

Your Money or Your Time: marketization and work in advanced economies

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The lower rate of work per adult in advanced European economies relative to the US has dominated much policy discussion in the past two decades. In 2000 the rate of employment per adult was 64% in the EU compared to 72% for the US. Hours worked per employee were also markedly lower in the EU than in the US. Together the difference in employment rates and in hours worked per employee produced a huge gap in hours worked per adult between the EU and the US. What factors account for this difference in work time? What are the welfare implications of the difference?

In the early 1990s many analysts tried to explain the difference in employment and hours worked by EU interventions in wage setting and employment regulations that purportedly created a rigid labor market. While some still hold to the rigidity hypothesis, its evidentiary base has crumbled as researchers have probed the data on employment, wages, and institutional interventions in greater depth.¹ The most recent examination of the time series regression models that seemed to support the rigidity argument in the early 1990s finds that the results are non-robust: the sign and magnitude of critical parameters varies with small extensions in years covered, changes in specifications, and measures of key variables.² Some EU wage and employment regulations may reduce employment and some welfare state benefits may increase lengths of joblessness, but there is no scientific support for the claim these factors account for much of EU-US employment and hours differences.

This paper proposes a different explanation of the US-EU work difference – the *marketization hypothesis* that the greater time worked in the US is due to the more extensive shift

¹ Nickell and Bell, 1996 show that EU-US employment gaps have been as large among skilled workers as among less skilled workers. Card, Kramarz and Lemieux, 1994 and Freeman and Schettkat, 2001b show that differences in the employment of workers by industry or occupation are barely related to differences in labor costs by industry or occupation. The big rise in hours worked in the US among the more skilled and among women, whose wages have risen relative to the US average, also runs counter to the rigidity argument (Freeman, 2001). The near uniform finding that changes in the US minimum had negligible effects on employment, further suggests that low wages are not the cause of the US employment miracle (Card and Krueger)

² David Howell (2004)

of traditional household production – food preparation, childcare, elderly care, cleaning houses -- to the market than in Europe, and possibly to greater marketization of leisure activities as well. Since women traditionally do most household production work, the marketization argument is particularly relevant to differences in the market work of women, which in fact constitutes much of the EU-US employment and hours gap.³ In earlier work comparing Germany and the US, we found strong support for the impact of marketization on employment differences. The German-US data showed a near one to one tradeoff between time in household production and time worked in the market for women across the two countries in the early 1990s. German women worked as many hours in total as American women but did their work in the household rather than in the market (Freeman and Schettkat, 2001).

In this study we extend our analysis to additional countries and time periods using time budget data from the Multinational Time Use Study (MTUS) and information on consumer expenditures and employment. Section 1 documents the difference in time worked per adult between the US and EU and shows that the EU-US difference in time worked is greater for women than for men. Section 2 uses the time budget data to link time worked in the market to time spent in household work, leisure, and in residual personal time. Section 3 develops the hypothesis that differential marketization is associated with much of the US-EU difference in annual hours worked and lays out a research strategy to test this claim. Section 4 examines the link between time spent in household production and time spent at work, and the link between household time and consumption spending on market substitutes and employment of persons producing those substitutes. Section five explores factors that help explain differences in marketization among countries: tax and wage incentives, unemployment, interpreted as a demand-side constraint on employment, the educational status of women, and provision of childcare services.

I. Differences in work time, US-EU

Table 1 records estimates of annual time worked among advanced countries from 1970 through 2002, based on OECD data, for various advanced countries. The bottom line in the table gives an unweighted average of the annual work time for the European countries. The estimates of

³In the five advanced OECD countries with the highest overall employment-population rates (Switzerland, Norway, Sweden, Denmark, Netherlands), the employment-population rate for women averages 71 % while in the five advanced OECD countries with the lowest overall employment-population rates (Italy, Greece, Spain, Belgium and France) the employment-population rate for women averages 47%. See OECD, 2003, table B

hours worked per adult in the table combine OECD data on rates of employment per adult and annual hours per employee for 1970, 1980 and 2002. The employment per adult rates are reasonably well-determined across countries, though subject to undercounts of immigrant populations and of work in the underground economy. In addition, the OECD's use of the age group 16-64 as the potential adult working population creates problems due to differences in length of schooling among countries. The more problematic estimates are for annual hours worked per employee. The OECD figures from the 2003 Employment Outlook differ modestly from those in some earlier OECD volumes and from hours estimates given by other sources. Appendix A contrasts hours from various sources over time. It shows that the biggest deviations are for the US, but that even in the US case, all the sources give similar trends. Comparisons of the annual hours by countries with independent estimates of vacation and holiday time and hours worked per week from other sources show similar cross-country patterns to the OECD figures (Bell and Freeman).

In any case, Table 1 tells a clear story about time worked among OECD countries. In 1970 the US had lower annual hours worked per adult than the five European countries for which the OECD provides data. By 1980 the position had reversed, as the US increased hours worked while EU countries reduced hours worked. Still the differences between the US and EU were modest. In 1980 Americans worked just 4.7% more hours over the year than persons in the EU countries covered by the table. Between 1980 and 2002, however, the US increased hours worked further while European countries reduced hours worked, producing the huge 23% differential in 2002. Over the entire 1970-2002 period, the US and Canada are the only countries with rising annual hours worked per adult. Australia had a modest rise in hours worked from 1980 to 2002. These patterns contrast with substantial drops in annual hours worked per adult in many European countries and in Japan and rough stability or modest declines in hours worked in other countries.

Figure 1 decomposes the 1980-2002 change in the US and EU working time per adult into its component hours and employment parts. It shows the \ln change in total work time, the \ln change in the employment rate and the \ln change in hours worked for the US and for an un-weighted average of the EU countries. From 1980 to 2002 the rise in US hours per adult is due largely to an increase in the employment rate while the fall in the EU hours per adult is due largely to a decrease in hours worked. Taking these two patterns together, we estimate that one half of the change in the EU-US difference in annual time worked per adult is attributable to a rising difference in hours worked between the EU and US and one half is due to a rising difference in

employment rates.

Differences in employment rates and hours worked per worker vary substantially by gender, age, and years of schooling between the US and EU. Table 2 shows no EU-US employment gap among all men aged 25-64. It also shows that European men with less than secondary education had a slightly higher employment rate than their US peers (contrary to what the wage rigidity hypothesis would predict). The gap among males is limited to those aged 15-24 and those aged 55-64. Among women, by contrast, there is a moderate employment rate gap for 25-54 year olds, though again the largest gap is for those aged 15-24 years old and those aged 55-64 years old. The employment gap among women is, moreover, concentrated among those with lower amounts of schooling (which one would expect from the wage rigidity story).

There is no cross country data set on hours worked that would allow us to calculate hours differences by gender, age, and years of schooling comparable to the employment rate differences in table 2. The OECD has, however, gathered data on the percentage of workers who are part time by gender since 1990. It reported hours worked by part time and full time employees in 1987. The data on part-time work shows little difference in the proportion of men working part-time in the EU and US in 2000: 6.1% of EU men worked part-time compared to 8.3% of US men. The big EU-US difference in part-time work is found among women: in the EU 30% of women worked part-time in 2000 whereas just 18.8% of US women worked part-time. The data on hours worked of part-time and full-time workers show that on average across nine countries, part-time employees work $\frac{1}{2}$ as many hours as full-time employees. Given this, and assuming for simplicity that men and women work the same number of hours within the part-time and full-time groups, we estimate that US men work 18% more than EU men while US women work 27% more than EU women.⁴

In sum, differences between the EU-US in work time consist as much of differences in hours worked per employee as of differences in employment rates, and are greatest among women and young or older age groups whose commitment to the job market is less strong than that of prime age workers.

⁴ Consistent with this, EU data on “full time equivalent workers” shows virtually no difference in rates of full-time equivalent employees per adults and the regular employment per adult ratio for men but a large difference between the full-time equivalent employment rate and the regular employment rate for women. In 2001, the regular male employment rate was 73.0 in the EU, while the full-time equivalent rate was 71.3. For women, the regular rate was 54.9 but the full-time equivalent rate was 46.0. See *Employment in Europe 2002*. Similarly, the ILO has given annual hours worked for men and women in its [Key Indicators of the Labour Market 1999](#). These data show larger differences in hours worked between the genders in the EU than US data shows for American workers.

2. Time budget Data

What do Europeans do with the greater non-work time that they have compared Americans? Alternatively, what non-market activities do Americans forego by devoting more time to work than Europeans? Standard analyses of the EU-US employment gap ignore these questions, implicitly assuming that people in different countries either spend non-working hours similarly or that any differences in the allocation of time among non-market activities are irrelevant to differences in market work. We take the opposite tack and analyze the extent to which the rising difference in the EU-US annual hours worked is associated with different usages of time outside the market. To examine links between market and non-market time we analyze time budget data across countries over time – a form of evidence that researchers have not previously applied to the EU-US employment gap. In this section we describe briefly time use studies in general and give some of the particulars of the studies that we use.

Time-use surveys ask respondents what they did over a day, where they did it, with whom they did it, and what other activities they may have done in the same period (see Robinson and Godbey; Juster and Stafford; National Research Council). The surveys that we use in this study asked respondents to fill out a time diary either when they engage in the various activities or asked them to report on one days' activities on the following day. In some cases time diaries ask what people did in different time slots – for instance from 8 to 9. In other cases, they ask for a history of daily activities. The activities that people report are fairly detailed: time listening to radio, cleaning up, socializing at a pub, cooking, washing up, time spent on excursions, as well as time in paid work.

Most time use studies ask people about what they did for one or two days in a week rather than over a longer period. Since time use varies by day, particularly between weekend days and working days, analysts traditionally aggregate data to obtain time allocation for a representative person over an 'artificial week'. The time use of persons interviewed, say, on Monday, is combined with the time use of persons interviewed on Tuesday and so on, to give a full weeks' activity for a sample respondent. If persons are sampled randomly and weekdays are represented evenly, this procedure produces an unbiased estimate of average time spent in various categories. The data for individual persons will, however, contain many zeros because some activities are performed infrequently. These zeros are similar to the zeros in expenditure surveys for durable goods and cannot be taken as valid estimates of the actual time an individual spent on the activity.

For instance, persons who reported that they spent no time in church on a Wednesday survey may spend just as much time in church on Sunday as persons who reported about their church-going behavior on a Sunday survey.

An alternative method of obtaining time budget data collects data for all days in a week and thus produces actual weekly time-use patterns for individuals. If the survey samples the population randomly, this procedure produces unbiased estimates of individual time spent on specific weekly activities. Observed zeros reflect actual zeros for activities that are performed once a week rather than a sampling artifact. This design has problems, however, for activities that may occur in some weeks rather than others. A sample scheme that covers 1-2 months for instance can overestimate or underestimate market work, depending on whether the survey period covered seasonal vacation or holiday times. Since a considerable portion of US-EU differences in time worked consists of differences in lengths of vacations and in numbers of holiday days per year, the ideal data for our analysis would be surveys that sample persons randomly for all weeks in a year and that obtain time data for them for every day in at least one week. Unfortunately, most existing time use surveys do not have an ideal sampling design, which impels us to make various adjustments toward the ideal in our analysis.

Our data come from the Multinational Time Use Study (MTUS) developed by the Essex University in the UK (<http://www.iser.essex.ac.uk/mtus/index.php>). Researchers at Essex have organized the time use surveys for 11 countries – the US, Canada, UK, Germany, Norway, the Netherlands, Italy, Austria, and Australia, Sweden, Finland⁵ – onto a comparable form that gives minutes spent on activities harmonized into a 41-activity typology (AV).⁶ We use the data for all of the countries save Australia and Finland (which were not available to us). Appendix B provides some technical information about the MTUS surveys. There are five survey years for the US, Canada, and the Netherlands, three for the United Kingdom, two for Sweden, and single surveys for Austria, Norway, Germany, and Italy. The surveys differ ways across countries and often in the same country across the years. The sample sizes range from 25,775 respondents in the 1991/92

⁵ Data for Australia, Sweden, Finland are only available by special permission from the countries. We obtained access to the Swedish data. We thank Lennart Flood (Gothenburg University) for generously sharing his files with us (see also Flood/Grasjoe).

⁶ Although the first major time-use studies of the 1960s were designed for international comparisons (Szalai et al. 1972), international comparative work on time allocation is rare.

German time use survey⁷ to 1151 in the 1998 US time use survey⁸. Response rates vary from 79%⁷ in the 1975 Netherlands survey to 20% in the 1995 Netherlands survey.

Appendix table B shows that surveys differ in the diary frame and sampling period over which they gather data. The Dutch and UK surveys ask individuals what they did over an entire week, which makes it valid to compare weekly time use among individuals. Most country surveys, however, ask respondents for one-day diaries, although they sample respondents over the seven days of the week. As a result, our analysis is based largely on comparisons of synthetic groups consisting of all persons with specified characteristics who report on their time allocation in a week. In addition, we focus on prime age workers, defined as those in age groups between 25 and 54, for whom the trade-off between market work and household work is likely to be particularly important, and leave analysis of the decisions of persons of school age and of retirees to future work. We categorized 25-54 year old persons along the following dimensions: gender, presence/absence of children less than six years of age, education divided into four groups⁹, and age divided into three groups. This gives us 48 cells for each country survey. With 24 surveys covering nine countries, we end up with a potential sample of 1152 grouped observations, derived from 96,000 individual observations for the age groups 25 to 54 years. Differences in the length of the survey period among countries create a further problem. The studies for the US, Canada, Italy, and Norway gathered time use diaries each day over the year, and thus represent an unbiased sample of days over the year. But the other countries cover shorter periods. The German study covered just 8 months, the Dutch study covered one month, the 1995 UK study covered one month, and so on. Samples that cover only some months are likely to give upwardly biased estimates of annual hours and days worked when the months covered exclude vacation periods than would come from a sample of all months and give downwardly biased estimates of annual hours and days worked when the months covered include those with an exceptional number of holidays. To obtain valid cross-country comparisons, we adjusted the data for this problem in all of the countries with less than annual sampling frames, as described in Appendix C.

Allocation of Time

⁷ We used data for the former West Germany only because East Germany was in 1991/1992 a 'transition economy' not comparable to Western economies.

⁸ The US 1998 survey covered just one day. Thus, the sample size for getting data on a full week of time is 1/7th the observations. With only 1151 observations, the US-1998 survey has only 165 observations for each artificial week. Because this survey has so few observations and showed some peculiar patterns, we use it sparingly.

The MTUS has data available on 41 separate activities, which we summarize in appendix D. While for some purposes we examine time spent on detailed activities, most of our work focuses on four aggregate categories of time use: work time, defined as time in paid work, time in paid work at home, and time in travel to/from work (AV1-AV5)¹⁰; time spent in household production (AV6-AV12), time spent in leisure (AV17-AVAV25 and AV29-AV41); and personal time (AV13- AV16 and AV26-AV28).¹¹

Table 3 records the average weekly hours spent by persons aged 25-54 on our four aggregate time categories: market work (M), household work (H), leisure (L), and personal time (P) in a given week. Each row also records the standard deviation and the coefficient of variation of time use for each category. Since total time per week is fixed at 168 hours, the figures in the column giving the means sum to that number. The top panel gives the weekly hours of time across all of the surveys in our analysis. It shows a substantial difference between men and women in market time and household work, but rough similarity in leisure time and personal time. Men average 41.3 hours per day in market work and 17.5 hours of household work for a total hours worked per week of 58.8 hours. Women average 22.4 hours a week in market work and 34.3 hours a week in household work for a total of 56.7 hours per week.

The panel labeled US, 1992 gives the average hours per week for persons in the 1992 US survey. We focus on the 1992 US survey rather than on the 1998 survey due to the small sample size of the 1998 survey and some peculiarities in the patterns of change from 1992 to 1998 that suggests that sample size or some other aspect makes it less comparable with the other surveys than the 1992 US survey.¹² The paneled labeled EU 1989 or later gives an un-weighted country average for EU countries in approximately the same period as the 1992 US survey. It is based on a single survey for the EU countries with multiple surveys, with the year chosen closest to 1992. These two panels show that US women allocate many more hours per week to the market than European women: 28.7 hours a week versus 20.7 hours for a huge 8.0 hour difference. If the marketization hypothesis is correct, most of this difference will be counter-balanced by a difference in household work time in the opposite direction. Indeed, American women report

⁹ We reclassified the initial MUTS educational classification (see Appendix C).

¹⁰ AV4 (education) is very small in the age groups 25 to 54 years we are analyzing.

¹¹ See Appendix D for details.

¹² From 1992 to 1998 work time increased in the US as the economy pulled out of recession, but the 1998 time budget survey shows a decline in hours for men compared to the 1992 survey. It also shows a huge rise in household work

working 10.4 hours less in the household than EU women (30.1 versus 40.5). Among men, by contrast, the difference in hours worked is modest: 44.1 hours in the US vs 43.4 hours in the EU. This effectively mirrors the finding in the OECD data – that time worked differs more between women than men in the EU and US, though the magnitude of differences are smaller in the MTUS data. Appendix C provides a detailed comparison of the time worked in the MTUS and time worked reported by the OECD.

Table 3 also reveals some surprising differences between American men and European men in the other categories. It shows that American men work 2.5 hours more in the household than European men as well as working more hours per week while spending 1.0 hours less time in leisure and 2.9 hours less in personal time. However, the underlying data for countries shows that most of this pattern results from the extreme outlier hours reported by Italian men. The Italians report just 8.2 hours of household work, above average leisure time, and extraordinarily high personal time. Excluding the Italian sample from the EU average as an extreme outlier that distorts the European data, the EU and US allocations of time by men are quite similar.

Variation in time allocation

The standard deviations and coefficients of variation in the hours spent among activities in table 3 reveal substantial variation in how men and women allocate their time between market work and other activities. To determine the main features of this variation, we have performed an analysis of variance (ANOVA) on the time worked in the synthetic groups that we created from the MTUS data. Table 4 records the results of our ANOVAs for each of the forms of time use taken separately, with countries, the year of the survey, education groups, and various interaction terms.

Among men, the ANOVAs show modest country differences (a probability for the F of just 0.146) and even smaller education differences in hours spent on market work but substantial variation by country across surveys conducted at different times. The uniform pattern is that men in the 25-54 age group spent considerable time at work in each country and education group. By contrast, the ANOVAs for household work time and leisure time for men reveal sizable country and time effects in these areas, while the ANOVA for personal time gives significance to education and some interaction terms. Overall, however, the main factors and interaction factors

among men, which if true, would surely have generated headlines.

account for only a modest proportion of the variation in the allocation of time among groups of men, which suggests that the variation that exists among groups may be idiosyncratic. The significant country-survey interactions, however, tell us that there are differences in trends at the country level, though we only have multiple surveys for five countries.

The ANOVAs for women look very different. Education plays a major role in the variation in market time and household work time. Country differences are also more significant contributors to the variation in market time and are an important contributor to the variation in other forms of time as well. In addition, the ANOVAs show greater variation among women than among men in all forms of time allocation except personal time. This reflects the greater change in women's roles in the work force and household over time and among countries – the differential marketization of household activities on which we will focus.

Treating the uses of time separately ignores the potential trade-off between the forms. Since the use of time sums to a fixed amount, if we divided time into market and non-market categories, there would necessarily be a -1.0 correlation between the two among individuals or groups. An hour more of work time in a day would mean an hour less of non-market time. With four groups, there is no such necessary correlation: some forms of non-market time could be highly negatively correlated with market time while others were less negatively correlated, and the different usages of non-market time could be positively or negatively correlated among themselves. Table 5 gives the correlations among the various forms of time allocation for men and women in our grouped data. The correlations differ noticeably by gender, which implies that men and women differ in the substitution/complementarity of activities. The negative correlation between market time and household time is larger for women than men, while the negative correlation between market work and leisure is larger for men than for women. These patterns suggest that for women household work and market work are substitutes while for men leisure and market work are substitutes, and thus that marketization of household work will give a better explanation of differences in female work time across countries than of differences in male work time across countries.

3. Marketization Hypothesis

The marketization hypothesis that we develop to help explain the differences in annual hours worked among advanced economies has three parts.

The first part relates to the substitution among various activities. The simplest economic

model of hours worked groups all non work activities as a single category. By contrast, the marketization hypothesis is that there is a fine structure to non-market time, with differences in market work time more closely negatively associated with differences in household work time than with differences in leisure time or personal time. Given the correlations in table 5, this story seems more applicable to women than to men, though we still expect substantial negative linkage between household work and market work among men.

The second part of the hypothesis is that among the categories of non-market time, the greatest variation in time use over time occurs for household work. This implies that even if leisure or personal time is equally or more substitutable with market time than is household work time, changes in household work time are the main driving force for changes in market work. Declines in household work time will be associated with increased supply of labor to the market.

The third part of the hypothesis holds that the marketization of household activities increases the demand for labor in sectors that produce goods and services to replace the foregone household production, as well as the supply of labor.

Figure 2 illustrates the dual impact of marketization of household production on the supply of labor and the demand for labor. On the supply side, marketization shifts supply from S to S' by “freeing” time from household production. This generates an increase in employment from E to E' . On the demand side, marketization increases the household demand for market goods and services to substitute for the foregone household production. This shifts the demand curve from D to D' and creates greater employment as well, from E' to E'' .¹³ The power of marketization comes from the fact that it shifts both the supply and demand sides of the market in ways that increase market employment.

What factors lead a household to shift from producing goods and services at home to purchasing those goods and services in the market? In principle, the decision depends on the difference between the opportunity costs of household production (lost work time for the employed) and the price of the good/service in the market. Box 1 lays out the basic micro-economic framework for examining the determinants of opportunity cost and market price. Implementing this model for households requires measures of the price incentives facing different groups. Implementing the model at the level of an entire economy/market is more difficult

¹³ How marketization affects wages depends on the reasons for the change in behavior and the correlation between household productivity and market productivity among individuals.

because marketization creates positive feedbacks between expansion of services and female employment. If, for some exogenous reason, say immigration of less skilled persons, the economy offers more services that substitute for household production, people will find it easier to combine market work and families duties. This should induce higher labor force participation, which in turn will increase the supply and demand of labor. Similarly, if persons in the household sector decide to go into the market for some exogenous reason – say development of fast food technologies -- this will raise the demand for those technologies and for workers producing those substitutes. The model allows for a high market employment/low household production equilibrium and a low market employment/high household production equilibrium; and for a dynamic adjustment process in which the movement of persons from the household to the market creates additional substitutes, which in turn induces more persons to enter the market, and so on.

Research strategy for assessing marketization

To see how much differential marketization of household production contributes to the difference in hours worked per adult between the EU and US, we need three types of data.

The first form of data that we need is time budget data. We need this to identify the substitution between time in household production and time at work and changes in household production time over time. If women or others who work more hours in the US than in the EU spend the same time in household production as comparable persons in the EU, the hypothesis fails. It would also fail if the increase in the work time of US women compared to EU women occurred without any sizable compensating reduction in household work time.

With time divided into four categories –market work time, M; household work time, H, leisure time, L and personal time (sleeping and related normal time intensive activities), P, we estimate the linkage between market time and household time and between market time and the other forms of non-market time in three ways. First, we use a linear form to relate hours worked in the market to household work time and leisure:

$$(1a) M = -a H - b L$$

In this specification, the notion that household and market time are closer substitutes than market time and leisure implies that $a > b$. A reduction in household work time leads to a greater increase in market time than does a reduction in leisure time. The closer the parameter a is to unity, the greater is the substitution of household work for market work. Since other family members could substitute for time worked in household production and people could take time out of leisure or the

omitted category of personal time, a could be less than b or considerably below unity.¹⁴

Second, we relate hours worked in the market to the ratio of household hours worked to leisure and personal time.

(1b) $M = -a H/(L+P)$, where $L+P$ is the sum of leisure time and personal time.

In this specification, we take account of all forms of time, using the non-linear ratio form to avoid the collinearity that would result from including all forms of time in a linear equation. The hypothesized greater link between household time and market time shows up in (1b) in the form of a positive a coefficient. Persons who spend more of their non-market in household work are expected to do less market work than persons who spend more of their non-market time on leisure or personal activities.

Since the decision to allocate time between household and market work is a simultaneous one, specifying market work as the dependent variable and household work and leisure/personal time as independent variables is arbitrary. Our third specification reverses the direction of the analysis to take the ratio of household to leisure and personal time as the left hand side variable and market time as the right hand side variable:

(1c) $H/(L+P) = A - a M$

In this equation the marketization hypothesis holds that $a > 0$ so that an hour of market time comes proportionately more from household time than from the other forms of non-market time.

The second data needed to assess the marketization hypothesis is consumption expenditure data to identify the market goods and services that substitute for the foregone household production. Less time spent in meal preparation at home should, for example, produce greater expenditures on food in restaurants or of prepared meals to eat at home. If households spend the same amount on consumption items regardless of the time they devote to household work, the hypothesis fails. Since persons are likely to shift into market work when they become more productive in the market than in household production, marketization should raise income inclusive of lost household production¹⁵. This should itself lead to increased market spending. If Y is income (ideally adjusted for lost household production), in linear form, we will estimate variants of:

¹⁴ We also recognize that this pattern may hold over some levels of household work, market work, and leisure and not at others. For instance, an increase in market work from 0 to say 20 hours a week might take more time out of household work while a further increase might take more time out of leisure.

(2) $MS = -a H + b Y$, where the dependent variable MS is market spending on goods and services traditionally produced in the household.

A more general specification of the consumption equation would compare consumer expenditures on all goods and services between households with more/less time worked in household production.

Third, we need employment data to identify the workers producing the goods and services in the market that replace the previous household production. Employment in the restaurant sector, childcare, cleaning, and related areas should be higher as a result of greater market production in those areas. If sectors that produce traditional household goods and services in the market have similar rates of employment per adult in the US as in the EU, (say because productivity in those sectors is higher in the US), the marketization hypothesis will fail to explain employment differences. Again in linear form, we have:

(3) $ME = c MS$, where c is an input-output coefficient relating spending to employment in the affected sectors.

A more general specification would follow the effects of spending through input-output tables on final sales and employment.

Ideally, the coefficients in equations (1)-(3) would be the same in the US and the EU, indicating that workers respond similarly to different incentives within the two settings and across them. In this case, the natural measure of how differences in marketization contributed to the EU-US gap in market work would be the sum of direct effect of marketization on the supply of labor available to the market sector plus the indirect effect of greater demand for market services,

Cross section analysis of household - market work trade-off

Is there a greater trade-off between household time and market time than between leisure and personal time and market work, per equations (1a) - (1c)?

We have examined this question using several related specifications of the linkages among the various usages of time, using both a cross-section and longitudinal design. The preponderance of evidence shows a stronger link between market and household work than between market and other time activities for women, but roughly similar relations between market time and household time as between market time and other forms of time for men.¹⁶

¹⁵ It invariably raises measured income, which excludes the value of household production.

¹⁶ The answer is not unequivocal because the magnitude of parameters depends on functional form. While all the

Table 6 presents the results our cross-section analysis for women (panel A) and for men (panel B) in all of the MTUS surveys taken together. The columns report results for variants of equations (1a)-(1c) with the same set of covariates: dummy variables for presence of a child below 6, education, and age and dummy variables for each survey. By including dummy variables for each survey, the calculations examine cross section patterns within countries in a given time period.

Column 1 in Panel A records the results of regressing hours of market time per week on household time and leisure time for women using the linear specification (1a). It shows that increases in household time and in leisure time have sizable negative impacts on market work time, with the coefficient on household time modestly larger than that on leisure time. Relative magnitude of the coefficients aside, the -0.93 impact of household work on market work is sufficiently large to explain the EU-US annual hours gap among women in the 1990s. According to table 3, European women spent 10.9 hours more in household work than American women in that decade. Multiplying 10.9 by -0.93 gives a predicted difference in hours worked 10.1 hours – which actually exceeds the observed difference in hours worked per week of 8.8 hours in table 3. The excess is reflected in the table in the greater leisure hours of US women than of EU women, which acts to reduce the difference in hours worked in the market.

The second regression estimates the link between market time and a nonlinear measure of the division of non-market time between household time and the sum of other forms of non-market time, $H/(L+P)$. The coefficient on $H/(L+P)$ is negative, consistent with the claim that household work time has a relatively larger link to market time than other forms of non-market time. The coefficient is large because the dependent variable is measured in hours while the independent variable is a ratio. Finally, the third regression alters the functional relation between the time variables by taking log transforms of the time variables. This gives an estimate of the elasticity between the market time and the ratio of household work time to other forms of non-market hours of -0.72. For comparison, we also estimated the relation between market time and the ratio of leisure time to personal time plus household work time (not reported in the table) and obtained an elasticity of -0.29. The larger impact of household time on market time than of leisure time on market time supports the claim that household and market time are more closely linked for women.

forms we used – linear, loglinear, and log odds ratio (not reported in the table) showed a greater impact for household time than for leisure – there are possibly functional forms that might give a different picture.

The regressions that use M as the dependent variable suffer from a statistical problem. Although the data relate to group averages in cells, market time is zero in some cells. In regressions 1 and 2 this produces a non-normal error term. In regression 3, this reduces the sample size by 94, since the \ln transform cannot deal with $M=0$. While there are statistical ways to treat the problem such as Tobit regressions, we deal with this problem by estimating a reverse regression, linking the allocation of non-market time, which is positive in all cells, to M . We explore potential non-linear effects of M on the allocation of non-market time by breaking M into categories.

Regressions 4-6 of the table report the results of estimating the effect of market hours and covariates on $H/(L+P)$. Regression 4 of $H/(L+P)$ on M gives a significant coefficient of -0.02 on M . This coefficient may seem to be small but in fact, it is substantial: it implies that an increase in market work of, say 10 hours reduces the ratio of H to $L+P$ by 0.20 points. But the simple linear relation does not fully fit the data. In regression 5 we replace hours of market work with a set of dummy variables, reflecting the amount of work the woman does per week relative to the deleted group of 0 market work. The coefficients on the dummy variables show that the household work/other non-market time ratio barely changes between 0 market work and market work up to 10 hours, then falls for each ensuing group as the hours worked rises. Persons working above 40 hours have a ratio of household time to other forms of nonmarket time that is 0.14 points lower than the ratio of household to other nonmarket time for those working 0 hours or those working fewer than 10 hours. In the last column, we transform the time variables into \ln form and obtain an elasticity of the household/other non-market time ratio to market work of -0.17 . Here, the sample falls because of the deletion of cells with 0 hours of market work. Finally turning to the covariates, all of the regressions for women show that women with children and older women work many fewer hours in the market, and that more educated women work more hours.

Panel B of table 6 records the results of similar regressions for men. The regressions for market time give noticeably different coefficients on the measures of non-market time than the equations in panel A for women. Regression 1 shows that hours spent in household work and hours spent in leisure have near unit impacts on hours worked. Regression 2 for men gives a larger negative coefficient on the relation between $H/(L+P)$ and market work than did the comparable regression for women. This reflects the greater hours worked in the market for men than for women and smaller ratios of H to other forms of market work. Most important, the

estimated elasticity between the market time and the ratio of household work time to other forms of non-market hours in column 3, which adjusts for these differences in scaling, is -0.17 , which is less than a quarter the elasticity for women in the same column.

The pattern of coefficients for regressions 4-6 in which the allocation of nonmarket time is the dependent variable also reveals differences between men and women. In regression 4, which relates $H/(L+P)$ to M , the coefficient on M for men is just $-.011$, which is half that for women. In regression 5, where we decompose market time into categories, the coefficients for men working relatively many hours, where most male observations are, are smaller than the coefficients for the comparable groups among women. Finally, the regression of $\ln H/(L+P)$ on $\ln M$ in the last column gives a higher elasticity for men than for women. This reflects the difference in the levels of market and household work. If we treat the regression of $\ln H/(L+P)$ on $\ln M$ as a reverse regression estimate of the impact of the allocation of non market time on market time, the coefficients for women from regressions 3 and 6 give a range from -0.72 to -5.88 (the inverse of the regression coefficient from the regression of $\ln (H/(L+P))$ on $\ln M$) while the coefficients for men give a range from -0.17 to -3.85 . While the ranges of estimated elasticities are wide, the data indicate that household work tends to have a larger negative impact on market time for women than for men.

The unemployed

Thus far, we have treated the allocation of time between market work and other activities as a simultaneous one, with persons free to choose market work and non-market activities. We have examined the trade-off between market work and the other forms without privileging one form of activity as pre-determined. For one group of workers, however, it is reasonable to assess the trade-off by taking market time as exogenously constrained and to examine the relation as reflecting the impact of this constraint on the division of non-market time. This group is the unemployed, who cannot by definition work the hours that they desire to work. Given this constraint, how do the unemployed allocate time among leisure, household work, and personal time?

Table 7 shows the allocation of time per day between persons who report themselves as unemployed in the survey week and those who are employed and work during the survey day and the differences between the two groups in the allocation of hours. Although the surveys categorize people as unemployed in the usual way, the unemployed report working a small number of hours

during a day. This reflects doing some odd jobs while lacking a “real” job. Looking at the allocation of non-work time, unemployed women spend an additional 2.1 hours a day in household work. However, there is considerable variation among countries in their allocation of time, with women in the Netherlands spending 0.5 additional hours per week in household work while those in the US spend 3.0 additional hours per week in household work. Unemployed women also increase their leisure time, by approximately 3.1 hours per week, again with a range across countries. In addition, unemployed women report on average 1.1 more hours a week on personal time. Thus, women allocate approximately one-third of the forced non-market time to household work, $\frac{1}{2}$ to leisure, and $\frac{1}{6}$ th to personal time.

The allocation of time between unemployed and employed men is quite different. They increase the amount of time to household work by 2.0 hours, comparable to that for women, but increase leisure and personal time by much larger amounts than do women. One quarter of their enforced non-work time goes to household work while over one half goes to leisure and one-fifth to personal time. Because men work more hours in the market per day than women, unemployment creates an additional two hours per day of enforced non-work time.

Overall, treating unemployment as an exogenous shock, the difference between the allocation of time by the unemployed and employed supports our earlier conclusion that household work and market work are closer substitutes for women than for men and that leisure time is a closer substitute for market work for men.

First Difference and trend analysis of household and market work

The second part of the marketization hypothesis is that changes in household time greatly affect market time because household time use changes more over than other forms of non-market time use. To examine this in our data, we calculated the change in the four categories of time for men and women in the five countries that have multiple MTUS surveys (US, Canada, UK, Netherlands, Sweden) from the earliest survey to the latest survey. Among women, the unweighted average change in household time across the countries was - 1.13 hours per week compared to a -0.01 change in hours of leisure per week. Among men, the unweighted average change in household work was 1.23 hours per week compared to a change in leisure of -0.23 hours per week. In all countries but Sweden, the decline in hours in household work for women exceeded any decline in leisure hours. In all countries but the US, the increase in household work time among men exceeded any decrease in leisure. If we apply the coefficients on household time

estimated from the cross-section data given in regression 1 of table 6 to the average change in hours of household work we can explain the average change in market work for women and men in our data. But, we believe that it is more appropriate to use estimates of the tradeoff between hours of market work and hours of household or other work from time series or longitudinal data to explain trend data.

Accordingly, we have examined the change in M, H and L from one survey to the next in each of the cells in our aggregated data. Since each cell is same, we exclude covariates from our analysis and simply regress ΔM on ΔH and ΔL in a first difference analysis that takes as observations the change in the hours spent on activities in a cell from year t to the next survey. Since we are limited to the five countries for which we have multiple surveys and lose a year by the difference format, we reduce our sample size substantially – to 240 cells for women and 246 cells for men. Table 8 presents the regression results. For women we get a negative coefficient near unity on the change in household time, which compares to a smaller negative coefficient on the change in leisure time. In this case, marketization of household activities affects the trend in hours worked substantially for two reasons: the larger impact of household activities than leisure on market work and the larger changes in household activities than in leisure time. For men, we get comparable negative coefficients of approximately minus one for both household time and leisure time. In this case, it is the increase in household time compared to the modest decrease in leisure time that helps explain the trends in market work.

Figure 4 provides a simple summary picture of the patterns of change within the five countries in our data. The horizontal axis records the change in household hours worked from the earliest year for which we have time use data (1965 for the US, 1971 for Canada, and 1975 for the UK and the Netherlands; 1984 for Sweden) to the most recent period (1998 for Canada, 1993 for Sweden, 1995 for the Netherlands and UK, and 1992 for the US¹⁷). The vertical axis records the change in hours worked in the market over the same period. The observations identify the country and the gender. The observations for women lie in the bottom right quadrant. They show that women decreased their household work time and increased their market work time. The observations for men lie in the upper left quadrant save for the Netherlands. They show that men

¹⁷ In this calculation we do not use the 1998 US survey because of problems described earlier. Including this survey as the final period for the US gives results comparable to those in figure 3. See Freeman (Can Marketization Explain the US-EU employment gap? (Freeman 2004), which uses the 1998 US data.

increased their household time and decreased their work time. Taking the two genders together, the observations fit along a well-defined negatively sloped linear curve. The univariate regression of the change in market hours on household production hours gives a coefficient of -0.97 .

From household work to ... consumption spending ... and employment

The third part of the marketization hypothesis holds that changes in household production generate changes in consumption spending and employment in the market sector that produces goods or services that substitute for household production. Because time use data do not readily map into consumer expenditure data and consumer expenditures do not readily map into industry or occupation employment data, we cannot examine this claim using a broad set of measures of household time and consumption and employment. Rather, we focus on two activities/consumption items where the link between household production and market production is particularly strong: food preparation and childcare.

Table 9 compares expenditures on restaurants/hotels and private food and beverage consumption from national income account files of the OECD with MTUS data on time spent cooking at home.¹⁸ Column 1 gives hours per week spent cooking at home from the MTUS files for each country. Consistent with the data on total time spent in household production, Americans spend much less time in cooking and cleaning up than Europeans: 4.1 hours per week versus 6.9 hours per week for Europeans. Column 2 gives the actual spending on restaurants/hotels in each country relative to spending in the US (=100.0), using 1999 purchasing power parity prices to place the country expenditures on the same scale. European countries spend just 38% on average as much as the US on restaurant/hotels. The difference is attributable to smaller consumption spending per head and to the smaller share of consumption spending on restaurants/hotels. Column 3 gives comparable figures for spending on food and nonalcoholic beverages, again scaled relative to the US. Here the US advantage, due largely to its higher total spending per capita, is modest. Finally, column 4 shows the ratio of spending on restaurants/hotels to spending on food and beverages. The US spends more than twice as much relatively on restaurants/hotels as do the European countries.

¹⁸ The expenditure data cannot distinguish hotels and restaurants in most countries (see OECD national accounts data). For countries, which distinguish the two in their data, hotels are approximately 10% of the expenditures in the combined category.

The underlying consumption data show a striking contrast between the US and Germany.¹⁹ Households in the two countries spend about the same share of household budgets on food, beverages, tobacco, and miscellaneous related items, but the US spends twice as large a share on restaurants as do the Germans: 16.7% of the US consumption budget goes for expenditures in restaurants, etc and miscellaneous goods and services compared to 8.3% of the German consumption budget. Since Americans have higher incomes per capita and consume a larger share of their budgets the difference in spending per head in table 9 is even greater. Going beyond the US-German comparison to look at all of the countries for which we have data, there is a sizable negative correlation between the ratio of spending on restaurants/hotels and food and beverages at home and time spent cooking at home. The rank correlation between spending on restaurants relative to food and beverages at home and time spent cooking at home and for the countries in table 9 is -0.77 .

Finally, because restaurants and hotels are an industrial classification, we can take the analysis a step further and estimate the impact of the greater market production of meals in the US on employment. Figure 4 graphs the relation between expenditures per capita on hotels/restaurants (relative to the US) and employment per capita on hotels/restaurants for 12 countries over the period 1970 - 2000 (5 year intervals, 53 observations). Although factors other than domestic spending affect employment in the hotel/restaurant sector, such as tourism, degree of outsourcing, and productivity, employment per capita follows closely the spending per capita. The number of workers employed in the hotel/restaurant sector per adult is higher in the US than in the European countries. Again, the comparison with Germany is particularly telling. In the US there are 5.6 persons working in the hotel and restaurant sector per adult. In Germany there are 3.5 persons working in the hotel and restaurant sector per adult. The regression of \ln employment per capita on \ln expenditures per capita on hotels/restaurants gives a sizable coefficient of 0.69.

Household vs market provision of child care

Whether parents care for children at home or use market substitutes is a major factor in whether mothers with young children work or not. In the US married mothers with young children work regularly. In 2002 61% of married mothers with children less than 6 years of age participated in the labor force; 57% of mothers with children less than 1 year of age also

¹⁹ Looking over time we also find that the ratio of hours spent in restaurants to hours spent cooking and cleaning up at home rose substantially in Canada, the US, and UK and rose modestly in the Netherlands in the 1980s and 1990s.

participated in the labor force. From 1970 to 2002, the participation rate of US women with young children roughly doubled, contributing substantially to the rise of female employment in the country.²⁰ There are three ways in which the families with working mothers of young children could substitute childcare time for mothers' time: through additional childcare by the father; through informal child care arrangements by other family members or neighbors; or through increased formal child care in the market. The marketization hypothesis directs attention to the use of formal childcare through the market.

Table 10 records estimates of the time spent on childcare and in market work by women and men with children less than four years of age in the various countries in the MTUS data. The first two columns relate to the allocation of time by women. They show that American women with children less than 4 years old spend 10.8 hours a week in childcare while averaging 19.1 hours a week in market work. By contrast, women in the EU countries and in Canada spend many more hours with children, and fewer hours with market work. The unweighted average of hours spent in childcare for women in the European countries is 17.5 compared to 12.8 hours work time. The next two columns give figures on the allocation of time by men. The data for men show that the Americans are not substituting male time for female time in household production of childcare. American men spend just 4.2 hours a week in childcare, compared to a 7.5 unweighted average of hours spent in childcare for men in the European countries. American men average 42.5 hours in market work compared to 41.9 hours for the men in the covered European countries.

Although the time budget data are for individuals rather than families and exclude the time spent caring for children by older siblings or grandparents, the sum of female and male hours of child care and market work given in the column labeled synthetic family still provides a rough estimate of total parental time spent on children and of parental time spent working. In total, men and women spent 15.0 hours in childcare in the US compared to 25.5 hours in childcare in the European countries – a 10.5 hour difference. This differential is almost perfectly reverse matched by the times spent in market work – 61.6 hours in the US compared to 54.8 hours in Europe. The marketization hypothesis suggests that the differential in household production of childcare services and market work should show up in differences in market production of childcare services.

²⁰ US Census Bureau, Statistical Abstract of the United States, 2003, table 598.

Because Europe produces childcare publicly to a greater extent than does the US, we do not look to data on private spending on childcare to assess this prediction. Data on private expenditures would show that parents in countries like Sweden or France spend little on market production of child services when in fact they use those services, as provided by the state rather than private organizations.²¹ Our measure of market production of child care services is the percentage of children under the age of three using formal day care arrangements. The last column of table 10 gives the estimated proportions of children in this age group in formal day care arrangements in the US, Canada, Australia and six European countries. The US, Canada, and Sweden have the highest proportion of children less than 3 years of age in daycare while the Netherlands, Germany, and Australia have the lowest proportions. The unweighted average of the percentage of children using formal day care in the European countries is 24 percentage points below that in the US (29% vs 54%). The implication that mothers working is closely tied to provision of childcare services. Indeed, the hours worked by women in the market in column 2 is perfectly rank correlated with the proportion of children using formal day care arrangements for the five countries for which we have both sets of data. Employment-population rates for women in the nine countries for which we have the day care arrangement data are rank correlated at 0.75 with the proportion of children using day care. Looking at regions within Germany, van Ham and Buechel report higher employment rates for mothers working in regions with a high density of childcare provision, other factors held fixed.²²

In sum, the data on the use of formal day care arrangements and on hours spent in childcare fit the marketization hypothesis: Americans spend less time taking care of their small children than do Europeans, which allows them to work in the market and which adds demand for childcare workers in the market. While we do not have data on employment of childcare workers across countries, the greater use of formal childcare arrangements almost certainly has to produce commensurate differences in the relative number of childcare workers between the US and EU.

5. Differential marketization: causes and implications

The preceding analysis has shown that differences in time spent in household production

²¹ Freeman and Rein (1988) found that much of the difference in private spending on specific forms of services between the US and Sweden was due to Swedish provision of the same services through the state. We expect that this is still true and that it will also be true, at least to some extent between the US and the other countries.

²² See Maarten van Ham, Felix Büchel, “Unwilling or Unable? Spatial, Institutional and Socio-Economic Restrictions in Females' Labor Market Access” <ftp://ftp.iza.org/dps/dp1034.pdf>

are an important correlate of the US-EU jobs gap. Higher employment in the US is associated with lower production of goods and services in the household, and greater production in the market of traditional household products such as food production and childcare.

What has caused the greater marketization? What are the welfare implications of the differential marketization of household activities?

The micro-economic analysis summarized in Box 1 suggests that differences in marketization result from differences in the relative cost of producing goods and services at home versus the market, and thus depend on such factors as: the wages of the less skilled workers who provide the labor input for market substitutes for household production; the tax rate on women or other persons who have historically specialized in household work; the dispersion of wages, particularly among women; the provision of benefits such as health insurance at the workplace; regulations of hours worked (such as the French 35 hour work week ruling); equal opportunity or affirmative action policies that increase demand for educated women; and so on.

Because time use surveys do not obtain data on wages or incomes²³, it is difficult to assess these factors in a convincing way with our data. We can estimate potential determinants of the opportunity cost (OC)/market cost (MC) relation by linking levels of education or other demographic characteristics to potential income, and to data on taxes and dispersion of wages by country. While at best, this provides a consistency check on the hypothesized link between estimated OC/MC ratios and the allocation of time between household work and market work rather than a genuine test of the relation, we have undertaken such a check. To do this, we formed a new set of aggregated groups from the time use survey to include a key variable that affects taxation: family status. Using data on income by education and the income differentials within countries, we estimated OC/MC ratios for workers with differing education by family status across countries and time. Appendix E describes our methodology and displays estimates of the OC/MC ratio for one-earner couples earning 66, 100, 133 and 200% of the average production worker as well as for two earner couples earning the average production wage and for different amounts of working time by second earners. Using average household specific tax rates for the various years and estimates of country earnings differentials over time, we estimate that OC/MC ratios were above one for average production workers in the US and Canada and for higher income groups in

²³ The German files do have some wage data, but the rest of the files do not.

Germany²⁴ and the UK. In Norway, Italy, the Netherlands, and Sweden, we estimate that OC/MC ratios below one even for one-earner couples with twice the average production workers income. We regressed ln hours worked in the market relative to hours worked in the household on the estimated opportunity cost/market cost ratios.

Table 11 gives the results of our calculations for men and women separately. Regression 1 shows the basic relation between the relative hours in the market versus the household and demographic factors, country dummy variables and time dummy variables. For women, education has a very substantial impact on the allocation of time. Replacing education with an estimate of opportunity cost to marginal cost in column 2 gives a highly significant estimate of the effect of ln OC/MC on ln household/market time for women by 0.46. But this is largely a rescaling of the education results. If we add education dummies into the regression, the estimated effect of OC/MC disappears. The results in the bottom panel for men show little relation between the relative time spent in the market versus household work and education (regression 1), and an insignificant and negative relation between the estimates of OC/MC in regression 2. In short, given absence of data on actual wages and costs of market substitutes, the most we can say is that using education as a proxy, our cross section estimates are consistent with an **interpretation** that taxes, wages, and other factors that affect the opportunity cost/market cost ratio influence marketization of women. But we have no independent support for that proposition. Rather, we find that education is the critical factor in this process, and while it may operate through the relative cost of market and household production, it may also operate through other mechanisms. Given the rising trend for women to obtain university education among all advanced countries, our analysis suggests further pressures in all countries for marketizing household work.

Finally, we used our time series or longitudinal data for the five countries for which we have multiple surveys to see whether we could find evidence of responsiveness of the ratio of market to household time to our measures of opportunity cost to market cost. The results were analogous to those in table 11. Regressions of the ratio of market work to household work on the opportunity/ market cost variable yielded a positive sign for women absent covariates, but inclusion of cell dummy variables, which absorb differences between education and age groups produces insignificant signs. With our data we simply do not have enough variation in the

²⁴ In Germany a so-called splitting system is applied, which taxes couples basically at half of the single's tax rate. The German tax system produces much less favorable OC/MC ratios for two-earner couples (compare Dingeldey).

opportunity cost/market cost ratio within cells to detect any response of M/H to the cost ratio, if any exists. Our inability to find a relation over time is consistent with the Flood and Grasjoe analysis of the impact of the 1990 Swedish Tax Reform, which was designed to boost market work but failed to do so.

Cultural Differences?

Differences in preferences for household production vs market production of goods and services could contribute to greater marketization in the US than in most European countries independently of the relative cost of household and market production. Given the evidence in table 1 that Americans worked more hours than Europeans in 1970, such an interpretation of US-EU differences would require that attitudes changed over time or that the same attitudinal differences produce different work outcomes in different economic environments.²⁵ In this section, we examine extant data to see whether Americans and Europeans have different attitudes toward work in the market and household consistent with observed differences. We do not have evidence as to whether expressed attitudinal differences reflect exogenous preferences or are responses to market incentives.

To compare US and EU preferences toward work, we tabulated responses to questions about work from surveys of the International Social Survey Programme (ISSP).²⁶ In 1989 and in 1997 the countries in the ISSP conducted Work Orientation modules that asked the same questions. We focus on two questions that measure commitment to market work. The first question is: “How hard do you work?” (for which the answers were: As best as I can even if it interferes with rest of life; hard but not if it interferes with life; and only as hard as I have to); the second question is “Would you prefer to ... work more and earn more ... work same/earn same, work less/earn less?” The 1989 survey covered the US and four EU countries, Germany (D), Great Britain (GB), the Netherlands (NL), and Norway (NW). The 1997 survey covered Sweden (S) as well.

Figure 5 records the percentage of men and women in the EU countries who gave the most market work favorable responses relative to the percentage of Americans who gave the most market work favorable responses. Specifically, we treat the proportion of US respondents who

²⁵ The same problem faces analysts who have try to explain European employment problems by the operation of labor market institutions that were compatible with full employment in the 1960s-1970s.

²⁶ The ISSP is a continuing annual programme of cross-national collaboration on surveys covering diverse social

answered “as best I can even if it interfered with rest of life” and who answered “work more/earn more” as a base line 0 and record the difference between proportion of Europeans who gave these responses and the US proportion. When the proportion of persons in a country-cell exceeds the American proportion in the direction of inclination toward market work, we give it a positive score. Conversely, when the proportion of persons in a country-cell falls short of the American proportion, we give it a negative score. The most striking aspect of the figure is the tendency for Europeans to report themselves as less devoted to market work than Americans. In response to the question of how hard respondents work, many fewer European respondents in 1989 and 1997 said that they would work so hard it would interfere with their life falls compared to American respondents. In response to the question about preferences for hours worked, European men were less likely to want to work more/earn more than American men in both surveys. In 1997 European women were also less likely to say that they want to work more/earn more than are American women. Only in the 1989 survey responses of women to the question about preferences for hours worked do we find US and EU women giving similar responses. Looking within the European countries, the figure shows some diversity in responses among countries and over time, particularly to the question about working hard. In 1989 British women and men responded that they would work hard even if it interfered with their lives almost as much as did American women. In 1997 German men and women said that they would work hard even if it interfered with their lives almost as much as did Americans; while Swedish men and women were more likely than Americans to say that they would work hard even if it interfered with the rest of their lives.

Overall, the ISSP survey suggests that Europeans are less intensely devoted to market work than Americans, which is consistent with the observed differences in employment and hours worked.²⁷

In 1998 the European Foundation for the Improvement of Living and Work Conditions surveyed more than 30,000 persons aged between 16 and 64 years across the 15 EU Member

science issues (<http://www.issp.org>) which involves the US and many European countries.

²⁷ Other ISSP questions also show EU-US differences in responses. In both years, the ISSP asked whether respondents viewed a job as only a way to make money; and if they would take a job even if they did not need money. Europeans were more likely than Americans to say that they viewed a job as something more than a way to make money and that they would work without financial reward. One interpretation is that the European social welfare state makes Europeans less dependent on market earnings so that non-pecuniary factors are more important in their work decisions; whereas the sizable dispersion of wages in the US makes Americans highly sensitive to pecuniary factors in their attitudes toward work.

States and Norway.²⁸ The “employment options for the future” survey questions allow us to probe more closely attitudes toward women working in the market as opposed to working in the household. While the survey did not ask directly about household work, it asked whether people preferred a situation in which men worked full-time and women worked full-time, part-time, or not at all. Given the MTUS results regarding the trade-off between household work and market work among women, we interpret the results as telling us whether respondents prefer women to work more in the market than in the household. Both men and women in the 1998 survey expressed a greater desire for employment, with the difference between actual and desired employment larger for women than for men. At the same time, more men and women with jobs expressed a desire for a reduction in hours worked than for maintaining their current hours worked.²⁹ For our purposes, the most useful data gives the proportion of respondents who said that they preferred women working full-time or part-time the proportion of respondents who said that they had those arrangements. Table 12 summarizes the OECD’s tabulation of these responses for five EU countries.³⁰ The upper panel of the table shows massive differences among countries in their desire for women to hold full-time jobs versus part-time jobs. Two thirds of the Swedish respondents and over half of the French respondents favor full-time work by women whereas just 5.6% of Dutch respondents favor this form of arrangement. The British, Germans, and Dutch are more favorable to women working part-time. The figures on actual arrangements in the five countries show a shortfall in the proportion of women working full-time relative to the preferred arrangements in Sweden, Germany, and France, and a shortfall of women working part-time compared to being not employed in all of the countries.

In sum, the evidence suggests that observed US-EU differences in the allocation of time to work are consistent with reported preferences, but that there is a shortfall of women working full or part time in at least some EU countries compared to their preferred market work/household work arrangements.

6 Conclusion

This study has brought a new body of data – time use surveys – to bear on the difference in

²⁸ <http://www.eurofound.eu.int/working/balance/work-life/options.htm>

²⁹ European Foundation for the Improvement of Living and Working Conditions, Working Time Preferences in Sixteen European Countries, Luxembourg; Office for the Official Publications of the European Commission, 2002, table 7 gives the greater preference for employment, table 15 gives the preference for fewer hours.

³⁰ OECD Employment Outlook 2001, Chapter Balancing Work and Family Life: Helping Parents Into Paid

US and EU annual hours worked per adult. It has shown that the gap in time worked between the US and EU consists as much of differences in hours worked per employee as in differences in employment rates, and that the differences are greatest among women and young or older age groups whose commitment to the job market is less strong than that of prime age workers. The differences in work time among women are, moreover, closely associated with differences in household work: American women devote less time to household production, including meal preparation and childcare, than European women. The evidence is consistent with the hypothesis the marketization of household work creates demand for workers to produce market substitutes for the foregone household goods and services as well as to increase the potential supply of workers to the market. Because data on allocation of time showed that women substitute time largely between market work and household work while men substitute more between market work and leisure, the marketization analysis is relevant primarily to women. If Americans use more market-produced goods and services than Europeans as part of their leisure activities (an issue which we did not address), the analysis could generalize to time spent outside the market more broadly, but we have no evidence on the market-intensity of leisure.

The substitution of market for household work implies that differences in GDP per capita between the US and EU exaggerate differences in total production per capita between the US and EU countries. Analysis of the extent of this exaggeration requires data on the relative productivity of household vs market production about which there is little evidence and considerable controversy (for instance between the relative value of daycare and mother care of children) and assessment of the value of leisure. On the basis of the 2001 time use survey in Germany, the Federal Statistical Office estimated that the value of unpaid work in households added nearly 40% to German GDP in 2001.³¹ The MTUS time use data in the Appendix suggest that American women and men spent 81% of the time in household production that German men and women spent in the 1990s. Assuming similar productivity in household work between the two countries, we estimate that household production in the US would add less to US GDP than the Federal Statistical Office estimates it household production would add to GDP in Germany. Adding household production to US GDP would increase output by approximately 32%

Employment, Table 4.3, page 136, Paris

³¹ Federal Statistical Office Germany, Value added of unpaid work in households amounts to at least 40% of GDP, press release, 2 December, 2003. www.destatis.de/press/englisch/pm2003/p4880530.htm

($=0.81 \times 40\%$). Thus, taking account of household production would thus raise US output by 8 percentage points less than the Federal Statistical Office estimates that it would raise German output. This is roughly one-third of the 25% or so difference in GDP per capita between the US and Germany.

Finally, while lack of wage data in time use surveys made it difficult to estimate the impact of opportunity cost/market cost incentives on marketization of household work, our data shows powerful effects of education on marketization of household work for women, so that increased education is likely to lead to greater marketization in the EU in the future. In addition, persons in advanced European countries seem to want further increases in female work, either full-time or part-time, that would by our analysis involve greater marketization of household work. This would move European economies closer to the US in terms of generating work per adult and in GDP per capita, though the reduction in household goods and services would imply a smaller impact on production per capita more broadly defined. At the same time, the data on preferences toward work suggest that at least some of the differences in time spent at work are consistent with differences in preferences, as Europeans are less favorably inclined to work when it interferes with their lives and less likely than Americans to prefer more hours and more pay. From this perspective, EU welfare would not be increased by completely closing the annual hours of work gap with the US.

Box 1: The marketization decision

The decision to produce goods and services at home or through purchase in the market depends on the difference between the opportunity costs of household production (lost work time for the employed) and the price of the good/service in the market.

The opportunity cost of one hour of household production is the **net** hourly earnings (gross earnings minus taxes and social security contributions) that an individual forgoes by working one hour less in the market. We write this as $W(1-t)$, where W is the gross wage and t measures the taxes. If H is the amount of household goods and services produced in that hour (ie the productivity of household production), the cost of a unit of producing the good or service will be $W(1-t)/H$ (= opportunity cost/hour / goods/hour). If P is the market price of the good, the worker will produce the good at home as long as

$$(1) P > W(1-t)/H.$$

The price in the market will equal the **gross** hourly cost of the workers who produce the goods/services in the market divided by the productivity per hour of market production. If W_m is their market wage, s is the social security contributions of employers, VAT is the sales or value added tax, M is market productivity and Sub is a subsidy expressed as a share of the initial costs, the market price will be

$$(2) P = W_m (1+s)(1+VAT)/M * (1 - Sub)$$

Substituting (2) into (1) and rearranging terms shows that the worker will produce the good at home when

$$(3) (W_m/W) (H/M) > [(1-t)/(1+s)(1+VAT)] / (1 - Sub)$$

The term on the left hand side depends on the wage of the market provider relative to the wage of the household provider and the relative productivity of the household compared to the market. The term on the right is the wedge between take-home pay and the cost of labor adjusted for possible subsidies to market purchase of some good or service. If H falls as the worker spends more hours in household production, we can reach an interior solution in which the individual allocates time between the market and household production until the inequality in (3) becomes an equality.

The bigger the wedge between take-home pay and gross cost of labor the more inclined will workers be to household production. Since the wedge is less than 1, market production requires that the worker producing the good or service either have a lower wage than the household and/or that productivity of market provision be higher than that of household production. For some products like cleaning services or babysitting the household may be as or more productive as the market, but if the cost of labor in the market is much below the opportunity cost of time, the household will choose market production. When the state funds a service out of general taxation and charges users nothing, per childcare services in some countries, households will shift from household production to market production.

This simple model predicts that workers in countries with higher wage differentials and a smaller wedge will do more market work relative to household production than workers in countries with lower wage differentials and a higher wedge. Institutional arrangements that affect relative wages, such as collective bargaining or minimum wages, and taxes that affect the wedge, will influence the division of work between market and household. Since much household work is performed by women, affirmative action and equal opportunity programs that improve women's opportunities, are likely to increase market production. Programs that reduce the cost of market substitutes for household production, such as child care subsidies or supported day care or schooling, should also increase reliance on the market

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Table 1 Country Differences in Patterns and Trends of Time Worked Per 15-64 year old

countries	Annual hours worked (employed/population * hours)		
	1970	1980	2002
US	1169	1213	1305
Canada	1153	1227	1271
Australia	--	1257	1266
Sweden	1198	1198	1184
Spain	--	1092	1075
UK	--	1271	1241
Norway	1201	1120	1035
Italy	1122	996	900
Finland	1387	1323	1158
Japan	--	1488	1234
Germany	--	1127	932
France	1295	1156	944
EU, unweighted average	1241	1160	1059
Ln Gap, US over EU	-.059	.045	.209

Source: Tabulated from OECD, Employment Outlook Database and OECD Employment Outlook, 2003. The hours data are for total

employees; 1980 figures on hours are for 1979. The EU unweighted average in the 1970 column is for countries covered in 1970. The EU unweighted average in the 1970 and 1980 columns is for countries in 1980 and 1990s samples. There is only a modest 1 hour difference between the unweighted average for countries in the 1970 sample and those in the 1980 sample in 1980, so this does not distort any patterns. German figures are for West Germany, the Netherlands is excluded due to lack of data on hours for 1970 and 1980. Including the Netherlands in 2002 would have lowered the EU average slightly since the OECD data shows the Dutch with 988 hours per adult in that year.

Table 2: Employment to Population Rates, EU vs US, 2002, by education for persons aged 25-34 and for persons 15-24 and 55-64

	Men			Women		
	EU	US	Gap	EU	US	Gap
All, aged 15-64	72.9	78.0	-5.1	55.7	66.1	-10.7
15-24	43.7	57.1	-13.4	37.2	54.3	-17.1
25-54	86.7	86.6	0.1	67.3	72.3	-5.0
55-64	50.5	66.3	-15.8	31.0	53.2	-22.2
Aged 25-64						
Less than 2ndary	71.0	69.8	1.2	40.5	47.1	-6.6
2ndary	81.7	82.1	-0.4	66.8	70.6	-3.8
Tertiary	88.3	89.9	-1.6	79.8	79.1	0.7

Source: OECD, *Employment Outlook*, 2003, tables B, C and D

Table 3: Time-Use in MTUS surveys, by gender, all surveys, 1965-1998 and US and EU Countries, circa early 1990s

	mean	men stdv.	stdv / mean	mean	women stdv.	stdv / mean
all surveys, 1965-1998						
M	41.3	16.1	0.392	22.4	16.8	0.729
H	17.5	9.8	0.556	34.3	14.7	0.423
L	38.5	12.6	0.323	37.8	12.6	0.330
P	70.0	9.1	0.129	72.8	7.7	0.108
US 1992						
M	44.1	14.0	0.316	28.7	16.8	0.578
H	16.1	14.7	0.886	30.1	12.6	0.429
L	36.4	14.0	0.379	35.0	12.6	0.351
P	70.7	9.1	0.130	71.2	7.7	0.104
Europe circa early 1990s						
M	43.4	31.5	0.7	20.7	27.2	1.3
H	13.6	16.0	1.2	40.5	22.9	0.6
L	37.4	21.8	0.6	32.1	18.9	0.6
P	73.6	15.3	0.2	74.6	13.0	0.2

M = market work, H = household production, L = leisure, P = personal time

Source: computations are based on modified MTUS, with EU countries Italy, 1989, ETC

Table 4: Analysis of variance in time-use

Source	M		H		L		P	
	Partial SS	Prob > F	Partial SS	Prob > F	Partial SS	Prob > F	Partial SS	Prob > F
	Men							
Model	645.8	0.001	267.3	0.000	398.6	0.000	188.9	0.000
country	62.1	0.146	73.4	0.000	99.2	0.000	71.3	0.000
survey	122.7	0.010	55.5	0.000	66.6	0.010	26.0	0.052
education	15.7	0.334	1.0	0.881	1.2	0.927	9.1	0.063
country*education	69.3	0.821	32.9	0.448	36.4	0.846	13.8	0.958
country*survey	62.4	0.004	5.9	0.282	6.4	0.464	12.1	0.021
survey*education	127.6	0.806	38.9	0.890	79.6	0.628	28.6	0.935
country*survey*education	33.4	0.206	5.7	0.597	5.0	0.849	7.3	0.316
Residual	3698.5		1241.0		2009.8		988.5	
Total	4344.3		1508.3		2408.4		1177.3	
R2adj.	5.5		8.7		7.4		6.8	
# observations	889		889		889		889	
	Women							
Model	1155.3	0.000	565.9	0.000	625.4	0.000	120.9	0.028
country	145.5	0.000	99.2	0.003	103.8	0.000	36.2	0.000
survey	73.7	0.185	76.0	0.078	82.2	0.001	47.3	0.000
education	192.9	0.000	100.9	0.000	3.3	0.729	5.8	0.136
country*education	124.9	0.161	58.8	0.815	52.6	0.472	13.8	0.896
country*survey	82.4	0.001	8.3	0.546	14.2	0.132	8.9	0.035
survey*education	177.1	0.303	138.6	0.439	134.0	0.030	28.1	0.821
country*survey*education	33.3	0.199	11.3	0.715	11.0	0.504	4.1	0.556
Residual	4005.0		3420.5		2226.0		909.6	
Total	5160.2		3986.4		2851.3		1030.6	
R2adj.	14.6		5.6		14.1		2.9	
# observations	969		969		969		969	

M = market work, H = household production, L = leisure, P = personal time

Source: Computations are based on aggregate cells from MTUS, with 4 education groups (modified by us), 3 age groups, presence of children less than 6, nine countries, and 24 total surveys.

Table 5: Correlations Between Time Categories, Women and Men, using MTUS grouped observations

	WOMEN				
	Market	Household	Leisure	Personal	
Market	1.0				
Household	-0.63	1.0			
Leisure	-0.39	-0.30	1.0		
Personal	-0.22	-0.02	-0.15	1.0	

	MEN				
	Market	Household	Leisure	Personal	
Market	1.0				
Household	-0.38	1.0			
Leisure	-0.62	-0.20	1.0		
Personal	-0.41	-0.02	-0.03	1.0	

Source: Calculated from MTUS aggregated categories, as described in appendix. Based on 1093 observations for men and 989 for women.

Table 6: Cross Section Estimates of the Association Between Hours Worked in the Market and Hours Worked in Household Production and Leisure Within Country Surveys

A) Women Dependent Market Time variable		Allocation of Non Market Time											
		M		M		Ln(M)		H/(L+P)		H/(L+P)		Ln H/(L+P)	
		Coef.	Std. Err			Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err
H		-0.928	0.022										
L		-0.855	0.022										
H/(L+P)				-5.397	0.483								
Ln H/(L+P)						-0.715	0.066						
M								-0.022	0.002				
Ln M												-0.171	0.016
M=0													
0 <M<10										0.013	0.016		
10<M<20										-0.020	0.015		
20<M<30										-0.058	0.016		
30<M<40										-0.105	0.017		
40<M										-0.136	0.018		
Cell covariates													
kid6		0.000	0.083	-0.855	0.148	-0.345	0.063	0.133	0.009	0.129	0.009	0.400	0.028
age3544		0.116	0.076	0.089	0.141	0.060	0.058	0.038	0.009	0.037	0.009	0.120	0.028
age4554		-0.013	0.082	-0.479	0.151	-0.143	0.064	0.007	0.010	0.007	0.010	0.055	0.031
Educd2		0.284	0.085	0.615	0.157	0.191	0.066	-0.003	0.010	-0.001	0.010	-0.037	0.032
Educd3		0.283	0.095	0.846	0.174	0.300	0.073	-0.013	0.011	-0.010	0.011	-0.047	0.036
Educd4		0.386	0.091	1.044	0.166	0.223	0.069	-0.017	0.011	-0.017	0.011	-0.129	0.034
_cons		12.359	0.226	4.748	0.292	0.218	0.182	0.392	0.017	0.392	0.017	-1.189	0.079
R2adj		0.814		0.362		0.385		0.446		0.439		0.440	
Prob. (F)		0.000		0.000		0.000		0.000		0.000		0.000	
N		951		951		857		951		951		857	

Table 6: continued

B) Men Dependent variable	Market Time				Allocation of Non-Market Time							
	M		M		Ln(M)		H/(L+P)		H/(L+P)		Ln H/(L+P)	
	Coef.	Std. Err			Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err
H	-1.063	0.031										
L	-1.013	0.024										
H/(L+P)			-7.438	0.845								
Ln H/(L+P)					-0.171	0.028						
M							-0.011	0.001				
Ln M											-0.259	0.043
M=0												
0 <M<10									-0.020	0.031		
10<M<20									-0.015	0.020		
20<M<30									-0.073	0.018		
30<M<40									-0.080	0.016		
40<M									-0.099	0.015		
Cell covariates												
kid6	0.168	0.082	0.711	0.159	0.076	0.031	0.067	0.006	0.063	0.006	0.348	0.036
age3544	-0.077	0.088	0.225	0.171	0.035	0.033	0.009	0.007	0.008	0.007	0.091	0.041
age4554	-0.099	0.091	0.000	0.179	-0.042	0.035	0.009	0.007	0.004	0.007	0.031	0.043
Educd2	0.101	0.099	0.365	0.192	0.065	0.037	0.007	0.008	0.008	0.008	0.017	0.046
Educd3	0.224	0.109	0.339	0.213	0.039	0.041	0.010	0.008	0.009	0.008	0.056	0.051
Educd4	0.229	0.100	0.531	0.195	0.048	0.038	0.009	0.008	0.008	0.008	0.023	0.047
_cons	14.066	0.307	5.797	.0495	1.413	0.080	0.193	0.020	0.215	0.024	-1.524	0.103
R2adj	0.771		0.127		0.070		0.278		0.275		0.254	
Prob. (F)	0.000		0.000		0.000		0.000		0.000		0.000	
N	866		866		825		866		866		825	

Table 7: Allocation of Time Per Day of Unemployed Persons Compared to Allocation of time of Employed Persons Working on survey workday

Country	M	unemployed			P	M	employed		
		H	L	P			H	L	P
						women			
Canada	0.8	5.6	6.7	10.8		8.5	2.8	3.2	9.5
Netherlands	0.8	4.5	7.6	11.1		4.1	4.0	5.5	10.3
Norway	1.6	6.0	6.3	10.1		7.2	3.4	4.1	9.3
Uk	0.7	4.8	7.6	10.9		6.9	3.3	4.2	9.5
Usa	0.6	5.5	7.4	10.5		8.4	2.5	3.4	9.7
Italy	1.1	5.8	5.9	11.2		6.5	4.0	3.3	10.2
Austria	0.4	6.4	5.7	11.5		7.9	3.7	2.7	9.8
						Men			
Canada	1.5	4.1	7.7	10.6		9.6	1.7	3.6	9.1
Netherlands	1.0	3.5	8.7	10.8		6.7	2.0	5.6	9.7
Norway	1.3	3.7	8.0	11.0		8.7	2.1	4.3	9.0
Uk	0.2	4.4	7.9	11.5		8.8	1.3	4.5	9.4
UA	1.2	3.2	8.7	10.9		9.3	1.5	3.7	9.4
Italy	2.7	1.7	7.5	12.0		7.9	0.9	4.6	10.7
Austria	1.6	3.4	7.1	11.9		9.8	1.3	3.3	9.6

Source: computations are based on modified and extended MTUS. These data based on multiple surveys for Canada, US, UK and single surveys for Italy, Austria, Norway.

Table 8: Regression Estimates of the Effect of Changes in Hours In Household Work and Hours of Leisure on Hours of Market Work, Survey to Survey (standard errors in parenthesis)

Country	Women ΔM	Men ΔM
ΔM		
ΔH	-0.96(.05)	-1.01(.06)
ΔL	0.56(.04)	-1.00(.05)
R2	.75	.71
N	240	246

Source: Tabulated from group cells for **countries with multiple MTUS surveys**, US, Sweden, Canada, UK, Netherlands. Each observation is a change for a particular cell – ie a change in hours for cells with specified education, age, gender, child status

Table 9: Shares of the Consumption of Food and Beverages in Restaurants, the ratio of Spending on Restaurants to Spending on Food at home (1999), and Time Worked Cooking and Cleaning

Country	Time spent Cooking at home (hours per week)	Spending per head Relative to US on restaurants (international prices, 1999)	Spending per head Relative to US on food, beverages at home (international prices, 1999)	Ratio of Spending on Restaurants to Spending on food, beverages at home (US = 1)
US	4.1	100.0	100.0	1.000
Canada	5.7	55.5	77.0	0.720
Australia	--	58.2	98.2	0.590
UK	5.6	45.4	81.5	0.580
Netherlands	6.3	42.7	85.3	0.500
Norway	6.0	33.3	89.8	0.420
Sweden	7.7	17.3	78.9	0.220
Germany	6.5	38.7	91.9	0.420
Italy	10.0	56.4	102.1	0.554
Austria	7.1	92.4	107.0	0.864
Japan	--	41.7	73.4	0.570
France	--	47.3	98.5	0.480
Unweighted European	7.0	46.7	91.9	0.505
Unweighted European with time data	7.0	46.6	90.9	0.508

Source: Time spent cooking, tabulated from MTUS

Spending per head Relative to US on restaurants and food and beverages at home from OECD National Accounts, Private Household Expenditures (OECD 2000) and the 1999 EU/OECD PPP benchmarks (OECD 2002).

Table 10: Time spent in Child Care and in Market Work for Persons with children under 4 years and Percentage of Children under 3 years using formal Daycare

Country	Women Hours of childcare,	Women, Hours of Market Work	Men Hours of childcare	Men Hours of market work	Women and men Hours of childcare	Women and men Hours of market work	Proportion of Children using formal day care arrangements
US 1992	10.8	19.1	4.2	42.5	15.0	61.6	54%
Canada	20.5	18.4	10.3	43.3	30.8	61.7	45%
Australia							15%
UK	18.7	12.1	10.2	38.6	28.9	50.7	34%
Netherlands							6%
Norway	18.6	13.9	8.7	41.0	27.3	54.9	40%
Sweden							48%
Germany	18.4	11.9	6.6	45.0	25.0	56.9	19%
Italy	14.2	13.4	4.6	43.1	20.8	56.5	
France							29%
Unweighted European	17.5	12.8	7.5	41.9	25.5	54.8	29% (31%)*

Source: Hours of childcare and market work tabulated from MTUS. We exclude the Netherlands because the question about children refers to children 14 or less. Austria is excluded because the survey does not contain information on children.

* Unweighted European with time data

Table 11: Regressions of the Ratio of Market to Household Time on Demographic Factors and on Estimates of the Ratio of Opportunity Cost to Marginal Cost, MTUS cells

dependent variable	M/H		M/H	
	Coef.	Std. Err	Coef.	Std. Err
	Women			
Civstat	-0.552	0.054	-0.496	0.055
kid6	-0.801	0.058	-0.819	0.059
age3544	-0.227	0.059	-0.242	0.061
age4554	-0.434	0.068	-0.450	0.070
dedunew2	0.251	0.066	.	.
dedunew3	0.459	0.074	.	.
dedunew4	0.649	0.074	.	.
Dcan	0.274	0.114	-0.034	0.119
DNL	0.223	0.116	0.185	0.114
DUS	0.377	0.137	0.021	0.147
DUK	0.336	0.135	0.158	0.136
DIT	-0.131	0.182	0.042	0.179
DNOR	0.217	0.156	0.258	0.154
DSWED	0.408	0.138	0.469	0.137
P80s	0.063	0.079	0.051	0.083
P90s	0.103	0.086	0.158	0.088
OC_MCmD			0.458	0.051
Constant	1.055	0.143	0.945	0.146
R2 adj.	0.449		0.455	
Prob. (F)	0.000		0.000	
N	603		551	

Table 11: continues

dependent variable	M/H		M/H	
	Coef.	Std. Err	Coef.	Std. Err
			Men	
civstat	-0.006	0.652	0.089	0.712
kid6	0.330	0.641	0.356	0.705
age3544	-0.174	0.628	-0.194	0.692
age4554	0.776	0.692	0.857	0.756
dedunew2	-0.394	0.704	.	.
dedunew3	-0.650	0.797	.	.
dedunew4	-0.296	0.767	.	.
dCan	0.786	1.227	1.302	1.354
dNL	0.248	1.244	0.192	1.303
dUS	-0.576	1.469	0.130	1.698
dUK	0.155	1.435	0.450	1.534
dIT	2.170	1.881	2.160	1.958
dNOR	-0.054	1.617	-0.114	1.725
dSWED	-0.228	1.445	-0.339	1.518
P80s	-2.807	0.831	-2.807	0.921
P90s	-3.092	0.918	-3.104	0.992
OC_MCmD			-0.751	0.614
Constant	5.289	1.535	5.545	1.667
R2 adj.	0.011		0.013	
Prob. (F)	0.135		0.115	
n	570		516	

Table 12: Preferences Toward Women Working in the Market (vs the Household)

	MAN woman full- time	WORKING woman part- time	Full-Time woman not employed	Other
	PREFERRED			
Sweden	66.8	22.2	6.6	4.4
UK	21.3	41.8	13.3	23.6
Germany	32	42.9	5.7	19.4
Netherlands	5.6	69.9	10.7	13.8
France	52.4	21.9	14.1	11.7
	ACTUAL			
Sweden	51.1	13.3	24.9	10.7
UK	24.9	31.9	32.8	10.4
Germany	15.7	23.1	52.3	8.9
Netherlands	4.8	54.8	33.7	6.7
France	38.8	14.4	38.3	8.4

Source: Data from <http://www.eurofound.eu.int/working/balance/work-life/options.htm> as reported in OECD Employment Outlook 2001, Chapter Balancing Work and Family Life: Helping Parents Into Paid Employment, Table 4.3, page 136,

Figure 1: Contribution of Ln Changes in E/Pop and Hours per Employee to Ln Changes in Annual Hours Worked
US vs Europe, 1970-2003 and 1980-2002 (variables measure change in US minus change in EU)



Figure 2: Marketization Shifts Supply and Demand

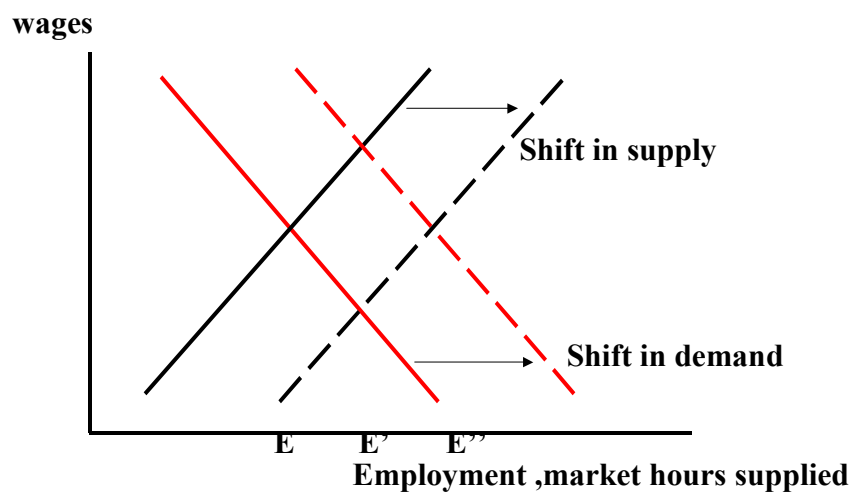
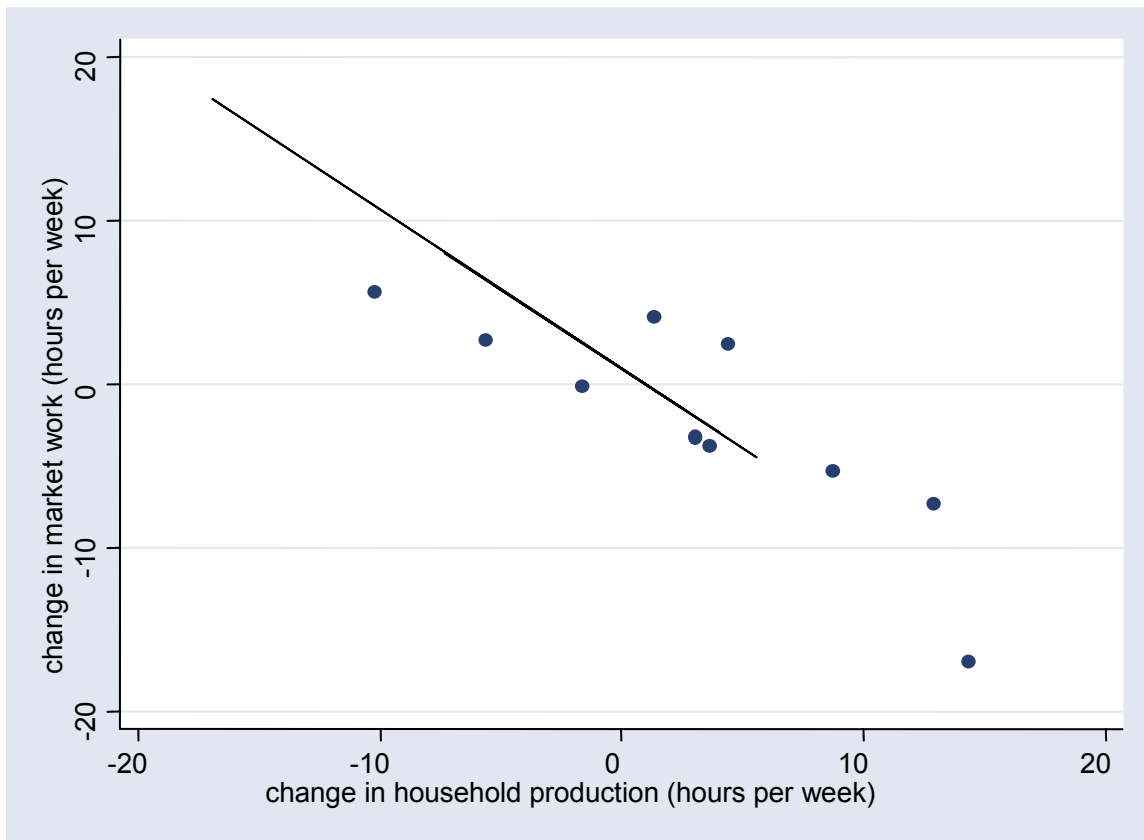


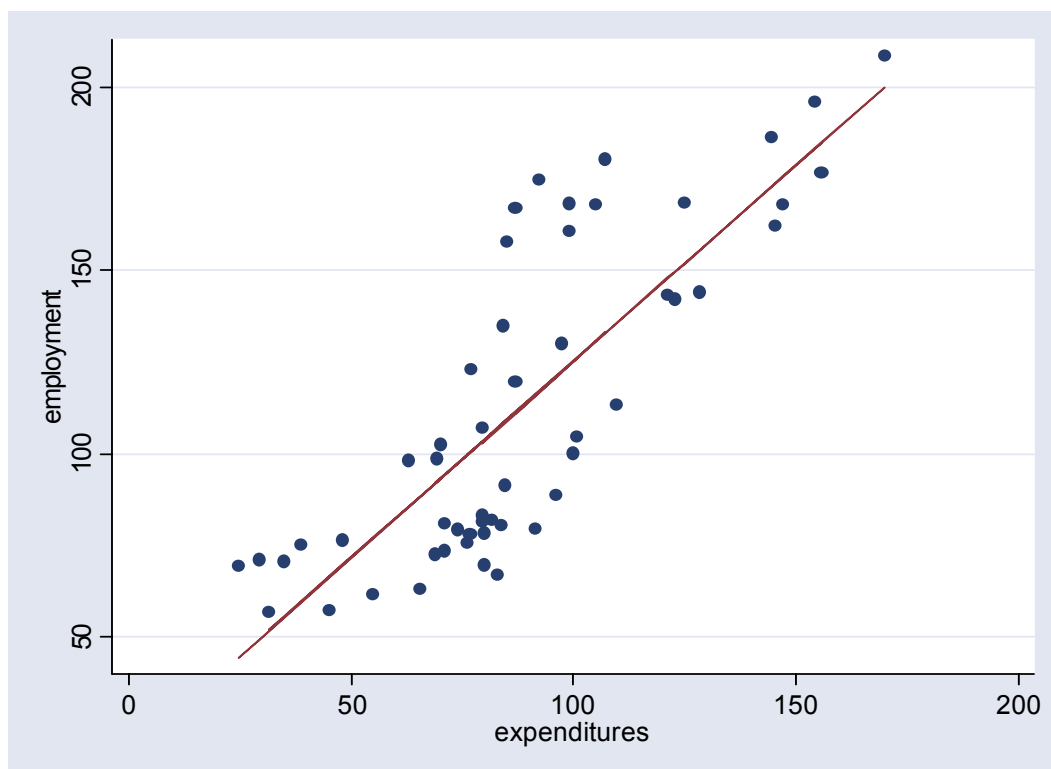
Figure 3: Change in hours worked, market vs household, 1965-1998 (years covered differ by country)



Source: computations based on the MTUS, countries: US 1965-1992, Canada 1971-1998, UK 1975-1995, Netherlands 1975-1995, Sweden 1984-1993

change in market work hours = .95 - 0.97 change in household production hours

Figure 4 Employment per capita on expenditures per capita on restaurant hotels (US 1970=100)



Source: Estimated from observations for the following countries and years: Canada 1986, 1992, 1998, Netherlands 1995, Norway 1990, UK 1975, 1987, 1995, US 1965, 1975, 1985, 1992, 1998, Italy 1989, Austria 1992, Germany 1991, Sweden 1984, 1993

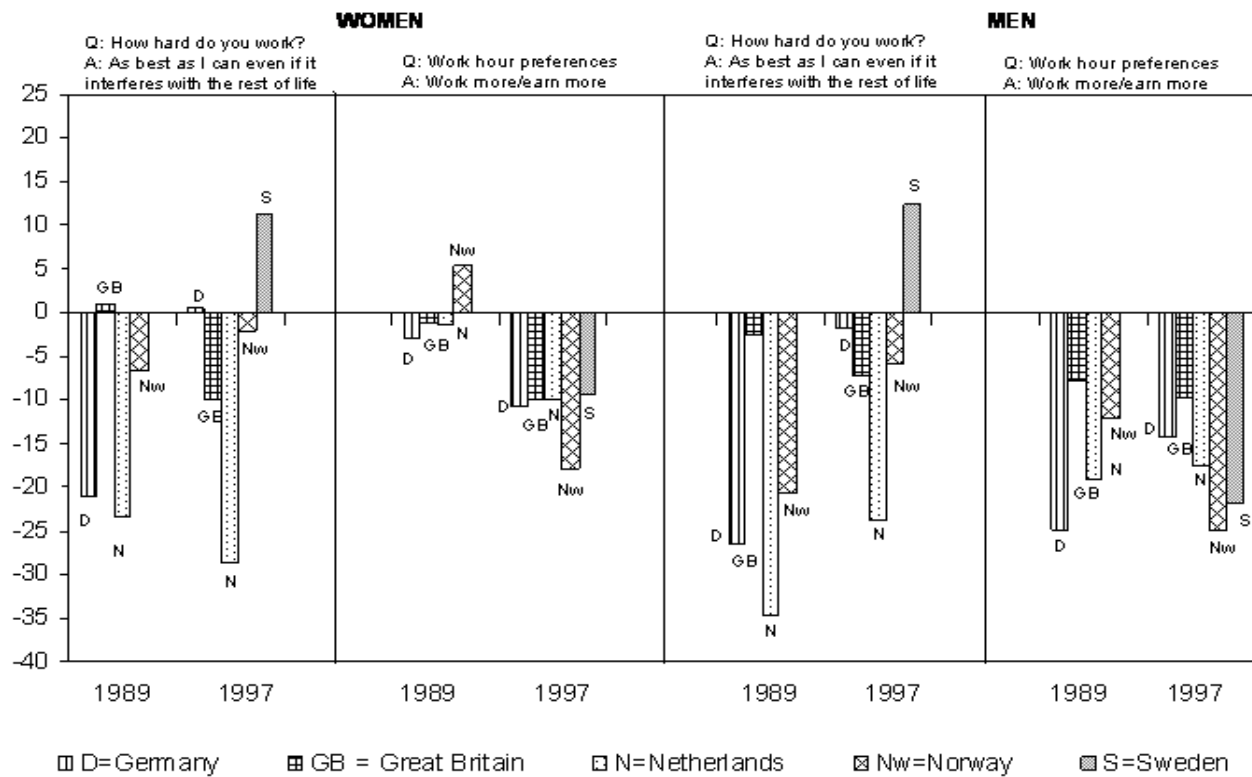
Employment = 18 + 1.07 expenditures

Employment: employment in restaurants-hotels divided per capita, US 1970 = 100

Expenditures: private household expenditures on restaurant-hotel services per capita in PPPs (OECD 1999 benchmarks), US 1970 =100

$\ln(\text{employment per capita in restaurants/hotels US 1970=100}) = 1.6 + 0.69 \ln(\text{expenditure on restaurants-hotels US 1970=100})$

FIGURE 5: EU Attitudes Toward Work Compared to US



Source: Tabulated from International Social Survey Programme surveys, Work Orientations I, 1989 and Work Orientations II, 1997 See <http://www.issp.org/> Data downloadable from <http://www.icpsr.umich.edu:8080/ICPSR-SERIES/00124.xml>, studies 3032 and 9784

Freeman/ Schettkat

Appendices

Appendix A: Comparison of Working Hours Estimates

Appendix B: Technical information on the time use surveys

Appendix C: Aggregation and adjustment of data for vacation/holiday and education. Time estimates of MTUS time worked over the year vs. OECD

Appendix D: Definition of Time Use Categories

Appendix E: Time use by country and period, means, standard deviations, coefficients of variation

Appendix F: Education, Taxes and Wage Distributions

Appendix A: Comparison of Working Hours Estimates

Working hour estimates differ substantially between sources. For example, for the United States in 1990, the OECD reports 1838 hours per year (OECD Online Labor Market Statistics) and 1943 hours per year in its Employment Outlook of 2000, while Mary O'Mahoney and Angus Maddison (1991) report 1691 and 1604 (for 1989) respectively.

Also inter-country comparisons within datasets may show rather diverging numbers. O'Mahoney, for example, estimates that in 1990 Germans worked an average of 1611 hours, which is only 80 hours less than her estimates for the US. This seems too small of a difference, considering that Germans work fewer hours a week and take about four more weeks of holidays each year, while part-time shares are comparable.

Visual inspection of the graphs that plot the hour estimates of the different sources (which all claim to report actual hours worked) is quite revealing and shows that large discrepancies between data sources occur mainly for the US (Figure A1). There is much more agreement between sources for, for example, the Netherlands. The percentage difference between the maximum and the minimum value for 1990 for the US was more than 20%, while for West-Germany this value was only 2%. All data series, however, display similar trends: Working hours declined substantially in Europe but stagnated or even increase in the US in the 1980s and 1990s.

Fig. A1: Estimates for hours actually worked

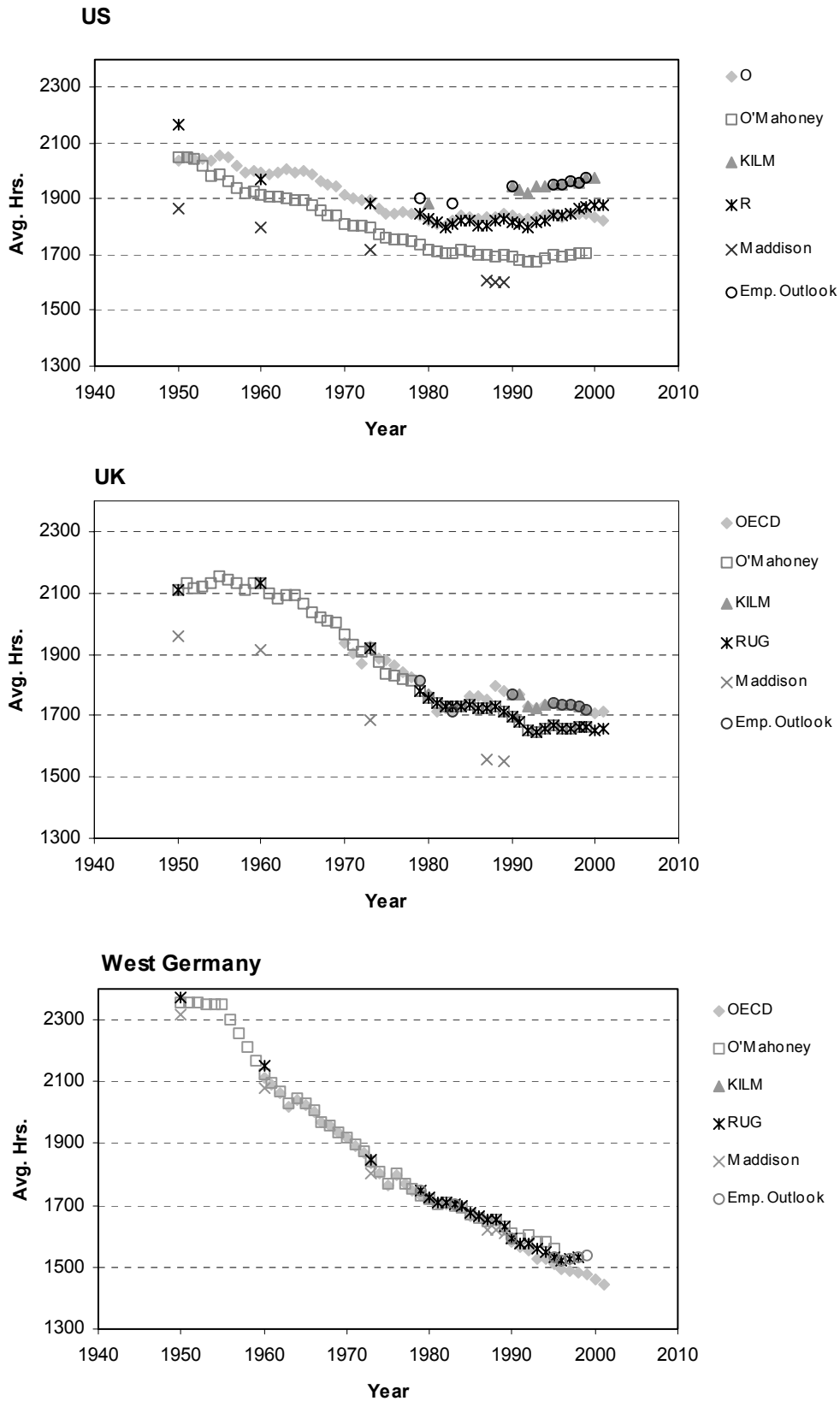
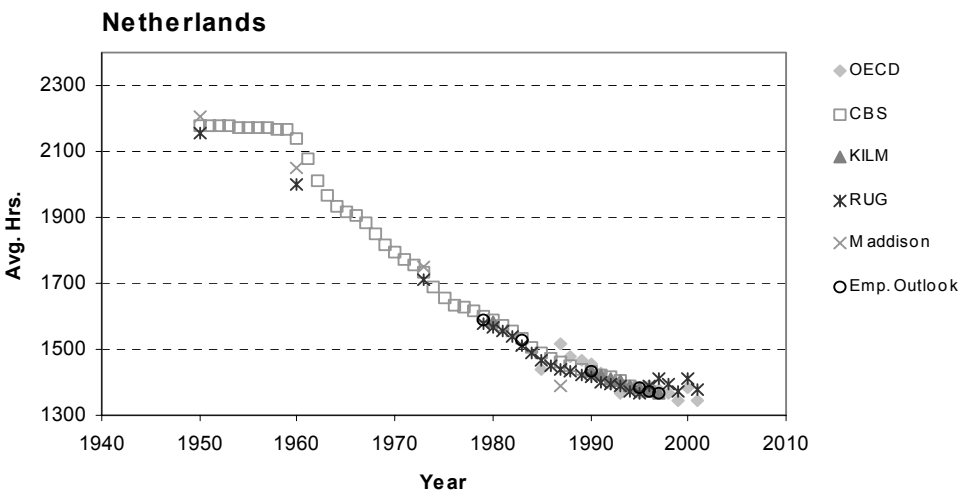
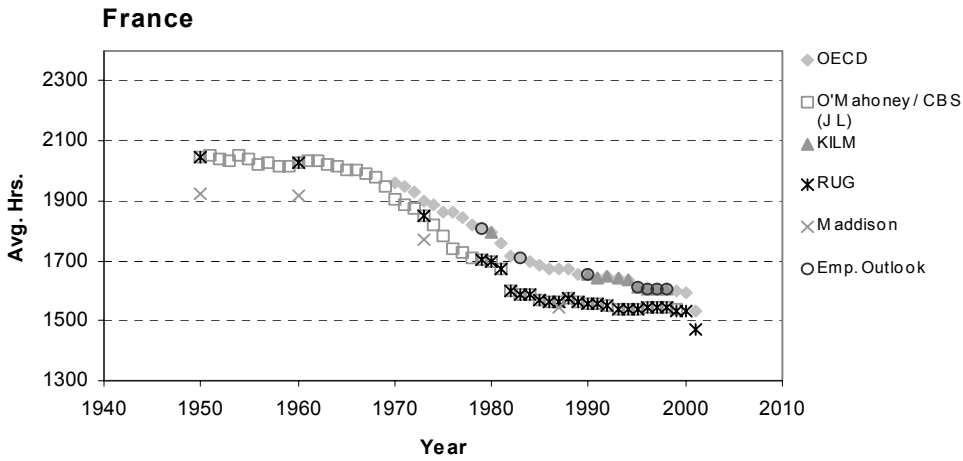
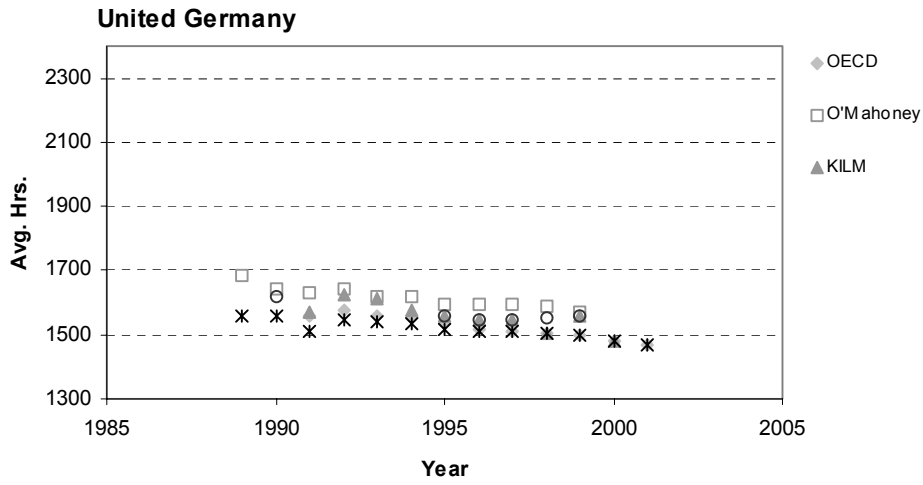


Fig. A1: Continued.



reference Board. (2003),

Appendix B: Technical information on the time use surveys

Country	Year	Age	N	Response Rate (%)	Diary	Survey period (months)
Australia¹	1992	15+	13806	83	2-day	11
Austria	1992	10+	25162	47	1-day	2
Canada	1971/2	18-64	2000	72	1-day	1
Canada	1981	15+	2631	46	1-day	3
Canada	1986	15+	9618	80	1-day	2
Canada	1992	15+	8936	77	1-day	12
Canada	1998	15+	10726	78	1-day	12
Finland¹	1987/8	10+	15219	74	2-day	12
Germany	1991/2	12+	25775	Quota	2-day	8.
Italy	1988/9	3+	37764	70	3-day	12
Netherlands	1975	12+	1292	79	7-day	1
Netherlands	1980	12+	2727	54	7-day	1
Netherlands	1985	12+	3263	54	7-day	1
Netherlands	1990	12+	3158	49	7-day	1
Netherlands	1995	12+	3227	20	7-day	1
Norway	1990	16+	6129	64	2-day	12
Sweden²	1984	18-74	7065	75	2-day	12
Sweden	1993	18-74	7065	75	2-day	12
UK	1975	5+	3423	60	7-day	4 periods
UK	1987	16+	1225	70	7-day	1 periods.
UK	1995	16+	1906	70	1-day	1
USA	1965	19-69	2021	74	1-day	3 periods
USA	1975	18+	2406	72	1-day	3
USA	1985	18+	4935	56	1-day	12
USA	1992/4	0+	9386	63	1-day	24
USA	1998	18+	1151	56	1-day	12

¹ We did not have access to the data for Australia and Finland

² The Swedish data was kindly provided by Professor Lennart Flood (see Flood/ Grasjoe 1995).

Appendix C: Aggregation and adjustment of data for vacation/holiday and education. Time estimates of MTUS time worked over the year vs OECD

We aggregated individual observations from the MTUS into groups as described in the text. To examine carefully the relation between the time worked on the MTUS and time worked on the OECD, we compared estimates of days worked on the MTUS with estimates of days worked on the basis of holiday, vacation, weekend, sickness, and other forms of time off and with the OECD estimates of hours worked over the year. To get some notion of the proportion of days we ought to find employed people working, we estimated the number of holidays, vacation, and sickness days for each country. Beginning with 365 days we then estimated the number of days worked over the year by subtracting 52 days for Saturdays and 52 days for Sundays and then subtracting the number of vacation, holiday, and sickness days. This adjustment accords the US 237 working days (65% of the year), accords 211 working days in the Netherlands (58%) of the year, and 206 working days in Germany (56% of the year).

From the MTUS data, we calculated the proportion of employed persons who said that they had positive hours worked on the time budget survey. For the US this ranged from 47% in the large 1992 survey. Both of these numbers fall below the estimated 65% expected on the basis of the days worked calculation above. But in the US a sizable proportion of those employed over a year work only part of the year or work part-time. In 2001 just 2/3rds of those who worked during the year worked full-time for 50-52 weeks (www.bls.gov/news.release/work.t01.htm). Assuming that those who worked fewer weeks or part-time were employed, the representative employed person during the year would be working 20% less than in the estimate that adjusts solely for vacation, holiday, sickness, and weekends – or about 53% of total working days. This reduces the gap between the proportion of the employed with positive hours on the time budget survey, though a sizeable difference still remains for the 1998 survey (which is very small (N=1151) and about which we have doubts on its validity).

By contrast our estimates of the percentage of days worked for the Netherlands fit well with what we expected on the basis of the reported holiday, vacation, and sickness days although the Dutch survey is conducted in October only and misses the major vacation period. The German survey period has breaks in the summer and in December and thus misses the vacation period. The employed who have a job but do not work during a weekday because they were on vacation are

5.3% in the original survey compared to 12.5% expected (see table C1). To achieve a better presentation of vacation in Germany we raised the weight for persons with jobs but on vacation during the survey data and lowered the weights for the rest accordingly. In Sweden the sampling design oversamples weekend and vacation days (Flood/ Grasjoe 1995). To achieve valid estimates of average time-use we used a re-weighted dataset from Lennart Flood following the same logic of the re-weighting for Germany, i.e. weights of the oversampled weekend days have been reduced and those for the week days increased.

Turning to hours worked, the line labeled mean hours employed persons gives the mean hours per week by persons employed in each country from the MTU. The line labeled mean hours, all population, is the multiplicand of this statistic and the proportion of the surveyed population working during the survey period. Since we are using the time budget data to help analyze the differences in annual hours worked from the OECD, it is important to compare our estimated time worked and the time worked reported by the OECD. The last two lines of table 4 give the hours worked per year from the OECD and hours worked per week obtained by dividing these numbers by 52 weeks. The time budget estimates of hours worked per week are higher than the OECD estimates. One reason for this is that the time budget survey data includes breaks at work (lunches etc.), which the OECD data does not. There are other problems as well. The difference between the time budget and OECD estimates are particularly large for Germany due to the German sampling method, which overestimated working time (see Schettkat 2003). The German data is sampled over a 4-month period underestimating vacation and holidays, which are correctly estimated in data sampled evenly over a 12-months period.

All these differences notwithstanding, the time budget data show the same basic pattern that we found in the OECD data in the table 1: greater work time in the US and Canada than in the European countries.

APPENDIX Table C1: Estimates of Days Worked Over the Year, Time Use Surveys vs Administrative Data

	US	NL	UK	I	S	N	A	GER- WEST	CAN
Survey	1992	1995	1995	1989	1993	1990	1992	1992	1992
Sampling period (months)	24	1	1	12	12	12	2	8	12
Public Holidays	10	8	8	12	11	(11)	13	9-12	(10)
Vacation (collectively bargained)	17	31	25	28	25	21	20 (statutory)	29	10 (15 after 5 years, statutory)
Sickness (absent days)	5	10	4.6	(10)-	10	7	(11)	11	(7)-
Days not working Prob. that employed person does not work at random day	128	154	135	152	148	141	146	159	129
Derived [%]	35	42						44	
Observed in MTUS	32.0	5.6	33.5	23.5	28.8	36.8	28.2	35.7	28.9
Employment rate (employed/pop 15-64)									
OECD									
MTUS (status =employed)	67.8	61.6	68.9	55.0	79.5	71.1	64.4	66.7	60.5
MTUS (actually working)	49.4	56.0	48.9	46.7	66.2	48.3	47.2	44.5	47.0

Sources: MTUS for lower panel, [European Foundation for the Improvement of Living and Working Conditions](http://www.eiro.eurofound.ie/about/2001/03/update/tn0103999u.html), paid vacation, collectively bargained, //www.eiro.eurofound.ie/about/2001/03/update/tn0103999u.html, * Wagner 2003, ** [european industrial relations observatory on-line](http://www.eiro.eurofound.ie/2001/11/feature/tn0111148f.html) Public Holidays, vacation: EIRO, JIL, BLS, TUC ([Banking on your holiday?](http://www.eiro.eurofound.ie/2001/11/feature/tn0111148f.html), August 2001) according to: <http://www.eiro.eurofound.ie/2001/11/feature/tn0111148f.html>.

Absence because of sickness rough estimates based on Barmby, Ercolani, Treble 2000 for Netherlands, Norway, Sweden and UK, in paranthese: guesses

APPENDIX Table C2: Estimates of Hours Worked Over the Year, Time Use Surveys vs Administrative Data

	US	NL	UK	I	S	N	A	GER- West	CAN
Survey	1992	1995	1995	1889	1993	1990	1992	1992	1992
Market work									
Mean hours MTUS (15-64 years, employed)	44.2	39.7	39.0	40.4	32.6	37.0	47.0	39.0	46.1
Mean hours MTUS (25-54 years)				29.3	31.4	32.1	34.7	30.9	
Hours per year OECD (employed)	35.6 1819 (1990)	28.6 1433 (1990)\	30.6 1703 (1998)		1549 (1990)	1432 (1990)		1566 (1990)*	35.1 1788 (1990)
Average hours per week (OECD) (employed, 52 weeks)	34.9	27.6	32.8		29.8	27.5		27.1	34.4
Average hours collectively agreed	38	37	37.5	38	39		39	37	

Sources: MTUS and OECD average hours worked from OECD (2000).

Education

As mentioned in the description of the MTUS World551 description (<http://iserwww.essex.ac.uk/mtus/index.php>) the harmonization of the educational variable was the most difficult, which in part is caused by a lack of detailed information (as in Italy, for example) or by uncertainties about the comparability of certificates. Following our earlier work (Freeman/ Schettkat 2001b) we used the original information on educational attainment as provided in the MTUS World551 data and aggregated these into 4 educational groups (educational groups 3 and 4 combined for display in table C.3).

Appendix Table C3: Comparison of education distributions according to different classifications

		Our classification (group 3 and 4 combined)	MTUS' edtry	OECD
Canada 1992	uncompleted secondary or less	19.8	24.5	58
	completed secondary	43.0	22.1	41
	above secondary	37.2	53.5	30
Netherlands 1990	uncompleted secondary or less	47.4	50.5	45
	completed secondary	29.6	27.7	36
	above secondary	23.1	21.8	19
Norway 1990	uncompleted secondary or less	14.0	16.4	35
	completed secondary	57.5	56.6	42
	above secondary	28.5	27.0	21
UK 1995	uncompleted secondary or less	2.5	7.4	35
	completed secondary	73.7	71.0	48
	above secondary	23.8	21.6	15
USA 1992	uncompleted secondary or less	41.7	8.4	18
	completed secondary	24.6	35.5	46
	above secondary	33.8	56.1	35
Austria 1992	uncompleted secondary or less	68.5	82.5	35
	completed secondary	17.5	11.2	60
	above secondary	14.0	6.3	5
West-Germany 1991	uncompleted secondary or less	10.5	59.5	22
	completed secondary	76.1	25.6	61
	above secondary	13.5	14.9	17
Sweden 1993	uncompleted secondary or less	42.4	62.1	33
	completed secondary	31.1	13.1	44
	above secondary	26.5	24.8	23

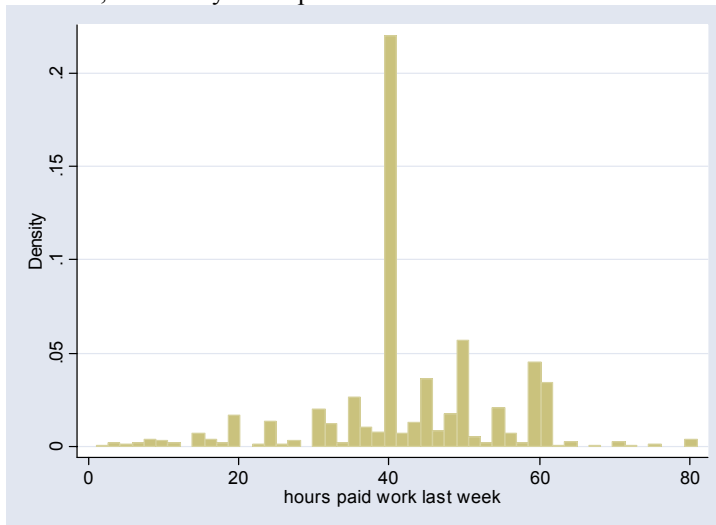
source: MTUS World551 methodological description, OECD (1992), authors estimates

Hours distribution in time-use surveys and in retrospective survey

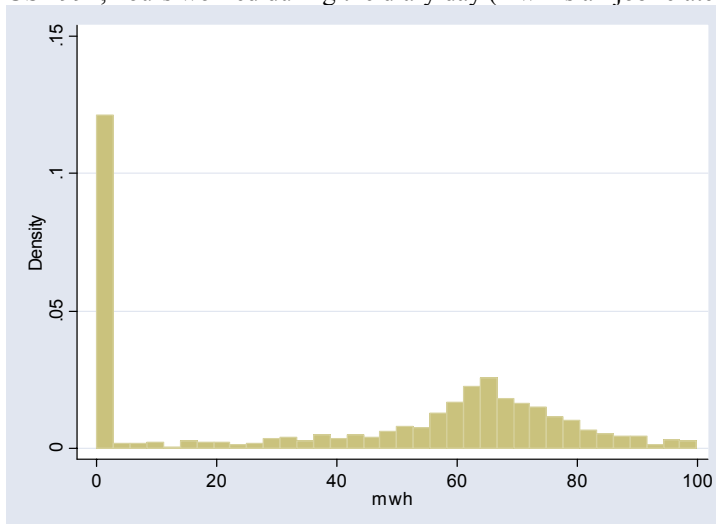
Retrospective question on ‘how many hours paid work last week’ is clearly answered related to standard workweek. The frequency distribution has a peak around 40 hours work per week. The time diary data shows a much wider variation but has a peak at zero hours worked (although the histogram is restricted to those respondents who are employed, i.e. who have an employment contract).

Appendix Figure C1: Typical frequency graphs for retrospective questions and diary data for hours worked among employed persons, individual data.

US 1992, how many hours paid work last week?



US 1991, hours worked during the diary day (mwh is all job related time)



APPENDIX D: Definition of Time Use Categories

Appendix Table D1: The 41 time use categories from MTU World551 and our four broad groups

Code	Label	broad category
AV1	Time in paid work	market work
AV2	Time in paid work at home	"
AV3	Time in paid work, second job	"
AV4	Time in school, classes	"
AV5	Time in travel to/from work	"
AV6	Time cooking, washing up	household production
AV7	Time spent doing housework	"
AV8	Time spent doing odd jobs	"
AV9	Time spent gardening	"
AV10	Time spent shopping	"
AV11	Time spent in childcare	"
AV12	Time spent during domestic travel	"
AV13	Time for dressing/toilet	personal
AV14	Time spent receiving personal services	"
AV15	Time spent eating meals and snacks	"
AV16	Time spent sleeping	"
AV17	Time spent during travel for leisure	leisure
AV18	Time spent on excursions	"
AV19	Time spent actively participating in sports	"
AV20	Time spent passively participating in sports	"
AV21	Time spent walking	"
AV22	Time in religious activities	"
AV23	Time doing civic duties	"
AV24	Time at the cinema or theatre	"
AV25	Time at dances or parties	"
AV26	Time at social clubs	personal*
AV27	Time at pubs	personal*
AV28	Time at restaurants	personal*
AV29	Time visiting friends	"
AV30	Time listening to radio	"
AV31	Time watching the television or video	"
AV32	Time listening to records, tapes, cds	"
AV33	Time in study	"
AV34	Time reading books	"
AV35	Time reading papers, magazines	"
AV36	Time relaxing	"
AV37	Time in conversation	"
AV38	Time entertaining friends	"
AV39	Time knitting, sewing, etc	"
AV40	Time in other hobbies or past-times	"
AV41	Time in unclassifiable ac	"

* we classified these categories as personal time because not all survey distinguish AV15 and AV26 to AV28. The original MTU classification allocated meals in cantina to AV28 but in other survey meals at work are included in AV1, we reclassified the German categories in accordance with the other surveys.

Appendix Table E.1: Time use by country and period, means, standard deviations, coefficients of variation

country	Period	mean				standard deviation				coefficient of variation			
		M	H	L	P	M	H	L	P	M	H	L	P
						men							
USA	1960s	7.4	1.8	4.6	10.2	1.9	0.9	1.6	0.9	0.25	0.50	0.34	0.09
USA	1970s	6.1	2.5	4.9	10.5	2.9	1.8	1.6	2.2	0.48	0.72	0.34	0.21
USA	1980s	6.6	2.7	4.9	9.9	2.1	1.7	1.2	1.3	0.33	0.65	0.25	0.13
USA	1990s	6.2	2.8	4.9	10.0	2.3	2.1	1.8	1.2	0.37	0.73	0.36	0.12
Canada	1970s	6.3	2.0	5.3	10.3	2.9	1.3	2.3	1.7	0.46	0.62	0.44	0.16
Canada	1980s	5.8	2.5	5.7	10.0	2.6	1.2	2.2	0.9	0.44	0.48	0.38	0.09
Canada	1990s	6.3	2.8	5.2	9.7	2.6	1.4	1.9	1.1	0.42	0.49	0.37	0.11
Netherlands	1970s	5.0	2.0	6.6	10.5	2.0	1.1	1.0	1.7	0.40	0.55	0.15	0.16
Netherlands	1980s	5.2	2.3	6.4	10.1	1.8	1.0	1.2	0.6	0.35	0.42	0.19	0.06
Netherlands	1990s	5.8	2.2	6.1	9.9	1.1	0.8	1.0	0.4	0.19	0.37	0.17	0.04
UK	1970s	6.8	1.6	5.6	10.0	1.4	0.7	1.1	0.6	0.21	0.41	0.20	0.06
UK	1980s	5.5	2.6	5.6	10.4	1.8	0.9	1.4	0.5	0.32	0.34	0.25	0.05
UK	1990s	5.0	2.7	5.9	10.5	3.0	1.8	2.3	1.2	0.61	0.68	0.38	0.12
Italy	1980s	5.3	1.4	5.9	11.5	1.8	0.7	1.0	0.8	0.33	0.47	0.17	0.07
Sweden	1980s	5.6	3.3	5.5	9.6	2.1	2.0	2.3	1.0	0.39	0.59	0.42	0.10
Sweden	1990s	6.1	3.0	5.6	9.4	3.2	1.5	2.2	1.7	0.53	0.51	0.40	0.18
Norway	1990s	5.5	2.8	5.8	9.9	2.5	1.2	1.3	1.0	0.45	0.44	0.22	0.10
Austria	1990s	7.1	1.9	4.7	10.3	1.0	0.6	0.7	0.4	0.14	0.30	0.14	0.04
West-Germany	1990s	5.8	2.9	5.3	10.0	1.2	0.8	0.9	0.5	0.20	0.27	0.18	0.05

Source: computations are based on modified and extended MTUS

Appendix Table E.1: Time use by country and period, means, standard deviations, coefficients of variation (continued)

Country	Period	mean				standard deviation				coefficient of variation			
		M	H	L	P	M	H	L	P	M	H	L	P
						women							
USA	1960s	3.1	5.7	4.8	10.4	2.9	2.5	1.4	1.1	0.93	0.45	0.29	0.10
USA	1970s	3.2	5.2	5.1	10.5	2.5	2.1	2.2	1.1	0.80	0.40	0.43	0.10
USA	1980s	4.0	4.9	5.0	10.1	2.6	2.0	1.7	1.0	0.65	0.41	0.33	0.10
USA	1990s	4.4	4.3	4.9	10.4	2.2	1.7	1.6	1.0	0.49	0.40	0.32	0.09
Canada	1970s	2.8	5.3	5.3	10.7	2.8	2.5	1.8	1.3	1.01	0.48	0.34	0.12
Canada	1980s	3.3	5.0	5.3	10.4	2.2	2.3	2.3	1.1	0.69	0.46	0.43	0.11
Canada	1990s	3.7	4.9	5.1	10.2	2.6	2.5	1.9	0.9	0.70	0.50	0.37	0.09
Netherlands	1970s	1.3	5.5	6.4	10.8	1.6	1.3	1.1	0.6	1.21	0.24	0.17	0.06
Netherlands	1980s	2.2	4.8	6.5	10.5	1.9	1.7	1.2	0.7	0.86	0.36	0.18	0.07
Netherlands	1990s	2.9	4.4	6.2	10.5	1.8	1.8	1.1	0.8	0.63	0.41	0.18	0.07
UK	1970s	3.2	4.9	5.8	10.1	2.3	2.0	1.1	0.7	0.73	0.40	0.18	0.07
UK	1980s	2.3	5.2	5.7	10.8	1.7	1.9	1.0	0.9	0.76	0.36	0.18	0.08
UK	1990s	2.6	4.4	6.5	10.5	2.5	2.0	2.8	1.5	0.96	0.45	0.43	0.15
Italy	1980s	2.7	6.0	4.2	11.0	1.3	2.2	1.0	0.5	0.47	0.36	0.24	0.05
Sweden	1980s	3.7	4.6	5.6	10.1	2.5	1.8	2.4	1.9	0.66	0.39	0.43	0.18
Sweden	1990s	4.1	4.3	4.9	10.6	2.3	1.9	1.8	1.8	0.56	0.43	0.36	0.17
Norway	1990s	3.3	5.0	5.7	10.0	2.0	1.7	1.4	0.6	0.60	0.33	0.25	0.06
Austria	1990s	4.5	4.8	4.1	10.6	1.6	1.4	0.8	0.4	0.36	0.29	0.19	0.04
West-Germany	1990s	3.0	5.9	4.7	10.4	1.8	1.8	1.0	0.6	0.61	0.31	0.20	0.06

Source: computations are based on modified and extended MTUS

Appendix Table E.2: Shares of time use categories by country and period

Country	Period	M	H	L	P	M + H
			Men			
USA	1960s	30.9	7.5	19.1	42.4	38.4
USA	1970s	25.3	10.5	20.5	43.7	35.8
USA	1980s	27.3	11.2	20.4	41.1	38.5
USA	1990s	26.0	11.8	20.5	41.7	37.8
Canada	1970s	26.4	8.5	22.1	43.0	34.9
Canada	1980s	24.2	10.3	23.9	41.6	34.5
Canada	1990s	26.2	11.5	21.7	40.6	37.7
Netherlands	1970s	20.7	8.1	27.3	43.8	28.8
Netherlands	1980s	21.6	9.7	26.6	42.1	31.3
Netherlands	1990s	24.3	9.4	25.3	41.1	33.7
UK	1970s	28.5	6.7	23.3	41.5	35.2
UK	1980s	22.7	10.8	23.3	43.2	33.5
UK	1990s	20.7	11.1	24.7	43.6	31.8
Italy	1980s	22.0	5.9	24.4	47.7	27.9
Sweden	1980s	23.2	14.0	22.9	40.0	37.2
Sweden	1990s	25.2	12.6	23.2	39.0	37.8
Norway	1990s	22.8	11.6	24.3	41.3	34.4
Austria	1990s	29.6	7.8	19.7	43.0	37.4
West-Germany	1990s	24.3	12.0	22.0	41.6	36.3

Source: computations are based on modified MTUS

Appendix Table E.2: Shares of time use categories by country and period (continued)

Country	period	M	H	L	P	M + H
Women						
USA	1960s	13.1	23.6	20.1	43.2	36.7
USA	1970s	13.3	21.6	21.3	43.8	34.9
USA	1980s	16.6	20.4	21.0	42.0	37.0
USA	1990s	18.4	18.0	20.3	43.4	36.4
Canada	1970s	11.6	21.9	21.9	44.6	33.5
Canada	1980s	13.6	21.0	22.2	43.2	34.6
Canada	1990s	15.6	20.5	21.3	42.6	36.1
Netherlands	1970s	5.6	23.0	26.5	44.9	28.6
Netherlands	1980s	9.2	20.1	26.9	43.7	29.3
Netherlands	1990s	12.2	18.3	25.7	43.8	30.5
UK	1970s	13.2	20.6	24.2	42.0	33.8
UK	1980s	9.6	21.6	23.7	45.2	31.2
UK	1990s	11.0	18.4	26.9	43.7	29.4
Italy	1980s	11.3	25.1	17.5	46.0	36.4
Sweden	1980s	15.5	19.0	23.4	42.1	34.5
Sweden	1990s	17.0	18.1	20.5	44.4	35.1
Norway	1990s	13.9	20.8	23.6	41.8	34.7
Austria	1990s	18.7	20.1	17.1	44.2	38.8
West-Germany	1990s	12.5	24.6	19.7	43.2	37.1

Source: computations are based on modified MTUS

APPENDIX F: Education, Taxes and Wage Distributions

The microeconomic considerations in Box 1 suggest that the own wage relative to the market wage for household-production substitutes, the tax wedge and relative productivity of market vs. household production affect the allocation of time between market work and household production. These data is very difficult to get and one can at best approximate the ratio of opportunity costs to market costs. Given these difficulties some analysts investigated possible labor supply response to tax rates etc. on the level of the aggregate economy. We go beyond such an aggregate approach and assign tax rates according to the individual's situation (single, married, one-earner, two earner, educational attainment, wages). The OECD published average and marginal tax rates for various household types and income classes in the Job Study publications (OECD 1996) using the classification shown in Appendix Table F 2.

The correlation between educational attainment and earnings is not perfect but a rough allocation of our four educational groups to income classes may be: educational group 1= 66% of APW wage, educational group 2 = 100% of the APW wage, 3 = 133% of the APW wage and educational group 4 > 133% of the APW wage. To account for differences in wage dispersion between the countries we used the OECD Employment Outlook figures on D9/D5 and D5/D1 wage differentials and assigned median to our educational group 2, D1 and D9 to our educational groups 1 and 4, respectively and our educational group 3 was given a relative wage between D5 and D9.

Marginal tax rates for the second earner can differ substantially whether the unit of taxation is the household, the couple respectively or whether it is the individual. Separate taxation systems tax the income of each individual independently of the household or family context, whereas in joint taxation systems, the household's incomes are aggregated and either taxed with (1) the same tariff as singles (aggregation method), or (2) split among the adults (spouse splitting system) or split among the family members (family splitting system). In joint taxation systems the second income is taxed on a relatively high marginal rate, which is often interpreted as discouraging female labor force participation, but in almost all joint taxation systems couples are taxed less than two singles with the same income. In the US, where the aggregation method is applied, joint taxation may lead to a higher tax burden for married couples than for two singles with the same aggregated income (so-called marriage penalty), which can be avoided, however, if couples choose for separate taxation. Appendix Table F.1 gives an overview of the tax system applied in various countries. There seems to be a general trend to individual taxation,

Appendix Table F1: Tax systems

Country	1970	1990	1999
Australia	separate	separate	separate
Austria	Joint	separate	separate
Canada	separate	separate	separate
Denmark	Joint	separate	separate
Finland	joint	separate	separate
France	Joint	joint	joint
Germany	Joint	joint	joint
Italy	joint	separate	separate
Japan	separate	separate	separate
Netherlands	Joint	separate	separate
Norway	Optional	optional	optional
Sweden	Joint	separate	separate
UK	Joint	separate	separate
US	Joint	joint	separate/optional joint

OECD Employment Outlook 2001: 142

We assumed that men are the prime earners and that married women are second earners for whom a higher marginal tax rate may apply (see OECD 1996). The figures for two-earner households refer to households in which both spouses earn a wage equal to the average production worker but with variations of the second-earners working hours, which are 33, 66 and 100% of full-time. Thus the combinations of civic status, gender and education defined our tax rate cells. The OECD's 'Taxation and Employment' (1996) capture the changes in the taxation shown in Appendix Table F1.

Of course, the result of the OC-MC ratios depends heavily on the assumption necessary to make but these are not implausible and may give indications of the directions although they cannot be proofs of relationships. More specifically we used the procedure described below Appendix Table F2.

Appendix Table F2: Opportunity-Market-Cost Ratio Estimates

		one-earner			two-earner		
Wage Level (% of APW)	66	100	133	200	100	100	100
working time	100	100	100	100	100-33	100-66	100-100
gross family income (% of APW)	66	100	133	200	133	166	200
Canada	0.66	1.14	1.78	2.34	0.61	0.61	0.52
Germany	0.49	0.71	1.02	1.42	0.45	0.44	0.42
Italy	0.47	0.71	0.85	0.90	0.50	0.47	0.47
Netherlands	0.37	0.65	0.65	0.85	0.44	0.37	0.30
Norway	0.66	0.79	0.79	0.95	0.66	0.66	0.61
Sweden	0.45	0.67	0.65	0.80	0.47	0.45	0.45
United Kingdom	0.53	0.95	1.38	2.05	0.57	0.53	0.53
United States	0.51	1.39	2.43	3.47	0.63	0.63	0.63

The OC-MC ratio is calculated as:

$[\text{own wage} / \text{market-wage}] * [1 - \text{tax rate} / (1 + \text{employer contribution}) * (1 + \text{consumption tax})]$

Market-wage is the wage of 'eating and drinking places', 'personal services', 'retail trade' relative to the mean wage,

which is set equal to 67% of APW, which roughly fits the wage position of these industries (Freeman/ Schettkat 1999)

This calculation assumes productivity in households to be equal to market productivity

Own wage = f(education, wage dispersion in country): D1 for .66 APW (educational group 1), D5 for APW (educational group 2), mean of D5 and D9 for 1.33 APW (educational group 3), D9 for 2.0 APW (educational group 4)

income tax rates according to income (education) and marital status, consumption tax and employer contribution from OECD Jobs Study: Taxation, employment and unemployment, results shown refer to 1992