

Beckmann, Klaus; Franz, Nele E.; Schneider, Andrea

**Working Paper**

## Intensive labour supply: A menu choice revealed preference approach for German females and males

Diskussionspapier, No. 145

**Provided in Cooperation with:**

Fächerguppe Volkswirtschaftslehre, Helmut-Schmidt-Universität (HSU)

*Suggested Citation:* Beckmann, Klaus; Franz, Nele E.; Schneider, Andrea (2014) : Intensive labour supply: A menu choice revealed preference approach for German females and males, Diskussionspapier, No. 145, Helmut-Schmidt-Universität - Universität der Bundeswehr Hamburg, Fächerguppe Volkswirtschaftslehre, Hamburg

This Version is available at:

<https://hdl.handle.net/10419/102307>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



INTENSIVE LABOUR SUPPLY:  
A MENU CHOICE REVEALED  
PREFERENCE APPROACH FOR GERMAN  
FEMALES AND MALES

KLAUS BECKMANN  
NELE FRANZ  
ANDREA SCHNEIDER

Nr./ No. 145  
JUNE 2014

Autoren / Authors

**Klaus B. Beckmann**

Helmut Schmidt Universität Hamburg  
Department of Economics  
Holstenhofweg 85, 22043 Hamburg  
Germany  
[klaus.beckmann@hsu-hh.de](mailto:klaus.beckmann@hsu-hh.de)

**Nele E. Franz**

Carinthian School of Applied Sciences  
School of Management  
Europastraße 4, 9524 Villach  
Austria  
[mail@nelefranz.de](mailto:mail@nelefranz.de)

**Andrea Schneider**

University of Münster  
Department of Economics  
Scharnhorststraße 100, 48151 Münster  
Germany  
[andrea.schneider@uni-muenster.de](mailto:andrea.schneider@uni-muenster.de)

Redaktion / Editors

Helmut Schmidt Universität Hamburg / Helmut Schmidt University Hamburg  
Fächergruppe Volkswirtschaftslehre / Department of Economics

Eine elektronische Version des Diskussionspapiers ist auf folgender Internetseite zu finden/  
An electronic version of the paper may be downloaded from the homepage:  
<http://fgvwl.hsu-hh.de/wp-vwl>

Koordinator / Coordinator

Klaus B. Beckmann  
[wp-vwl@hsu-hh.de](mailto:wp-vwl@hsu-hh.de)

# **Intensive labour supply: A menu choice revealed preference approach for German females and males**

KLAUS B. BECKMANN

NELE E. FRANZ

ANDREA SCHNEIDER

## **Zusammenfassung/ Abstract**

This paper deals with discrete labour supply decisions of different groups of persons in response to a change in net wage rates. The centrepiece of this approach is individuals' switching between working time categories, while facing switching costs that arise when people expand or reduce working hours.

We define a degree of persistence of individual behaviour as well as its complement, labour supply mobility. Using the German Socio-Economic Panel (SOEP), we estimate persistence and mobility by gender and type of household.

**JEL-Klassifikation / JEL-Classification:** H31; J22; C25

**Schlagworte /Keywords:** labour mobility; discrete choice approach; labour supply elasticities

# 1 Introduction

It is well documented that female labour supply has been on the rise during the last decades (Blau and Kahn 2007). In particular, labour supply by married females received attention in the literature (see e.g. Attanasio et al. (2008), Evers et al. (2008) or Keane (2011)). One central finding is that labour supply elasticities are much higher for women than for men, especially for married women and mothers. However, with continuously expanding labour force participation since the 1980's, wage related elasticities of women seem to adapt to those of men (Blau and Kahn 2007). A remaining difference between women and men is the share of part-time employed individuals: for men, irrespectively of being single, married or father, part time employment only plays a secondary role.<sup>1</sup>

Usually two dimensions of labour supply decisions are distinguished: the decision whether to work at all (extensive margin) and the decision on hours worked (intensive margin). In the context of a family and childbearing, it is plausible to focus on gender-specific child care responsibilities and to conclude that the extensive dimension is the more important one. However, the expansion of part-time employment and other innovative forms of employment often is neglected when discussing female labour supply (Attanasio et al. 2008; Keane 2011). The fact that the increase in female labour force participation goes along with a similar expansion of part-time participation gives us reason to revisit the intensive margin, i.e. the extent to which women in different household situations expand or reduce employment due to wage changes.

Supply responses at the intensive margin are typically measured in terms of labour supply elasticities. There exists no unique way to operationalize labour supply elasticities nor is there a standard econometric method to identify and to estimate these elasticities. For a review of the different theoretical and empirical approaches see e.g. Blundell and MaCurdy (1999) or Keane (2011). Evers et al. (2008) provide a meta-analysis for empirical studies on the uncompensated labour supply elasticity. Well-known problems with this approach include that (a) hours worked may not be a continuous variable, but rather a discrete choice between available categories (see e.g. van Soest (1995), Hoynes (1996) or Blundell et al. (2000)), and (b) effort on

---

<sup>1</sup>See table 2 in section 3.

the job may depend on career prospects and other expectations rather than contemporaneous pay (Sandmo 1990).

Although the results on specific labour supply elasticities vary across the literature, there is evidence that gender and the type of household, i.e. marital status and presence of children, have a crucial impact on the individual labour supply decision. Most of the literature finds higher labour supply elasticities for females than for males. Triest (1990) as well as Blau and Kahn (2007) give evidence for this result with respect to married individuals in the US. Kimmel and Kniesner (1998) confirm this result and focus additionally on the impact of the marital status finding that elasticities are higher for singles than for couples. Evers et al. (2008) summarise results for some European countries.

This paper takes a modified menu choice approach. We consider individuals' *switching behaviour* between working time categories, where individuals face *switching costs* arising when they expand or reduce working hours. Although there is a large literature on labour supply elasticities the role of switching costs – as far as we know – has been neglected until now. The main focus of our empirical study is how switching behaviour varies by gender and household type.

Aggregating individuals' probabilities to stay in their current working time category we can define a *degree of persistence* for individuals by gender and type of household. Analogously, we analyse upward and downward *mobility* for individuals' labour supply by aggregating individuals' probabilities to switch to a higher and lower labour supply category, respectively. We find that independent of the type of household individuals more often change between working time categories that are close to each other. In addition, marriage decreases labour supply mobility for both genders while the presence of children increases it. Although the overall effect on the labour supply persistence for couples with children appears quite similar for both genders, the composition of the aggregated effect turns out to be different. While the increase in the labour supply mobility of males is almost solely driven by an increase in the upward labour mobility, females show a reduction in the upward mobility that is overcompensated by an even stronger increase in the downward labour supply mobility.

The remaining paper is structured as follows: In section 2 we derive our hypotheses about differences in labour supply behaviour between women and

men and between selected household types. We then test these hypotheses using the SOEP panel data set for German households. Section 3 gives particulars of the data set used and explains some descriptive statistics. Section 4 continues with estimations of the probabilities that an individual switches from one working time category to another. Estimations will be separated by gender and type of household. In section 5 we analyse how a change in the net wage rate affects the switching probabilities derived previously. Section 6 gives some concluding remarks.

## 2 Hypotheses

In our analysis we assume that individuals face a menu of possible labour supplies rather than a continuous labour supply function. Similar to van Soest et al. (1990) we assume employers to demand a discrete number of working time categories: (1) low work, (2) part-time work, (3) full-time work and (4) considerable over-time. Switching between those labour supply categories entails costs of implementing the change. To fix ideas, think of contractual costs or costs such as a devaluation of human capital due to switching the employer in order to be able to reduce or expand hours worked. There may also be costs due to additional commuting time required, moving one's residence or childcare arrangements. Finally, for couples considerations of risk, specialisation and bargaining would also enter the picture.<sup>2</sup> Though we provide no formal model of the switching process in this paper, a couple of hypotheses emerge from simple thought experiments.

For example, it is plausible that greater changes in working arrangements imply higher costs, and so we argue that switching costs increase in the difference between the working time categories, *ceteris paribus*. The closer the initial labour supply is to the supply category after a contractual change, the smaller the differences for employer and employee and so the lower the supposed costs of switching categories. For example, changing working hours from full-time to low-work may have consequences for the employer as well as

---

<sup>2</sup>This involves obvious trade-offs. For example, couples with a "traditional" allocation of market work and home production appear to be more vulnerable to labour market shocks or policy reforms such as gender-based taxation, while they also can profit from returns to specialisation, in particular as home production is not taxed. As a result, the comparative statics of switching costs are likely to be muddled.

the employee. The employer will need to search for a new employee filling the gap of productivity, instruct the new employee, have additional administrative effort and so on. The employee will earn less than before and therefore may have to move or to reduce certain expenditures and therefore change habits and so on. In the contrary, a switch from half-time to low-work will be less costly for both the employer and the employee. The employer's costs of switching working hours may be - directly or indirectly - transformed to the employee. Altogether, these assumptions lead to our first testable hypothesis:

*HYPOTHESIS 1. The probability of an upward/downward jump from one labour supply category to another decreases in the distance between the two labour supply categories.*

Our model does not explain the emergence of relationships, nor do we model fertility decisions – both are taken as exogenously given. A (married) couple faces a joint maximisation problem in which a change in one spouse's decision affects the other spouse's utility. Specialisation of household members will tend to increase switching costs – especially over time as human capital for alternative activities is depreciated and job market chances decline. On the other hand, the mere presence of a partner is likely to lower the cost because of access to an additional source of income and, therefore, increases the downward labour mobility.<sup>3</sup> In countries where the traditional role model used to dominate, such as it did in Germany (Killingsworth and Heckman 1987; Mincer 1962), the first effect should be especially pronounced for males while the second effect plays a more important role for females' labour supply decisions. Therefore, we formulate the following hypothesis:

*HYPOTHESIS 2. (a) Marriage increases the switching costs on balance and, therefore, reduces the probability that an individual changes her/his working time. (b) However, facing an additional source of income there can be an incentive to decrease own labour supply.*

Turning to the effect of children, we refer to our illustration of switching costs above and note that there is likely to be both a direct and an indirect positive effect of the presence of children on switching costs. The direct effect

---

<sup>3</sup>Alesina et al. (2011) give a more detailed discussion on households' labour supply decisions and possible effects of hysteresis that may arise.



comes about as a result of the fact that any change of working times entails additional considerations if children are present; additionally, and indirect effect is present whenever the presence of children in a household increases the benefits to specialisation, which appears to be a plausible assumption. This leads us to:

*HYPOTHESIS 3. Children decrease the probability that females increase their working time.*

The incentive to switch between the supply categories at all is driven by overall or specific wage changes. The higher the wage difference to the next higher category of labour supply, the more likely it is that the benefits of switching exceed the costs. Consequently, the probability of switching labour supply categories rises, if relative wages of the current supply category fall, all other things being equal. Or conversely:

*HYPOTHESIS 4. An increase in the net wage rate of the current labour supply category decreases an individual's labour supply mobility.*

Let us conclude this section by adding a hypothesis that summarises what can in all fairness be termed the “folk wisdom” regarding the literature on gender and labour supply:

*HYPOTHESIS 5. Other things being equal, female labour supply reacts more strongly to a change in remuneration than male labour supply does.*

After the description of the data in the following section we test hypotheses 1-3, which capture the effects of individual characteristics on labour supply mobility, in section 4 and hypotheses 4 and 5, which focus on the effects of a change in net wage rates on labour supply mobility, in section 5.

### 3 Descriptives

In order to test our five hypotheses, we use data from the German Socio-Economic Panel (SOEP v28),<sup>4</sup> a representative survey of private households

---

<sup>4</sup>Data used in this paper have been provided by the German Institute for Economic Research (DIW). For a detailed explanation of the German Socio-Economic Panel see

in Germany yielding data from 1984 to 2011. Our data set overall consists of 39,370 individuals, of whom 51% are women. We restrict our analysis to the working population, defined to include individuals aged 16 to 67 at the time of observation. Since continuous and complete data from 1984 to 2011 for each person are not necessary and to maximise numbers of observations, the panel data used here are unbalanced.

The key variables for our empirical analysis are the current net labour income per month in euros, the actual weekly working hours, and the corresponding net wage rate. In a first step we partition respondents into four labour supply groups:

$$\text{labsup} \equiv \begin{cases} 1 \text{ (low-work)} & \text{if hours} \leq 20 \\ 2 \text{ (part-time work)} & \text{if } 20 < \text{hours} \leq 32 \\ 3 \text{ (full-time work)} & \text{if } 32 < \text{hours} \leq 43 \\ 4 \text{ (over-time work)} & \text{if } 43 > \text{hours.} \end{cases} \quad (1)$$

This classification not only conforms to intuition, it also tallies well with the centiles of the distribution of the average monthly working hours.<sup>5</sup>

We also have data to control for age, the household type and the total income of the household. We consider three different types of households: singles without children, couples without children, and couples with children, i.e. couples where at least one individual younger than 16 years lives in the household. We exclude singles with children as the number of male singles with children is too small for our estimation approach.

Table 1 gives the descriptives of the data revealing that males, irrespective of the type of household, on average earn higher net wage rates and work more. Increasing differences between women and men in monthly net labour income with expanding household size mirror traditional responsibility assignments as well as less working hours for women, especially regarding couples with children. There are also some gender difference in the average age: while males in our data set are older than females when we focus on couples, the

---

Wagner et al. (2007).

<sup>5</sup>The 10-/20-/30-/40-/50-/60-/70-/80-/90- centile of the distribution of the average working hours is 20/32/38/40/40/40/43/46/50.

	Singles		Couples		Couples	
	without children		without children		with children	
	female	male	female	male	female	male
labour income	1202.04 (763.86)	1535.21 (1180.79)	1116.74 (771.26)	1771.21 (1449.65)	812.42 (650.62)	1688.28 (1255.32)
working hours	37.96 (11.47)	42.74 (10.99)	36.14 (11.83)	43.42 (10.65)	30.75 (13.35)	43.64 (9.90)
net wage rate	8.29 (7.55)	9.33 (8.14)	8.05 (6.61)	10.56 (9.56)	7.25 (6.04)	9.96 (8.43)
age	45.39 (15.69)	41.53 (13.12)	48.70 (14.22)	49.77 (13.80)	36.40 (11.97)	37.39 (12.98)
household inc.	1199.65 (761.51)	1445.95 (1407.32)	2437.53 (1781.25)	2458.91 (1792.28)	2697.88 (1716.58)	2705.77 (1654.33)
naive labour supply elasticity	0.100 (2.94)	0.124 (2.77)	0.137 (2.81)	0.090 (2.69)	0.209 (2.95)	0.093 (2.60)
number of obs.	11530	14585	31176	31693	57530	84681

Table 1: Descriptive statistics for males and females by type of household; standard deviations in parentheses

reverse holds for single individuals. Independent of the type of household, couples with children are younger than singles and couples with children. At first this age structure might look strange. However, the low average age of couples with children is driven by our definition that focuses on children currently living in the household and not on the existence of children in general. Thus, we assume that the existence of children is relevant for labour supply decisions only as long as children live in the same household and they are younger than sixteen. Therefore, households with grown up children automatically switch their household type, e.g. from a couple with children to a couple without children.<sup>6</sup>

Figure 1 contains a more detailed description of labour supply in our sample, plotting average working hours by age and type of household for women and men. Unsurprisingly, the most remarkable difference between women's and men's labour supply arises when children are involved: while there are only small differences in labour supply of females and males for couples without

<sup>6</sup>Also note that divorces will lead to the emergence of households with older single members.

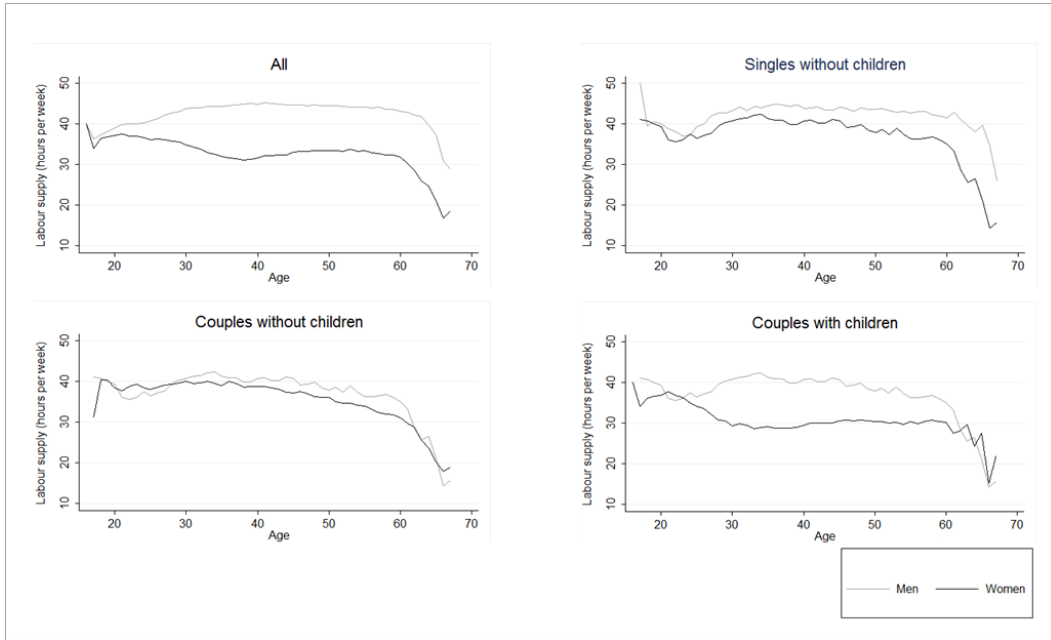


Figure 1: Average hours worked per week by age and type of household

children, differences are largest for couples with children. Although in general average female labour supply is smaller than average male labour supply the reverse holds for couples without children before the age of 30. Supply curves for singles without children proceed rather parallel over time. For this type of household, the highest level of average working hours is reached in their mid-thirties, then remains on a high level until the age of 50, before it declines sharply after reaching the sixties. For couples with children, men have their peak of labour supply when turning 35. At this age gender differences in the labour supply are highest. Between the age of 35 and the stage of retirement, mothers' labour supply appears not to vary a lot, while there is more variation in fathers' labour supply.

Table 2 shows the average net wage rates by type of household and gender. Obviously, the spread of labour supply income and net wage rates for men is much wider than for women. For both sexes lower working hours are conducted with higher net wage rates, but lower absolute labour incomes. The only exception are net wage rates for employees working more than 43 hours per week: here net wage rates are slightly lower than for employees working

Labour supply Working hours	low work		part-time work		full-time work		considerable over time	
	<20		20-31		32-43		>43	
	female	male	female	male	female	male	female	male
frequency in %	21.48	3.55	17.04	2.04	45.32	53.66	16.15	40.75
labour income	443.85	675.76	841.03	1286.16	1093.02	1450.82	1245.75	1996.11
	(334.72)	(787.75)	(513.75)	(1180.28)	(599.25)	(799.82)	(1149.15)	(1628.75)
net wage rate	9.00	18.42	7.83	11.50	6.97	9.164	7.07	9.96
	(10.79)	(30.31)	(4.72)	(10.48)	(3.82)	(5.03)	(5.15)	(7.42)

Table 2: Descriptive statistics for females and males by type of household; standard deviations in parentheses

full-time.

Note that men with low work and working part-time are rare: the share of men for both groups remains lower than 6 %, while more than 40% of all men work regularly more than 43 hours.

To get a first impression of how labour supply reacts on changes in net wages, we calculate a naive labour supply elasticity using a textbook definition, i.e. equation (2), where  $labinc_t$  denotes the monthly net labour income and  $hours_t$  the weekly effective working hours for an individual  $i$  at time  $t$ :

$$\eta_{it} = \frac{\frac{hours_t - hours_{t-1}}{hours_{t-1}}}{\frac{labinc_t - labinc_{t-1}}{labinc_{t-1}}}, \quad (2)$$

The results for the naive labour supply elasticity are given in table 1. We find that females only have a higher labour supply elasticity than males if they are married. For single individuals the reverse seems to be true. In general, females show more heterogeneity within their labour supply elasticities than males.

To be sure, the naive approach in equation (2) is fraught with difficulties. As noted in the introduction, hours reported as well as reported wages may change spuriously. In particular, people may have but a rough idea of how many hours they put in. In addition most employees do not *decide* about hours worked at all, but are confronted with a menu of choices of *official* work hours, which differs from *effective* labour input. The latter may depend on

expected future wages and the prospect of promotion (Sandmo 1990) rather than the present contractual wage that is reported.

These problems would be put into sharp relief by inspecting the distribution and the large number of outliers of the elasticities computed using equation (2). We omit this for reasons of brevity. However, this observation provides further justification for our menu choice approach, to which we now turn.

## 4 Labour supply mobility

Consider the following model: write the probability that an individual  $i$  at time  $t + 1$  belongs to labour supply category  $k \in \{1, 2, 3, 4\}$ , respectively, as

$$\begin{aligned} & \Pr(\text{labsup}_{i,t+1} = k | \boldsymbol{\kappa}, \text{wage}_{i,t+1}, \mathbf{X}_{i,t+1}, \nu_i; \text{labsup}_{i,t} = k') \\ = & \Pr(\kappa_{k-1} < \boldsymbol{\beta} \text{wage}_{i,t+1} + \boldsymbol{\gamma} \mathbf{X}_{i,t+1} + \nu_i + \epsilon_{i,t+1} \leq \kappa_k | \text{labsup}_{i,t} = k') \end{aligned} \quad (3)$$

for each gender, each type of household, and each possible current labour supply category where  $\boldsymbol{\kappa} = \{\kappa_1, \dots, \kappa_3\}$  is the set of cut points with  $\kappa_0 = -\infty$  and  $\kappa_3 = \infty$ . While  $\text{wage}_{i,t+1}$  denotes the net wage rate of individual  $i$  at time  $t + 1$ ,  $\mathbf{X}$  is a vector of covariates such as gender, household type and (potentially) a host of other individual characteristics. As we are not interested in the overall probability that an individual is in labour supply category  $k$  but in the conditional probability that an individual is in labour supply category  $k$  at time  $t + 1$  if it has been in labour supply category  $k'$  at time  $t$ , we condition on labour supply at time  $t$ .

To implement (3) econometrically, we estimate the following equation

$$\text{labsup}_{i,t+1} = \boldsymbol{\beta}_{k'} \text{wage}_{i,t+1} + \boldsymbol{\gamma}_{k'} \mathbf{X}_{i,t+1} + \nu_i + \epsilon_{i,t+1} \quad \forall k' \in \{1, 2, 3, 4\} \quad (4)$$

in a panel ordinal logit regression. Again,  $i$  is the individual index and  $t$  denotes the time index. Individual fixed effects,  $\nu_i$ , are independently and identically normal distributed.

from/to	female				male			
	low-work	part-time work	full-time work	over-time work	low-work	part-time work	full-time work	over-time work
low-work	0.640 (0.257)	0.193 (0.113)	0.132 (0.116)	0.035 (0.041)	0.468 (0.283)	0.174 (0.072)	0.231 (0.136)	0.128 (0.135)
part-time work	0.068 (0.129)	0.620 (0.143)	0.292 (0.160)	0.020 (0.017)	0.045 (0.113)	0.463 (0.123)	0.435 (0.135)	0.058 (0.027)
full-time work	0.009 (0.067)	0.015 (0.031)	0.890 (0.084)	0.085 (0.050)	0.006 (0.049)	0.005 (0.010)	0.840 (0.072)	0.150 (0.063)
over-time work	0.080 (0.128)	0.067 (0.048)	0.588 (0.108)	0.265 (0.141)	0.029 (0.060)	0.017 (0.015)	0.391 (0.129)	0.563 (0.164)

Table 3: Mean predicted probabilities; singles without children; standard deviations of the predicted probabilities in parentheses

The estimation results from (4) allow us to compute the mean predicted probability that an individual  $i$ , who belongs to labour supply category  $\text{labsup}_{i,t}$  today, switches to labour supply category  $\text{labsup}_{i,t+1}$  in the next year. In doing so, we use the average controls for each group – for example, all female singles who have been in low work labour supply category at time  $t$  – and therefore control for gender differences in net wage rates and other control variables.<sup>7</sup> For each ordinal logit model we find a highly significant effect of the net wage rate. Tables 3, 4, and 5 summarise these results for singles, couples without children, and couples with children, respectively.

With a few exceptions, the results in tables 3, 4, and 5 support hypothesis 1. Independent of the type of household or gender the probability that an individual switches to a labour supply category appears to be the higher, the closer the new labour supply category is to the current category. This is consistent with switching costs increasing in the degree of the change of the working time.

To facilitate the interpretation of the results, we now define and implement the notion of *persistence* in labour supply as it applies to a switching model. We think of persistence as the probability that an individual does not change her/his current labour supply between two consecutive years. The complement of persistence is the degree of upward (downward) *mobility in labour*

<sup>7</sup>Blomquist and Hansson-Brusewitz (1990) point out that a large part of the difference in labour supply elasticities between females and males can be a result of different mean sample values for both genders. Therefore, the differences in the levels of the explaining variables may drive the differences in the labour supply elasticities.

from/to	female				male			
	low-work	part-time work	full-time work	over-time work	low-work	part-time work	full-time work	over-time work
low-work	0.761 (0.203)	0.174 (0.129)	0.055 (0.064)	0.010 (0.013)	0.535 (0.325)	0.126 (0.072)	0.221 (0.162)	0.118 (0.154)
part-time work	0.048 (0.098)	0.798 (0.124)	0.147 (0.118)	0.007 (0.008)	0.065 (0.141)	0.517 (0.153)	0.375 (0.165)	0.044 (0.030)
full-time work	0.007 (0.037)	0.023 (0.028)	0.907 (0.048)	0.063 (0.027)	0.004 (0.041)	0.004 (0.011)	0.848 (0.067)	0.144 (0.061)
over-time work	0.079 (0.098)	0.104 (0.062)	0.632 (0.088)	0.185 (0.091)	0.020 (0.042)	0.010 (0.010)	0.386 (0.125)	0.584 (0.149)

Table 4: Mean predicted probabilities; couples without children; standard deviations of the predicted probabilities in parentheses

from/to	female				male			
	low-work	part-time work	full-time work	over-time work	low-work	part-time work	full-time work	over-time work
low-work	0.798 (0.105)	0.165 (0.081)	0.032 (0.020)	0.005 (0.004)	0.329 (0.289)	0.088 (0.044)	0.328 (0.135)	0.255 (0.214)
part-time work	0.076 (0.097)	0.811 (0.080)	0.107 (0.059)	0.007 (0.005)	0.039 (0.079)	0.341 (0.109)	0.526 (0.109)	0.094 (0.041)
full-time work	0.013 (0.046)	0.045 (0.045)	0.890 (0.068)	0.052 (0.025)	0.005 (0.050)	0.003 (0.012)	0.836 (0.095)	0.155 (0.088)
over-time work	0.266 (0.156)	0.238 (0.050)	0.436 (0.133)	0.060 (0.042)	0.020 (0.056)	0.010 (0.014)	0.406 (0.187)	0.565 (0.221)

Table 5: Mean predicted probabilities; couples with children; standard deviations of the predicted probabilities in parentheses

*supply*, i.e. the probability that an individual increases (decreases) her/his current labour supply. Formally, the degree of persistence is simply

$$\text{pers} \equiv \frac{1}{4} \sum_{k=1}^4 p_{k \rightarrow k} \quad (5)$$

where  $p_{k \rightarrow k}$  denotes the probability that an individual belonging to labour supply category  $k$  at time  $t$  belongs to the same labour supply category in the next year  $t + 1$ .

Analogously, upward and downward labour mobility are given by



	Singles without children	Couples without children	Couples with children
Females			
Persistence	0.604	0.663	0.640
Upward labour mobility	0.189	0.114	0.092
Downward labour mobility	0.207	0.223	0.269
Males			
Persistence	0.584	0.621	0.518
Upward labour mobility	0.294	0.257	0.362
Downward labour mobility	0.123	0.122	0.121

Table 6: Persistence, upward labour mobility, and downward labour mobility

$$u \equiv \frac{1}{4} \sum_{k'=1}^4 \sum_{k>k'} p_{k' \rightarrow k} \quad \text{and} \quad d \equiv \frac{1}{4} \sum_{k'=1}^4 \sum_{k<k'} p_{k' \rightarrow k}, \quad (6)$$

respectively. Table 6 indicates that independent of the household type females show a *higher* persistence than males do. For example while a single female changes her working time category with probability 0.396 single males face a probability of 0.417. Note however that this result, albeit surprising and a trifle counterintuitive, does not contravene the “folk rule” that female labour supply is more elastic than male (hypothesis 5). This is because our estimates in this section are predicted on the *mean value* of the covariates in each group. We will return to this issue in section 5.

Our results also show that gender differences with respect to labour mobility are highest for married individuals with children. In general, males more often increase than decrease their working time while females, independent of the household type, have higher downward than upward mobility. For both types of gender the persistence of labour supply is higher for couples without children than for singles, which constitutes evidence for hypothesis 2 (a). Switching costs do seem to be higher for married individuals than for singles. Although, the aggregated effect of marriage on labour mobility is similar for both genders there is a difference in the composition of this effect. For males the increased labour supply persistence due to marriage is almost solely the result of a decrease in the upward mobility. For females there is an

additional increase in the downward mobility that is overcompensated by an even higher decrease in upward mobility. This gives some evidence for hypothesis 2 (b). In general, comparing the degrees of persistence for the different types of household, we have to keep in mind that the different subsamples have different average individuals' ages which may confound the issue.

Our analysis moreover provides some evidence that the existence of children in the household affects females' and males' labour supply decision differently. While children increase the males' upward labour mobility they reduce the females' upward labour mobility and even stronger increase their downward labour mobility. The last point is in line with hypothesis 3 and the argument that the existence of children raises a female's costs to increase her working time.

## 5 Effects of changes in net wage rates on labour supply mobility

We noted in the preceding section that our results regarding average persistence (and mobility) may fail to show a complete picture if shocks differ between groups. In particular, females and males in the labour market may face different changes in the net wage rate. To check for this, we now analyse the marginal effects of a change in net wage rate on the predicted probabilities, i.e.

$$m_{k' \rightarrow k} \equiv \frac{\partial \Pr(\text{labsup}_{t+1} = k | \text{labsup}_t = k', \text{wage}_{t+1}, \mathbf{X}_{t+1})}{\partial \text{wage}_{t+1}}. \quad (7)$$

Again we calculate marginal effects based on average net wage rates and average controls by using averages of the respective group, i.e. individuals with same gender, same type of household, and same previous category of labour supply. Thus, some differences between genders may result from the fact that we evaluate the marginal effects at different levels of the control variables. Table 7 gives the marginal effects of a change in net wage rates for female and male singles. Tables 8 and 9 proceed by showing the results

from/to	female				male			
	low-work	part-time work	full-time work	over-time work	low-work	part-time work	full-time work	over-time work
low-work	0.0377	-0.0114	-0.0189	-0.0074	0.0187	-0.0003	-0.0080	-0.0104
part-time work	0.0095	0.0275	-0.0330	-0.0040	0.0025	0.0162	-0.0142	-0.0045
full-time work	0.0011	0.0031	0.0144	-0.0186	0.0005	0.0007	0.0184	-0.0196
over-time work	0.0012	0.0014	0.0253	-0.0279	0.0007	0.0005	0.0166	-0.0178

Table 7: Marginal effects of a change in net wage rates; marginal effects evaluated at gender specific averages of controls; singles without children

from/to	female				male			
	low-work	part-time work	full-time work	over-time work	low-work	part-time work	full-time work	over-time work
low-work	0.0217	-0.0133	-0.0069	-0.0015	0.0085	-0.0003	-0.0034	-0.0048
part-time work	0.0065	0.0142	-0.0195	-0.0012	0.0034	0.0137	-0.0137	-0.0034
full-time work	0.0008	0.0033	0.0051	-0.0093	0.0004	0.0005	0.0157	-0.0814
over-time work	0.0007	0.0013	0.0193	-0.0213	0.0005	0.0002	0.0118	-0.0126

Table 8: Marginal effects of a change in net wage rates; marginal effects evaluated at gender specific averages of controls; couples without children

from/to	female				male			
	low-work	part-time work	full-time work	over-time work	low-work	part-time work	full-time work	over-time work
low-work	0.0306	-0.0235	-0.0061	-0.0011	0.0209	0.0024	-0.0014	-0.0219
part-time work	0.0101	0.0059	-0.0149	-0.0011	0.0017	0.0097	-0.0069	-0.0044
full-time work	0.0020	0.0071	-0.0000	-0.0091	0.0004	0.0005	0.0208	-0.0216
over-time work	0.0025	0.0030	0.0266	-0.0321	0.0006	0.0003	0.0168	-0.0176

Table 9: Marginal effects of a change in net wage rates; marginal effects evaluated at gender specific averages of controls; couples with children

for couples without and with children, respectively.<sup>8</sup>

With the single exception of the highest labour supply category, an increase in the net wage rate of the current labour supply category boosts the probability that individuals do not change their working time, thus increasing persistence. Although downward mobility is positively correlated to an increase in net wage rates, the corresponding decrease in the upward mobility overcompensates the first effect and, therefore, aggregate mobility decreases.

<sup>8</sup>Note, that changes in the probabilities must add up to zero. Whenever this is not the case in tables 7 to 9 this is due to rounding errors.

This result arises independently of gender or household type. However, for individuals currently working in the over-time category, we do not find evidence in line with hypothesis 4. For these individuals an increase in the net wage rate appears to lead to a *reduction* of the working time.

In addition, the results provide some evidence in favour of hypothesis 5: generally, females more strongly respond to a change in net wage rates. However, there are two exceptions. First, facing an increase in net wage rates for males the probability that the individual switches to possible over-time is stronger reduced than for females. Second, the effect on the probability to retain in full-time is also stronger for males than for females.

Comparing the results in tables 7 to 9 we find that the impact of an increase in the net wage rate on singles' labour supply is higher than for couples without children. In fact, the effects of children on the impact of a wage change on mobility appear to be ambiguous. One clear result, however, is that married females react even more strongly to a change in net wage rates by reducing in labour supply when they have children.

## 6 Concluding remarks

Using a menu choice revealed preference approach, i.e. a “switching model”, we analyse labour supply mobility of individuals with respect to sex and the type of household. We argue that this method, while providing results of lower granularity than the estimation of labour supply elasticities does, avoids many problems in the literature. It also affords a very simple summary measure of the persistence – or mobility – of labour supply, and the underlying model strikes us as intuitively plausible.

We provide estimates of persistence that qualify accepted wisdom: we find that males in general change their working time category more often than females do and, consequently, exhibit higher labour supply mobility. This does not imply that they react less elastically to wage changes, however. Furthermore, there are still significant differences between genders and household types, and a more detailed picture emerges than the one normally used in discussion of policy.

For both genders mobility is lower for married individuals than for singles

and higher for couples having children than for couples without children. While the comparison between singles and couples without children gives qualitatively similar result for males and females, the existence of children affects both genders differently. Fathers have a high upward labour mobility. Mothers have a low upward mobility but a high downward mobility.

Analysing the impact of an increase in the current net wage rate we also find some differences depending on sex and the type of household. Females react stronger on a change in the net wage rate than males. While for both sexes labour supply elasticities are higher for singles than for couples the effect of children on these elasticities are ambiguous.

These results are highly relevant for the design of tax policies, for example the abolition of the marriage bonus (“Ehegattensplitting”) in the German tax code, the design of the taxation of families, and the differentiation of tax schedules by gender (assuming, for the moment, that such a policy were constitutionally feasible in Europe). The general message of our paper is that one ought to step more lightly than many papers in favor sweeping reforms do. The issue of optimal taxation of households is a messy one that does not admit a simple split of taxpayers by gender, nor will the simple rule of individual taxation necessarily do the trick.

Future empirical efforts need to address the question of hysteresis effects. Extending our theoretical reasoning in section 2 the degree of persistence as defined in this paper should increase in the duration of a couple’s relationship, other things being equal. We will leave this to future work.

## References

- Alesina, Alberto, Andrea Ichino and Loukas Karabarbounis (2011). Gender based taxation and the division of family chores, *American Economic Journal: Economic Policy* 3(2), 1-40.
- Attanasio, Orazio, Hamish Low and Virginia Sanchez-Marcos (2008). Explaining Changes in Female Labor Supply in a Life-Cycle Model, *American Economic Review* 98(4), 1517-1552.
- Blau, Francine D. and Lawrence M. Kahn (2007). Changes in the Labor

- Supply Behavior of Married Women: 1980-2000, *Journal of Labor Economics* 25(3), 393–438.
- Blomquist, Sören and Urban Hansson-Brusewitz (1990). The Effect of Taxes on Male and Female Labor Supply in Sweden, *Journal of Human Resources* 25(3), 25–43.
- Blundell, Richard and Thomas MaCurdy (1999). Labor Supply: A Review of Alternative Approaches. In: Ashenfelter, O. and D. Card (eds.), *Handbook of Labor Economics*, Elsevier, Amsterdam et al., Vol. 3A, Ch. 27, 1559–1695.
- Blundell, Richard, Alan Duncan, Julian McCrae and Costas Maghir (2000). The labor Market Impact of the Working Families' Tax Credit, *Fiscal Studies* 21(1), 75–104.
- Evers, Michiel, Ruud de Mooij and Daniel van Vuuren (2008). The Wage Elasticity of Labor Supply: A Synthesis of Empirical Estimates, *De Economist* 156(1), 25–43.
- Hoynes, Hilary W. (1996). Welfare Transfers in Two-Parent Families: Labor Supply and Welfare Participation under AFDC-Up, *Econometrica* 64(2), 295–332.
- Keane, Michael P. (2011). Labor Supply and Taxes: A Survey, *Journal of Economic Literature* 49(4), 961–1075.
- Killingsworth, Mark R. and James J. Heckman (1987). Female Labor Supply: A Survey, in: Ashenfelter, Orley, Richard Layard and David Card, *Handbook of Labor Economics* 1, 103-204.
- Kimmel, Jean, and Thomas J. Kniesner (1998). New Evidence on Labor Supply: Employment versus Hours Elasticities by Sex and Marital Status, *Journal of Monetary Economics* 42(2), 289–301.
- Mincer, Jacob (1962). Labor force participation of married women, in: Lewis, Gregg H. (ed.), Aspects of labor economics, *Universities National Bureau of Economic Research Conference Series* (14),

Princeton, NJ, Princeton University Press.

Sandmo, A. (1990). Tax distortions and household production, *Oxford Economic Papers* 42(1), 78–90.

Triest, Robert K. (1990). The Effect of Income Taxation on Labor Supply in the United States, *Journal of Human Resources* 25(3), 491–516.

van Soest, Arthur, Isolde Woittiez and Arie Kapteyn (1990). Labor Supply, Income Taxes and Hours Restrictions in The Netherlands, *Journal of Human Resources* 25(3), 217-558.

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

Wagner, Gert G., Joachim R. Frick and Juergen Schupp (2007). The German Socio-Economic Panel Study (SOEP) – Scope, Evolution and Enhancements, *Schmollers Jahrbuch* 127(4), 626–654.

Die komplette Liste der Diskussionspapiere ist auf der Internetseite veröffentlicht / for full list of papers see:  
<http://fgvwl.hsu-hh.de/wp-vwl>

**2014**

- 144 Beckmann, Klaus; Fraz, Nele; Schneider, Andrea: On optimal tax differences between heterogenous groups
- 143 Berlemann, Michael; Enkelmann, Sören: Institutions, experiences and inflation aversion, May 2014
- 142 Beckmann, Klaus; Gattke, Susan: Tax evasion and cognitive dissonance, April 2014
- 141 Herzer, Dierk; Nunnenkamp, Peter: Income inequality and health – evidence from developed and developing countries, April 2014
- 140 Dewenter, Ralf; Heimeshoff, Ulrich: Do Expert Reviews Really Drive Demand? Evidence from a German Car Magazine, March 2014
- 139 Dewenter, Ralf; Heimeshoff, Ulrich: Media Bias and Advertising: Evidence from a German Car Magazine, March 2014.
- 138 Beckmann, Klaus; Reimer, Lennart: Dynamics of military conflict from an economics perspective, February 2014.

**2013**

- 137 Christmann, Robin: Tipping the Scales - Conciliation, Appeal and the Relevance of Judicial Ambition.
- 136 Hessler, Markus; Loebert, Ina: Zu Risiken und Nebenwirkungen des Erneuerbare-Energien-Gesetzes, June 2013.
- 135 Wesselhöft, Jan-Erik: The Effect of Public Capital on Aggregate Output- Empirical Evidence for 22 OECD Countries -, June 2013.
- 134 Emrich, Eike; Pierdzioch, Christian; Rullang, Christian: Zwischen Ermessensfreiheit und diskretionären Spielräumen: Die Finanzierung des bundesdeutschen Spitzensports – eine Wiederholungsstudie, April 2013.
- 133 Christmann, Robin: Vertragliche Anreize und die Fehlbarkeit des Richters – Der ungewisse Gang vor Gericht und sein Einfluss auf eine Verhaltenssteuerung im BGB-Vertragsrecht, March 2013.
- 132 Gerrits, Carsten: Internetnutzer und Korruptionswahrnehmung - Eine ökonometrische Untersuchung, February 2013.
- 131 Freese, Julia: The regional pattern of the U.S. house price bubble - An application of SPC to city level data, January 2013.

**2012**

- 130 Kruse, Jörn: Unabhängige staatliche Institutionen: Funktionalität und demokratische Legitimation, November 2012.
- 129 Andrae, Jannis: Unabhängigkeit von Institutionen - Gründe bzw. Ursachen und Kriterien zur Beurteilung der Unabhängigkeit von öffentlichen Institutionen im demokratischen Rechtsstaat, November 2012.
- 128 Andrae, Jannis: Ideengeschichtliche Aspekte unabhängiger Institutionen, November 2012.
- 127 Pfeiffer, Christoph P.: Causalities and casualties: Media attention and terrorism, 1970–2010, November 2012.
- 126 Pierdzioch, Christian; Emrich, Eike: A Note on the International Coordination of Anti-Doping Policies, November 2012.
- 125 Berlemann, Michael; Wesselhöft, Jan-Erik: Estimating Aggregate Capital Stocks Using the Perpetual Inventory Method – New Empirical Evidence for 103 Countries –, October 2012.
- 124 Berlemann, Michael; Freese, Julia; Knoth, Sven: Eyes Wide Shut? The U.S. House Market Bubble through the Lense of Statistical Process Control, October 2012.
- 123 Pierdzioch, Christian; Emrich, Eike; Klein, Markus: Die optimierende Diktatur – Politische Stabilisierung durch staatlich verordnetes Doping am Beispiel der DDR, August 2012.
- 122 Flatau, Jens; Emrich, Eike; Pierdzioch, Christian: Zum zeitlichen Umfang ehrenamtlichen Engagements in Sportvereinen – sozioökonomische Modellbildung und empirische Prüfung, August 2012.
- 121 Pfeiffer, Christoph P.: The curse of anxiety-pleasure: Terrorism, the media, and advertising in a two-sided market framework, August 2012.
- 120 Pitsch, Werner; Emrich, Eike; Pierdzioch, Christian: Match Fixing im deutschen Fußball: Eine empirische Analyse mittels der Randomized-Response-Technik, August 2012.
- 119 Dluhosch, Barbara; Horgos, Daniel; Zimmermann, Klaus W.: EU Enlargement and Satisfaction with Democracy: A Peculiar Case of Immizerising Growth, July 2012.
- 118 Pierdzioch, Christian; Rülke, Jan-Christoph; Stadtmann, Georg: Forecasting U.S. Housing Starts under Asymmetric Loss, June 2012.
- 117 Dluhosch, Barbara; Horgos, Daniel; Zimmermann, Klaus W.: Explaining the Income Distribution Puzzle in Happiness Research: Theory and Evidence, May 2012.
- 116 Dluhosch, Barbara; Horgos, Daniel: (When) Does Tit-for-Tat Diplomacy in Trade Policy Pay Off?, April 2012.



