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# Do Tax Deductions Affect Labor Supply Choices?: Longitudinal Evidence for Lone Parents in Germany\*

By Hilke A. Kayser\*\*

## Summary

*The German tax reforms between 1986 and 1990 contained expansions of the tax deductions for single-parent households. I estimate the impact of the expansion on labor force participation by comparing participation changes of single parents who benefit from the expansion to those of childless adults. Single-parent households are of interest because of their growing size and high poverty rate. Results from a probit specification provide no evidence that the tax deductions had an impact on labor force participation. Instead, participation is determined by family structure, human capital, and demographic factors such as age and marital status.*

## 1. Introduction

The German tax and welfare reforms between 1986 and 1990 provided substantial increases in the household deduction for single-parent taxpayers and in the child deductions for taxpayers with children. Given the distortionary impact of payroll and income taxes on labor supply, these large tax deductions to single parents with children are predicted to have a positive impact on their labor force participation. I estimate the response of single-parent taxpayers to the tax incentives by considering the expansion in tax deductions as a treatment to single parents while childless single adults serve as a control group in this natural experiment.

Single-parent households are a particularly relevant group for empirical research. The economic situation of many single-parent families in Germany is not a promising one. Over the 1980s, the proportion of single-parent families in Germany grew from 11 percent of all families with children in 1981 to 14 percent in 1988, primarily because of higher divorce and separation rates (DIW 1990). Furthermore, the proportion of single-parent families in Germany that are poor is much higher than that of married families with children. Fischer and Hauser (1988) show that in 1983 between 23 and 38 percent of single-parent families fell below the 50 percent poverty line while the corresponding proportion for married couples with children was substantially lower, between 6 and 14 percent (Fischer and Hauser 1988). Put together, these trends imply that an increasing number of children grow up in relatively poor economic circumstances.

The current discussions of welfare reform in Germany and in the United States focusing on cost reductions and the hazards of welfare dependency suggest that the reliance of single-parent families on welfare programs is likely to become increasingly difficult (Staat and

Wagenhals 1996). In the United States, the discussion has led to a number of measures designed to "make work pay" and to move welfare recipients into the labor market through policies such as large increases in the Earned Income Tax Credit (EITC), term limits on welfare receipts, or work requirements for those receiving welfare.

Inducing single parents to enter the labor force is complicated for a variety of reasons. Financial barriers exist because the costs of child care are often high. Additionally, in Germany the complex social welfare system results in reductions of social benefits in the case of income from employment, with replacement rates that can exceed 100 percent. Nonfinancial barriers exist because child-care facilities are often not available or flexible enough to accommodate a working parent. Recent work on low-wage workers in the United States shows that the workplace as well may not be flexible enough to deal with the conflicting demands imposed by parenthood, such as higher rates of absenteeism when the child is sick or when child care arrangement fall through on short notice (Henly, Hasenfeld, and Handler 1997).

For the empirical work, I use longitudinal data from the German Socio-Economic Panel (GSOEP) from 1984 to 1990 to compare labor market choices of single parents to the choices made by a natural control group: single childless adults. Annual trends indicate that in the years when the increased deductions became effective labor force participation among single parents increased while participation of single childless adults declined slightly. However, comparing changes in labor force participation in a multivariate analysis provides no evidence that the tax deductions had an impact on labor force participation. Instead, labor force participation appears to be determined by family structure, human capital endowment, and demographic factors such as age and marital status.

## 2. Tax Treatment of Single-Parent Families

The tax reforms between 1986 and 1990 were in response to criticisms that tax-splitting favored marriage but provided no relief to less traditional families, such as the growing number of single-parent families (Spahn, Kaiser, and Kassella 1992). To mitigate this perceived imbalance, the reforms in the 1980s contained provisions that favored families and children more directly. In this section I will sketch the main provisions to families, the main features of the German tax and welfare system, and the tax reforms between 1986 and 1990.

Effective as of January 1986, annual *child deductions* were raised substantially for each child, from DM 432 to DM 2,484. By 1988, the child deduction was up to DM 3,924

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per child. The *household deduction* for single-parent families was increased from DM 4,212 to DM 4,536 in 1986, to DM 4,752 in 1988, and to DM 5,616 in 1990. Thus, between 1985 and 1990, the household deductions to a single parent increased by DM 1,404 (or by 33 percent) and the child deduction by DM 3,482 (over 900 percent) per child. It is the impact of these combined changes that I will estimate in the empirical part of the paper.

To get a feeling for the magnitude of these changes, consider a working single parent with two children who has a gross income of DM 3,000 per month. With the marginal tax rates that applied in 1985, she owes about DM 4,800 in taxes. Keeping the same marginal tax rates but adjusting her taxable income to reflect the child and household deduction levels for 1990, her tax liability is reduced to about DM 3,600. Because of the changes in the tax deductions her net income increases by about DM 100 per month.

A number of additional provisions exist for families with children that also impact single parents' labor supply choices. Single-parent families are eligible for a *child-care* deduction. Furthermore, there are a number of benefits, including *maternity benefits* for working mothers and *child benefits* that have a universal component and a means-tested component. As of 1986, all parents who rear children by themselves and do not work more than 19 hours a week are entitled to *child-rearing benefits*. If a mother was employed prior to the birth of a child, the employers must protect the mother's job for up to 12 months in 1986, up to 18 months in 1988, and up to 24 months in 1990.<sup>1</sup>

### 3. Identification of Effects

Standard labor theory predicts a positive effect of the expanded tax deductions on labor force participation. Post-tax income increases but only for taxpayers who qualify — single parents with earned income — inducing those with a reservation wage close to the margin to enter the labor force. The expansion of the tax deduction occurred simultaneously with a large number of other changes that affect labor supply choices. Over time, changes in society's attitudes about women and mothers in the labor force, reductions in the marginal tax rates across the board, and increases in the standard deduction for all taxpayers coincided with the expansion of the tax deductions, as did the tax treatment of some other sources of income. All of these factors influence labor supply and may confound estimation of the impact of the expansion in tax deductions.

However, because the increases in tax deductions are only available to single parents, it is possible to view the increase as a treatment to single parents and to let childless single adults serve as a control group in this natural experiment. The focus here is on single adults and not on married parents who also benefit from the increased child deductions — though not from the household deduction — mainly for two reasons. As explained above, single parents are a

vulnerable segment of the population. They tend to rely heavily on welfare payments and they face numerous constraints in their decisions to enter the labor force. At a time when the welfare system is under heavy attack, finding alternative ways for these households to sustain a minimum standard of living while acknowledging the difficulty of their choices is of particular importance. Secondly, single parents cannot reallocate resources and responsibilities within the household. This constraint makes the analysis of single-adult households easier because I do not need to consider the joint decisions about work and child rearing that occur in households with more than one adult.

The empirical approach taken in this paper is closely linked to the work by Eissa and Liebman (1996) who estimate the impact of expansions of the EITC in the United States by comparing changes in labor force participation over time of single mothers who are eligible for the tax credit to changes in labor force participation of single childless women who do not qualify for the credit. They find that single mothers' labor force participation increased 2.4 percent more than that of single childless women. When controlling for confounding demographic characteristics, the treatment effect increases to around 7 percent.

### 4. Data and Sample Selection

To estimate labor supply choices of single parents empirically, data from the German Socio-Economic Panel Data (GSOEP) are pooled over the years 1984 to 1990. The GSOEP is a representative longitudinal sample of persons and households in West Germany. The sample used here includes heads of households aged 17 to 55 who are either never married, widowed, or divorced, and it does not include any retired head. Furthermore, all members of the sample live in a household by themselves or as the only adult in a household with children. I will refer to the first group as single childless adults and the second group as single parents.

Table 1 presents means and standard deviations for characteristics of all single adults and for single parents and single childless adults separately. Pooling the seven years results in a sample with 3,397 observations of which 868 (25.5 percent) are single parents. The single parents have on average 1.54 children; 8 percent have very young children aged 3 or less, and about 12 percent have children aged 4 to 6.

The two groups in the sample show some interesting differences. Single parents tend to be older than single childless adults, and there are noticeably fewer men among the single parents: only 19 percent of the single

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<sup>1</sup> The child-rearing benefits may run counter to the impact of the increase in tax deduction on single parents' labor supply. Since parents who rear their children are allowed to work 19 hours before losing eligibility for the child-rearing benefits, however, the impact of the tax deduction on labor force participation of single parents may not be influenced greatly by this concurrent change.

Table 1

Means and Standard Deviations for Single Adult Households<sup>a)</sup>

	All Adults		Single Parents		Single Childless Adults	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Single Parent	0.255	0.436	1.000	0.000	0.000	0.000
Male	0.447	0.497	0.188	0.391	0.537	0.499
Age	36.00	10.20	39.80	8.690	34.60	10.40
Number of Children	0.394	0.778	1.540	0.776	—	—
Children Aged 4 and Below	0.019	0.137	0.075	0.263	—	—
Children Aged 4 to 6	0.031	0.174	0.122	0.328	—	—
Head is Divorced	0.245	0.430	0.463	0.499	0.170	0.376
Head is Widow(er)	0.084	0.278	0.217	0.412	0.039	0.194
Occupational Disability	0.185	0.388	0.185	0.389	0.185	0.388
Education (7 to18 years)	11.90	2.710	11.20	2.390	12.20	2.770
University/Vocational Degree	0.764	0.425	0.717	0.451	0.780	0.414
Part-Time/Irregular Work	0.082	0.274	0.162	0.369	0.054	0.226
Works Full-Time	0.693	0.461	0.503	0.500	0.758	0.428
Apprenticeship Program	0.019	0.137	0.003	0.059	0.025	0.155
Gross Labor Income	31,179	24,764	23,338	22,770	33,871	24,853
Nonlabor Income	1,476	5,693	2,965	7,714	966	4,702
Lives in the North	0.271	0.445	0.256	0.437	0.277	0.447
Lives in the South	0.300	0.458	0.309	0.462	0.297	0.457
Lives in Central Germany	0.429	0.495	0.435	0.496	0.427	0.495
Observations	3397		868		2529	
a) The data are pooled annual data from the German Socio-Economic Panel (GSOEP) covering the years 1984 to 1990. Means and standard deviation are presented for adults aged 17 to 54 who are labeled in the GSOEP as single parents ( <i>Alleinerzieher</i> ) or as living in a household as the only adult. Source: Author's calculations.						

parents are male as opposed to 54 percent among the single childless. Furthermore, single childless adults have on average about one more year of education than single parents and are more likely to have successfully completed an apprenticeship or university degree.<sup>2</sup>

In this study, I am particularly interested in the employment status of the adult. Among all households with a single adult, 69.3 percent work full-time, 8 percent part-time or irregularly, and about 2 percent participate in an apprenticeship. Among the single parents 50.3 percent work full-time and 16 percent part-time or irregularly, while among the single childless adults 75.8 percent work full-time and only 5.5 percent part time. Labor force participation for single parents is thus substantially lower with 66.8 percent compared to a labor force participation rate of 83.7 percent for childless adults.

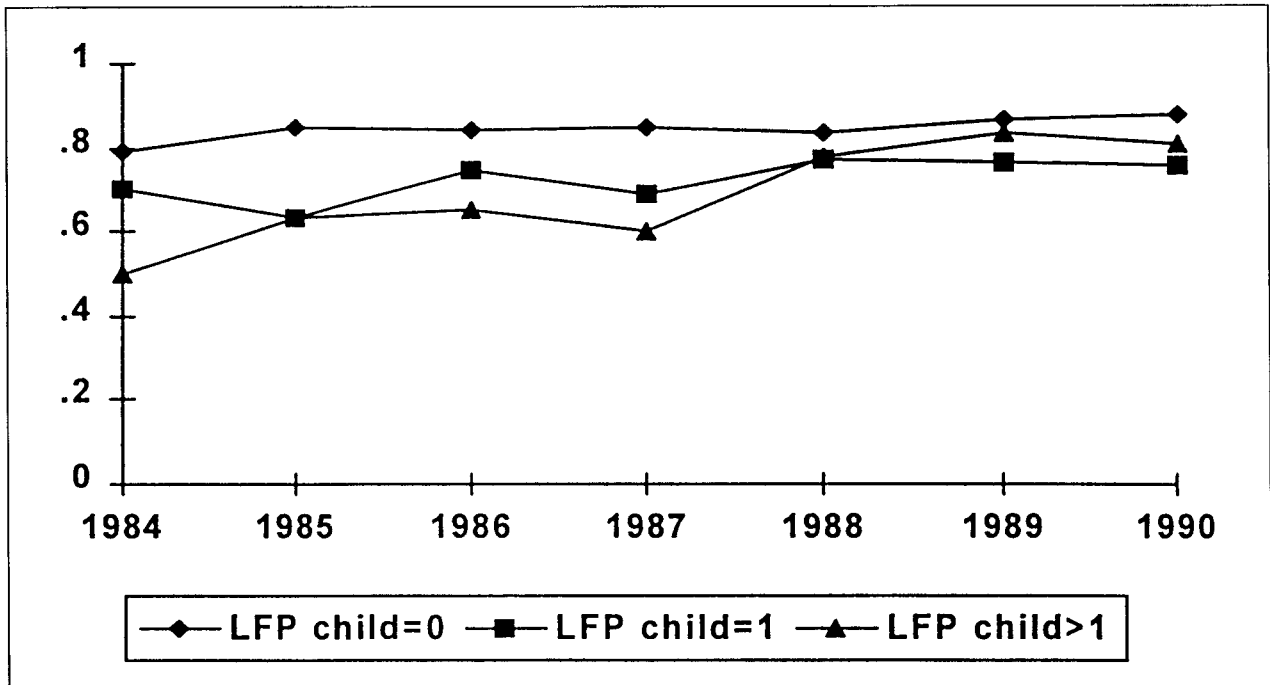
Figure 1 shows what happened to labor force participation over the years for single-adult households with no children, with one child, and with more than one. Labor

force participation for childless adults increased from 1984 to 1985 and remained rather stable in the following years at around 85 percent. For single parents with children there appears to be more of an upward trend over the years, particularly for households with several children, and 1986 and 1988 show peaks in the general trend. Since 1986 and 1988 are the years of the increase in tax deduction, this provides some evidence of a positive impact on labor force participation of single parents. However, the declines in participation rates in 1987 and after 1988 may indicate that the incentives were too small to have a lasting effect.

<sup>2</sup> The German education system provides a number of parallel tracks after four years of elementary school which lead to a variety of different degrees and allows for cross-overs and add-ons. Instead of creating a necessarily arbitrary ranking of these possible degrees and the paths taken to obtain them, I capture an individual's education using a measure from the GSOEP that assigns the minimum number of years necessary to reach any level of schooling.

Figure

Labor Force Participation Rates Over Time, by Number of Children



Look now at single parents with more than one child who stand to benefit the most from the expansion of the child deductions. The figure indicates that the changes in 1986 had no large impact but that the additional increase in 1988 may have had a more lasting positive impact on this group's labor force participation rate. The impression is that labor force participation rates moved closer together after 1988, lending support to the claim that the tax reforms had some positive impact on labor force participation of single parents.

### 5. A Probit Estimator for the Difference in Labor Force Participation Rates

Because Table 1 shows that the two groups differ in important ways, I need to account for observable differences between them that may affect their labor supply choices. To capture the influence of individual characteristics and the influence of changes in the tax provisions over time, the individual's participation decision is modeled as a probit equation of the form

$$(1) \Pr(LFP_t = 1) = \Phi(\sum_j \beta_j X_{jt} + \gamma_t Year_t + \delta_t SPR_t * YEAR_t)$$

where  $LFP_t$  indicates participation in the labor force in year  $t$ ,  $X_t$  is a vector of socio-economic characteristics in year  $t$ ,  $Year_t$  is a vector of indicator variables for the years,  $SPR_t$  indicates whether the adult is a single parent in year  $t$ , and  $\Phi$  is the standard normal density function. While the year

dummy variables account for common trends in labor force participation, the coefficients on the interaction terms between the years and the dummy for single parent,  $\delta_t$ , capture the change in the gap between single parents and childless single adults.

The estimated probit coefficients are presented together with their standard errors and marginal effects in Table 2. The first three columns present estimation results from a specification with no controls other than the year dummy variables while the last three columns show the results with a set of controls included.

Looking first at the "unadjusted" results, the negative and significant coefficients for the interaction terms indicate that the labor force participation rate of single parents is significantly lower than that of single childless adults in all years. From 1985 to 1986, however, the difference is reduced by 2.7 percent from 18.2 to 15.5 percent in 1985. The results show that the gap narrows again in 1986 and 1988, the years in which the tax deductions were expanded. However, in other years the gap increases, undermining the hypothesis that the increases in the tax deductions for single adults had a lasting and measurable impact on their rate of participation in the labor force.

Adding socio-economic factors as controls eliminates any significance in the difference between single parents and single adults. The magnitude of the coefficients for the interaction terms are closer to zero and no longer significant. When such factors as human capital endowment, age, marital status, location, gender, or income sources

Table 2

**Probit Estimation<sup>a)</sup>**  
(dependent variable: labor force participation)

	Without Controls			With Controls		
	Marginal Effects	$\beta$	Standard Error <sup>a)</sup>	Marginal Effect	$\beta$	Standard Error <sup>a)</sup>
Single Parent * 1984	-0.133**	-0.485**	0.116	0.050	0.198	0.158
Single Parent * 1985	-0.182**	-0.663**	0.141	-0.021	-0.085	0.180
Single Parent * 1986	-0.155**	-0.563**	0.148	-0.011	-0.043	0.160
Single Parent * 1987	-0.176**	-0.690**	0.145	-0.013	-0.051	0.196
Single Parent * 1988	-0.108**	-0.393**	0.162	0.078	0.308	0.218
Single Parent * 1989	-0.122**	-0.443**	0.158	0.034	0.133	0.204
Single Parent * 1990	-0.142**	-0.516**	0.143	0.024	0.096	0.196
Nonlabor Income	—	—	—	-0.002**	-0.008**	0.004
Male Head	—	—	—	0.007	0.029	0.058
Age of Head	—	—	—	0.028**	0.108**	0.027
Age <sup>2</sup> (*100)	—	—	—	-0.033**	-0.129**	0.035
Number of Children	—	—	—	-0.041**	-0.160**	0.071
Youngest Child Aged 4 and Under	—	—	—	-0.339**	-1.337**	0.243
Youngest Child Aged 4 to 6	—	—	—	-0.194**	-0.767**	0.179
Divorced	—	—	—	-0.052**	-0.207**	0.076
Widowed	—	—	—	-0.187**	-0.737**	0.130
Occupational Disability	—	—	—	-0.095**	-0.375**	0.068
Years of Education	—	—	—	-0.003	-0.001	0.012
With Complete Degree	—	—	—	0.152**	0.599**	0.071
South Germany	—	—	—	-0.078	-0.306**	0.122
Central Germany	—	—	—	-0.106**	-0.419**	0.069
State Unemployment Rate	—	—	—	-0.018**	-0.071**	0.018
1984	0.221**	0.803**	0.066	-0.134	-0.530	0.484
1985	0.256**	0.933*	0.074	-0.106	-0.403	0.498
1986	0.275**	1.000**	0.073	-0.090	-0.355	0.484
1987	0.284**	1.030**	0.089	-0.082	-0.324	0.502
1988	0.269**	0.979**	0.077	-0.115	-0.454	0.505
1989	0.309**	1.126**	0.088	0.084	-0.332	0.489
1990	0.318**	1.160**	0.082	-0.086	-0.338	0.486
Log-likelihood		-1,559			-1,619	
Observations		3,222			3,222	

<sup>a)</sup> Standard errors are adjusted through bootstrapping to account for multiple observations from the same individual. —

\* Statistically significant at the 10 percent significance level. — \*\* Statistically significant at the 5 percent significance level.

Source: The data are pooled data from the GSOEP, 1984 to 1990.

that are independent of work effort are allowed to vary across the two groups, labor force participation rates move along the same paths over time for both groups.

On the other hand, labor force participation for all single adults is explained by the socio-economic situation of the household. Age positively affects labor force participation rates but decreasingly so. Income sources that are unrelated to earnings have a significant though small effect on participation rates: an additional DM 1,000 of non-labor income decreases labor force participation by 0.2 percent.

Completion of a vocational training or university program significantly increases the probability that an adult works. Having more children and having children of preschool age has a negative and large impact on labor force participation. A high unemployment rate in the state in which the adult lives lowers the probability of participation in the labor force. Finally, widows or widowers and divorced adults are less likely to participate in the labor market than adults who have never married. All of these factors have the expected sign and are statistically significant.

Results from this probit specification suggest that the financial incentives from the increased tax deduction did not induce single parents to enter the labor market. According to the results from the second probit specification, any narrowing of the gap in labor force participation between single parents and single childless adults can be attributed to observable differences between the two groups. For example, over the years the share of divorced adults in the group of single parents has increased at the expense of the share of widowed adults. Such a change affects the labor force participation both because widows and widowers are less likely to participate in the labor force than divorced household heads, and because divorced parents tend to be younger than widowed parents. Similarly, the number of male single parents has increased over the years. Since men tend to be better educated and participation increases with education, single parents as a group are more likely to work over the years compared to single childless adults.

## 6. Summary and Discussion of Results

I find little evidence that adult labor force participation is determined by the financial incentives provided by tax deductions in the German income tax system. The picture that emerges is instead one in which labor force participation is related to the adult's marital status, her age, her human capital endowment, and the number and age of children in the household. Lowering the tax burden for single parents in an attempt to make work pay and to get single parents to enter the labor market to provide for themselves and their children through their own earnings would thus not appear to be an effective policy, at least as implemented over the 1980s. The institutional environment and the lack of adequate child care may have dominated any financial constraints.

These results confirm the findings in Staat and Wagenhals (1994) that single mothers' labor supply in Germany is not determined by financial variables. But they stand in contrast to Eissa and Liebman (1996) who find a more significant treatment effect associated with the expansion of the EITC in the United States. It is not surprising that they find a larger impact for a number of reasons. First, the attitude toward parenting is quite different in the United

States. While in Germany mothers of small children especially are encouraged to stay home with their children — as can be seen in generous maternity leave policies and universal child benefits — no such policy exists in the United States where working mothers are more the norm. Also, child care is more readily available to working mothers in the United States, reducing non-financial barriers to entry.

Secondly, Eissa and Liebman investigate the impact of a rather substantial expansion of a refundable tax credit. Compared to the impact of a tax credit, tax deductions are more regressive and smaller. An increase in a tax deduction by \$2,000, for example, reduces tax liabilities by only  $\tau \cdot \$2,000$ , where  $\tau$  is the taxpayer's marginal tax rate. Under a progressive income tax system, richer individuals have higher marginal tax rates and therefore, benefit more than poorer taxpayers. A tax credit of \$2,000, on the other hand, reduces the tax liability of all eligible taxpayers by \$2,000. If the credit is refundable (low income) working parents who owe no taxes or less than the available credit are entitled to a refund.

Thus, though the empirical work in this paper does not show a significant impact of the expansion in tax deductions in Germany, tax relief in a form that looks more like the EITC may be a more effective policy, particularly if single parents' preferences for work have changed and child care has become more easily available.<sup>3</sup> Tax credits or tax deductions are also desirable welfare tools because they do not have the problem of stigma that is common to other forms of support from the government, which tends to lead to relatively low take-up rates. Blank and Ruggles (1993) estimate that in the United States, the participation rate for Aid to Families with Dependent Children (AFDC) was 62 to 72 percent and for food stamps as low as 54 to 66 percent for the years 1986-1989. With take-up rates as high as 80 to 86 percent for the EITC (Scholz 1994), tax relief may in effect provide a tighter safety net for working poor single mothers than other transfer programs.

<sup>3</sup> The EITC has some shortcomings as well, particularly related to the phase-out region of the credit that provides negative work incentives to higher income taxpayers. For a more extensive discussion of the EITC, the reader is referred to Scholz (1994).

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