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ABSTRACT

Preferences for Childcare Policies: Theory and Evidence*

We analyse preferences for public, private or mixed provision of childcare theoretically and empirically. We model childcare as a publicly provided private good. Richer households should prefer private provision to either pure public or mixed provision. If public provision redistributes from rich to poor, they should favour mixed over pure public provision, but if public provision redistributes from poor to rich, the rich and poor might favour mixed provision while the middle class favour public provision ('ends against the middle'). Using estimates for household preferences from survey data, we find no support for the ends-against-the-middle result.

JEL Classification: J13, D72, H42, D19

Keywords: childcare, redistribution, political preferences, public provision of private goods

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1 Introduction

In many countries, the provision of childcare has received increased attention in recent years. There seem to be several reasons for this. In the US, interest has focused on the effect of educating disadvantaged children, whose opportunities may be enhanced by early childhood education programmes. In many European countries, an important issue is female labour force participation, which is often hampered by limited availability of childcare. Hence, in different places worldwide, there seems to be increased demand for childcare provision. An important question is whether provision should be organised by the public or left to private forces. Apart from issues of market failure in childcare provision (see Blau and Currie, 2006), the choice of regime has clear redistributive consequences, since public provision is usually financed to a large extent by redistributive taxes.

In this paper, we analyse household preferences over public, private or mixed provision of childcare both theoretically and empirically. The theoretical model builds on the redistributive aspect of public provision of private goods (see Besley and Coate, 1991; Epple and Romano, 1996a). We consider households who differ in income and analyse their preferences over three different regimes: purely private provision, purely public provision, and mixed provision where households can opt out of the public sector and use private childcare instead. We find that richer households should prefer market provision to purely public or mixed provision. Preferences for public versus mixed provision depend on the redistributive effect of public provision. If richer households want less public provision than poorer ones, mixed provision results in a median voter equilibrium and richer households generally prefer mixed to public provision. However, it may also be that richer households prefer more public provision (because demand increases faster with income than it falls with households' tax price). In this case, mixed provision leads to an 'ends against the middle' equilibrium (Epple and Romano, 1996a,b): the poor and rich want low spending (the rich use private childcare while the poor prefer less childcare than the middle class or rich) while the middle class want high public spending. In this case, the same argument implies that we may find that the rich and poor favour mixed provision while the middle class favour public provision.

We also estimate the relationship between income and people's preferences for childcare regimes empirically, using survey data from Germany. Since Germany has a large public childcare sector but also some private providers, we argue that its childcare system corre-

sponds to the mixed system in our model. We find that as predicted, richer individuals prefer private provision to public or mixed provision. We also find that richer households favour mixed over purely public provision. Thus, our evidence does not seem to support the ends against the middle hypothesis. The main contribution of the paper is to clearly link a theoretical model of preferences over policies to micro-evidence on individual preferences. As far as we know, this is also the first paper to directly test whether an 'ends against the middle' type equilibrium can emerge in a specific policy area.

Our paper is related to several lines of research. First, many researchers have addressed the reasons for public provision of childcare. If there are market failures in the provision of childcare, then public provision may be warranted.[1] There are several lines of argument (Blau, 2001; Blau and Currie, 2006): (1) Private markets may fail because some parents are liquidity constrained and may not be able to afford the amount of childcare they would like, (2) parents may be poorly informed about the quality of childcare providers, which can lead to well known problems of moral hazard and adverse selection, and (3) there are thought to be externalities from childcare in the form of better social outcomes, such as higher education achievements, lower crime rates, drug use, teenage pregnancies, and so on (see e.g. Heckman and Masterov, 2007). Although we are mainly interested in the redistributive effects of childcare provision, we will return to the issue of market failure below. The reason is that our empirical analysis shows that individuals have a relatively low preference for private provision, which may be due to real or perceived market failure.

Second, our model is related to the literature on the political determination of public provision of private goods. Besley and Coate (1991) showed that public provision of private goods can be used to redistribute income. We use the model of Epple and Romano (1996a) – adapted to the case of childcare – who analyse public provision with private alternatives. Epple and Romano (1996b) study provision of goods such as health care, where public provision can be topped up by private provision. They also study the equilibrium choice of regime and show that – under some assumptions – mixed provision beats either pure public or pure private provision. We follow the same approach but explicitly analyse the preferences of different households over the regimes, in order to lay the foundation for our empirical analysis. There are some papers with empirical evidence about the public provision of private goods, but this evidence is mostly indirect. Cohen-Zada and Justman (2003) analyse provision of local public schooling with private alternatives. Using

[1] Although in many cases, subsidising private provision may be more efficient than public provision.

a mixture of simulation and regression analysis with aggregate spending data from US cities and school districts, they find no support for the ends-against-the-middle hypothesis.[2] In particular, their result is based on estimated price and income elasticities from aggregate data. By contrast, we directly estimate individual preferences over regimes and do not rely on aggregate variables. Merzyn and Ursprung (2005) analyse voter support for privatisation using data from Swiss referenda. They also find no support for the ends-against-the-middle hypothesis. Our approach is different, again, in that we use individual micro-data instead of approval rates aggregated at the district level as Merzyn and Ursprung (2005).

There are also a couple of other papers on the political determinants of family policies. Bergstrom and Blomquist (1995) study the political economy of childcare. They argue that taxpayers may support childcare subsidies in order to induce women to enter the labour force, which increases taxable income. Booth and Sepulveda (2007) analyse a model with voting on social security and fertility subsidies. They find that individuals vote strategically, since fertility incentives change the future support for social security. Both papers are related to ours but have a different focus; in addition, they are purely theoretical, while we combine theory and evidence.

Third, there is a growing empirical literature on preferences for redistribution. Our paper follows a similar approach, but we focus on childcare provision instead of broad redistribution. To cite just a few examples of this literature, Corneo and Grüner (2002) look at individual preferences for redistribution and find that, consistent with the idea of self-interested individuals, richer individuals prefer less redistribution, although other motives (which they call public values and social rivalry) also play a role. Alesina and La Ferrara (2005) focus on the US and find that social mobility plays a key role in determining preferences for redistribution. Using the same data as we do, Alesina and Fuchs-Schündeln (2007) analyse preferences for redistribution by East and West Germans. They find that East Germans are much more in favour of government redistribution than West Germans. They interpret this as evidence that communism shapes people's preferences. We find a similar effect of East versus West in the determination of preferences for public childcare provision.

The paper proceeds as follows. In the next section, we present the theoretical model used to derive testable hypotheses about preferences for childcare regimes. In Section 3, we

[2] Fernandez and Rogerson (2003) also calibrate an education finance system to US data, and find an elasticity of substitution of 0.5 fits the data best. Again, this is not consistent with the EATM hypothesis.

simulate the model numerically, with functional forms and parameters roughly calibrated to match German data on income distribution, public childcare spending and participation in private childcare. In Section 4, we discuss in how far the theoretical model provides a good description of the German childcare system. Section 5 presents our empirical analysis and the last section concludes.

2 The model

We consider a simple model where households, consisting of husband and wife, make choices over childcare. Households have identical quasiconcave utility functions defined over consumption c and children, n:[3]

$$U = u(c, n),$$

with $u_c, u_n > 0 > u_{cc}, u_{nn}$ (subscripts denote partial derivatives). We consider two possible interpretations with respect to the nature of n in the utility function: one is a long-run perspective, where households, at the point in time we observe, compute their current and future desired fertility levels. This would be sensible if we think of rational forward looking households, who, even if they do not now have children, consider that they may want to have children in the future. In the other interpretation, we take the number of children to be fixed in the short run, and suppose that households make decisions on childcare, which influences the 'quality' of any given number of children.[4]

Households allocate their income between consumption and bought-in childcare (if any). In the following, by private childcare we mean childcare purchased in the market, not childcare in the home. The household budget constraint is:

$$c + g = (1 - t)(w_m + w_f(1 - \phi)), \tag{1}$$

where w_m and w_f are the husband's and wife's wage, t the income tax rate, ϕ is the wife's time devoted to childcare, and g is bought in childcare – if any – at price of 1. We assume

[3]The theory part looks at households' preferences, that is, we do not consider bargaining or conflict within households. In the empirical part, our unit of analysis is the individual. We simply posit that an individual within a couple has preferences which are linked to the household's budget, so we will control for own income and the partner's income for individuals who live with a partner.

[4]By quality here we mean how households perceive childcare to affect the outcomes – educational or social – of their children.

the husband works full time for one unit of time, while the wife works when not rearing children at home. For simplicity, we treat ϕ as fixed. We do not here explicitly model the household's choice of home care versus institutional care. In an extended framework, we could treat ϕ as endogenous as in Apps and Rees (2004), but this would complicate the analysis without substantially changing our results. However, it is useful to keep in mind that household preferences for public childcare also depend on the household's costs of raising children at home, which depends on (mainly women's) wages.

We can then write the household wage income as $w \equiv w_m + w_f(1-\phi)$.[5] Income is distributed according to the distribution function $H(w)$ with continuous density $h(w)$. Median income is denoted by w_m and mean income by $\bar{w}$.

Following Apps and Rees (2004), production of childcare is given by

$$n = f(x, \phi),$$

where $x \in \{G, g\}$ is childcare outside the home which consists of privately (g) or publicly supplied childcare (G). For simplicity, in what follows we suppress ϕ in the production function and assume a linear relationship $n = x$.

2.1 Chidcare regimes

2.1.1 Private childcare

Let us first look at a purely private childcare regime. For simplicity, we will treat the number of children as fixed. However, treating fertility as endogenous would produce similar results, with the utilities below having to be interpreted as indirect utilities where households have optimised over n.

With private childcare and fixed n, households maximise U by choice of g subject to the budget constraint (1) and $n = g$. The resulting utility level is denoted by

$$V^{MO}(w) = v(w) \equiv \max_{g \geq 0} u(w - g, g), \tag{2}$$

where the superscript MO refers to 'market only' and $v(w)$ is the indirect utility function, which is increasing in w.

[5] For now, we don't distinguish between households with rich husband and poor wife on the one hand and poor husband and rich wife on the other. In the empirical section, however, we will test for the effects of individuals' own income and that of their partners separately.

The first order condition for g, assuming an interior solution is:

$$-u_c + u_n = 0. \tag{3}$$

The optimal choice is denoted as $g^{MO}(w)$ and is increasing in w.

2.1.2 Purely public childcare

Suppose now that provision is purely public. Household utility is given by

$$V = u((1-t)w, G). \tag{4}$$

The government budget constraint is

$$\bar{n}G = t\bar{w}, \tag{5}$$

where $\bar{n}$ is the average number of children per household.

The decision on the provision level is taken by simple majority vote. Each household then votes for the level of public childcare and tax rate to maximise $u((1-t)w, G)$ subject to the budget constraint (5).

Due to our assumption of fixed wages, the government budget constraint is linear. Together with our assumptions on the utility function, this implies that utility is single peaked in the level of provision G and a voting equilibrium exists, namely the median of the optimal provision levels of all voters. In order to study how the optimal provision level changes with income, we look at households' indifference curves in (t, g) space. From (4), the slope of such an indifference curve is

$$M(t, G, w) = \left.\frac{dt}{dG}\right|_{\bar{V}} = -\frac{dV/dG}{dV/dt} = \frac{u_n}{u_c w}. \tag{6}$$

Following Epple and Romano (1996a), we will consider two cases.

Case 1 (SRI) *Slope rising with income:* $dM/dw > 0$.

Case 2 (SDI) *Slope decreasing with income:* $dM/dw < 0$.

When household income increases, there are two opposing effects on its willingness to pay for public childcare: first, the demand for childcare increases since childcare is a normal good. Second, the price of childcare increases because of the linear income tax. If the price

elasticity of demand is larger than the income elasticity, the second effect dominates which implies SDI, i.e. that richer households want marginally lower taxes than poorer ones. Conversely, when the income elasticity is larger, we have SRI and richer households prefer marginally higher taxes.

Under either assumption, household preferences in the purely public provision regime can be ordered independently of the policy. This implies that the household with median income is decisive over the policy choice. We can then write household utility in the public regime (superscript GO for 'government only') as

$$V^{GO} = u((1 - t^{GO})w, G^{GO}), \tag{7}$$

where t^{GO}, G^{GO} maximise

$$u((1 - t)w^m, G) \quad \text{s.t. (5)}.$$

2.1.3 Mixed public/private regime

Let us now consider the mixed public/private regime, where households may opt out of public childcare and choose privately supplied childcare instead (Epple and Romano 1996a). Public childcare is still financed by general income taxes, so households who choose private childcare still have to pay for public provision through taxes, but they can also vote on the provision level.

We assume the following sequence of events: first, households vote on the tax rate and level of publicly provided childcare and then, each household chooses whether to use public or private childcare. We solve the game backwards.

For a given level of taxes and childcare spending, households choose public childcare if

$$u((1 - t)w, G) > v((1 - t)w) \equiv \max_g u((1 - t)w - g, g). \tag{8}$$

It is easy to show that if there is a wage income $\tilde{w}(t, G)$ such that $u((1-t)\tilde{w}(t, G), G) = v((1 - t)\tilde{w}(t, G))$, all households with $w > \tilde{w}(\cdot)$ will choose private childcare and all others public childcare. This is intuitive, since households who choose private childcare have to pay fees in addition to the income tax. Hence, only rich households find this profitable. The fraction of children in public childcare is then $\beta(t, G) \equiv H(\tilde{w}(t, G))$, and the public budget constraint is

$$\beta(\cdot)\bar{n}G = t\bar{w}. \tag{9}$$

Differentiating (9) gives the slope of the budget constraint:

$$\left.\frac{dt}{dG}\frac{G}{t}\right|_{GBC} = \frac{1+\epsilon_{\beta,G}}{1-\epsilon_{\beta,t}}, \tag{10}$$

where $\epsilon_{\beta,t}$ and $\epsilon_{\beta,G}$ are the elasticities of public childcare attendance with respect to the tax rate and public spending level. Both elasticities are positive: increasing G obviously makes the public alternative more attractive, while increasing t reduces utility in both public and private childcare, but due to diminishing marginal utility, the utility in the private alternative decreases by more.

Consider household preferences over public spending and taxes in the mixed regime. For each household, there is a function $\hat{G}(t)$, which makes the household indifferent between public and private childcare. This function satisfies $d\hat{G}/dt < 0$ and $d\hat{G}/dw > 0$ (Epple and Romano, 1996a). Typical indifference curves thus have the shape shown in Figure 1: the horizontal part is relevant when $G < \hat{G}(t)$ where the household chooses private childcare; here, utility depends only on the tax rate and an increase in public childcare has no effect on utility. For $G > \hat{G}(t)$, the indifference curves are upward sloping with slope given by (6).

The outcome of the voting game depends on how the slope of these indifference curves varies with income: When SDI holds, the indifference curves of any two households cross at most once. Richer households have a marginally lower preference for public spending than poorer ones, and the richest households who opt out of public childcare prefer zero public spending. This implies that an equilibrium exists and is given by the optimum allocation of the household with the median income (see Epple and Romano, 1996a, for a proof). Thus, if SDI holds we get t^{GM}, G^{GM} (superscript GM for 'government mixed'), where these maximise

$$u((1-t)w^m, G) \quad \text{s.t. (9)}.$$

On the other hand, when SRI holds, different households' indifference curves can cross twice, and an equilibrium may not exist. If it does exist, it can be shown that the decisive voter has income w_d, which satisfies

$$F(w_d) + 1 - F(\tilde{w}(t_d, G(t_d))), \tag{11}$$

where t_d is the optimal tax rate of household w_d (Epple and Romano, 1996a). The intuition is that in this case, households with higher income prefer higher public spending, but very

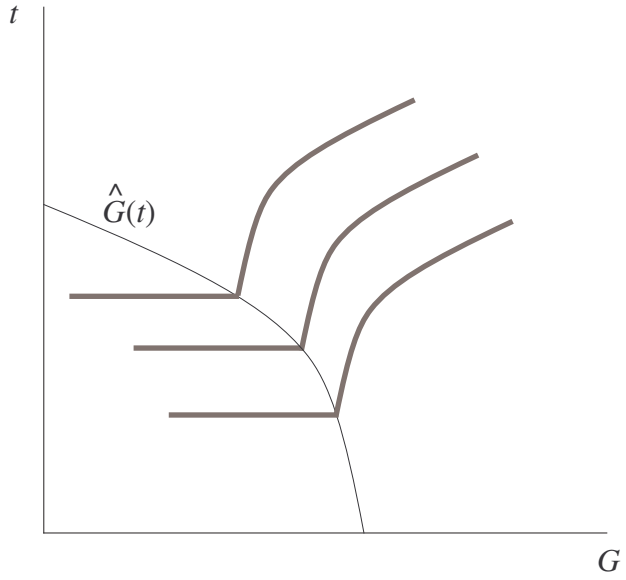

Figure 1: Households indifference curves in the GM regime

rich households prefer zero public spending since they opt for private childcare. There are thus 50% of households (those with wage income in the interval $[w_d, \tilde{w}(\cdot)]$) who favour marginally higher taxes than t_d. On the other hand, there are also 50% (those with income below w_d or above $\tilde{w}(\cdot)$) who prefer marginally lower taxes. This is the 'ends against the middle' result of Epple and Romano (1996a): The middle class who want high spending levels are opposed by the rich and poor who want low spending levels. Epple and Romano (1996a) argue that this may be the relevant assumption for education, and childcare (or pre-school education) may have similar attributes. Note that it must be true that $w_d < w_m$, since at the median income household's preferred tax rate, more than 50% prefer lower taxes (all $w < w_m$ and all $w > \tilde{w}(t_m)$).

Note that condition (11) only ensures that locally, there is no majority in favour of a tax rate smaller or larger than t_d, but due to the failure of single crossing, this does not imply that t_d is a global equilibrium. This has to be checked, i.e. we have to make sure that there is no other tax rate which commands a majority against t_d. In the numerical simulations, this is done 'by hand' by checking over a dense grid of alternative tax rates that none of them wins against t_d in a pairwise vote.

2.2 Preferences over childcare regimes

Our aim is to study household preferences over public versus private childcare. Therefore, we study how household preferences over the three regimes, MO, GO and GM, are determined by income. We can trace out some general propositions, although some of the results will depend on the specific relationship between spending levels and tax rates under the GM and GO regimes. Here, we will present some results under specific assumptions on tax rates and spending levels, but in the next section, we use numerical simulations to show that these relationships are plausible under the specific functional forms used.

MO vs GO. We first study preferences over purely private versus public childcare. It is rather intuitive that richer households should prefer private childcare, and indeed, this is our first result. We make the realistic assumption that the income distribution is skewed to the right so mean income exceeds median income.

Assumption 1 *The median income is below the average income,* $w_m < \bar{w}$.

This implies that the 'tax price' under public provision (i.e., the part of the total cost to be financed) for the median income household is less than one, i.e. they are effectively subsidised by public provision. We can now prove our first result:

Proposition 1 *There exists an income level* $\hat{w}$ *such that* $V^{GO}(\hat{w}) = V^{MO}(\hat{w})$. *All households with* $w > \hat{w}$ *prefer MO and all others prefer GO.*

Proof. See Appendix A. ■

MO vs GM. Second, we study preferences over purely private versus mixed provision. Our result here parallels that of the previous subsection:

Proposition 2 *There exists an income level* $\underline{w}$ *such that all* $w < \underline{w}$ *prefer GM and all others prefer MO.*

Proof. See Appendix A. ■

GO vs GM. Third, let us look at preferences for pure public versus mixed provision. In order to analyse the preferences over these two regimes, we need to consider the determination of the tax rate and spending level under the two regimes, since this obviously affects households' preferences over one or the other regime. In comparing the voting outcomes, we have to account for the fact that the incomes of the decisive voters as well as the government budget sets under the two regimes differ. For concreteness, we will suppose that utility is of the CES type. In that case, the income elasticity is one and the price elasticity exceeds the income elasticity if and only if the elasticity of substitution σ is larger than one. Hence, $\sigma < 1$ implies SRI, and $\sigma > 1$ implies SDI. The following effects can then be discerned:

1. The decisive voter under GM has lower income than under GO : $w^d < w^m$. If $\sigma < 1$, this will imply $t^{GM} < t^{GO}, G^{GM} < G^{GO}$, other things equal, while $\sigma > 1$ will imply $t^{GM} > t^{GO}, G^{GM} > G^{GO}$.

2. Assuming $\beta < 1$, the tax price of public childcare is lower under GM than under GO, since tax revenue is spread over fewer children. This will imply $G^{GM} > G^{GO}$, other things equal, while on the other hand it implies $t^{GM} < t^{GO}$ if $\sigma < 1$ (if demand is inelastic, expenditure falls if the price falls, so the tax rate must be lower with lower price) and $t^{GM} > t^{GO}$ if $\sigma > 1$.

3. Since $\epsilon_{n,t}, \epsilon_{n,G} > 0$, the GBC under GM is steeper than that under GO (see (10)), which implies $t^{GM} < t^{GO}, G^{GM} < G^{GO}$.

While in general it is not a priori clear which effects prevail, we will assume that the mixed regime yields lower tax rates and public spending. This seems reasonable, as it is also the result of the simulations in the next section.

Proposition 3 *Suppose that $t^{GM} < t^{GO}$ and $G^{GM} < G^{GO}$. (i) Under SDI, if there is an income level w' such that $V^{GO}(w') = V^{GM}(w')$, all $w < w'$ prefer GO and all others GM. (ii) Under SRI, if there are two households with incomes $w'' < w'''$ who are indifferent between regime GM and regime GO, then all households with $w \in [w'', w''']$ prefer GO to GM and all others prefer GM to GO.*

Proof. See Appendix A. ■

3 Numerical simulation

We now simulate the model numerically to illustrate the results from the previous section. We choose parameters to approximate key variables empirically observed in Germany, in particular the income distribution and public childcare spending. Except for childcare spending, all data are computed from the 2002 wave of the SOEP.[6]

We use a CES utility function

$$u(c,n) = (c^{\frac{\sigma-1}{\sigma}} + \gamma n^{\frac{\sigma-1}{\sigma}})^{\frac{\sigma}{\sigma-1}}, \quad \gamma > 0. \tag{12}$$

In view of the empirical analysis, we note that by assumption, households here differ only with respect to income, whereas empirically of course, they differ in many other respects. We thus interpret the results in this section as depicting the preferences of households with average characteristics as a function of wage income only.

The income distribution is assumed to be lognormal: $\ln y \sim N(\mu, v)$. We set the parameters of the distribution function such that we match the empirical distribution of household pre-tax income in Germany in 2002. Mean income was 34,693 Euro and median income 29,733 Euro. If we measure income in thousands, we can solve for $\mu = 3.34, v = 0.64$.

We now calibrate the model as follows: γ and σ are chosen such that under the political equilibrium in the GM regime we can replicate the values observed in Germany in 2002. In particular, total public spending is approximately 4500 Euro per year (Statistisches Bundesamt, 2007). Since there are 0.28 children per household, spending per household is $0.28 \cdot 4500 = 1260.4$ Euro. The share of children in public childcare was approximately 96%.[7] Under SRI, we can replicate these values by setting $\gamma = 0.047$ and $\sigma = 0.95$. Using these parameters, under the GM regime, we find $G^{GM} = 1,261.62, t^{GM} = 0.0348$, and $\beta = 0.96$. For the GO regime, we find $G^{GO} = 1,3841, t^{GO} = 0.03989$, so the tax rate and public spending under purely public provision are higher than in the mixed regime.

We show results for case SRI first and for SDI second. Results for SRI are in Figures 2–4. The results portray the following scenario. First, richer households clearly prefer market provision over pure government provision (Figure 2). Second, richer households likewise tend to prefer private over mixed provision (Figure 3), but the utility difference

[6] We use data from 2002 since this wave is also used in the empirical estimation, see section 5.

[7] See Table 1 below.

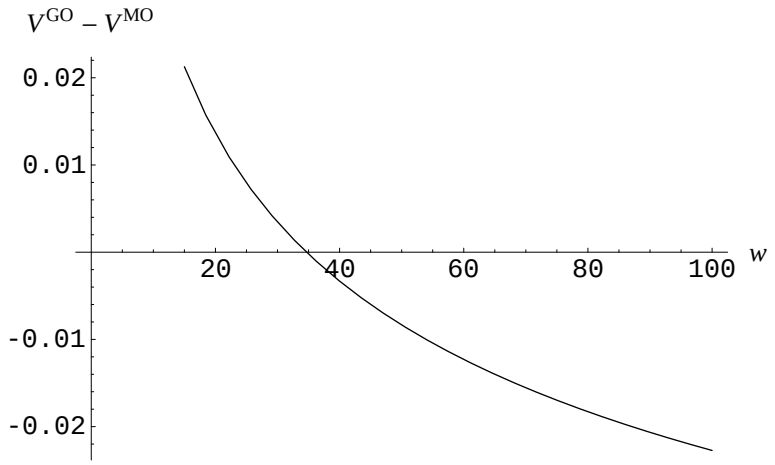

Figure 2: Preferences for pure public vs market provision

$V^{MO} - V^{GM}$ is decreasing in income for those households who actually use the private sector under the mixed system. Third, the utility difference between purely public and mixed provision, $V^{GO} - V^{GM}$ is increasing in w for households who use the public sector under the mixed system and decreasing in income for those who use the private system. However, as Figure 4 shows, under the parameters used, there are no households who prefer purely public over mixed provision. We will see in Section 5 that this indeed holds when all household characteristics other than income are held constant at the sample mean. There are, however, other preference shifters which make some households prefer the GO system, see below.

Figures 5–7 show the results for the case of SDI. Calibrating γ and σ as before now yields $\gamma = 0.38, \sigma = 0.99$ (i.e. very close to Cobb-Douglas). We now find $G^{GM} = 1,1292.8, t^{GM} = 0.0313$, and $\beta = 0.96$.[8] For the GO regime, we find $G^{GO} = 1,2328.8, t^{GO} = 0.0355$, so again the tax rate and public spending under purely public provision are higher than in the mixed regime.

The preferences for pure government versus market only (Figure 5) and purely private versus mixed system (Figure 6) look relatively similar to the SRI case. Figure 7 shows, however, that the preference for the purely public over the mixed system is now monotonically decreasing in income, with a kink at the income level of the household who is just indifferent between public and private childcare under the mixed system. Again, all

[8] With σ strictly less than one, we cannot exactly reproduce the spending level of 1260.

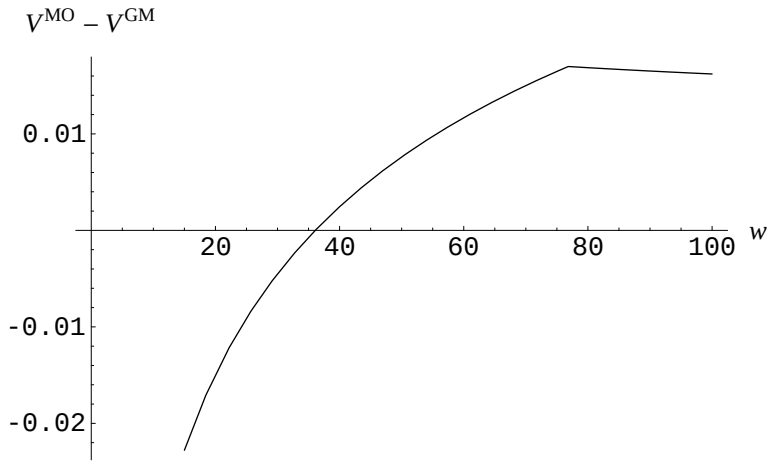

Figure 3: Preferences for market vs mixed provision

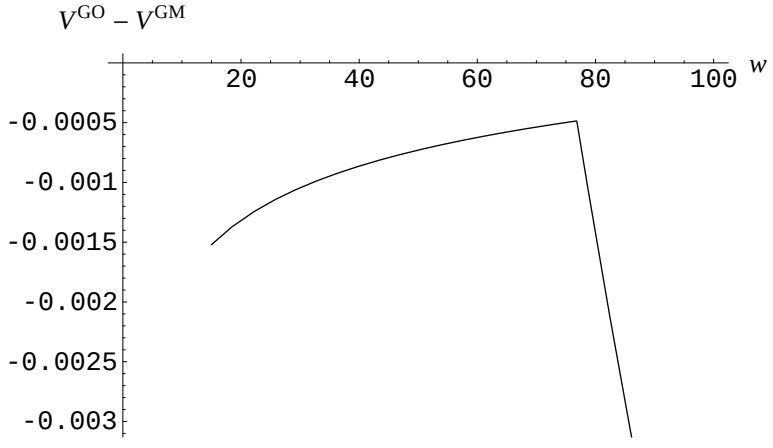

Figure 4: Preferences for pure public vs mixed provision

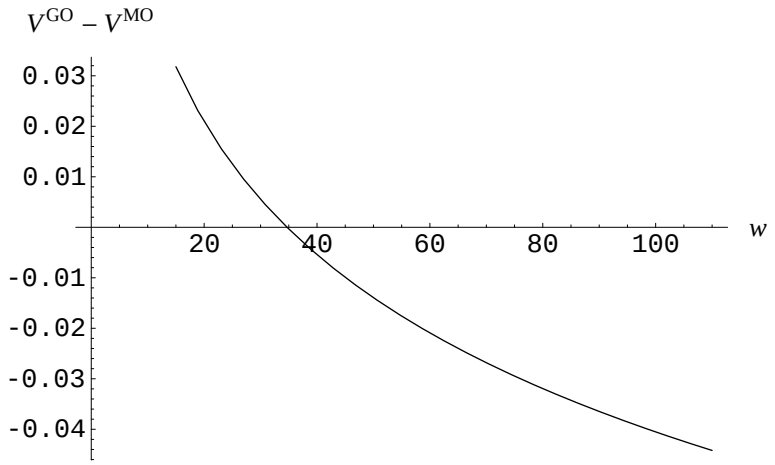

Figure 5: Preferences for pure public vs market provision (case SDI)

households prefer the mixed system, which would no longer necessarily be true if we let preferences vary among households.

An important point for the empirical section is that the estimation of preferences over the GO versus GM regime allows us to discriminate between the SDI and SRI case: if we find that $V^{GO} - V^{GM}$ is decreasing in income, this would rule out SRI, since here the utility difference should be increasing over the middle range of the income distribution.

4 Institutional background

The ultimate goal of this paper is to estimate household preferences over childcare policies, based on the predictions of the theoretical model. To do so, we argue that households behave as if they compute the equilibria under the different regimes as shown in the previous two sections. The present system in Germany, we argue, is a mixed regime, so households know their utility level under the current (GM) regime, which they then compare to their imputed utility level under the other two (hypothetical) regimes, namely GO and MO. We now argue in some detail why the GM regime is a good approximation of the current system of childcare provision in Germany.

At current, public and private childcare institutions co-exist in Germany. The majority of the institutions that provide care for pre-school aged children are run by the communities and another considerable share is run by private non-profit organizations such as churches,

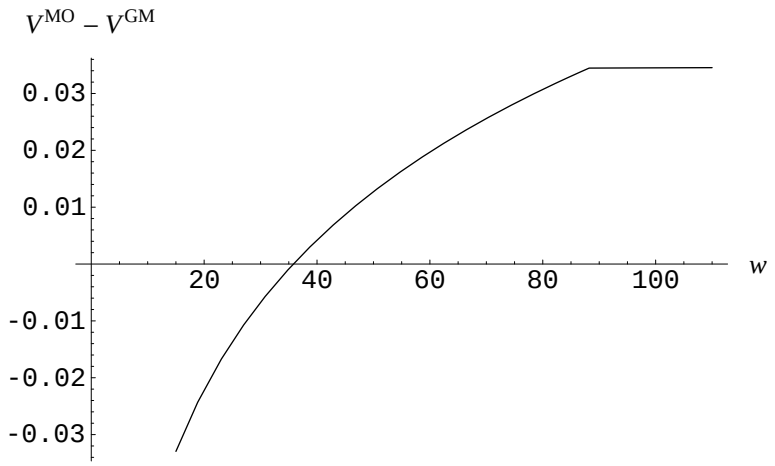

Figure 6: Preferences for market vs mixed provision (case SDI)

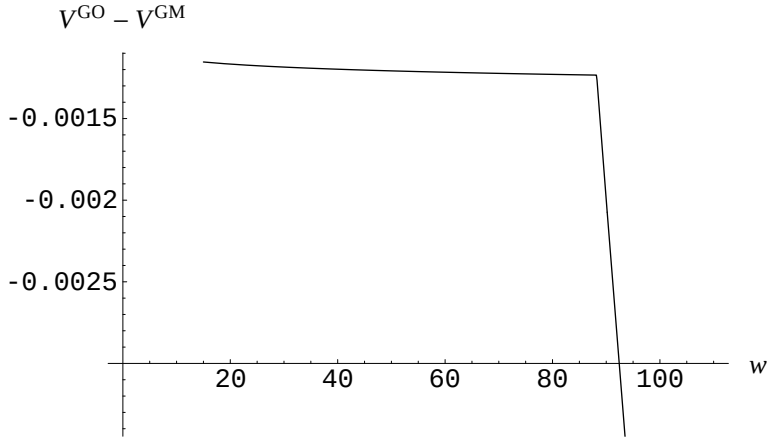

Figure 7: Preferences for pure public vs mixed provision (case SDI)

who are also heavily subsidized by the public. Only a very small share of all childcare institutions is run by private, for-profit, non-subsidized enterprises, as can be seen from Table 1. In addition, there is a growing market of non-institutionalized childcare in the private sector in the form of nannies, private child minders or family day care. Some of these forms are also subsidized by the communities, while others are purely privately organized. Unfortunately, for this private market, empirical evidence on utilization is rather scarce. Survey-based evidence from data-sets such as the SOEP only includes utilization of these forms of childcare, without further information on hours of care or possible subsidies.

Table 1: Form of childcare used for children aged up to 6 years

year	2002	2005
Children attending childcare institutions	51%	56%
thereof:		
public institutions	59%	58%
church-based institutions	33%	34%
private non-profit institutions	5%	4%
employer-based institutions	<1%	<1%
private for-profit institutions	2%	3%
Children cared for by paid nannies within their household:	–	2%
Children cared for by paid nannies ouside their household ("Family day care"):	3%[1]	3%
Total number of observations:	2,063	1,635

[1] For the 2002 wave, there is only information on childcare by a paid nanny, without distinction whether this takes place within or outside the household.
Source: SOEP, waves 2002 and 2005.

Financing scheme for public childcare. An important point to note – and a difference to the stylized "mixed childcare regime" described in the theory section above – is that parents have to pay fees even for childcare institutions that are public or publicly subsidized. The fees are set by the communities and generally depend on parents' income and the age of the child.[9] Both, public institutions as well as privately run but subsidized institutions, usually charge fees according to a similar scheme. As shown in Table 2, fees amounted to roughly 100 Euro per month on average for a full-time slot for a child aged 3 to 6 years. This covers only a small fraction of total costs, obviously. Public expenditures per childcare slot amount to about 350 Euro per month for a child in the older age group and about 700 Euro per month for children under three years.

[9] Since fees are set at the community level, there is a relatively wide variety of fee schedules. In most communities, however, fees increase in household income up to a cap.

Table 2: Public expenditures and parents' fees of center-based childcare

	Children aged 0-3			Children aged 4-6		
	public expenditures	parents' fees		public expenditures	parents' fees	
year	2005	2002	2005	2005	2002	2005
part-time care	not available	67	107	224	66	76
full-time care	717	122	124	358	94	104

Note: Childcare costs refer to Euro per month.
Source: Numbers on public expenditures are taken from Statistisches Bundesamt (2007), parents' fees from SOEP, waves 2002 and 2005.

Under stylised assumptions, the existence of parents' fees does not change the predictions of the theoretical model. Suppose for simplicity that parents have to pay fees which are linear in income and subsidised at rate s: $(1-s)kwG$ would be the fee to be paid by parents with wage income w.[10] Then taxes have to pay for aggregate subsidies, so the government budget constraint is

$$\bar{n}sG = t\bar{w}. \tag{13}$$

Using (13) and setting $k = \bar{n}/\bar{w}$, the individual budget constraint can be be written

$$\begin{aligned} c &= (1-t)w - (1-s)kwG & (14)\\ &= w - \bar{n}\frac{w}{\bar{w}}G, & (15) \end{aligned}$$

which is obviously the same as free provision and tax financing with the government budget constraint given by (5). As long as the fee schedule has the same shape as the tax schedule, it obviously does not matter whether households pay fees or whether provision is financed through taxes. Thus, the theoretical model should be a good approximation of the real system.

Rationing. As can be seen from Table 1, the large majority of children up to six years who attend childcare facilities use either publicly provided or publicly subsidized forms of childcare. Both forms can be interpreted as provided by the "state" since access to these institutions is similarly managed and also the fee structure is the same in public and publicly subsidized institutions. One problem with this form of childcare in Germany

[10]There are few communities that charge flat fees. If public provision is financed by subsidies, this would not change our results. (It should be noted again that about 80% of costs are subsidised for children under three.) However, to the extent that public provision is financed by fees, the redistributive element is obviously eliminated. The same argument would, however, apply to purely public provision if the financing scheme were the same as for mixed provision.

is, however, that there is rationing, in particular for children under three years in West Germany. Compared to other European countries, Germany has relatively low availability rates of public or publicly subsidized childcare for children under three years. In the year 2002, for example, there were only 3 slots per 100 children in this age group in West Germany. In East Germany, where full-time public childcare for children in all age groups was provided as part of the explicit policy to foster mothers' employment under the former German Democratic Republic regime (see Rosenfeld et al., 2004), availability of childcare is still much higher and amounted to almost 40% in 2002. In the past years, however, West German communities have caught up and the latest numbers show an availability rate of 8% for children under three years in West Germany. The low availability of subsidized childcare in West Germany that is – if available – relatively cheap for parents, leads to excess demand for this type of childcare. Empirical studies have shown that in 2002, about 25% of all children whose parents desired a childcare slot did not have access to subsidized childcare (Wrohlich, 2008).

How does this affect the results of the theoretical model? Suppose that a household who applies for a public childcare slot perceives a probability p to receive a place. We allow this to be a function of income, $p(w)$. For instance, it might be that richer (or better educated) parents have better chances of receiving a slot, because they are better at dealing with bureaucracies, or conversely, it might be that for political reasons, poorer families receive a higher priority.

The important point is that with respect to the GM system, a household who chooses to apply for public childcare now has an expected utility

$$EV^{GM} = p(w)u((1-t)w, G) + (1-p(w))v((1-t)w). \tag{16}$$

The determination of equilibrium proceeds as before and depends on whether preferences satisfy SDI or SRI. Which case applies now also depends on e.g., the degree of risk aversion and how it varies with income, and on how the probability of obtaining a slot changes with parents' income.

How this affects the utility of the mixed system is relatively complicated to determine, since one would have to predict the tax rate and spending level in the voting equilibrium. However, we can speculate on how preferences change for given tax and spending levels. First, since rationing introduces uncertainty, risk aversion means that utility decreases compared to a certain world. This is true for all income levels. Whether this effect is

more or less severe for richer parents depends on how risk aversion changes with income. For instance, if absolute risk aversion decreases with income, this would be less severe for richer households in the mixed system. Second, we have to consider how the probability of obtaining a slot changes with income. Any household who applies for a public slot must prefer public to private childcare, i.e. $u((1-t)w, G) - v((1-t)w) > 0$. If $p'(w) > 0$, the expected utility in (16) would increase in w, other things equal. Hence, it is possible that rationing favours richer parents in the GM system. But this depends on a number of assumptions, in particular how risk aversion and the probability of obtaining a rationed slot depends on income. In fact, Wrohlich (2008) finds no evidence that the probability of obtaining a rationed slot increases with household income. Moreover, the same argument could be made for a purely public system if households assume that there would be rationing in such a system, too.

Tax progression. Finally, the assumption of proportional income taxes is not literally true for Germany, because income taxes are directly progressive with increasing average and marginal tax rates. Thus, it could be that our empirical results are biased against SRI because in reality households' taxes rise more than proportionately with income. However, assuming that the tax schedule is of the form $ta(w)$ with $a', a'' > 0$ (i.e.directly progressive with increasing marginal tax rates), our results would generalise, but the condition for SRI would obviously require a larger income elasticity than under a proportional tax system. Moreover, childcare in Germany is financed by the communities. These levy their own taxes, namely the business tax (Gewerbesteuer) and property tax (Grundsteuer), and in addition they receive part of the large shared tax bases, in particular the income tax and the VAT. Furthermore, there is a system of fiscal equalization between the states and within states. In summary, it is far from clear that the marginal financing source for community spending on childcare is not proportional.

5 Data, empirical model and results

5.1 Data

In the following, we analyze empirically how income saffect preferences over the three childcare regimes. We draw on data from Germany, thus the spending levels and tax rates are given by the current German system described above.

What we need for our empirical analysis is a data-set that provides information on (i) preferences over childcare regimes and (ii) wages or income. The German Socio-Economic Panel (SOEP) contains information on both variables. The SOEP is a representative sample of private households living in Germany and currently covers about 20,000 individuals.[11]

In two waves of the SOEP, 1997 and 2002, individuals are asked questions on preferences over public or private provision of childcare for pre-school aged children. The specific question in the questionnaire that we will use for the definition of our dependent variable is: *"At present a multitude of social services are provided not only by the state but also by private freemarket enterprises, organizations, associations, or private citizens. What is your opinion on this? Who should be responsible for the care for pre-schoolers: – only the state – mostly the state – state and private forces – mostly private forces – only private forces?"* We argue that the answer to this question can be interpreted as preferences over the three different childcare regimes defined in the sections above.

Since the question on childcare preferences has only been asked twice in the SOEP, in 1997 and 2002, we can only use data from these two waves.[12] Moreover, we restrict the sample to individuals aged 20 to 65 years.

The most important explanatory variable in our model will be the pre-tax household income.[13] In order to allow for nonlinear effects of income on household preferences, we enter the income in a linear and squared term. If we were to impose linearity, we obviously would not be able to find evidence for SRI. Hence, we use the quadratic form as a simple form of possible non-linearity.

In addition to the pre-tax household income, we will include several other variables on the right-hand side of our estimation equation, in particular, age, sex, number of children, education variables, health status and region of residence. Summary statistics of these variables can be found in Table A.1 in Appendix B.

The descriptive statistics of the distribution of the dependent variable presented in Table 3 below show that the large majority of all interviewees have a preference for some sort of mixed regime (answer categories 2, 3 or 4). Almost 50% of the sample state that

[11] More details on the SOEP can be found in Wagner et al. (2007).

[12] Note that we do not include the high-income sample in our analysis, since this sub-sample of the GSOEP has been introduced only in 2002.

[13] As a sensitivity check, we have also estimated our model with the hourly wage instead of household income as an explanatory variable, since private childcare costs are more closely related to wages than household income. This specification leads to almost identical results as the models with household income. Results are available from us.

they find the state as well as private forces should be responsible for the care of pre-schoolers. Roughly 30% favor a regime in which "mostly the state" is in charge, while less than 10% favor "mostly private forces". Slightly more people, about 12%, prefer a purely public regime. Those favoring a purely private system are a relatively small group, roughly 3%. As Table 3 shows, we do not find large differences in the distribution of preferences over childcare regimes in the two years. Also the differences by gender are relatively small: Slightly more women prefer a mixed regime, while more men prefer a purely or mostly public regime. Similarly, the presence of children under 18 years living in the same household does not change preferences, and neither does family status (not shown in the Table).

The largest difference in the preferences over childcare in these descriptive tables can be found between East and West Germany: Although the same fraction of people prefer a purely public system and a mixed system, there is a large difference between the preferences for a "mostly public" system: this is the preferred regime for 34% of all individuals living in East Germany, but only for 28% of those living in West Germany. On the other hand, while 14% of West Germans prefer a "mostly private" or "purely private" system, this group amounts to only 5% in East Germany. This indicates that East Germans may have different attitudes towards government provision of childcare than West Germans. Of course, this may be due to the fact that East Germans have different incomes and other socio-economic characteristics, but below we will see that this effect is found also in regressions including income and other independent variables.

Table 3: Descriptive Statistics: Dependent Variable

	Whole Sample	1997	2002	Men	Women	West Germany	East Germany
"Who should be responsible for the care of pre-schoolers?" (Frequency in percent)							
"Only the state"	11.55	12.56	10.92	12.33	10.88	11.41	11.94
"Mostly the state"	29.36	28.89	29.66	30.81	28.12	27.89	33.60
"The State and private forces	47.79	47.71	47.85	45.43	49.82	47.17	49.62
"Mostly private forces"	8.73	8.69	8.75	8.68	8.77	10.30	4.16
"Only private forces"	2.59	2.22	2.81	2.76	2.42	3.23	0.68
Number of observations	19,996	7,836	12,018	9,219	10,777	14,781	5,125

Source: SOEP, waves 1997 and 2002.

5.2 The empirical model

In order to empirically analyze the effect of income on childcare preferences over the three different regimes, we estimate a discrete choice model with the preferences over childcare regimes as dependent variable. Since discrete choice models can be interpreted as random utility models[14], we base our analysis on the idea that individual i perceives a utility level U_{ij} under each childcare regime $j \in \{MO, GO, GM\}$. Individuals prefer the childcare regime that provides them with the highest utility level. That is, the invididual will prefer childcare regime k to any other regime if and only if $U_{ik} > U_{ij}, \forall k \neq j$. Since there are aspects of U_{ik} that are unobserved, it can be decomposed into an observed part V_{ik} and an unobserved part ε_{ik} that is treated as random. Typically, it is assumed that ε_{ik} is distributed iid extreme value, and thus, following McFadden (1974) the probability P_{ik} that individual i chooses alternative k over all other alternatives,

$$P_{ik} = \text{Prob}(V_{ik} + \varepsilon_{ik} > V_{ij} + \varepsilon_{ij}), \quad \forall k \neq j, \tag{17}$$

is given by the standard multinomial logit formula[15]

$$P_{ik} = \frac{\exp(V_{ik})}{\sum_j \exp(V_{ij})}. \tag{18}$$

Assuming that V_{ij} is linear in parameters, we can write it as

$$V_{ij} = \beta_j' x_i, \tag{19}$$

where x_i is a vector of explanatory variables and β_j are parameter vectors to be estimated. As explained above, the most important variable in x_i is the pre-tax household income. In addition, we control for family status (i.e. whether an individual has a partner) and other socio-economic variables that can be interpreted as taste shifters, such as age, gender, number of children in different age groups, education level, health status and state of residence. In addition to the latter variable, we also include a dummy indicating that an individual lives in East Germany. Controlling for state of residence picks up the different levels of rationing across states in Germany.

[14] In the description of our model, we follow Train (2003).

[15] We choose to use a multinomial logit model instead of an ordered logit since the ordering in our case is not straight-forward. Moreover, the multinomial logit model is more flexible, although we have to assume that the error terms are distributed identically across alternatives.

The nice feature of this model is that based on the estimated coefficients, we can predict utility levels V_{ij} for all individuals and all choice categories, i.e. childcare regimes. Using the estimated coefficient vectors $\hat{\beta}_j$, we will then plot the differences in estimated utility levels

$$\hat{V}_{ik} - \hat{V}_{ij} = (\beta_k' - \beta_j')x_i. \tag{20}$$

We will use these predictions to compute the utility difference (that is, the differences in the deterministic part of the utility levels) as a function of income in order to compare our estimation results to the simulated results from Section 3.

5.3 Results

For our estimations, we draw on the pooled sample of the waves 1997 and 2002. The basic model that we present in the following uses a definition of the dependent variable as follows: If individuals state that they prefer "only the state" or "mostly the state", we count this as a preference for a purely public system. Similarly, we take individuals to prefer a purely private system if they state that they wish "only private forces" or "mostly private forces". Thus, only those explicitly stating that they wish a system with "both the state and private forces" are assumed to prefer a mixed system.[16]

Estimation results in terms of coefficients and marginal effects are presented in Tables A.2 and A.3 in Appendix B. We find that household income decreases the probability that individuals prefer the public childcare regime and increases the probability to prefer the mixed system and the purely private system.

Confirming the descriptive findings, the multivariate analysis shows that women are, other things equal, less likely to prefer a purely public system over the other two systems than men. They do have a significantly higher probability to prefer the mixed system over the other two. The total number of children under 18 living in the same household increases the probability that the purely public system is preferred. The presence of children under three years and between three and six years significantly increase the probability that a mixed system is preferred and decrease the probability that a purely private system is preferred. This finding confirms our priors, since families with many children pay lower

[16] As a sensitivity analysis, we estimated the same models with a different definition of the dependent variable. In this case, we assume that those who choose either "mostly private forces" or "mostly the state" also prefer a mixed system. As Tables A.4 and A.5 in Appendix B show, estimation results are mostly the same in both specifications.

fees per child in state run childcare centers and also benefit from various provisions in the tax code.

One of the strongest predictors of preferences over childcare regimes is the region of residence. Individuals living in East Germany have a much higher probability to prefer a public system than West German residents, keeping income and all other socio-economic control variables constant. Accordingly, East Germans have a significantly lower probability (about 9 percentage points) to prefer a pure private system than West Germans.

Other control variables such as age and education also significantly affect preferences for childcare regimes: Age seems to decrease the probability to prefer the private system. Individuals with intermediate schooling degree ("Realschule") and high-school ("Abitur") or university degree are more likely to prefer the mixed regime and are less likely to prefer the purely public regime than those with a lower school degree, who serve as reference category.[17]

As a further sensitivity check, we have estimated all models for men and women separately, and mostly found the same results. Moreover, we have estimated the model separately for individuals living in East and West Germany. Surprisingly, we found that our results are purely driven by West German residents. For individuals living in East Germany, we found no statistically significant effect of income on preferences over childcare regimes. Thus, living in the East seems to have two effects: First, East Germans have a significantly lower preference for private childcare. This is similar to Alesina and Fuchs-Schündeln's (2007) finding that East Germans generally have a lower preference for government redistribution than West Germans. Their interpretation is that living under communism influences one's preferences for government intervention. In the case of childcare, we should note that under the socialist regime, childcare coverage was almost universal and is still several times higher than in West Germany. Hence, it may be that living with a universal state-run childcare regime significantly influences people's preferences over regimes.[18] Second, income does not seem to significantly affect the preferences over

[17] As an alternative specification, we have also estimated a model in which we additionally control for political party preferences. With this model, we found the same results as the ones presented here. Results are available from us.

[18] It is not entirely clear, however, that we should interpret the results as saying that communism changes people's preferences, since the current childcare system still differs between East and West. In particular, there is larger availability of public childcare in the East and fees also differ between East and West. Therefore, East and West Germans may have the same general preferences, but simply realise different utility levels under the current regime.

regimes in the East, while this is clearly the case in the West. One possible interpretation is that income largely captures the individual redistributive gain that individuals perceive under each system. Perhaps, in the East, socialisation leads individual preferences to be determined less by income than by other factors, so that regardless of how rich they are, all individuals have similar preferences for how childcare should be organised.[19]

In the next step, we predict the differences in utility levels between the different childcare regimes, from equation (20). Predictions are based on the sample mean of all individuals and only vary by the level of pre-tax household income. We let the income start at 0 and run up to 110,000 Euro, which is between the 95th and the 99th percentile of the income distribution. Based on these predictions, we calculate utility differences between pairs of childcare regimes in order to reproduce Figures 2–7 on the basis of estimation results.

Figure 8 shows the difference in utility levels under the purely public and the purely private childcare regime. The shape of the curve is very similar to those shown in Figure 2 and Figure 5: the higher income, the less likely is purely public childcare provision preferred over the purely private system.

The difference in utility levels between the purely private over the mixed provision of childcare, shown in Figure 9, also looks very much like the Figures from the simulated model, Figures 3 and 6. The higher income, the more likely is the private system preferred over the mixed system.

So far, we find support for the theoretical model. The most important difference between the Figures based on our empirical estimations and those based on the simulated model is a "level" effect that seems not to be captured in the theoretical model. Based on our estimation results, we find that the purely private system is generally less preferred than predicted on the basis of the theoretical model. For example, as can be seen from Figure 8, the difference between the utility level under the public and private system never gets negative, not even for high levels of household income. Similarly, Figure 9 shows that the difference between utility under the purely private regime and the mixed system never gets positive. (Note that these figures represent the marginal effect of household income, while all other variables are kept constant at the sample mean. That is, for some values of the independent variables away from the mean the utility difference between MO and

[19] Note that Alesina and Fuchs-Schündeln (2007) capture only the first effect, but do not analyse whether the effect of income differs between East and West Germans.

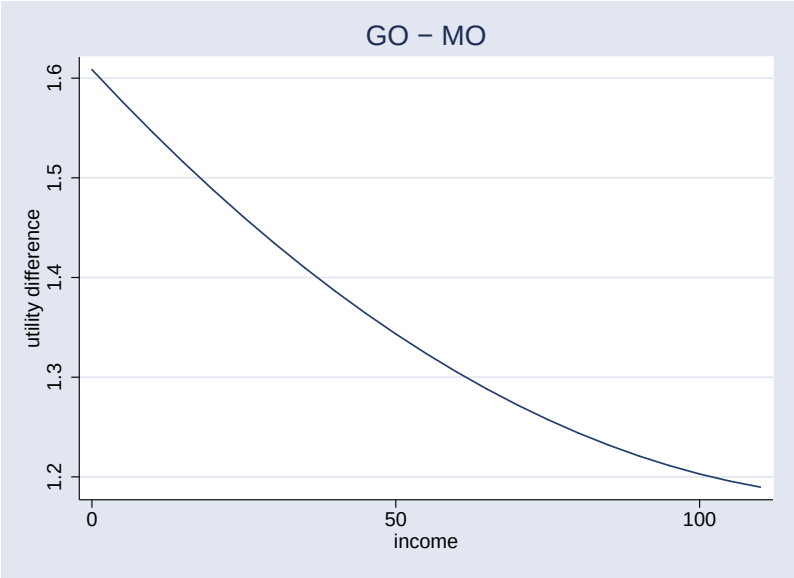

Figure 8: Empirical preferences for pure public vs private provision

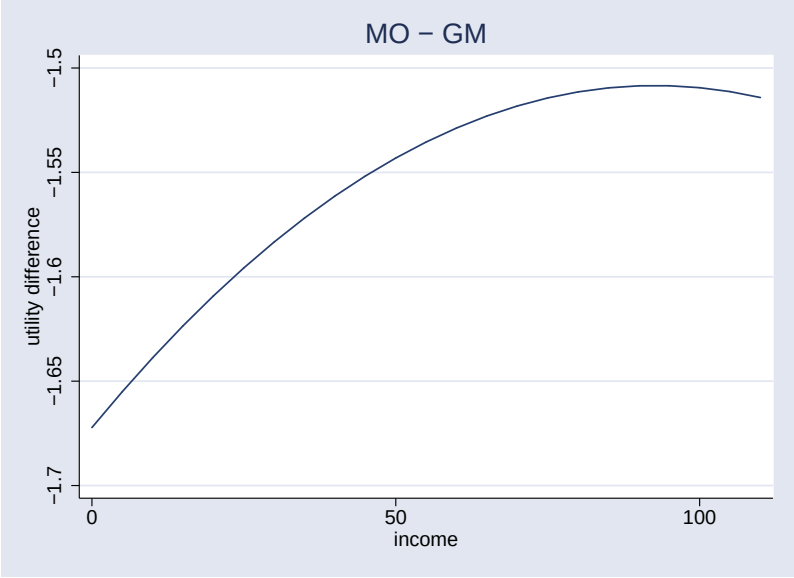

Figure 9: Empirical preferences for pure private vs mixed provision

GO or between MO and GM will clearly become positive.) One way to view this is that parents are averse to pure market provision. It might simply be that, for whatever reason, parents view markets as inferior to government provision of childcare. For instance, a pure market allocation will lead to greater inequality of opportunities, or it may be thought to be desirable to facilitate labour force participation by women through greater availability of childcare than provided by the market (see, e.g., Blau and Currie, 2006). Further, there are well known market failures in childcare provision. First, liquidity constraints due to capital market imperfections may prevent low income parents from making optimal childcare choices for their children. Second, asymmetric information about the quality of childcare may lead to moral hazard of providers or adverse selection. Indeed, an often heard concern about private childcare is that quality is low (see Blau, 2001). Parents may thus perceive a quality difference between public and private childcare. And third, there may be positive externalities from high quality care in the form of better social outcomes such as reduced crime or unemployment, lower drug use, and so forth.[20] Suppose there is a market failure which leads to a welfare loss, say, θ, which is unrelated to income. We could easily amend our model and redraw the plots of $V^{GO} - V^{MO}$ and $V^{MO} - V^{GM}$. Since they would shift by θ, they would look similar to Figures 8 and 9.

Finally, Figure 10 shows that the utility differential between public and mixed (GO vs GM) provision is decreasing in household income. This is an especially noteworthy finding, since theory predicts that in the case of SRI, this function should be increasing in income over the lower and middle income range. However, we clearly find no support for this. Hence, taken at face value, our results are not consistent with the the validity of SRI. Rather, they are consistent with SDI, i.e. the hypothesis that richer parents want less public childcare than poorer ones. We conclude that public provision of childcare in Germany should result in a 'standard' type of rich versus poor equilibrium rather than an 'ends against the middle' equilibrium.

6 Conclusion

In this paper, we apply a model of publicly provided private goods to the provision of childcare. We compare preferences over private, public and mixed provision, and how these preferences vary with income. We then estimate empirically the effect of income

[20] See for example Blau (2001), Blau and Currie (2006) and Heckman and Masterov (2007) for reviews.

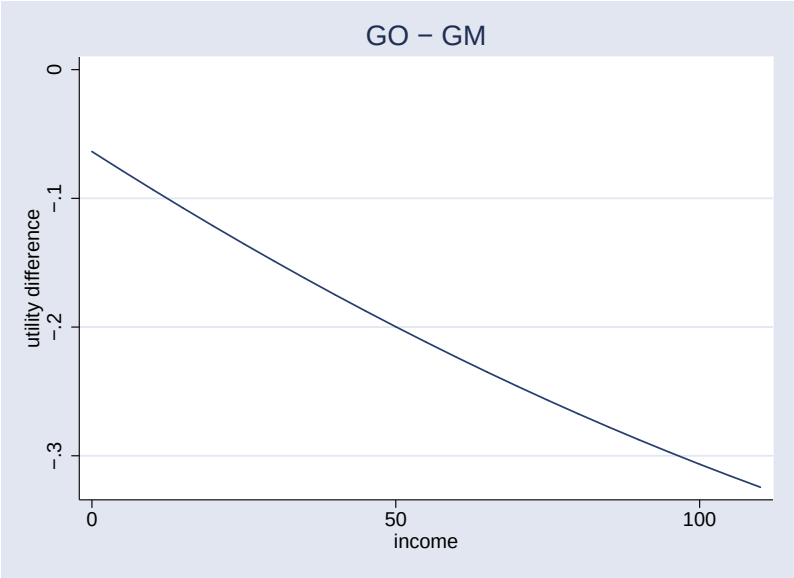

Figure 10: Empirical preferences for pure public vs mixed provision

on reported preferences of respondents to the SOEP. Our findings are consistent with the theoretical model. In particular, richer individuals prefer private provision to either public or mixed provision. Concerning the preference for mixed versus public provision, we find that richer individuals prefer mixed provision. Based on the theoretical model, this evidence is consistent with the view that public provision redistributes from rich to poor rather than poor to rich. Thus, we find no support for the ends-against-the-middle hypothesis, under which public provision should be favored by the middle class and mixed provision by the rich and poor. As far as we know, this is the first piece of direct evidence on this question.

We also find that preferences differ significantly between East and West Germans, consistent with the historic and persisting differences in childcare provision between the two parts of the country.

Our approach could be extended in several directions. One possibility would be to elaborate on the micro-foundations of childcare provision by allowing households to choose between institutional care and home care and to explicitly introduce the effects of childcare on labour supply. This, we believe, would be an interesting extension, which, however, should not produce major qualitative changes. Another possibility would be to look at a cooperative or non-cooperative game where spouses bargain over the provision of childcare

and the division of labour more generally. This is surely an interesting avenue, which would, however, greatly complicate the analysis and is therefore left for future research.

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Appendix

A Proofs

Proof or Proposition 1. From the GBC, we can rewrite V^{GO} as $u((1-t)w, G) = u(w - w/\bar{w}G, G)$. Since G^{GO} maximises $u((1-t)w_m, G) = u(w_m - w_m/\bar{w}G, G)$, the household with median income must prefer public provision since $w_m < \bar{w}$ implies they are effectively subsidised by public provision. Consider now the household with mean income. Since $p(\bar{w}) = 1$ but G^{GO} maximises $u(w_m - w_m/\bar{w}G, G)$, the average income household prefers market provision, and so do all households with $w > \bar{w}$. Since $V^{GO} - V^{MO}$ is continuous in w, by the intermediate value theorem, there must be some $\hat{w}$ with $w_m < \hat{w} < \bar{w}$ who is just indifferent between government and market provision. ■

Proof or Proposition 2. The decisive voter under GM could always vote for $t = G = 0$, and hence, if they don't they prefer GM to MO. All households with $w > \tilde{w}()$ prefer MO by revealed preference: $V^{GM,P} > V^{GM,S}$, and $t^{GM} > 0$ implies $V^{MO} = v(w) > v((1-t^{GM})w) = V^{GM}$. Since V^{GM} and V^{MO} are continuous, by the intermediate value theorem, there is a household that is exactly indifferent between the two systems. An argument analogous to the proof of Proposition 1 establishes that this income level is unique. ■

Proof or Proposition 3. (i) See Figure A.1. Let point A characterise the equilibrium under GM and B the equilibrium under GO. Suppose the household with indifference curve V' (and income w') is just indifferent between the regimes (the way the Figure is drawn, this household chooses public provision under the GM regime, but this is not important). All households with higher income have indifference curves which are flatter and have a corner to the right of the corner of V', such as the household with indifference curve V'' and income $w'' > w'$. Hence, they prefer A to B. Likewise, we can easily show that all $w < w'$ prefer B to A.

(ii) See Figure A.2. Let point A characterise the equilibrium under GM and B the equilibrium under GO. The indifference curves labeled V'' and V''' correspond to those of two households with income w'' and w''', where SRI implies $w''' > w''$. Note that both households are indifferent between the regimes. All households with $w < w''$ have indifference curves which are flatter than V'' at point A. Since the corner of their indifference

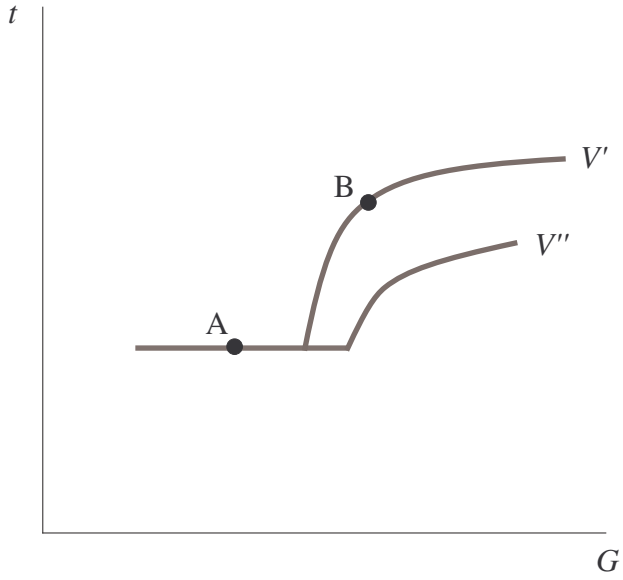

Figure A.1: Preferences over GM and GO regime (SDI)

curve is to the left of A, they must prefer A to B. Households with income $w'' < w < w'''$ have steeper indifference curves than V'' at point A and a corner of the indifference curves to the left of A. Finally, all households with income $w > w'''$ have a corner to the right of and indifference curves steeper than V'''. We can show that those with $w'' < w < w'''$ prefer B to A while those with $w > w'''$ prefer A to B. ■

B Figures and Tables

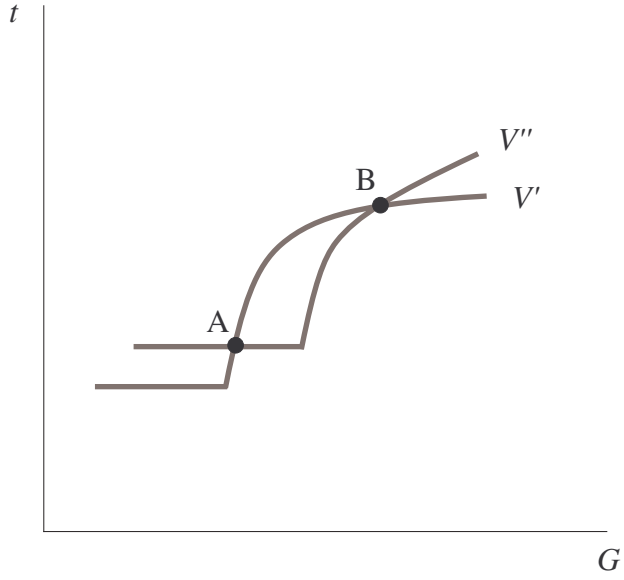

Figure A.2: Preferences over GM and GO regime (SRI)

Table A.1: Descriptive Statistics: Explanatory Variables

Variable	Mean	Std. Deviation
pre-tax household income / 1,000	39.81	28.75
female	0.54	–
age	43.97	11.26
children under 3 yes/no	0.09	–
children 3-6 yes/no	0.11	–
number of children under 18	0.998	1.09
education level: intermediate ("Realschule")	0.33	–
education level: upper secondary ("Abitur")	0.08	–
education level: university	0.15	–
education level: other (e.g. foreign)	0.09	–
resident of east Germany	0.26	–
German citizenship	0.89	–
degree of disability (in %)	5.20	17.32
year 2002	0.61	–
Berlin	0.04	–
Schleswig-Holstein	0.03	–
Hamburg or Bremen	0.02	–
Niedersachsen	0.08	–
Hessen	0.07	–
Rheinland-Pfalz or Saarland	0.06	–
Baden-Württemberg	0.12	–
Bayern	0.13	–
Mecklenburg-Vorpommern	0.03	–
Brandenburg	0.05	–
Sachsen-Anhalt	0.05	–
Thueringen	0.05	–
Sachsen	0.08	–
Total number of observations	19,996	

Source: SOEP, waves 1997 and 2002.
Note: Reference category for education level is "less than intermediate".
Reference category for federal states is Nordrhein-Westfalen.

Table A.2: Estimation Results: Coefficients

	"Only" or "Mostly" the state		"Only" or "Mostly" private forces	
Variable	Coefficient	Std. Err.	Coefficient	Std. Err.
pre-tax household income	-0.0030	0.0009 ***	0.0035	0.0018 **
pre-tax household income squared	0.0000	0.0000	-0.0001	0.0000 **
single	-0.0666	0.0721 *	0.0422	0.0582
female	-0.1984	0.0308 ***	-0.1048	0.0482 **
age	0.0011	0.0128	-0.0545	0.0202 **
age squared	0.0000	0.0001	0.0007	0.0002 ***
children under 3 yes/no	-0.1443	0.0577 **	-0.2573	0.0939 ***
children 3-6 yes/no	-0.0876	0.0540	-0.2414	0.0873 ***
number of children under 18	0.0754	0.0173 ***	0.0475	0.0278 *
education level: intermediate	-0.1583	0.0385 ***	-0.0414	0.0611
education level: upper secondary	-0.2242	0.0602 ***	-0.0201	0.0931
education level: other	-0.1135	0.0629 *	0.0345	0.0897
education level: university	-0.2030	0.0477 ***	-0.0133	0.0721
resident of east Germany	0.1516	0.1521	-1.1138	0.3600 ***
German citizenship	-0.1189	0.0560 **	-0.2783	0.0790 ***
disabled	0.0003	0.0009	-0.0018	0.0015
year 2002	0.0304	0.0315	0.0353	0.0499
Berlin	0.2367	0.1081 **	-0.1606	0.1770
Schleswig-Holstein	-0.0873	0.1093	0.8954	0.1199 ***
Hamburg or Bremen	0.3125	0.1136 ***	-0.0902	0.1849
Niedersachsen	0.4117	0.0616 ***	-0.1757	0.1039 *
Hessen	0.2110	0.0672 ***	0.0063	0.1021
Rheinland-Pfalz or Saarland	0.2027	0.0705 ***	0.1380	0.1053
Baden-Württemberg	0.1500	0.0559 ***	0.3095	0.0779 ***
Bayern	-0.0562	0.0549	0.3431	0.0741 ***
Mecklenburg-Vorpommern	0.0774	0.1802	0.1192	0.4302
Brandenburg	0.1188	0.1705	-0.0272	0.4130
Sachsen-Anhalt	0.1345	0.1698	-0.1038	0.4138
Thueringen	0.1975	0.1706	0.3968	0.4018
Sachsen	-0.0946	0.1648	0.4971	0.3856
constant	0.0647	0.2669	-0.3044	0.4186
Log-Likelihood: -18883.797				
Number of observations: 19,996				
F-Test on joint significance of income and income squared: Prob > chi2 = 0.0002				

Note: Choice Category "State and Private Forces" serves as base category.
(*/**/***): indicates significance at the 1%- / 5%- / 1%-level.
*Source:*Estimations based on SOEP, waves 1997 and 2002.

Table A.3: Estimation Results: Marginal Effects

	"Only" or "Mostly" the State		The State and Private Forces		"Only" or "Mostly" Private Forces	
Variable	Marg. Eff.	Std. Err.	Marg. Eff.	Std. Err.	Marg. Eff.	Std. Err.
pre-tax hh. income	-0.0008	0.0002 ***	0.0004	0.0002 *	0.0005	0.0002 ***
pre-tax hh. income squared	0.0000	0.0000 *	0.0000	0.0000	-0.0000	0.0000 **
single	-0.0178	0.0072 **	0.0112	0.0088	0.0067	0.0052
female	-0.0437	0.0081 ***	0.0449	0.0072 ***	-0.0012	0.0042
age	0.0025	0.0029	0.0024	0.0030	-0.0050	0.0018 ***
age squared	-0.0000	0.0000	-0.0000	0.0000	0.0001	0.0000 ***
children under 3 yes/no	-0.0249	0.0133 *	0.0414	0.0135 ***	-0.0165	0.0073 **
children 3-6 yes/no	-0.0119	0.0125	0.0291	0.0127 **	-0.0173	0.0067 ***
number of children under 18	0.0163	0.0040 ***	-0.0175	0.0041 ***	0.0011	0.0024
education level: interm.	-0.0364	0.0089 ***	0.0337	0.0090 ***	0.0028	0.0051
education level: upper sec.	-0.0525	0.0135 ***	0.0452	0.0140 ***	0.0073	0.0086
education level: other	-0.0287	0.0142 **	0.0207	0.0146	0.0080	0.0082
education level: university	-0.0479	0.0108 ***	0.0408	0.0111 ***	0.0071	0.0066
resident of east Germany	0.0773	0.0368 **	0.0108	0.0374	-0.0881	0.0218 ***
German citizenship	-0.0162	0.0129	0.0378	0.0128 ***	-0.0217	0.0078 ***
disabled	0.0002	0.0002	0.0000	0.0002	-0.0002	0.0001
year 2002	0.0059	0.0073	-0.0078	0.0074	0.0019	0.0043
(federal state dummies skipped)						
(coefficients see Table A2)						

Source: Estimations based on SOEP, waves 1997 and 2002.
(*/**/***): indicates significance at the 1%- / 5%- / 1%-level.

Table A.4: Estimation Results: Coefficients

	"Only the state"		"Only private forces"	
Variable	Coefficient	Std. Err.	Coefficient	Std. Err.
pre-tax household income	-0.0045	0.0154 ***	0.0088	0.0040 **
pre-tax household income squared	0.0000	0.0000	-0.0001	0.0001 *
single	-0.0231	0.0557	0.0933	0.1144
female	-0.1570	0.0453 ***	-0.1175	0.0924
age	0.0053	0.0192	-0.0414	0.0382
age squared	-0.0001	0.0002	0.0006	0.0004
children under 3 yes/no	-0.1928	0.0873 **	-0.1202	0.1785
children 3-6 yes/no	-0.1601	0.0807 **	-0.5677	0.1840 ***
number of children under 18	0.1263	0.0242 ***	0.1073	0.0531 **
education level: lower secondary	-0.2964	0.0583 ***	-0.2001	0.1235
education level: upper secondary	-0.5322	0.0991 ***	-0.1448	0.1782
education level: other	-0.0164	0.0862	0.1667	0.1618
education level: university	-0.4366	0.0776 ***	-0.1168	0.1373
resident of east Germany	0.3277	0.2082	-1.1119	0.5613 **
German citizenship	-0.1565	0.0779 **	-0.2760	0.1438 *
disabled	0.0017	0.0013	-0.0010	0.0027
year 2002	-0.0647	0.0458	0.1852	0.0980 *
Berlin	0.2774	0.1534 *	0.3048	0.2575
Schleswig-Holstein	-0.0935	0.1625	1.4284	0.1619 ***
Hamburg or Bremen	0.1343	0.1675	-0.6040	0.3919
Niedersachsen	0.5424	0.0820 ***	-0.3020	0.1865 *
Hessen	0.2043	0.0950 **	-0.2719	0.1924
Rheinland-Pfalz or Saarland	-0.0596	0.1049	-0.6072	0.2334 ***
Baden-Württemberg	-0.2558	0.0863 ***	-0.2229	0.1468 *
Bayern	-0.2141	0.0838 **	-0.1474	0.1433
Mecklenburg-Vorpommern	-0.4406	0.2600 *	-1.6645	1.1489
Brandenburg	-0.2159	0.2369	-0.5678	0.7216
Sachsen-Anhalt	0.1076	0.2308	-1.5046	0.9059
Thueringen	-0.4106	0.2398 *	-0.2607	0.6770
Sachsen	-0.3778	0.2288 *	0.0399	0.6188
constant	-1.6082	0.4031 ***	-2.699	0.7939 ***
Log-Likelihood: -9183.9684				
Number of observations: 19,996				
F-Test on joint significance of income and income squared: Prob > chi2 = 0.0001				

Note: Choice Category "Mostly the state, the state and private forces or mostly private forces" serves as base category.
(*/**/***): indicates significance at the 1%- / 5%- / 1%-level.
*Source:*Estimations based on SOEP, waves 1997 and 2002.

Table A.5: Estimation Results: Marginal Effects

	Only the state		Mostly the state / The state and private forces/ Mostly Private Forces		Only private forces	
Variable	Marg. Eff.	Std. Err.	Marg. Eff.	Std. Err.	Marg. Eff.	Std. Err.
pre-tax hh. income	-0.0046	0.0002 ***	0.0003	0.0002 *	0.0002	0.0001 **
pre-tax hh. income squared	0.0000	0.0000 *	0.0000	0.0000	-0.0000	0.0000
single	-0.0025	0.0054	0.0006	0.0058	0.0018	0.0022
female	-0.0153	0.0045 ***	0.0171	0.0047 ***	-0.0019	0.0017
age	0.0006	0.0019	0.0002	0.0022	-0.0008	0.0007
age squared	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
children under 3 yes/no	-0.0176	0.0076 **	0.0194	0.0080 **	-0.0018	0.0031
children 3-6 yes/no	-0.0141	0.0072 *	0.0225	0.0075 ***	-0.0084	0.0023 ***
number of children under 18	0.0122	0.0023 ***	-0.0139	0.0025 ***	0.0017	0.0009 *
education level: interm.	-0.0277	0.0053 ***	0.0307	0.0056 ***	-0.0031	0.0022
education level: upper sec.	-0.0438	0.0068 ***	0.0456	0.0074 ***	-0.0017	0.0031
education level: other	-0.0020	0.0084	-0.0014	0.0089	0.0033	0.0034
education level: university	-0.0380	0.0060 ***	0.0393	0.0064 ***	-0.0013	0.0024
resident of east Germany	0.0364	0.0233	-0.0193	0.0241	-0.0171	0.0068 **
German citizenship	-0.0154	0.0084 *	0.0207	0.0088 **	-0.0053	0.0032
disabled	0.0002	0.0001	-0.0002	0.0001	0.0000	0.0000
year 2002	-0.0068	0.0045	0.0032	0.0048	0.0035	0.0018 *
(federal state dummies skipped)						
(coefficients see Table A4)						

Source: Estimations based on SOEP, waves 1997 and 2002.
(*/**/***): indicates significance at the 1%- / 5%- / 1%-level.