until now, economic theories have been able to evaluate some of the consequences of different constructions of the parental leave, but they have not been able to explain why a government intervention forcing fathers to take a bigger share could improve the situation.

In this thesis, I have shown that is possible to explain why mothers are still taking around 80 % of the parental leave by other means than genetic differences. A combination of statistical discrimination and a willingness to stick to the behavior prescribed by current norms could provide an alternative explanation. Furthermore, it is possible that this is a permanent state which could be suboptimal. Hence, political interventions could be motivated in certain cases.

The model I have used has been specific for the parental leave, but there is no reason why the main results can not be used in a wider context. The same argumentation could be applied on other discrimination/separating phenomena regarding gender, race, etc.

Although interventions could be motivated, the model used here can not explain why restricting the tradability of the parental insurance between parents (the daddy months) could increase welfare used as a permanent policy. However, used as a temporary policy it can be a way to change the norms so that a new and welfare increasing equilibrium will be reached when the policy is removed. This would benefit the future parents, but it would still do so at the expense of current parents. A policy which could do the same job even better with less short term welfare losses is dynamic daddy months where the tradability is restricted only for the sex which tends to use a too small share and only when

[21] In fact, it will mean that no one will do that, which is not realistic either. The most realistic approach would probably be to let $\gamma$ vary between individuals.

the share of this sex is to small.

The aim of this thesis has been to show a possible way of motivating why the government should intervene in the parents' choices. This is based on certain assumptions which, from my perspective, could or could not be true. Depending on the choice of parameters, the asymmetric use of the parental leave could be explained both as a suboptimal equilibrium due to a wrong starting point or as an optimal equilibrium due to average genetic differences in preferences.

To find out if the explanation sketched here is the correct one, much more research must be done. Until then, it is an open question which explanation is more probable. What I hope to have achieved with this thesis is to spread some light on which view of the underlying factors could motivate political interventions.

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# A Parameters for figures

## A.1 Figure 1

In this figure the statistical discrimination is turned off meaning that we have the utility function

$$U(f_M) = C_M f_M + C_F(1 - f_M) + \left(\frac{1}{\ell} - f_M\right) A_M + \\ + \left(\frac{1}{\ell} - (1 - f_M)\right) A_F - 2\alpha(f_M - \tilde{f}_M)^2$$

The parameters used are

$$\begin{aligned} C_M, C_F &\in \left\{0, \frac{1}{2}, 1\right\} \\ A_M = A_F = A_0 &= 1 \\ \alpha_0 &= 7 \\ \beta &= 15 \\ \ell &= 0.8 \end{aligned}$$

There are $3 \times 3 = 9$ possible couples where all couples are assumed to be equally probable. In case 1, the starting expectations are that mothers are assumed to use 80 % of the parental leave in all families. In case 2, the starting expectations are that mothers are assumed to use 51 % of the parental leave in all families. In case 3, the starting expectations are randomly chosen between 0 and 1 for all families.

## A.2 Figure 3

The parameters are the same as in the Figure 1, but statistical discrimination exists, meaning that the utility function is the usual,

$$U(f_M) = C_M f_M + C_F(1 - f_M) + \left(\frac{1}{\ell} - f_M\right)(A_M - \tilde{f}_M^{A_M}) + \\ + \left(\frac{1}{\ell} - (1 - f_M)\right)(A_F - \tilde{f}_F^{A_F}) - 2\alpha(f_M - \tilde{f}_M)^2$$

The starting conditions are the same as in the Figure 1.

## A.3 Figure 4

The parameters are the same as in Figure 3 except from that there is less variation in $C$ and instead some variation in $A$.

$$\begin{aligned} C_M, C_F &\in \{0, 1\} \\ A_M = A_F &\in \{0, 1\} \\ \alpha_0 &= 7 \\ \beta &= 15 \\ \ell &= 0.8 \end{aligned}$$

There are $2 \times 2 \times 2 \times 2 = 16$ possible couples where all couples are assumed to be equally probable.

The starting conditions are the same as in the previous figures.