IHS Economics Series
Working Paper 213
June 2007

# Why are Mothers Working Longer Hours in Austria than in Germany?: A Comparative Micro Simulation Analysis

Helene Dearing
Helmut Hofer
Christine Lietz
Rudolf Winter-Ebmer
Katharina Wrohlich

IRIHS Institutional Repository at IHS Vienna

Institut für Höhere Studien
Institute for Advanced Studies
Vienna

INSTITUT FÜR HÖHERE STUDIEN
INSTITUTE FOR ADVANCED STUDIES
Vienna

**Impressum**

**Author(s):**
Helene Dearing, Helmut Hofer, Christine Lietz, Rudolf Winter-Ebmer, Katharina Wrohlich

**Title:**
Why are Mothers Working Longer Hours in Austria than in Germany?: A Comparative Micro Simulation Analysis

**ISSN: Unspecified**

**2007 Institut für Höhere Studien - Institute for Advanced Studies (IHS)**
Josefstädter Straße 39, A-1080 Wien
E-Mail: office@ihs.ac.at
Web: www.ihs.ac.at

All IHS Working Papers are available online:
http://irihs.ihs.ac.at/view/ihs_series/
This paper is available for download without charge at:
https://irihs.ihs.ac.at/id/eprint/1777/

**213**

**Reihe Ökonomie**

**Economics Series**

# Why are Mothers Working Longer Hours in Austria than in Germany?

## A Comparative Micro Simulation Analysis

**Helene Dearing, Helmut Hofer, Christine Lietz, Rudolf Winter-Ebmer, Katharina Wrohlich**

**213**

**Reihe Ökonomie**

**Economics Series**

# Why are Mothers Working Longer Hours in Austria than in Germany?

## A Comparative Micro Simulation Analysis

**Helene Dearing, Helmut Hofer, Christine Lietz, Rudolf Winter-Ebmer, Katharina Wrohlich**

**June 2007**

**Institut für Höhere Studien (IHS), Wien**
**Institute for Advanced Studies, Vienna**

**Contact:**

Helene Dearing
Institute for Advanced Studies (IHS), Vienna
☎: +43/1/599 91-252
email: dearing@ihs.ac.at

Helmut Hofer
Institute for Advanced Studies (IHS), Vienna
☎: +43/1/599 91-251
email: hofer@ihs.ac.at

Christine Lietz
Institute for Advanced Studies (IHS), Vienna
☎: +43/1/599 91-252
email: lietz@ihs.ac.at

Rudolf Winter-Ebmer
Department of Economics
University of Linz
Altenberger Str. 69
4040 Linz, Austria
email: rudolf.winterebmer@jku.at
and
Institute for Advanced Studies (IHS), Vienna

Katharina Wrohlich
German Institute for Economic Research (DIW), Berlin
☎: +49/30/89789-164
email: kwrohlich@diw.de

---

Founded in 1963 by two prominent Austrians living in exile – the sociologist Paul F. Lazarsfeld and the economist Oskar Morgenstern – with the financial support from the Ford Foundation, the Austrian Federal Ministry of Education and the City of Vienna, the Institute for Advanced Studies (IHS) is the first institution for postgraduate education and research in economics and the social sciences in Austria. The **Economics Series** presents research done at the Department of Economics and Finance and aims to share "work in progress" in a timely way before formal publication. As usual, authors bear full responsibility for the content of their contributions.

Das Institut für Höhere Studien (IHS) wurde im Jahr 1963 von zwei prominenten Exilösterreichern – dem Soziologen Paul F. Lazarsfeld und dem Ökonomen Oskar Morgenstern – mit Hilfe der Ford-Stiftung, des Österreichischen Bundesministeriums für Unterricht und der Stadt Wien gegründet und ist somit die erste nachuniversitäre Lehr- und Forschungsstätte für die Sozial- und Wirtschafts-wissenschaften in Österreich. Die **Reihe Ökonomie** bietet Einblick in die Forschungsarbeit der Abteilung für Ökonomie und Finanzwirtschaft und verfolgt das Ziel, abteilungsinterne Diskussionsbeiträge einer breiteren fachinternen Öffentlichkeit zugänglich zu machen. Die inhaltliche Verantwortung für die veröffentlichten Beiträge liegt bei den Autoren und Autorinnen.

# Abstract

Labor force participation rates of mothers in Austria and Germany are similar, however full-time employment rates are much higher among Austrian mothers. In order to find out to what extent these differences can be attributed to differences in the tax transfer-system, we perform a comparative micro simulation exercise. After estimating structural labor supply models of both countries, we interchange two important institutional characteristics of the two countries, namely (i) the definition of the tax unit within the personal income tax and (ii) the parental leave benefit scheme. As our analysis shows, differences in mothers' employment patterns can partly be explained by the different tax systems: While Germany has a system of joint taxation with income splitting for married couples, Austria taxes everyone individually, which leads to lower marginal tax rates for secondary earners than the German system.



## Keywords

Labor supply, micro simulation, family policy, income taxation, Austria, Germany

## JEL Classification

J22, H31, H24

**Comments**
Katharina Wrohlich would like to thank the Fritz-Thyssen Foundation for financial support of the project “Labor Market and Welfare Effects of Public Family Support.” Furthermore, we thank the Austrian Central Bank for financial support by means of the "Jubiläumsfonds" (project 11421). We would like to thank Robert Kunst, Peter Haan, and Viktor Steiner for helpful comments and Nicole Scheremet for editorial assistance.

# Contents


**1 Introduction 1**

**2 Differences and Similarities between Austria and Germany 2**

2.1 Employment behavior of mothers ..... 2

2.2 Institutions ..... 3

A. Income Taxation ..... 3

B. Family Allowance ..... 4

C. Parental Leave Benefit ..... 4

D. Child Care Institutions ..... 5

2.3 Work Incentives in Austria and Germany ..... 7

**3 Empirical Methodology and Data 12**

3.1 Data ..... 12

3.2 Labor Supply Estimation ..... 13

3.3 Policy Simulations ..... 16

**4 Summary and Conclusions 20**

**5 References 23**

**Appendix 1: Tables 24**

**Appendix 2: Calculating “expected costs of child care” 26**

# 1 Introduction

There is considerable variation in the employment rates of mothers with young children across European countries. Traditionally, Scandinavian countries have relatively high employment rates of mothers, while in Southern European countries, but also Austria and Germany, employment rates of mothers are relatively low (see OECD, 2002). These differences have often been explained by different work incentives created by the tax-transfer system and the child care infrastructure. However, these institutional factors do not only influence the participation decision but also working hours. Countries with similar participation rates of mothers can have quite different average working hours of employed mothers. Comparing employment behavior of mothers with young children in Austria and Germany we see that the share of mothers with children above age two who work is relatively similar in both countries. However, once Austrian mothers start working, they are twice as often working full-time as compared to Germans. We try to explain these differences by specific features of the tax-transfer system in both countries.

Comparing Austria and Germany is an interesting case because the two countries share many common institutions and can both be assigned to the corporatist welfare state regime (Esping-Andersen, 1990). Furthermore, also the child care institutions are very similar as far as availability, costs and quality are concerned. However, there are two important differences influencing the work incentives for mothers with young children. First, income taxation differs with respect to the definition of the tax unit. While in Austria, all individuals, whether married or not, are taxed individually, Germany has a system of joint taxation with income splitting for married spouses. This feature of the tax system has a strong influence on marginal tax rates and thus creates very different work incentives for secondary earners. The second important difference in the tax-transfer systems is the design of the parental leave benefit scheme. This scheme is much more generous in Austria than in Germany, in terms of the amount of the benefit, the maximum duration period as well as the income thresholds.

To investigate to what extent differences in labor supply behavior can be traced back to these two features of the tax system we have to control for differences in preferences and other aspects of the tax-benefit system in these countries. We first show the structure of work incentives induced by the tax-transfer system for stylized family types. Then we pursue a comparative micro simulation exercise starting with the estimation of a behavioral model of maternal labor supply based on representative data-sets and detailed tax-transfer models for both countries. Thereafter we interchange the two distinctive features of the tax-transfer systems in

Austria and Germany, namely the definition of the tax unit as well as the parental leave benefit. For Germany, we simulate the introduction of individual taxation as practiced in Austria. Separately, we simulate a switch to the Austrian parental leave scheme. Finally, we simulate both institutional characteristics at the same time to show the joint effect. The same exercise is done for implementing the German legislation in Austria.

Our results show that interchanging these two features of the tax-benefit scheme would in fact increase German mothers' participation rates and decrease participation in Austria. All in all, these two distinctive institutional characteristics explain part of the difference in full-time employment rates. The difference in part-time rates, however, would become even more pronounced if both countries interchanged the definition of the tax unit and the parental leave benefit. Part-time employment would rise in Germany and fall in Austria. This can be explained by lower costs of child care for part-time slots in Germany as well as strong preferences for part-time work of mothers with young children.

# 2 Differences and Similarities between Austria and Germany

## 2.1 Employment behavior of mothers

Table 1 shows that the share of mothers with children up to 10 years who are not participating in the labor market is higher in Austria than in Germany. About 50 percent of mothers with children in this age group are not working in Austria, while this share amounts to 43 percent in Germany. We find the same pattern for mothers whose youngest child is below three years. In this group, the non-participation rate is 77 percent in Austria and 66 percent in Germany. The majority of participating mothers in Germany are engaged in part-time work. Among all mothers with children up to 10 years, the part-time employment rate in Germany amounts to 34 percent but only 22 percent in Austria. Even more striking are the differences in marginal employment ("geringfügige Beschäftigung"), which are almost three times as high in Germany (10.4 percent) as in Austria (3.7 percent). In Austria, full-time employment is much more prevalent: 24 percent of all mothers are working full-time compared to 13 percent in Germany. This difference is even more pronounced if we look at the group of mothers whose youngest child is 3 to 10 years old: In this group, the share of full-time working mothers in Austria is 32 percent and only 15 percent in Germany.

**Table 1: Employment patterns of mothers with young children in Austria and Germany**

| | Mothers with youngest child aged 0-2 | | Mothers with youngest child aged 3-10 | | All Mothers | |
|---|---|---|---|---|---|---|
| | Austria | Germany | Austria | Germany | Austria | Germany |
| Not working | 77.2% | 66.1% | 33.8% | 33.3% | 50.0% | 43.1% |
| Marginally employed | 2.5% | 8.7% | 4.3% | 11.2% | 3.7% | 10.4% |
| Part-time working | 9.2% | 17.2% | 29.6% | 40.8% | 22.0% | 33.7% |
| Full-time working | 11.1% | 8.1% | 32.3% | 14.8% | 24.3% | 12.8% |

Sources: Austrian version of SILC 2004; SOEP 2004.

Note that the aggregate numbers for Germany hide the prevailing strong differences in employment patterns between East and West Germany.[1] A more detailed description of employment patterns, including separate shares for single mothers and mothers living in couples, can be found in the Appendix.

## 2.2 Institutions[2]

### A. Income Taxation

As far as income taxation is concerned, the most important difference between Austria and Germany is the fact that married spouses can file jointly and apply full income splitting in Germany, while in Austria all persons are taxed individually. Under the German system of joint taxation with income splitting ("Ehegattensplitting") the income tax of a married couple is calculated by applying the tax function to half of the sum of the spouses' incomes. This amount is then doubled to determine the tax amount of the couple. This procedure guarantees that married couples – given a certain level of household income – will always be charged the same amount of income tax, no matter how income is distributed between husband and wife. Thus, the German system implies a "splitting advantage", defined as the difference between the tax amount that a married couple pays under income splitting and the amount the same couple would pay in case of separate filing – or in case of individual taxation such as practiced in Austria. The amount of the "splitting advantage" depends on the income distribution between husband and wife and on the absolute level of household income.[3]

[1] Full-time employment rates of mothers whose youngest child is 3 to 10 years old amount to 35 percent in East and 12 percent in West Germany. See Geisler and Kreyenfeld (2005) for a detailed overview of mothers' employment behavior in East and West Germany for the time period of 1991 to 2002.

[2] Since we use data from 2003 for the empirical analysis, we describe the institutional characteristics of both countries for the same year.

[3] See Steiner and Wrohlich (2004) for more details on the "splitting advantage" in Germany.

## B. Family Allowance

The most important cash transfer for families with dependent children is very similar in Germany and Austria as far as the amount of the benefit as well as the entitlement regulation is concerned. In Austria, the family allowance ("Familienbeihilfe") is a universal benefit amounting to between 1,260 and 2,100 Euro annually per child, depending on the age and rank order of the child. This benefit is supplemented by a refundable tax credit ("Kinderabsetzbetrag") that amounts to 610.8 Euro annually per child. The German family allowance ("Kindergeld") amounts to 1,848 Euro per year independent of the age of the child. From the fourth child onwards, this child benefit rises to 2,148 Euro per year. In contrast to Austria, which grants a fully refundable child tax credit in addition to the family allowances, Germany applies a higher-yield test between the family allowance and the tax relief that results from a child tax allowance amounting to 2,904 Euro per year. Although at first sight, this seems to be an important difference towards the Austrian system, in fact, the child tax allowance leads only to higher income gains than the family allowance for taxable incomes above 63,000 Euro per year, which corresponds more or less to the 85$^{th}$ percentile of the distribution of taxable incomes (Steiner and Wrohlich, 2006).

## C. Parental Leave Benefit

Parental leave benefit schemes differ quite substantially between Germany and Austria concerning the amount, the duration period as well as the income thresholds up to which the benefit is granted. In Austria, parents can draw the parental leave benefit until the youngest child has reached the age of 30 months. If the benefit is drawn by both parents, the duration period is extended until the child is three years old. The benefit amounts to 5,303 Euro per year for the youngest child. In the case of multiple births, a supplement of 50 percent for every additional child is granted until the birth of a further child. The parental leave benefit is only granted if gross annual income of the parent who is receiving the benefit does not exceed 14,600 Euro per year. Parents with very low income may apply for a supplementary payment, which is granted as a loan.

In Germany, the maximum duration period of the parental leave benefit is 24 months after the birth of the youngest child. The annual benefit is only 70 percent of the Austrian benefit and amounts to 3,684 Euro. In contrast to Austria, where the benefit is only tested against the income of the parent who receives the transfer, the parental leave benefit in Germany is means-tested on the household level with two different income thresholds. In the first six

months after the child's birth, the income thresholds up to which the benefit is paid are more generous (net household income must not exceed 51,130 Euro per year) than for the next 18 months (below 16,470 Euro per year). If income exceeds the threshold in the first six months, no benefit is granted at all. In the following 18 months, the parental leave benefit is withdrawn at a rate of 62.4 percent. The parental leave benefit is only granted if one of the parents is working less than 30 hours a week.[4]

## D. Child Care Institutions

Austria and Germany furthermore have a very similar child care „market" that is characterized by subsidized child care facilities of homogenous quality at relatively low parents' fees, however only limited accessibility.[5] Table 2 shows availability of child care slots as well as average fees of child care facilities in Austria and Germany.[6]

In the previous literature on mothers' labor supply (see, among others, Merkle (1994) for Germany and Mahringer (2005) for Austria), child care costs have often been measured as average parents' fees to center-based child care. However, given the low availability of formal child care slots in both countries, in particular for children under three years, it cannot be assumed that child care costs equal the average parents' fees charged by formal child care centers.[7] An adequate measure of child care costs in both countries has to take into account that child care is possibly rationed. We will do so by assuming that child care costs can be modeled as a weighted average of the fees for a subsidized slot and the private costs of child care, yielding a measure of "expected costs of child care". We present a detailed description of the calculation of these costs in Appendix 2. Table 3 summarizes the expected costs for part-time and full-time child care in both countries by different age groups. For children under three years as well as for children aged seven to ten years, child care costs are very similar in both countries. For children aged three to six, costs are lower in Germany, which is due to the fact that availability of subsidized child care is relatively high for children in this age group since a legal claim for a part-time slot has been introduced in 1996.

---

[4] Note that Germany introduced a new parental leave benefit ("Elterngeld") in 2007. This new benefit replaces the "Erziehungsgeld" and amounts to 67% of net earnings prior birth for the stay-at-home parent for the maximum duration of 1 year. If both parents share parental leave, the maximum duration can be extended by 2 more months.

[5] See Dörfler (2007) for a detailed comparison of child care institutions in Austria and Germany.

[6] Note that the Austrian figures refer to values from the city of Vienna only, whereas the numbers for Germany refer to the national average. As a consequence the parents' fees for Austria as shown in Table 2 are considerably higher than those for Germany. See Appendix 2 for a more detailed discussion.

**Table 2: Costs and availability of formal child care in Austria and Germany**

| | Children aged 0-2 | | Children aged 3-6[8] | | Children aged 7-10 | |
|---|---|---|---|---|---|---|
| | Austria | Germany | Austria | Germany | Austria | Germany |
| Number of part-time child care slots per 100 children | 3.4 | 0.8 | 19.3 | 57.1 | 26.9 | 8.9 |
| Number of full-time child care slots per 100 children | 12.9 | 7.7 | 44.0 | 32.7 | -- | -- |
| Average parents' fee for a part-time slot, Euro/month | 118 | 62 | 118 | 60 | 131 | 49 |
| Average parents' fee for a full-time slot, Euro/month | 199 | 127 | 199 | 96 | | |

Sources: Statistik Austria, Kindertagesheimstatistik 2003/04; Stadt Wien, MA 11A; Statistisches Bundesamt 2004; SOEP 2002.

Note that data on availability of child care slots in Germany are available only every fourth year. Information on parents' fees in the SOEP is only available in 2002.

**Table 3: "Expected costs of child care"**

| | Children aged 0-2 | | Children aged 3-6 | | Children aged 7-10 | |
|---|---|---|---|---|---|---|
| | Austria | Germany | Austria | Germany | Austria | Germany |
| Average expected child care costs for part-time care, Euro/month | 311 | 315 | 163 | 69 | 253 | 280 |
| Average expected child care costs for full-time care, Euro/month | 635 | 636 | 387 | 286 | -- | -- |

Sources: Own calculations based on Statistik Austria, Kindertagesheimstatistik 2003/04; Stadt Wien, MA 11A; Statistisches Bundesamt 2004; SOEP 2002, 2004.

We assume that whether and how much child care is required for a child depends on the mothers' and fathers' working decisions and the age of the child. Thus, if at least one of the parents is not working, no external child care is necessary. If one parent is working part-time and the other full-time, children aged 0 to 6 years need part-time child care, whereas older children are assumed to be looked after in school. If both parents work full-time, children aged 0 to 6 need full-time care and children aged 7 to 10 need part-time care, since in Austria and Germany full-time care provided by schools is not common.

[7] See Dörfler (2004) and Wrohlich (2007a) for empirical evidence on excess demand for childcare in Austria and Germany, respectively.

[8] The number of slots per 100 children aged 3-6 for Austria is somewhat underestimated due to the age classification we use. This age group contains 4 cohorts: 3-year-old, 4-year-old, 5-year-old and 6-year-old. However, usually children attend "Kindergarten" for three years only.

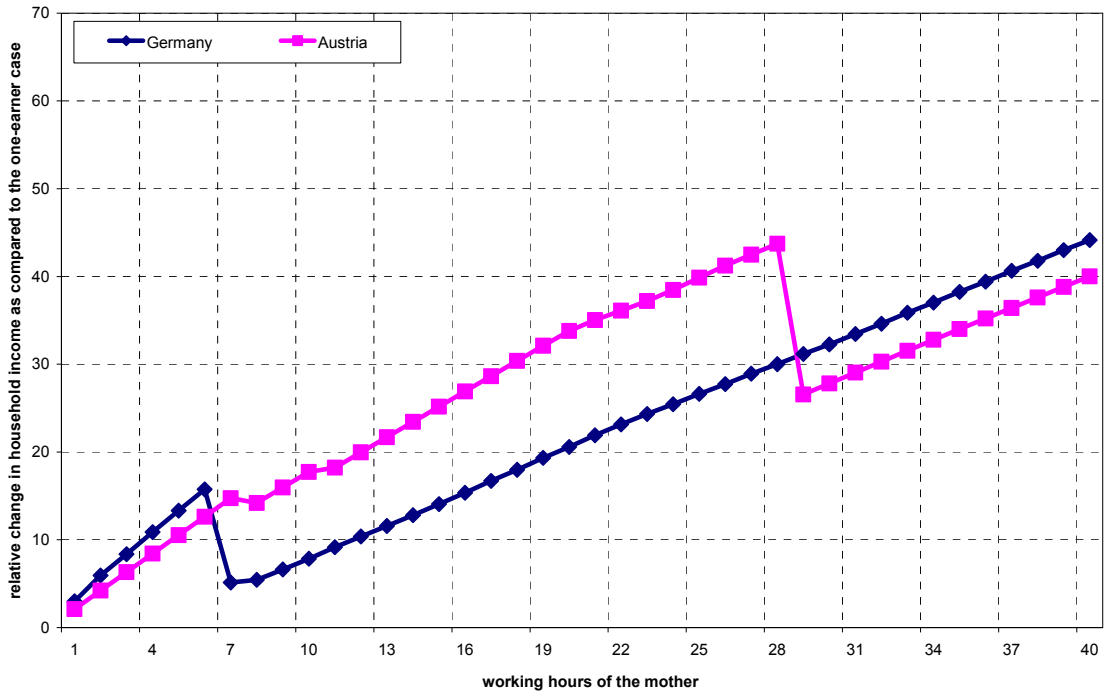
## 2.3 Work Incentives in Austria and Germany

The differences and similarities in the tax-transfer system, including the child care system, in Austria and Germany can best be summarized by comparing stylized budget constraints. The following figures show the relative change in net household income compared to income when the secondary earner, i.e. the mother, does not work at different levels of the mother's working hours. We show these stylized budget constraints for two household types: A married couple with one child aged 1 year and a married couple with two children aged 4 and 7 years. It is assumed that the husband is working full-time at the median hourly wage of the male wage distribution (15 Euro in Germany, 13 Euro in Austria) and the mother earns the median wage of the female wage distribution (12 Euro in Germany, 10 Euro in Austria).

Figure 1 and Figure 2 show the change in net household income ignoring costs of child care. The two tax-transfer systems generate several important differences. The income gain for both families is higher in Germany than in Austria for low levels of mothers' working hours: In the case of the couple with a 1-year old child, net household income at a weekly working time of 6 hours exceeds income at zero working hours by 15.6 percent in Germany but only 12.6 percent in Austria. Working above this threshold, however, becomes very unattractive in Germany, in particular for the family with the 1-year old child. At 7 working hours, the mothers' earnings exceed the minimum income limit for marginal employment ("Geringfügigkeitsgrenze") and are thus due to social security contributions and income taxation. Moreover, the family loses eligibility of the parental leave benefit because household income exceeds the maximum income threshold. It is only from 17 hours onwards that the relative gain in net household income is higher than at 6 working hours. In Austria, the kink above 7 hours is negligibly small due to the fact that the minimum income limit for marginal employment in Austria only affects social security contributions, but not income taxation. Since each spouse is taxed individually in Austria, the increase in income by working hours of the mother is much steeper than in the German case. However, there is a large drop in the income gain at 29 hours due to the withdrawal of the parental leave benefit. Thus, full-time work for mothers with children in this age group is relatively unattractive as compared to part-time work.

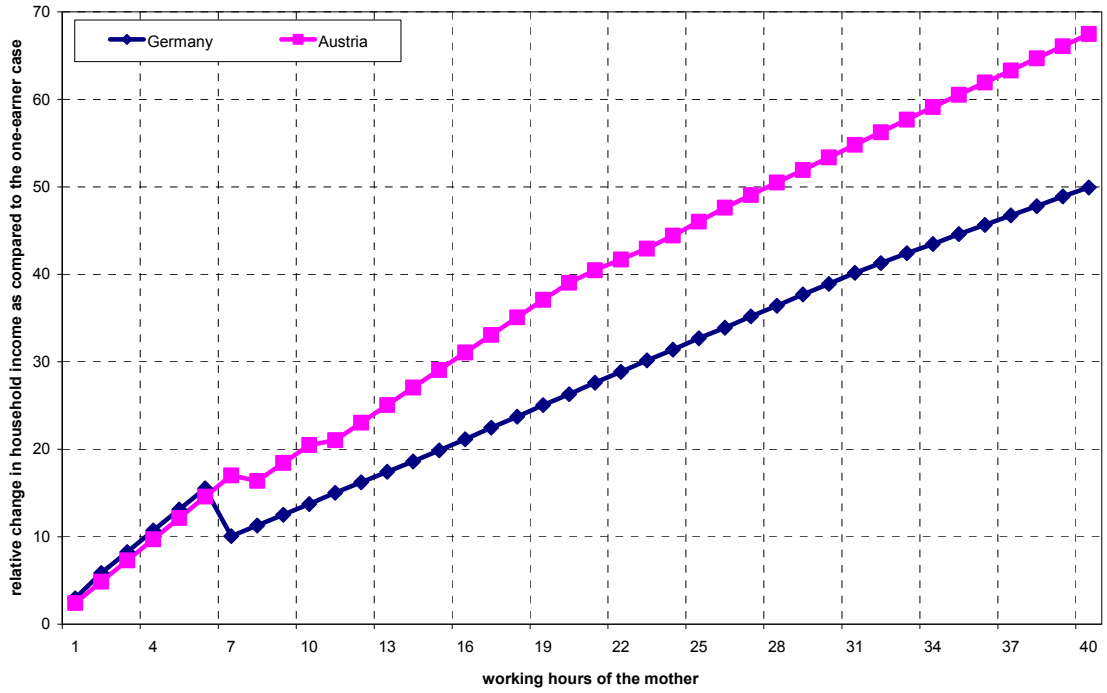
The budget line of a family with two children aged 4 and 7 years shows less kinks in both countries, since this household is not eligible to parental leave benefit any more. Comparing the budget lines for this family under the two country-specific regimes reveals the "pure" difference due to the tax system. Since low earnings are exempt from social security contributions and income taxation in Germany, the relative income gain at 6 hours of weekly work is slightly higher in Germany (15.5 percent) than in Austria (14.6 percent). From that threshold onwards, however, employment pays off much more in Austria than in Germany. For example, part-time employment (20 hours) increases income by 39 percent in Austria but only 26.3 percent in Germany as compared to the single-earner case. If the mother is working full-time net household income increases by 67.5 percent in Austria but only 50 percent in Germany.

**Figure 1: Relative change in household income as compared to non-participation of the mother; couple with one child (1 year old); without taking into account childcare costs**




Sources: ITABENA based on Austrian version of SILC 2004; STSM based on SOEP 2004.

**Figure 2: Relative change in household income as compared to non-participation of the mother; couple with two children (4 and 7 years old); without taking into account childcare costs**




Sources: ITABENA based on Austrian version of SILC 2004; STSM based on SOEP 2004.

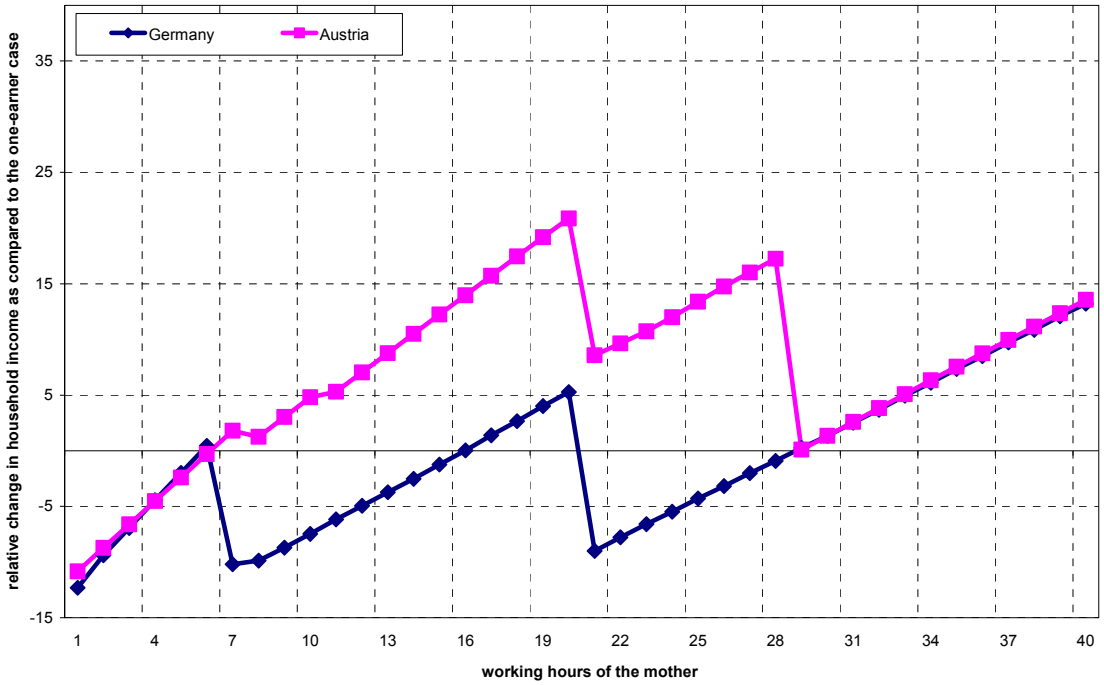
Figure 3 and Figure 4 show the relative change in household income for the same example households. However in contrast to Figure 1 and Figure 2, child care costs are deducted according to age and number of children. We assume that if the mother is working 1-20 hours per week, part-time care has to be purchased for all children up to 6 years. If the mother is working more than 20 hours, full-time care has to be purchased for children in this age group as well as part-time care for children aged 7-10. If the mother is not working, we assume that the household does not have to pay for child care.

Deducting child care costs in the way described above results in losses of household income as mothers start to work, because child care costs are high, in particular for families with children under three years. German mothers with a child in this age group can increase household income only by 0.4 percent if they work 6 hours per week. In Austria, household income is even 0.3 percent lower than in the single-earner (and no child care) case. Above the threshold of 6 hours of weekly work, we find the same pattern that has already been illustrated in Figure 1 and Figure 2: The increase in household income is much steeper in Austria than in Germany. Part-time employment at 20 hours of weekly work increases household income by

21 percent in Austria but only by 5 percent in Germany. Full-time work is relatively unattractive in both countries, increasing net income only by 14 percent.

The example of a married couple with two children aged 4 and 7 years illustrates very clearly the different incentive structures in both countries. 6 hours of weekly work lead to higher income gains in Germany (12.3 percent) than in Austria (6.7 percent). Full-time work, on the other hand, adds only little less to household income in Germany – 22.7 percent as compared to a single-earner family – whereas in Austria, income increases by 36.7 percent.

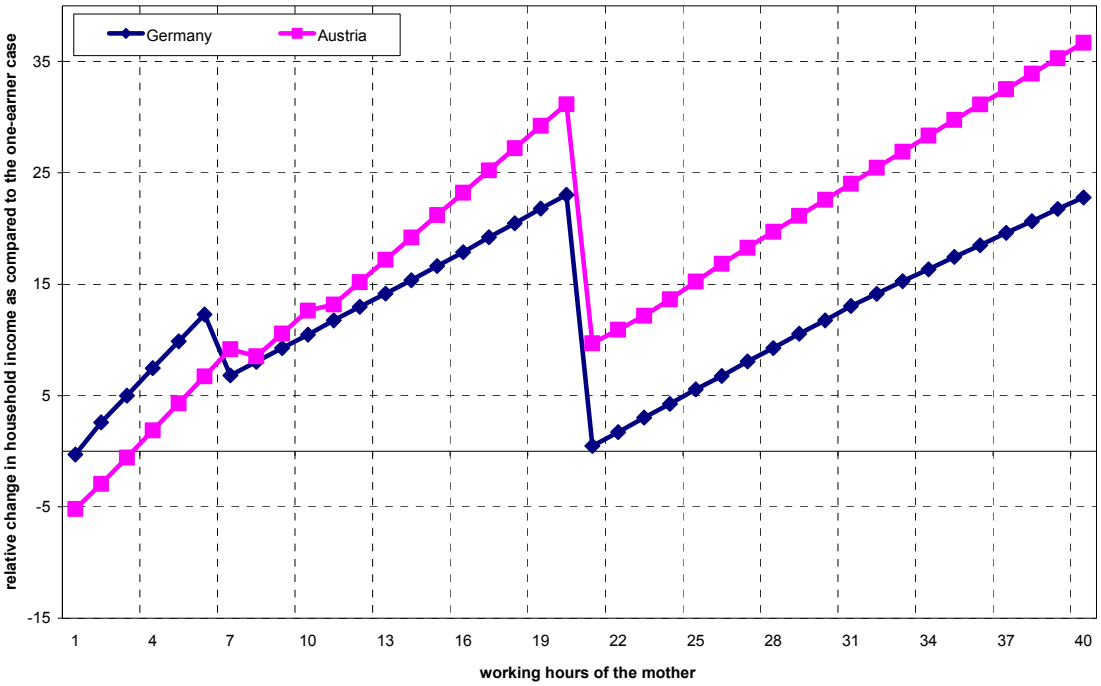
**Figure 3: Relative change in household income as compared to non-participation of the mother; couple with one child (1 year old); taking into account childcare costs**




Sources: ITABENA based on Austrian version of SILC 2004; STSM based on SOEP 2004.

We can sum up the findings of the preceding graphical illustration as follows: For married mothers with children under 2 years, marginal employment (at six hours of work) is slightly more attractive in Germany than in Austria. Part-time work at about 20 hours is more attractive in Austria than in Germany, however full-time employment is not attractive for Austrian mothers and hardly attractive for German mothers when compared to part-time work. For married mothers with children aged three years to ten years, we also find that marginal employment is more attractive in Germany than in Austria, whereas full-time employment is far more attractive in Austria than in Germany.

**Figure 4: Relative change in household income as compared to non-participation of the mother, couple with two children (4 and 7 years old); taking into account childcare costs**




Sources: ITABENA based on Austrian version of SILC 2004; STSM based on SOEP 2004.

Obviously, the differences in employment patterns of mothers with young children in Austria and Germany reflect the institutional characteristics of the two tax-transfer systems. The participation rate of mothers with very young children is higher in Germany than in Austria, which is to a large extent driven by the high rate of part-time and marginal employment. Mothers with children above two years have a very similar participation rate, however, The full-time rate of mothers in Austria is almost twice as high as the rate in Germany. Yet, employment patterns are not only affected by institutional settings but also by the empirical distribution of wages as well as preferences. In the following empirical analysis we apply structural models for Austria and Germany to take these labor market characteristics into account.

# 3 Empirical Methodology and Data

We estimate two labor supply models, each embedded in a detailed tax-benefit model of the Austrian and German legislation, respectively, in order to find out to what extent the differences in employment patterns of mothers with young children can be attributed to the different tax systems and benefits. We will proceed as follows: First, structural parameters of a labor supply model are estimated separately for Germany and Austria on representative micro data sets for each country. We model labor supply in a discrete choice framework including the choice categories non-participation, part-time work and full-time work. For each category, net incomes are calculated using detailed tax-benefit models. In a further step, we perform different simulations of the tax-benefit system in both countries: For Germany, we simulate first the introduction of individual taxation as practiced in Austria, second, the Austrian type of the parental leave benefit and third both changes simultaneously. Similarly, we perform three simulations for Austria. Using the structural parameters from the labor supply estimation, we then predict the labor market outcomes under the simulation scenarios. With this procedure, we can estimate the overall effect of the two most important institutional differences between Austria and Germany, but also – in an intermediate step – distinguish between the effect of the tax system and the parental leave benefit scheme.

## 3.1 Data

The empirical analysis for Germany is based on the 2004 wave of the Socio-Economic Panel (SOEP) and for Austria we use the 2004 wave of the European Community Statistics on Income and Living Conditions (EU-SILC). Both datasets are representative samples of households living in Germany/Austria with detailed information on household income, working hours and household structure such as number and exact age of the children.[9]

For both countries, we restrict the sample to families (married and cohabiting couples as well as single mothers) with at least one child aged 10 years or younger. Mothers who are self-employed or in education are also excluded from our sample. Table A 2 in the Appendix shows descriptive statistics on the number of observations in both data-sets and some socio-

[9] For more information on the SOEP see http://www.diw.de/soep and for the SILC for Austria see http://www.statistik.at/fachbereich_03/eusilc_txt.shtml.

economic characteristics. The table illustrates that sample sizes get very small for sub-groups like single mothers. Therefore, we are not able to perform a separate analysis for this group.

Net household income, which is a crucial variable in the estimation of labor supply, is calculated using tax-benefit simulation models that contain all important features of the German and Austrian tax-transfer system.[10] On the basis of these tax-benefit models, it is possible to calculate net household incomes for different working hours categories that will be used for the estimation of labor supply.

Table 7 shows average net household incomes for different hours categories for both data sets, before and after the deduction of child care costs.

**Table 4: Average annual household net-income before and after deduction of child care costs**

| | Austria | | Germany | |
|---|---|---|---|---|
| | before | after | before | After |
| Mother is not working | 26,950 | 26,950 | 33,293 | 33,293 |
| Mother is working part-time | 34,031 | 32,680 | 42,224 | 41,184 |
| Mother is working full-time | 37,759 | 33,563 | 41,319 | 37,184 |
| All mothers | 31,398 | 30,030 | 38,353 | 37,318 |

Sources: ITABENA based on Austrian version of SILC 2004; STSM based on SOEP 2004.

## 3.2 Labor Supply Estimation

The labor supply estimation is based on a structural model of the mother's utility.[11] It is assumed that the mother maximizes a utility function in the arguments leisure and disposable household income. Working hours are modeled as a categorical variable. This is done for several reasons. First, it takes into account the fact that hours of work are heavily concentrated at particular hours. Second, the specification of a relatively small number of working hours categories leads to a tremendous reduction in computational burden of calculating net household income at each possible hours choice. Given the complexities of the tax-transfer system in both countries, this simplification is in fact a prerequisite for an adequate specification of the budget constraint. We assume a choice set that consists of three working hours categories: non-participation, part-time work and full-time work (see Table 1 for the distribu-

[10] We use the tax-benefit model STSM (Steiner et al., 2005) for Germany and ITABENA (Dearing and Lietz, 2007) for Austria.

[11] This model is a special case of van Soest's (1995) model with joint estimation of couples' working hours. In our model hours of the husband are fixed. This can be justified by empirical findings of relatively inelastic labor supply elasticities of man as shown by Blundell and MaCurdy (1999) or Steiner and Wrohlich (2004) for Germany.

tion of households across these choice categories). Note that the part-time category includes marginal employment.

The econometric model is based on the assumption that a mother compares the expected utility obtained from net income and her leisure associated with the choice of a particular hours category.[12] It is assumed that the mother's utility index for a particular hours category $k$ can be modeled by the following quadratic function:

$$U_k(x_k) = x_k' A x_k + \beta' x_k + \varepsilon_k \qquad \text{where } x = (y, l)'. \tag{3}$$

The components of $x$ are net household income ($y$) and the mother's leisure ($l$). These components enter the utility function in linear, quadratic and cross terms. Matrix $A$ contains the coefficients of the quadratic and the cross terms, the vector $\beta$ contains the coefficients of the linear terms. $\varepsilon_k$ is a stochastic error term accounting for unobserved factors that affect the mother's utility. The mother will choose hours category $k$ if, in probability terms, the associated utility index $U_k$ exceeds the utility index in any other possible alternative $l$, i.e.:

$$P(U_k > U_l) = P\left[ (x_k' A x_k + \beta' x_k) - (x_l' A x_l + \beta' x_l) > \varepsilon_l - \varepsilon_k \right]. \tag{4}$$

Assuming that $\varepsilon_k$ is distributed identically across all hours categories according to an extreme-value distribution, the difference of the utility index between any two hours categories follows a logistic distribution[13]. Under this distributional assumption the probability of choosing alternative $k$ relative to alternative $l$ can be described by a Conditional Logit Model as introduced by McFadden (1973):

$$P(U_k > U_l) = \frac{\exp(x_k' A x_k + \beta' x_k)}{\sum_m \exp(x_m' A x_m + \beta' x_m)}, \quad \forall l \neq k, \tag{5}$$

where the summation sign is defined over all possible alternatives, i.e. hours categories. We control for observed heterogeneity by accounting for mother's characteristics such as age, nationality, educational characteristics as well as the number of children by different age

[12] We assume the maximum time budget that can be allocated to market work and leisure, to be 80 hours per week. Note that leisure includes all sorts of non-market activities.

[13] The assumption that the error terms follows an extreme value distribution is rather restrictive and results in the property of the independence of irrelevant alternatives (IIA). Haan (2006) has shown for the case of women's labor supply estimated on the SOEP data base that labor supply elasticities resulting from a conditional logit model as outlined above are not significantly different from elasticities derived from the estimation of a random coefficient model that is not based on the IIA assumption.

groups. For Germany, we furthermore interact income and leisure with a dummy variable indicating that the household is living in East Germany.

Results of the labor supply estimation for Austria and Germany are reported in Table A 3 in Appendix 1. The coefficients, which can be interpreted as parameters of the utility function, lead to plausible results as far as the theoretical predictions are concerned. First derivatives of the utility function with respect to income and leisure are positive for almost all households in both countries. The second derivative of the utility function with respect to income is equal to 0 in Germany and small and negative in Austria. The second derivative with respect to leisure is negative in Germany and very small (though positive) in Austria.

**Table 5: Changes in participation rates caused by a 1%-increase in gross hourly wage**

| | Austria | Germany |
|---|---|---|
| | *change in participation rates (in percentage points)* | |
| All mothers | 0.155<br>(0.140 – 0.171) | 0.189<br>(0.145 – 0.232) |
| Mothers with youngest child 0-2 | 0.106<br>(0.067 – 0.145) | 0.189<br>(0.142 – 0.237) |
| Mothers with youngest child 3-10 | 0.185<br>(0.181 – 0.189) | 0.188<br>(0.144 – 0.232) |
| | *change in part-time participation rates (in percentage points)* | |
| All mothers | 0.058<br>(0.052 – 0.063) | 0.083<br>(0.064 – 0.103) |
| Mothers with youngest child 0-2 | 0.100<br>(0.086 – 0.113) | 0.130<br>(0.097 – 0.165) |
| Mothers with youngest child 3-10 | 0.032<br>(0.027 – 0.038) | 0.063<br>(0.043 – 0.083) |
| | *Change in full-time participation rates (in percentage points)* | |
| All mothers | 0.098<br>(0.081 – 0.115) | 0.105<br>(0.075 – 0.135) |
| Mothers with youngest child 0-2 | 0.006<br>(-0.041 – 0.053) | 0.058<br>(0.033 – 0.083) |
| Mothers with youngest child 3-10 | 0.153<br>(0.148 – 0.157) | 0.125<br>(0.090 – 0.161) |

Sources: ITABENA based on Austrian version of SILC 2004; STSM based on SOEP 2004.

Notes: Elasticities refer to a 1% increase in gross wage. Numbers in parentheses refer to 95%-confidence intervals derived using the bootstrap-method (100 repetitions).

On the basis of estimated parameters we calculate labor supply elasticities that result from a 1%-increase in the gross hourly wage (Table 5). Point estimates of the changes in participation rates are higher in Germany than in Austria, although the difference is not statistically significant. Noticeably, the change in the participation rate is lower in Austria for mothers with small children than for mothers in general, while the elasticities are equal among both groups in Germany. A comparison of changes in part-time and full-time participation rates, however, reveals that the low elasticity for Austrian mothers stems from the very low change

in full-time participation that is not significantly different from 0. This can be explained by the incentive structure implied by the Austrian parental leave legislation. As we have shown in Figure 3, full-time employment leads to less income in absolute terms than part-time employment due to the withdrawal of the parental leave benefit.

## 3.3 Policy Simulations

As we have pointed out in section 2, the most important institutional differences between Austria and Germany that affect work incentives of mothers with young children are (i) the definition of the tax unit in the case of married couples and (ii) the parental leave benefit scheme. In order to find out whether and how much these structural differences can contribute to explain the different employment patterns of mothers, we perform several simulation exercises. For both countries, we simulate three scenarios: one in which the tax system (joint versus individual taxation) is replaced by the tax system of the other country (A1 and G1), leaving all other institutions equal, one in which we replace the parental leave benefit regulations with those of the other country (A2 and G2), and finally one in which we replace both the definition of the tax unit as well as the parental leave benefit with that of the other country (A3 and G3). Note that in simulations A1 and G1 (as well as A3 and G3), where we simulate joint taxation with income splitting for married spouses in Austria and individual taxation in Germany, we leave the tax schedule and the definition of taxable income as it is in both countries. However, in reforms G1 and G3 we take into account the single earner tax credit, which is abolished in reforms A1 and A3.[14]

Table 6 shows the simulation results for disposable income. In Austria the introduction of joint taxation with income splitting (simulation A1) – though increasing disposable income in all categories – decreases the financial gain of changing from non participation to working part-time (22.2 percent versus 16.8 percent) as well as the gain of changing from part-time full-time work (3.6 percent versus 2.3 percent). This is true for mothers with young as well as for mothers with older children. In Germany, the shift to individual taxation (G1) increases work incentives, in particular for part-time work.

[14] In simulations A2 and G2 (as well as A3 and G3) benefits and income thresholds were taken from the respective country and were not adapted to different income levels.

**Table 6: Simulation results: Average annual income in base and reform scenarios**

| | Policy Simulations for Austria | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Base | | A1: Joint taxation with income splitting | | A2: German parental leave benefit | | A3: Both | |
| | Average income Euro | Increase % | Average income Euro | Increase % | Average income Euro | Increase % | Average income Euro | Increase % |
| ***All Mothers*** | | | | | | | | |
| Non participation | 25,849 | | 27,556 | | 24,999 | | 26,711 | |
| Part-time work | 31,581 | 22.2% | 32,176 | 16.8% | 30,445 | 21.8% | 31,041 | 16.2% |
| Full-time work | 32,717 | 3.6% | 32,903 | 2.3% | 32,098 | 5.4% | 32,284 | 4.0% |
| ***Mothers with youngest child 0-2*** | | | | | | | | |
| Non participation | 26,161 | | 27,708 | | 23,885 | | 25,445 | |
| Part-time work | 29,833 | 14.0% | 30,375 | 9.6% | 26,791 | 12.2% | 27,336 | 7.4% |
| Full-time work | 28,196 | -5.5% | 28,371 | -6.6% | 26,540 | -0.9% | 26,715 | -2.3% |
| ***Mothers with youngest child 3-10*** | | | | | | | | |
| Non participation | 25,663 | | 27,466 | | -- | | 27,466 | |
| Part-time work | 32,624 | 27.1% | 33,251 | 21.1% | -- | -- | 33,251 | 21.1% |
| Full-time work | 35,412 | 8.5% | 35,604 | 7.1% | -- | -- | 35,604 | 7.1% |
| | **Policy Simulations for Germany** | | | | | | | |
| | **Base** | | **G1: Individual taxation** | | **G2: Austrian parental leave benefit** | | **G3: Both** | |
| | Average income Euro | Increase % | Average income Euro | Increase % | Average income Euro | Increase % | Average income Euro | Increase % |
| ***All Mothers*** | | | | | | | | |
| Non participation | 33,487 | | 30,388 | | 34,349 | | 31,249 | |
| Part-time work | 38,100 | 13.78% | 36,980 | 21.69% | 38,846 | 13.09% | 37,725 | 20.72% |
| Full-time work | 38,819 | 1.89% | 38,179 | 3.24% | 39,196 | 0.90% | 38,556 | 2.20% |
| ***Mothers with youngest child 0-2*** | | | | | | | | |
| Non participation | 32,198 | | 29,343 | | 35,073 | | 32,218 | |
| Part-time work | 34,240 | 6.34% | 33,279 | 13.41% | 36,724 | 4.71% | 35,762 | 11.00% |
| Full-time work | 33,348 | -2.61% | 32,745 | -1.60% | 34,606 | -5.77% | 34,003 | -4.92% |
| ***Mothers with youngest child 3-10*** | | | | | | | | |
| Non participation | 34,040 | | 30,835 | | -- | | 30,835 | |
| Part-time work | 39,755 | 16.79% | 38,565 | 25.07% | -- | -- | 38,565 | 25.07% |
| Full-time work | 41,162 | 3.54% | 40,506 | 5.03% | -- | -- | 40,506 | 5.03% |

Sources: ITABENA based on Austrian version of SILC 2004; STSM based on SOEP 2004.

The swap of parental leave benefits (A2 and G2) per definition affects only the group of mothers where the youngest child is less than three years old. In Austria disposable income decreases considerably due to the fact that the German parental leave benefit is less generous. Since the German income limit for couples is based on both partners' income and therewith much stricter than the Austrian limit, taking up part-time work is more often combined with a loss of the parental leave benefit, although this loss is lower in absolute terms due to the lower amount of the German benefit. As a result, taking up part-time work becomes less attractive for Austrian mothers in the "A2" scenario. However, the income loss when changing from

part-time to full-time work becomes less pronounced in the case that Austria would introduce the German parental leave benefit. This is due to the fact that above the income threshold the Austrian benefit is fully withdrawn at once (see Figure 1). Thus, full-time work becomes more attractive for Austrian mothers in the case that they are exposed to the German parental leave benefit regulations.

For the case that Germany would introduce the Austrian parental leave benefit (simulation G 2) we find that both part-time and full-time employment become less attractive, at least on average. This can be explained by the large share of German mothers with children up to two years (46%) who are not receiving the parental leave benefit even though they are not participating in the labor market. In these cases, earnings of the husband already exceed the income threshold, which is defined at the household level. For these mothers, the switch to the Austrian parental leave scheme makes non-participation far more attractive, because the Austrian benefit is means-tested at the individual rather than on the household level.

The joint effect of interchanging the income tax system and the parental leave benefit is shown in the last column of Table 6 (simulations A3 and G3). For Austrian mothers with very young children part-time employment becomes much less attractive under the German regulations, whereas full-time work becomes more attractive. For mothers with children between three and ten years, both working categories become less attractive. In the case that Germany introduced the Austrian tax system and parental leave regulations, we find that work incentives increase for mothers of children older than three years. For mothers with younger children, incentives to take up a full-time job decrease. Note that with the data at hand, it is not possible to model the change in the "marginal employment" category. From what we have shown in Figures 1 and 2, we would expect this category to become more attractive for Austrian mothers if German institutions were introduced.

Table 7 shows the labor supply effects that result from the change in disposable incomes due to the policy simulations. As expected, Austrian mothers would reduce their labor force participation rate in the case of joint taxation (simulation A1). The participation rate of mothers would decrease by 2.4 percentage points, where about 1 percentage point is due to changes in part-time participation and 1.4 to changes in full-time participation. If Germany, on the other hand, introduced Austria's system of individual taxation, mothers would increase labor force participation by more than 6 percentage points. The majority of women starting to participate would choose part-time: The part-time employment rate would increase by 4.5 percentage points, whereas the full-time employment rate would increase by only 1.7 percentage points.

**Table 7: Simulation Results: Labor Supply Effects**

| | Austria | | |
|---|---|---|---|
| | *A1: income splitting* | *A2: German parental leave benefit* | *A3: both* |
| | *change in labor force participation rate (in percentage points)* | | |
| All mothers | -2.39 (-2.26 – -2.52) | -0.21 (-0.31 – -0.10) | -2.61 (-2.76 – -2.46) |
| Mothers with youngest child 0-2 | -1.75 (-1.95 – -1.56) | -0.55 (-0.84 – -0.26) | -2.34 (-2.59 – -2.08) |
| Mothers with youngest child 3-10 | -2.77 (-2.92 – -2.63) | -- | -2.77 (-2.93 – -2.62) |
| | *change in part-time participation rates (in percentage points)* | | |
| All mothers | -1.02 (-1.09 – -0.95) | -0.44 (-0.51 – -0.37) | -1.43 (-1.54 – -1.32) |
| Mothers with youngest child 0-2 | -1.21 (-1.33 – -1.09) | -1.17 (-1.37 – -0.98) | -2.32 (-2.52 – -2.11) |
| Mothers with youngest child 3-10 | -0.90 (-0.98 – -0.82) | -- | -0.90 (-0.98 – -0.82) |
| | *change in full-time participation rates (in percentage points)* | | |
| All mothers | -1.37 (-1.47 – -1.28) | 0.23 (0.13 – 0.34) | -1.18 (-1.31 – -1.05) |
| Mothers with youngest child 0-2 | -0.54 (-0.62 – -0.47) | 0.62 (0.38 – 0.87) | -0.02 (-0.24 – 0.20) |
| Mothers with youngest child 3-10 | -1.87 (-2.00 – -1.75) | -- | -1.87 (-1.97 – -1.77) |
| | **Germany** | | |
| | *G1: individual taxation* | *G2: Austrian parental leave benefit* | *G3: both* |
| | *Change in labor force participation rate (in percentage points)* | | |
| All mothers | 6.15 (4.83 – 7.48) | -0.62 (-0.88 – -0.36) | 5.52 (4.30 – 6.74) |
| Mothers with youngest child 0-2 | 6.15 (4.74 – 7.64) | -2.06 (-2.91 – -1.22) | 4.08 (2.86 – 5.30) |
| Mothers with youngest child 3-10 | 6.15 (4.76 – 7.51) | -- | 6.14 (4.76 – 7.51) |
| | *change in part-time participation rates (in percentage points)* | | |
| All mothers | 4.47 (3.42 – 5.52) | -0.38 (-0.60 – -0.17) | 4.12 (3.12 – 5.12) |
| Mothers with youngest child 0-2 | 5.37 (4.10 – 6.65) | -1.28 (-1.99 – -0.57) | 4.22 (2.99 – 5.44) |
| Mothers with youngest child 3-10 | 4.08 (3.03 – 5.13) | -- | 4.08 (3.03 – 5.13) |
| | *change in full-time participation rates (in percentage points)* | | |
| All mothers | 1.68 (1.30 – 2.07) | -0.24 (-0.32 – -0.15) | 1.40 (1.06 – 1.74) |
| Mothers with youngest child 0-2 | 0.82 (0.52 – 1.11) | -0.78 (-1.06 – -0.51) | -0.14 (-0.29 – 0.02) |
| Mothers with youngest child 3-10 | 2.06 (1.59 – 2.52) | -- | 2.06 (1.59 – 2.52) |

Sources: ITABENA based on Austrian version of SILC 2004; STSM based on SOEP 2004.

Note: Numbers in parentheses refer to 95%-confidence intervals derived using the bootstrap-method (100 repetitions).

If Germany and Austria kept their tax systems but introduced the other country's parental leave benefit scheme (simulations A2 and G2), we find the interesting result that labor force participation of mothers would decrease in both scenarios. For Germany, this is what we expected due to the change in work incentives as summarized in Table 6. Both part-time and full-time employments become less attractive under this simulation. In the Austrian case, full-time employment becomes much more attractive if Austria were to shift to the German parental leave scheme, whereas part-time employment would become less attractive. Accordingly,

we find a decrease in part-time participation rates of 1.2 percentage points and an increase of the full-time employment rate amounting to 0.6 percentage points. The effect on full-time employment is relatively small, however, and does not compensate the drop in part-time employment. Thus, the overall effect on participation is negative.

Simulations A3 and G3 show the combined effects of exchanging the definition of the tax unit and the parental leave benefit at the same time. As can be seen from Table 7 , this joint effect approximately equals the sum of simulations A1 and A2 and G1 and G2, respectively.[15] As the effect of income splitting is quantitatively the more important, the combined effects are close to simulations A1 and G1.

The "exchange" of the income tax systems between the two countries, i.e. the introduction of individual taxation in Germany and the switch to joint taxation with full income splitting in Austria would not only affect labor supply, but also the fiscal budget. For Germany, Bach et al. (2003) have shown that the abolishment of joint taxation with income splitting would lead to an increase of income tax revenues by about 22 billion Euro per year, which is about 10 percent of total income tax revenues in Germany. Accordingly, Austria would face a loss in income tax revenues if it introduced the German system of taxing married couples. For a comprehensive assessment of the economic effects of these reforms, the fiscal effects would need to be considered. One simple way to model revenue-neutral reforms would be to introduce lump-sum taxes or transfers in order to redistribute additional revenues or to collect the loss in income tax revenues from households. This, however, hardly affects the individual's reactions with respect to labor supply that are the focus of our study, due to the fact that the substition effect dominates the relatively small income effect (see Wrohlich 2007b).

# 4 Summary and Conclusions

Employment patterns of mothers with young children differ considerably across European countries. These differences have often been attributed to institutional characteristics, in particular the work incentives created by the tax-transfer system as well as child care institutions. In this paper, we compare two countries, Germany and Austria that can both be defined as corporatist welfare states. Moreover, the general support for families through family allowances as well as costs and availability of child care are very similar in both countries. Still, we find strong differences in the employment behavior of mothers, in particular for mothers with

children aged three to ten years: While participation rates are similar in both countries, full-time employment rates are much higher in Austria than in Germany. The large majority of working mothers in Germany is engaged in marginal and part-time employment.

A closer look at institutional differences between the two countries shows that the differences in employment patterns can well be explained by the different work incentive structure implied by the tax-transfer systems. Two characteristics of the tax-transfer system affect mothers' employment decisions in a significant way. The definition of the tax unit for the personal income tax determines the marginal tax rate for secondary earners and is thus a crucial parameter affecting the work incentive structure. For mothers with very young children, the regulations concerning the parental leave benefit, such as the amount, maximum duration period as well as income threshold and withdrawal rates, are important as well. Austria and Germany have very different regulations as far as these two institutional characteristics are concerned. While in Germany, married spouses are taxed jointly and are eligible to full income splitting, Austria has a system of individual taxation. On the other hand, Austria has a much more generous parental leave benefit scheme than Germany. The Austrian benefit is higher and granted for a longer period. Moreover, the income threshold is defined at the individual level in Austria whereas the benefit is tested against household income in Germany.

We use a structural labor supply model based on tax-transfer models for Austria and Germany to test whether these two characteristics of the tax-transfer system can explain labor supply differences in these countries. Our results show that the labor force participation of German mothers would rise considerably if Germany introduced Austria's income tax and parental leave benefit institutions. In Austria, a small share of mothers would withdraw from the labor market if they were exposed to the German institutional environment. Since the labor force participation rate of mothers is very similar under the status quo in both countries, it can be concluded that German mothers seem to have stronger preferences towards participating in the labor market, given the lower work incentives induced by the German system. Most of the German mothers, however, who would choose to take up a job if they were exposed to the Austrian institutions, would prefer to work part-time. If the two countries exchanged their institutions, the difference in the full-time participation rate of mothers would decrease only by roughly 25 percent.

[15] This is not necessarily the case considering the highly non-linear character of the simulations.

Based on our empirical results we therefore conclude that part of the differences in employment patterns can in fact be explained by the different work incentives created by the tax-benefit system. However, there is a remaining part of the differences that cannot be explained by merely changing particular institutional characteristics. The empirical distribution of wages, as well as child care costs and not least preferences for part-time and full-time work in the presence of young children also play an important role.

# 5 References


Blundell, Richard and Thomas MaCurdy. (1999): Labor Supply: A Review of Alternative Approaches. in: Ashenfelter, O. und Card, D. (ed.): Handbook of Labor Economics, Vol. 3A. Amsterdam.

Dearing, Helene and Christine Lietz (2007): Dokumentation des IHS Steuer-Transfer-Mikrosimulationsmodells ITABENA, Mimeo.

Dörfler, Sonja (2004): Außerfamiliale Kinderbetreuung in Österreich. Status Quo und Bedarf. ÖIF Discussion Paper No. 43, Vienna.

Dörfler, Sonja (2007): Kinderbetreuungskulturen in Europa. Ein Vergleich vorschulischer Kinderbetreuung in Österreich, Deutschland, Frankreich und Schweden. ÖIF Discussion Paper No. 57, Vienna.

Esping-Andersen, Gosta (1990): The Three Worlds of Welfare Capitalism. Princeton University Press, Princeton.

Geisler, Esther and Michaela Kreyenfeld (2005): Müttererwerbstätigkeit in Ost- und Westdeutschland. Eine Analyse mit den Mikrozensen 1991-2002, MPIDR Working Paper No. 2005-033, Rostock.

Haan, Peter (2006): Much Ado About Nothing: Conditional Logit vs. Random Coefficient Models for Estimating Labour Supply Elasticities, *Applied Economics Letters* Vol. 13/4, pp. 251-256.

Mahringer, Helmut (2005): Child Care Costs and Mothers' Employment Rates in Austria, Austrian Institute for Economic Research, Vienna.

McFadden, Daniel (1973): Conditional Logit Analysis of Qualitative Choice Behavior, in P. Zarembka (ed.): Frontiers in Econometrics, Academic Press.

Merkle, Lucie (1994): Frauenerwerbstätigkeit und Kinderbetreuung. Eine theoretische und empirische Analyse für die Bundesrepublik Deutschland. Physica-Verlag, Heidelberg.

OECD (2002): Employment Outlook. Organization of Economic Cooperation and Development (OECD), Paris.

Statistik Austria (2003/04): Kindertagesheimstatistik, Vienna.

Statistik Austria (2006): Einkommen, Armut und Lebensbedingungen, Ergebnisse aus EU-SILC2004, Wien.

Statistisches Bundesamt (2004): Kindertagesbetreuung in Deutschland. Einrichtungen, Plätze, Personal und Kosten 1990 bis 2002. Wiesbaden.

Steiner, Viktor and Katharina Wrohlich (2004): Household Taxation, Income Splitting and Labor Supply Incentive – A Microsimulation Study for Germany, *Cesifo Economic Studies* Vol. 50/3, pp. 541-568.

Steiner, Viktor and Katharina Wrohlich (2006): Introducing Family Tax Splitting in Germany: How would it affect the income distribution and work incentives?, IZA Discussion Paper No. 2245, Bonn.

van Soest, Arthur (1995): Structural Models of Family Labor Supply: A Discrete Choice Approach, *Journal of Human Resources* Vol. 30/1, pp. 63-88.

Wrohlich, Katharina (2006): Labor Supply and Child Care Choices in a Rationed Child Care Market, IZA Discussion Paper No. 2053, Bonn.

Wrohlich, Katharina (2007): The Excess Demand for Subsidized Child care in Germany, *Applied Economics*, forthcoming.

Wrohlich, Katharina (2007b): Evaluating Family Policy Reforms Using Behavioral Microsimulation. The example of childcare and income tax reforms in Germany. Unpublished PhD Thesis, Free University of Berlin.

# Appendix 1: Tables

**Table A 1: Employment patterns of mothers with young children**

| | Mothers with youngest child aged 0-2 | | Mothers with youngest child aged 3-10 | | All Mothers | |
|---|---|---|---|---|---|---|
| | Austria | Germany | Austria | Germany | Austria | Germany |
| **Non-Singles** | | | | | | |
| Not working | 77.4% | 64.5% | 36.6% | 31.6% | 52.1% | 41.9% |
| Part-time working | 12.2% | 27.3% | 35.2% | 52.3% | 26.5% | 44.9% |
| Full-time working | 10.4% | 8.2% | 28.2% | 15.5% | 21.4% | 13.2% |
| **Singles** | | | | | | |
| Not working | 75.7% | 80.0% | 17.1% | 34.0% | 36.3% | 42.1% |
| Part-time working | 8.1% | 10.0% | 26.3% | 43.9% | 20.4% | 38.1% |
| Full-time working | 16.2% | 10.0% | 56.6% | 22.0% | 43.4% | 19.9% |

Sources: ITABENA based on Austrian version of SILC 2004; STSM based on SOEP 2004.

**Table A 2: Descriptive Statistics**

| | *Austria* | | *Germany* | |
|---|---|---|---|---|
| | Absolute | Share in % | Absolute | Share in % |
| *Number of households* | 846 | 100 | 1614 | 100 |
| *Couples* | 733 | 87 | 1443 | 90 |
| *Singles* | 113 | 13 | 171 | 10 |
| *Youngest child aged 0-2* | 316 | 37 | 484 | 30 |
| *Youngest child aged 3-6* | 265 | 31 | 607 | 38 |
| *Youngest child aged 7-10* | 265 | 31 | 523 | 32 |
| | Mean | Std. D. | Mean | Std. D. |
| *Age of the father (if present)* | 37.3 | 7.2 | 38.6 | 6.3 |
| *Age of the mother* | 34.0 | 6.3 | 35.8 | 5.8 |
| *Number of children up to 10* | 1.5 | 0.6 | 1.5 | 0.6 |
| *Mother is of German/Austrian nationality* | 0.88 | -- | 0.87 | -- |
| *Mother holds high school degree* | 0.27 | -- | 0.29 | -- |

Sources: ITABENA based on Austrian version of SILC 2004; STSM based on SOEP 2004.

**Table A 3: Estimation results conditional logit model, Austria and Germany**

| Variable | Austria | Germany |
|---|---|---|
| net income | 0.1047 (0.033) | 0.0012 (0.000) |
| leisure | -0.0802 (0.030) | 0.0162 (0.023) |
| net income squared | -0.0001 (0.000) | 0.0000 (0.000) |
| leisure squared | 0.0007 (0.000) | -0.0011 (0.000) |
| leisure * no. of children aged 0 to 2 | 0.0396 (0.006) | -0.0335 (0.005) |
| leisure * no. of children aged 0 to 10 | 0.0204 (0.005) | -0.0085 (0.004) |
| leisure * single | -0.0297 (0.008) | -0.0007 (0.007) |
| leisure * education (high-school) | -0.0149 (0.006) | -0.0051 (0.006) |
| leisure * mother holds German nationality | - | -0.0096 (0.007) |
| leisure * family is living in east Germ. | - | -0.0040 (0.009) |
| net income * family is living in east Germ. | - | -0.0006 (0.000) |
| Number of observations | 2538 | 4842 |
| Log Likelihood | -764.4 | -1443.9 |
| LR $chi^2$ (8) | 330.0 | 658.6 |

Source: ITABENA based on Austrian version of SILC 2004 Note: Numbers in parentheses are standard errors.

## Appendix 2: Calculating "expected costs of child care"

An adequate measure of child care costs used in the estimation of mothers' labor supply has to take into account that center-based child care (which is subsidized in almost 100% of the cases in Austria and Germany) is potentially rationed. Thus, we argue that it cannot be assumed that all families could purchase child care at the average parents' fee for subsidized child care. Rather, we need to use a measure that takes the excess demand for child care explicitly into account. This can be done by defining child care costs as a weighted average of the subsidized fee and private costs of child care. Formally this can be stated as follows:

$$ec_{pt} = c^{s}_{pt} \cdot (p_{pt} + p_{ft}) + c^{ns}_{pt} \cdot (1 - p_{pt} - p_{ft}) \qquad (1)$$

Expected costs of part-time child care ($ec_{pt}$) consist of the parents' fee for a subsidized child care slot ($c^{s}_{pt}$) and a market (non-subsidized) price for child care charged by a child minder ($c^{ns}_{pt}$), weighted by the probability to get a subsidized part-time ($p_{pt}$) or full-time ($p_{ft}$) child care slot. This probability takes into account that full-time slots are available for parents requesting a part-time slot at the costs of a part-time slot. For full-time child care ($ec_{ft}$) parents face three possibilities: either they get a subsidized full-time slot at costs $c^{s}_{ft}$; or they get a part-time slot at costs $c^{ns}_{pt}$ and have to use non subsidized child care at costs $c^{ns}_{pt}$ for the other half of the day; or no subsidized child care is available and they have to demand a full-time private child care slot at costs $c^{fs}_{pt}$. These three options are weighted with their probability in equation (2).[16]

$$ec_{ft} = c^{s}_{ft} \cdot p_{ft} + (c^{s}_{pt} + c^{ns}_{pt}) \cdot p_{pt} + c^{ns}_{ft} \cdot (1 - p_{pt} - p_{ft}) \qquad (2)$$

The probability of getting a child care slot is the ratio of "actual" supply and demand, where supply is defined as number of slots in institutional child care facilities.[17] In order to approximate the demand for child care we take the total number of children in the respective age group times a factor that takes into account that not all parents claim non-domestic child care for their children.

The monthly parents' fee for child care in a subsidized facility ($c^{s}_{pt}$ and $c^{s}_{ft}$ in equations 1 and 2) for Germany is calculated on the basis of individual information from the SOEP wave 2002, when parents were asked their monthly child care expenses. For the Austrian case, we

[16] For further discussion of this approach see Wrohlich 2006.

[17] For Austria this number is taken from Statistik Austria (Kindertagesheimstatistik 2003/04), for Germany, see Statistisches Bundesamt (2004).

make use of information on the parents fee structure charged by child care centers in Vienna. We take into account that parents' fees are income dependent. Therefore we apply the following social discounts for Austria (Source: Stadt Wien, MA 11A): For income below 828 Euro monthly no fee has to be paid, for income above 2,198 Euro monthly the full fee has to be paid, for income between these two amounts a tapered fee is applied.

It would be more precise to collect prices for each federal state, however this is difficult, since each federal state has different legislations including different guidelines for prices. Moreover, within each federal state, prices differ considerably since child care institutions are in charge of municipalities, which also do not set prices uniformly. As in Vienna prices and availability for child care are higher than in other federal states the bias of taking Viennese settings for public child care slots cancels out somewhat, as higher prices increase expected costs while higher availability decreases them.

As far as the price for private child care ($c^p_{pt}$ and $c^p_{ft}$ in equations 1 and 2) is concerned, we assume an average of 5 Euro per hour in Austria and Germany. While in Germany prices of day care mothers are used as a yardstick (see www.tagesmutter.de), in Austria this would not be appropriate. Austrian day mothers get around 2 Euro per hour (see http://www.efk.at/main/m_tagesmutter_3.htm), which is only slightly above hourly costs of public child care slots, but day mother slots are not always readily available either. However, even if Austrian private child care by day mothers is limited, there is no restriction in getting child care by "Leihomas" or child minders. "Leihomas" cost 6 Euro per hour (see Omadienst, katholischer Familienverband der Erzdiözese Wien), whereas child minder prices vary between 3 and 7 Euro per hour (see www.kinderbetreuung.at).

Finally, we need to calculate the probability that children have access to subsidized part-time and full-time child care, $p_{pt}$ and $p_{ft}$. This could be done by assuming this probability to equal the local availability rate of part-time and full-time slots. However, this approach implies the assumption that all parents demand subsidized child care for all children, which is probably not plausible. Thus, we multiply the availability rate by a factor that take into account that not all parents claim non-domestic child care for their children. This factor is calculated as the share of children for which any sort of non-parental child care is used, including care by grandmothers and other free of charge child care.

Authors: Helene Dearing, Helmut Hofer, Christine Lietz, Rudolf Winter-Ebmer, Katharina Wrohlich

Title: Why are Mothers Working Longer Hours in Austria than in Germany? A Comparative Micro Simulation Analysis

Reihe Ökonomie / Economics Series 213

Editor: Robert M. Kunst (Econometrics)
Associate Editors: Walter Fisher (Macroeconomics), Klaus Ritzberger (Microeconomics)

ISSN: 1605-7996
© 2007 by the Department of Economics and Finance, Institute for Advanced Studies (IHS),
Stumpergasse 56, A-1060 Vienna • ☎ +43 1 59991-0 • Fax +43 1 59991-555 • http://www.ihs.ac.at

ISSN: 1605-7996