# Labour Supply and Inequality Trends

# in the U.S.A. and Elsewhere

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**Abstract**

Within the OECD, there are significant differences in the trend and level of average work hours. [For example, from 1980 to 1997, average working hours per adult (ages 15-64) rose by 204 hours in the USA to 1428.5 while falling by 173 hours in Germany, to 981.9]. Since these trends appear to be continuing (Merz, 2000) growth in per capita GDP may be a poor indicator of trends in average economic well-being. To the extent that rising inequality in money income is driven by changes in the distribution of working hours, trends in money income inequality may misrepresent trends in the inequality of economic well-being.

Recently Bell and Freeman (2000) have argued that greater inequality in the USA provides the incentive that motivates greater work effort by Americans. However, changes in working hours, and differentials in working hours across countries, have been quite concentrated in particular demographic groups and largely arise from differences in labour force participation. [For example, the paid working hours of women in the USA have risen significantly, while German men aged 55 to 64 have cut back sharply on labour supply.] Except for the extreme lower tail, the distribution of working hours of prime age males is essentially identical and constant in Germany and the US. -which implies that the greater inequality of earnings in the USA has no noticeable incentive effect on the labour supply of workers.

## 1. Introduction

Why do working hours matter for inequality and growth?

One reason is the interpretation of "inequality" and "growth". Typically, discussions of the relationship between inequality and growth rely on measures of inequality of money incomes and of the rate of growth of per capita Gross Domestic Product. Both measures completely ignore the level and inequality of working time, and the utility which individuals derive from non-working time. If cross-country differentials in the rate of growth of per capita GDP reflect only differences in the trend of labour supply across countries, it is unclear whether "richer" countries should be counted as better off. Similarly, if changes in the inequality of money income reflect primarily shifts in the distribution of hours worked, it is unclear how inequality in money incomes corresponds with inequality in utility or well-being.

A second set of reasons concern possible causal links between inequality, growth and working hours. Economists have long emphasized the importance for behavior of financial incentives, and it is clear that absolute equality in money income would imply zero financial incentive for greater (or any) labour supply and fairly dramatic impacts on economic growth. However, as Dalton (1935:21) recognized long ago "The rejection of crude egalitarianism does not take us far, though there are some who seem to think that, when they have disposed of the argument for absolute equality, they have disposed also of all arguments for reducing existing inequalities." The more important issue is whether differences in the degree of inequality observed in modern economies help to explain differences in labour supply behavior and economic growth across countries.

The econometric literature on the wage elasticity of labour supply has typically concluded that

the effect of hourly wage differentials on annual hours of work is rather small (e.g. Osberg and Phipps 1993; Heckman, 1993). Recently, however, Bell and Freeman (1994, 2000) have argued that the current wage is an incomplete indicator of the incentives to labour supply since greater current work effort may have an impact on the probability of future promotion. They contend that the inequality of wages is a good measure of the returns to such advancement and that it is the greater incentives of a more unequal U.S. labour market that explains why Americans "typically" work more hours than Germans.

If greater inequality in hourly wages is necessary to induce more work effort, then inequality may be seen as a necessary (if perhaps somewhat unfortunate) cost of faster economic growth. However, a prior question is whether there are significant differences across countries in labour supply, and how they might arise. Section 2.1 therefore begins with a presentation of aggregate data on the trend in work hours in a selection of OECD countries and discusses implications for the analysis of growth and inequality. Section 2.2 uses micro data from Germany and the US to illustrate the importance of looking beneath macro-economic aggregates. Section 3 illustrates the importance of working hours for the perception of inequality and growth by contrasting calculations of the rate of growth and the level of inequality in money income and in income standardized for labour supply. Section 4 is a conclusion.[1]

[1]Appendix A is a model of individual choice of working hours which illustrates the potential importance of externalities at work and play for money income inequality. It was initially designed to explain the emergence of a difference in average working hours between Germany and the USA. Although I still think it is a neat model which expresses an important aspect of economic reality, the sense of the model (like the work of Bell and Freeman (2000)) relies on the difference in work hours being a general one - but see section 2.2.

## 2. What needs to be explained ?

### 2.1 Aggregate Trends

Figure 1 presents data[2] on the trend, from 1980 to 1997 in the average annual actual hours of paid work of all adults aged 15 to 64 in a selection of OECD countries (Canada, France, Germany, Sweden, United Kingdom and United States[3]). It is noteworthy that although all these countries began with actual hours of paid work clustered in a fairly narrow interval in 1980, by 1997 the differential in hours of paid work was quite dramatic. In 1997 the average actual hours of paid work per working age adult in Germany was 981.9 and in France 980.6, compared to 1428.5 in the USA. This difference amounts to 8.6 hours of work per adult per week - which is surely large enough to create significant differences in quality of life.

In Figure 1, the countries plotted seem to group themselves into three broad types, with Canada, Sweden and the UK having very similar trends, intermediate between those observed in the USA and France/Germany. However, do the trends in actual working time observed in Figure 1 just indicate that European labour markets were not able to generate enough jobs ? To examine this, Figure 2 adds to actual work hours the total number of unemployment hours (assuming that the desired weekly hours of the unemployed equal the actual weekly hours of the employed). [The Appendix also adds several other countries - Finland, Norway and Spain - which yield the same

[2]The ILO KILM data base provides a measure of the aggregate number of hours actually worked per employed person (by subtracting paid vacation days and holidays from usual total paid hours). This "hours actually worked" concept is not always available - data from the US Current Population Survey and Luxembourg Income Study cited below use the concept of 'annual hours of paid employment" which is based on weeks of employment and "usual weekly hours" of paid employment.

[3]The selection of countries is dictated by the availability of the work hours variable in the Luxembourg Income Study micro data which is used in the remainder of the paper. In the Appendix Figure 2A adds Norway, Spain and Finland - which also seem to fall fairly neatly into the three broad clusters previously identified.

result.] Since the unemployment rate in the USA in 1997 was well below that in most other countries, this procedure narrows the differences somewhat, but the same basic picture emerges. Adding together hours of actual paid work and desired work (unemployment), the average adult aged 15 to 64 in the USA supplied 7.6 hours per week more time to the paid labour market than the average adult in France or Germany.

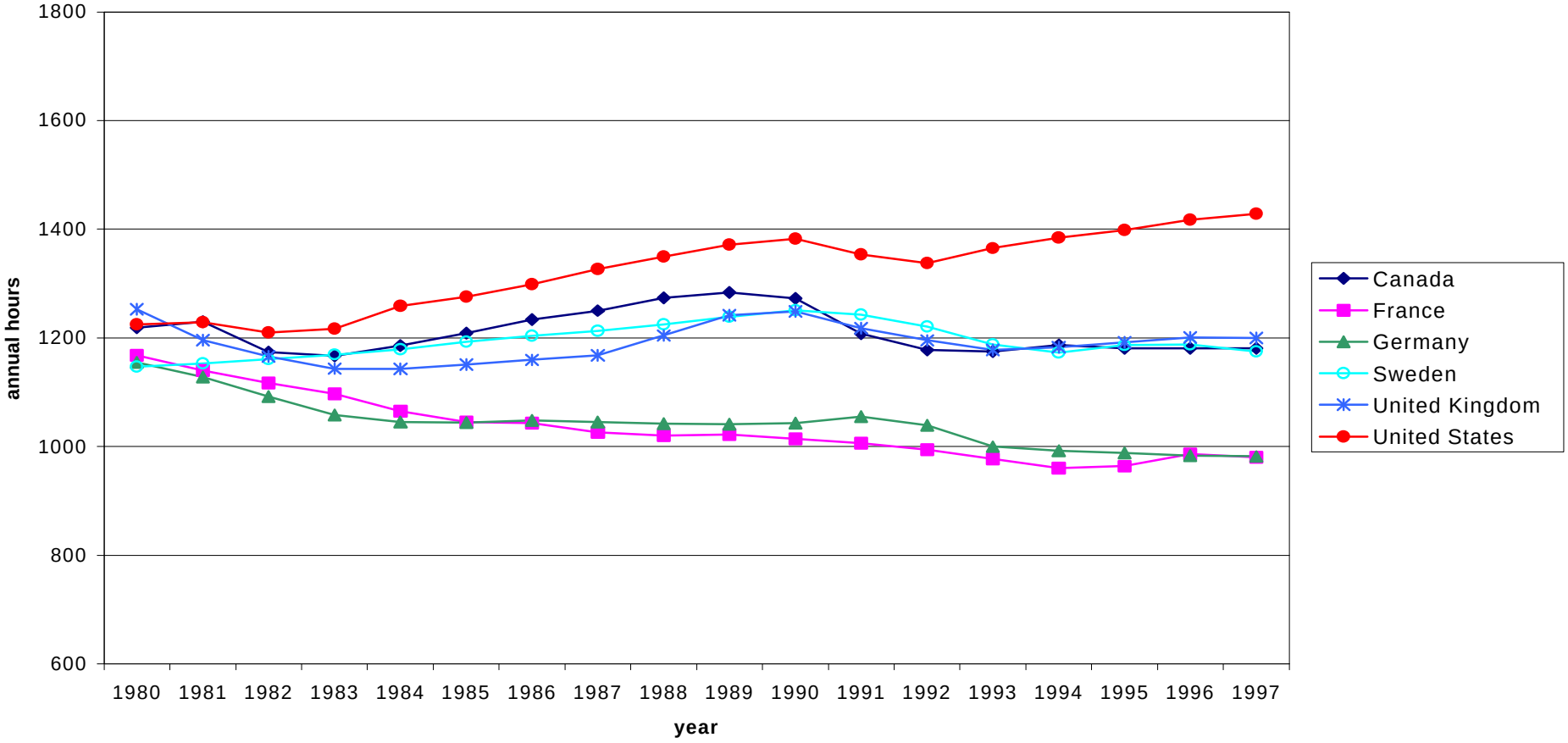
Both Figures 1 and 2 are derived from ILO data on average actual hours of work per employee, and average employment/population ratios. This has the advantage of enabling consistent and complete time series to be calculated. However, using aggregate time series data has the disadvantage that one cannot group individuals into households or examine differential labour supply trends at different points in the distribution of earnings or hours. These issues are important, since working hours differences may be quite concentrated and it is arguable that time pressures are experienced most acutely at the household level, when all family members feel over burdened. Furthermore, if increased working hours were solely an upper income phenomenon, the affected households could presumably purchase labour saving alternatives to household production.

Figure 3 uses Luxembourg Income Study micro data to calculate the average, across households, of usual paid working hours per adult in each household[4]. The disadvantage of using the "usual hours" concept is that paid holidays and vacations are not distinguished from working hours, but the advantage of using micro data is that one can examine labour supply at the household level. Average paid working hours per household adult may provide a better indication of "time crunch" than average working hours per worker, since within families adults can share household chores to

[4]Exact definitions of all LIS variables can be found at http://lisweb.ceps.lu/techdoc/variabdef.htm

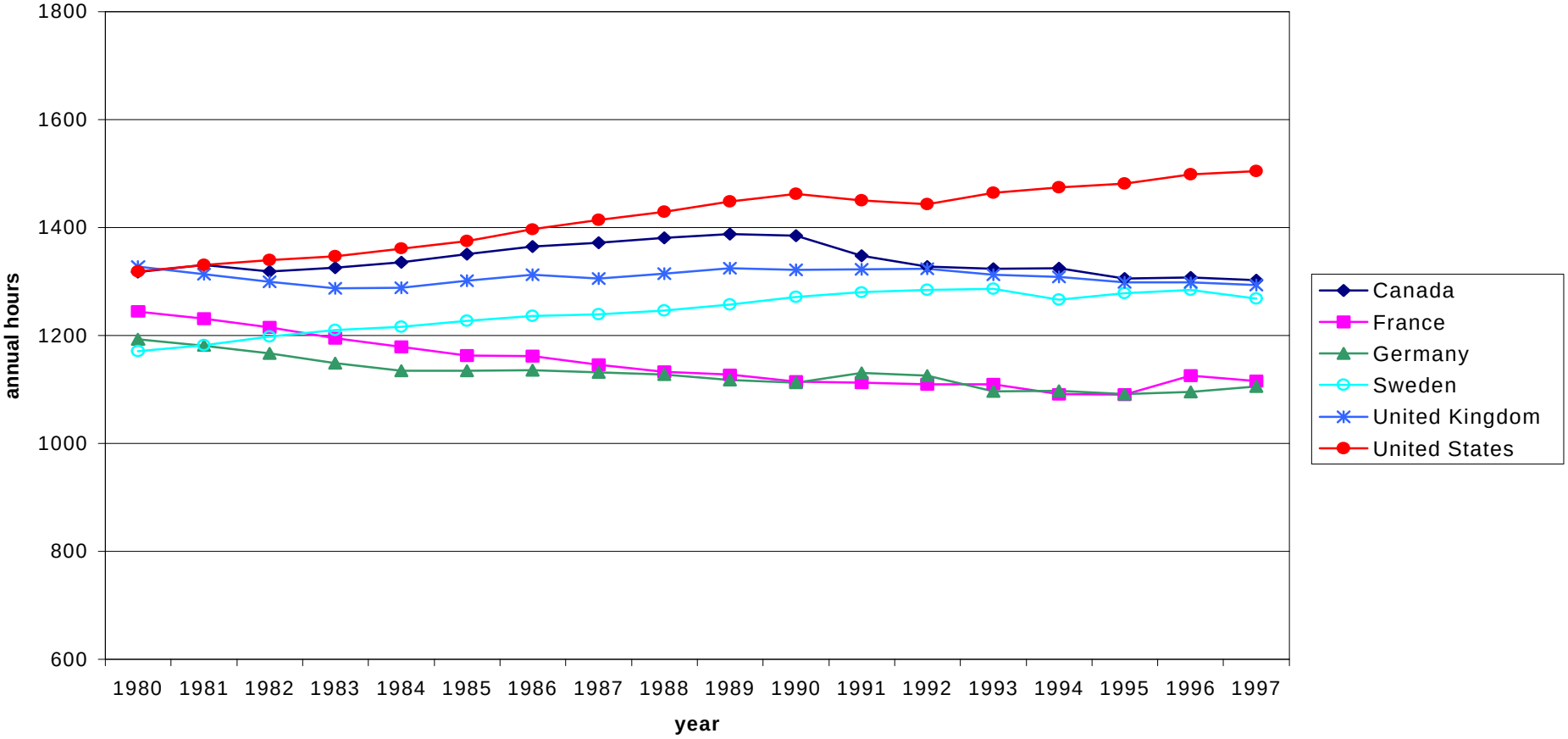
some degree, and balance off hours of paid work and unpaid household labour.

**Figure 1**
**Annual Number of Hours Worked per Person Aged 15-64** [1]




[1] = Average hours worked per employed person *(Employment / pop. age 15-64)
Source: OECD Health Data 98 CDROM, "A Comparative Analysis of 29 Countries".

**Figure 2**
**Annual Number of Hours Worked per Person Aged 15-64 [1]**
**- Adjusted for Unemployment**




[1]= Average hours worked per employed person * (Employment / pop age 15-64) + (Average Annual Hours of Unemployment for Persons Aged 16-64)
Source: OECD Health Data 98 CDROM, "A Comparative Analysis of 29 Countries".

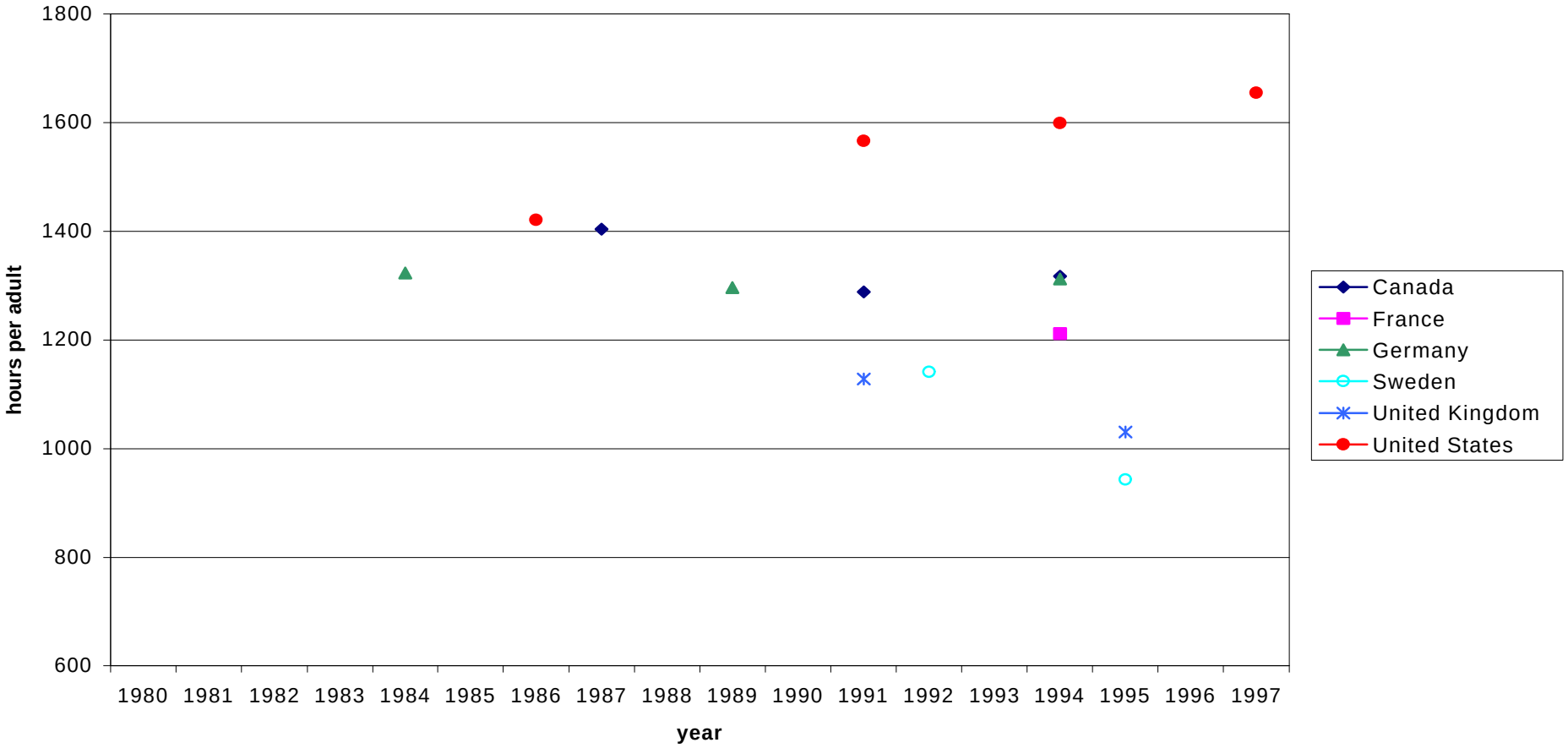
Since the LIS data uses a different hours concept and a somewhat different age categorization than the OECD data, the work hour totals are not strictly comparable, and the occasional nature of LIS data makes it more difficult to discern trends - but there does seem to be a fairly clear difference between labour supply trends (on a "per household adult" basis) in the USA and elsewhere.

The LIS data do not, however, fit well with the hypothesis that these international differences can be explained by greater incentives to additional labour supply provided by greater inequality in the USA. Figure 4 examines working hours per household adult at different points in the distribution of income in 1994-95. Within countries, individuals are ordered by their equivalent[5] individual disposable money income (after direct taxes and after transfers) and the average labour supply per household adult is calculated for each income decile. Panel A presents the average hours total. To highlight differentials with the US, in Panel B each country's decile average is expressed as a fraction of the corresponding US decile. With the exception of the top income decile in the UK (which has the least work effort of the top decile of all countries examined[6]), there is a clear tendency for work hours to be higher in higher deciles of the income distribution- both absolutely and relative to the US. At all points in the income distribution, Americans work more hours - but although the US incentive system has its greatest differentials in hourly rewards at the top of the income distribution, the differential in hours of work is significantly smaller at the top of the income distribution than at the bottom.

[5]Equivalent income is calculated using the LIS scale - i.e. Equivalent Income = Household Income divided by the square root of household size.

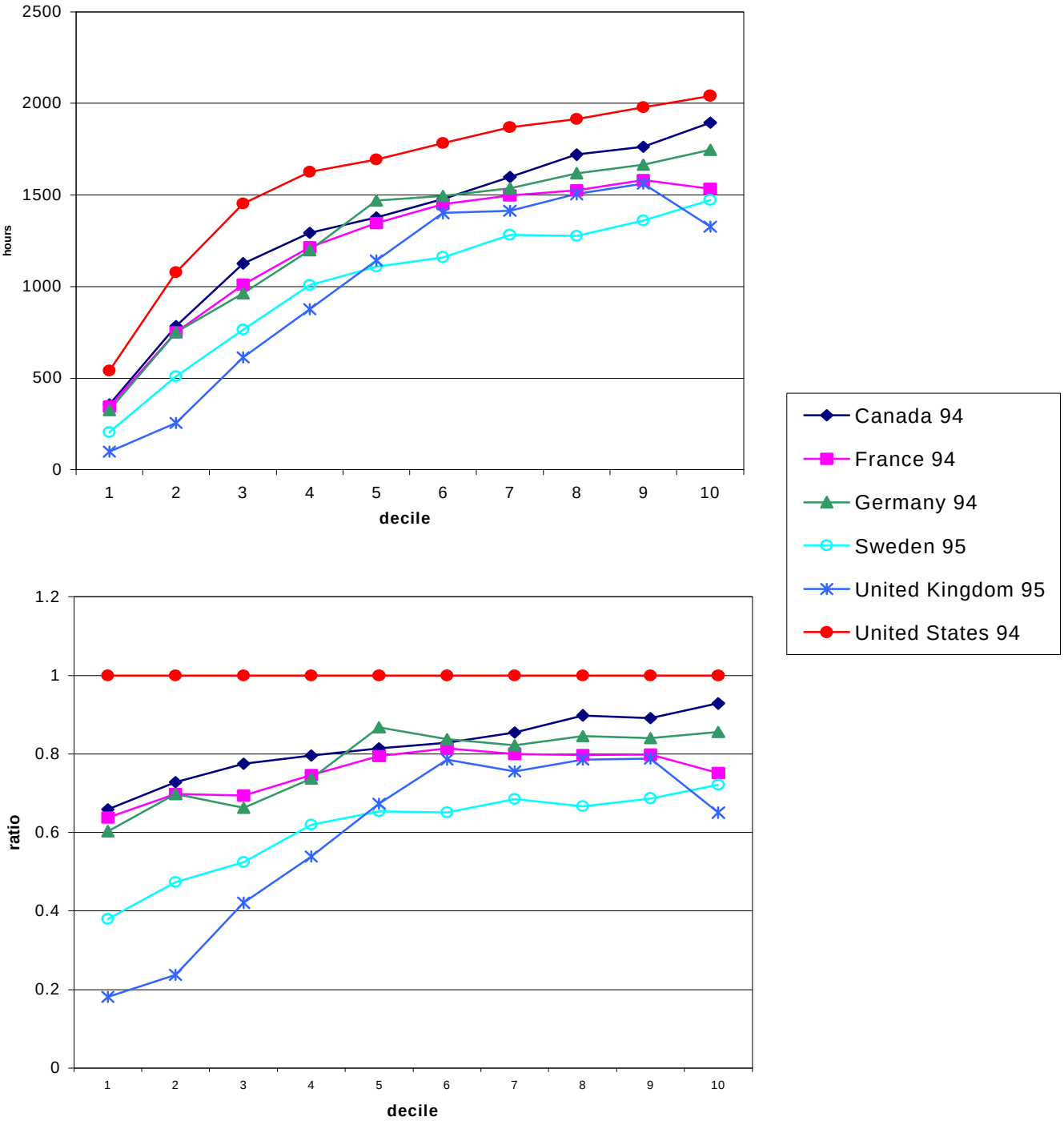
[6]Given the rhetoric surrounding "incentives" and "initiative" during the Thatcher era, this is an intriguing finding.

**Figure 3**
**Average Working Hours per Adult in Household ***
**Head of Household Aged 18-64**




* Average of head and spouse (if present) only.
Source: Author's calculations using The Luxembourg Income Study

**Figure 4**
**Average Working Hours per Household Adult (Head Aged 18-64*)**
**and Mean Ratios to the US by Decile 1994/95**



If non work time has positive utility value, these data indicate that comparisons of money income inequality between the USA and other countries will underestimate differences in the inequality of utility. In the USA, the relatively poor work significantly harder for their relative poverty than in other countries. Cross country comparisons of inequality in money alone would be magnified if inequality in time and money were to be considered.

Thus far, the picture is one of "harder working Americans", but some disagree. Kirkland (2000) found that average weekly hours of American employees fell by 11% from 1964 to 1999. However, as she points out, in an establishment based survey (such as Current Employment Statistics) "a person working two part-time jobs of 20 hours a week is counted as having two 20 hour jobs, but in the Current Population Survey, the same individual is counted as one worker working 40 hours" (2000, 26). The growing number of part time jobs, particularly in retail trade and services, can mean that average weekly hours *per job* fall, even as average weekly hours *per worker* rise.

A growing proportion of the population over 65 will affect the calculation of working hours *per person* (which might be thought of as an approximation to lifetime labour supply). There has been a steady decline in the percentage of those over 65 who are in the labour force, and in consequence working hours among seniors have declined. Averaging the market work of the elderly and non-elderly, McGrattan and Rogerson argue that "the number of weekly hours of market work per person in the United States has been roughly constant since World War II". (1998:02). However, this statement is entirely consistent with Figure 1, which indicates increased working hours among Americans *of working age.*

Thus far, this paper has considered trends in average working hours for the working age population as a whole, and has not disaggregated by age group or gender. In this, it has much in common with the work of Bell and Freeman, who in two fascinating papers (1994, 2000) have compared the working hours of Germans and Americans. As they put it, rather provocatively, in their 1994 paper, "All told, the impression from the ISSP is that American workers are more "into" work than are Germans and other European workers. In the same vein, Germans seem to be less into work than their European and U.S. counterparts. The puzzle is why large differences in actual hours worked have failed to quell American workaholicism and a German love of leisure". (1994: 14)

In more recent work, Bell and Freeman try to explain the differential in average hours in Germany and the USA and conclude that "the difference in wage inequality between the US and Germany is a major factor underlying the difference in hours worked between countries" (2000:4). They argue that the return to work hours is not just the current wage, but also any change in future probability of promotion or higher wage - i.e. the derivative of the lifetime income stream with respect to greater hours/effort. In their work, "The key operating assumption linking work hours to inequality is the notion that pay inequality provides a good indicator of that derivative." (2000:9) They argue that an individual who increase work hours by 10% can expect a 1% increase in future wages, which "suggests that working an extra hour pays off as much or more than an extra hour of schooling"(2000:17).

The Bell and Freeman papers thus draw an explicit link between wage inequality and international differences in average hours worked, arguing that greater inequality signals an incentive system that elicits greater work effort. Although the incentive/tournament models they discuss may

not produce a socially optimal mix of work and leisure[7], they do at least produce more GDP.

Because Germany and the USA seem to represent polar cases of working hours trends, this paper will henceforth concentrate on those countries. Moreover, in its first version this paper was very much in the spirit of the Bell and Freeman papers, proposing an over arching explanation for hours differentials which would make most sense if the change in hours worked in these two countries over the last twenty years was a *general* phenomenon. Although that model (see Appendix A) differed from Bell and Freeman in the nature of the link between inequality and work hours (arguing that individual choice of work hours has externalities, in the sense that each person's marginal utility of leisure depends on the availability (i.e. non working time) of convivial potential playmates) it did share their focus on explanation of the over all average working hours differential - an issue to which we now turn.

2.2 Disaggregated Trends

Hours of work per year are the product of weekly hours of work and the number of weeks worked. Aggregate hours can therefore change because more (or fewer) individuals enter the labour market in the course of a year, or because those already employed work more (fewer) hours per week. [The influence of labour force participation decisions is often called the "extensive" margin of labour supply, while changes in working hours of those already employed can be thought of as the "intensive" margin.] Average hours of work can also change either because people of a given age work more (fewer) hours or because the population share of age groups changes. Since any number

[7]In a tournament, or "rat-race", model of internal labour markets, each worker's decision to increase labour supply has an externality for other workers in reducing other workers' probability of promotion. As workers compete against each other for relative position, there is no presumption that their aggregate utility will be maximized - indeed, for any given final equilibrium of hours worked, all workers would be better off if they could sign an enforceable agreement for everyone to reduce work hours by x hours.

of shifts in the distribution of work hours may produce the same change in average hours, it is useful to represent graphically changes in the entire distribution of working hours. Figures 5 to 10 are therefore drawn to indicate the changes in the distribution of working hours in both Germany and the US which arise from both changes in the frequency of non-participation and from the changing work hours of participants. In them, the population is ranked by number of hours of work, and the difference between plots of hours worked indicates which part of the distribution of hours is responsible for differences in average hours.

In order to look at long term trends in hours of work, we use Current Population Survey micro data tapes for the US from 1979 and 1998. However, since the best micro data available to us at the time of writing was the Luxembourg Income Study data on Germany for 1984 and 1994, a shorter time span of data is presented for Germany[8]. When we obtain direct access to the GSOEP micro data, a more comparable span of German data will be included in this paper.

Figures 5 and 6 plot the usual hours of paid work per week and per year in Germany and the US for all adults aged 18 to 64[9]. It is notable that the top half of the hours distribution is much the same, in both time periods and in both Germany and the USA - a fact that should produce considerable scepticism about the "incentives" story, given the substantial difference in after tax wage

[8]In order to maintain comparability over time, the 1994 data presented in this paper refer only to the states comprising the former West Germany. In practice, however, this makes little difference.

[9]Because they are based on the "usual hours" concept, Figures 5 to 10 do not reflect the greater length of paid vacations and more frequent paid holidays of German workers. Using data from 1990, Bell and Freeman (1994:4) argue that: "Differences in weeks of vacation and holiday time translate into a 17% reduction in working time in Germany compared to a 9% reduction of work time in the United States, and therefore contribute .08 ln points to the annual hours gap between the two countries." However, there is no evidence of a *trend* in vacation and holiday entitlements large enough to explain Figure 1. Cross country differences in common entitlements to vacations and holidays also cannot explain the individual choice of work hours that the "incentives" argument relies on.

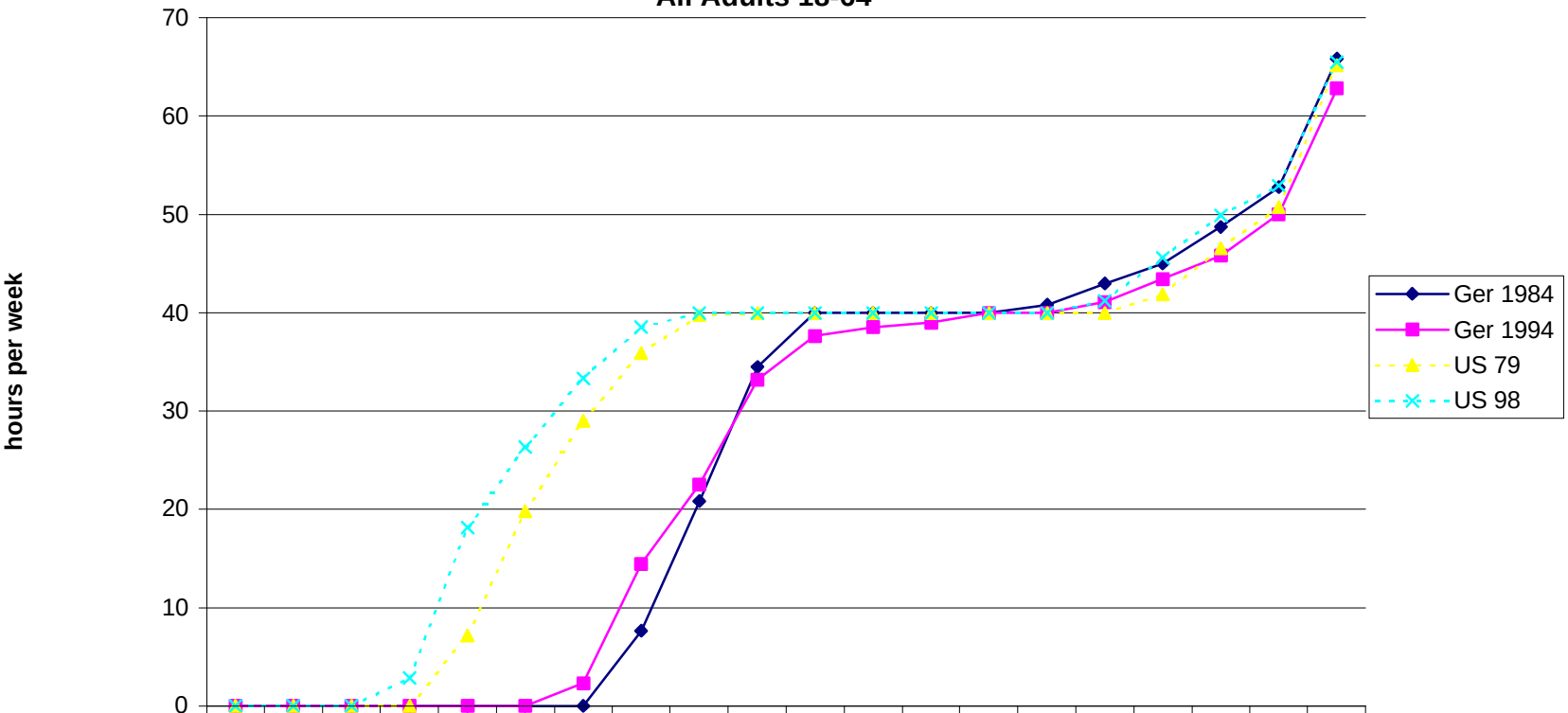
differentials. The main event is the difference in labour market participation rates. In Germany, substantially more people have no paid work, and the fraction jobless has increased marginally over time. In the USA, the percentage of working age adults who did some paid work was 15.4 percentage points greater than in Germany in 1984 and 18 points greater in 1994 - a substantial and widening difference (see Appendix Table A1).

Looking separately at men and women further isolates the changes in these two labour markets. Figure 7[10] indicates that the distribution of paid working hours for males 18 to 64 in the USA was essentially constant in 1979 and 1998, but the working hours distribution of German males shifted down by about five percentage points. Figure 8 shows how much more American women, increased their paid working hours - to a far greater degree than German women.

The picture for men becomes even clearer if one looks separately at men aged 25 to 54 and 55 to 64. Figure 9 illustrates how among men aged 25 to 54, the top three quarters of the hours distribution is essentially the same, and essentially constant, in both countries. The USA has a higher labour force participation rate among prime age males, but it is likely that social assistance regulations are a better explanation for that than wage differentials.

[10]To save space, only the usual annual hours data are presented - weekly data tell the same story and are available on request from the author.

**Figure 5**
**Usual Weekly Paid Hours by Vingtile**
**Germany and the United States**
**All Adults 18-64**




| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ger 1984 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 21 | 34 | 40 | 40 | 40 | 40 | 41 | 43 | 45 | 49 | 53 | 66 |
| Ger 1994 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 15 | 23 | 33 | 38 | 39 | 39 | 40 | 40 | 41 | 43 | 46 | 50 | 63 |
| US 79 | 0 | 0 | 0 | 0 | 7 | 20 | 29 | 36 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 42 | 47 | 51 | 65 |
| US 98 | 0 | 0 | 0 | 3 | 18 | 26 | 33 | 39 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 41 | 46 | 50 | 53 | 65 |

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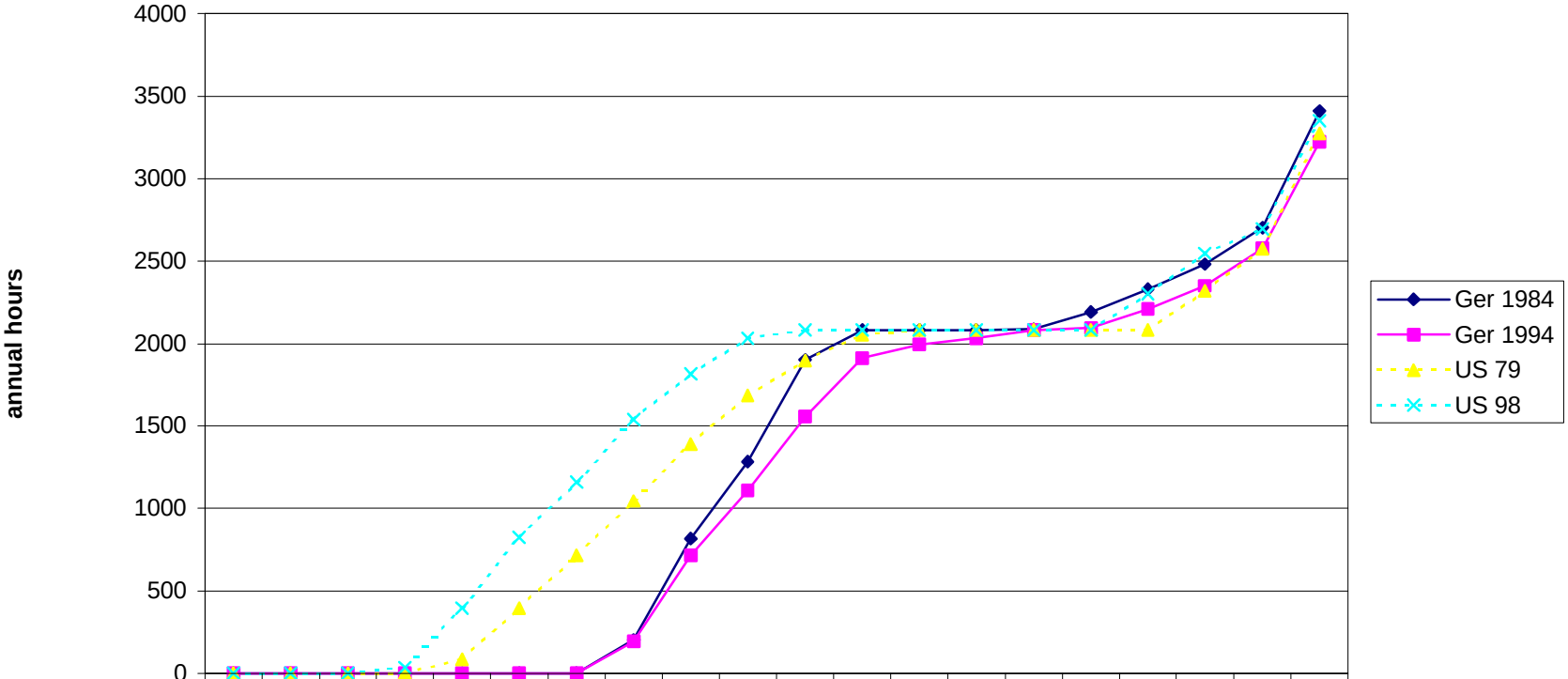
**Figure 6**
**Usual Annual Paid Hours by Vingtile**
**Germany and the United States**
**All Adults 18-64**




| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ger 1984 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 205 | 819 | 1285 | 1901 | 2080 | 2080 | 2080 | 2088 | 2192 | 2329 | 2483 | 2701 | 3409 |
| Ger 1994 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 193 | 715 | 1109 | 1555 | 1912 | 1995 | 2031 | 2080 | 2094 | 2207 | 2350 | 2577 | 3223 |
| US 79 | 0 | 0 | 0 | 0 | 88 | 396 | 716 | 1046 | 1389 | 1683 | 1899 | 2052 | 2080 | 2080 | 2080 | 2080 | 2082 | 2320 | 2575 | 3275 |
| US 98 | 0 | 0 | 0 | 36 | 398 | 826 | 1158 | 1538 | 1816 | 2034 | 2080 | 2080 | 2080 | 2080 | 2080 | 2080 | 2303 | 2548 | 2696 | 3351 |

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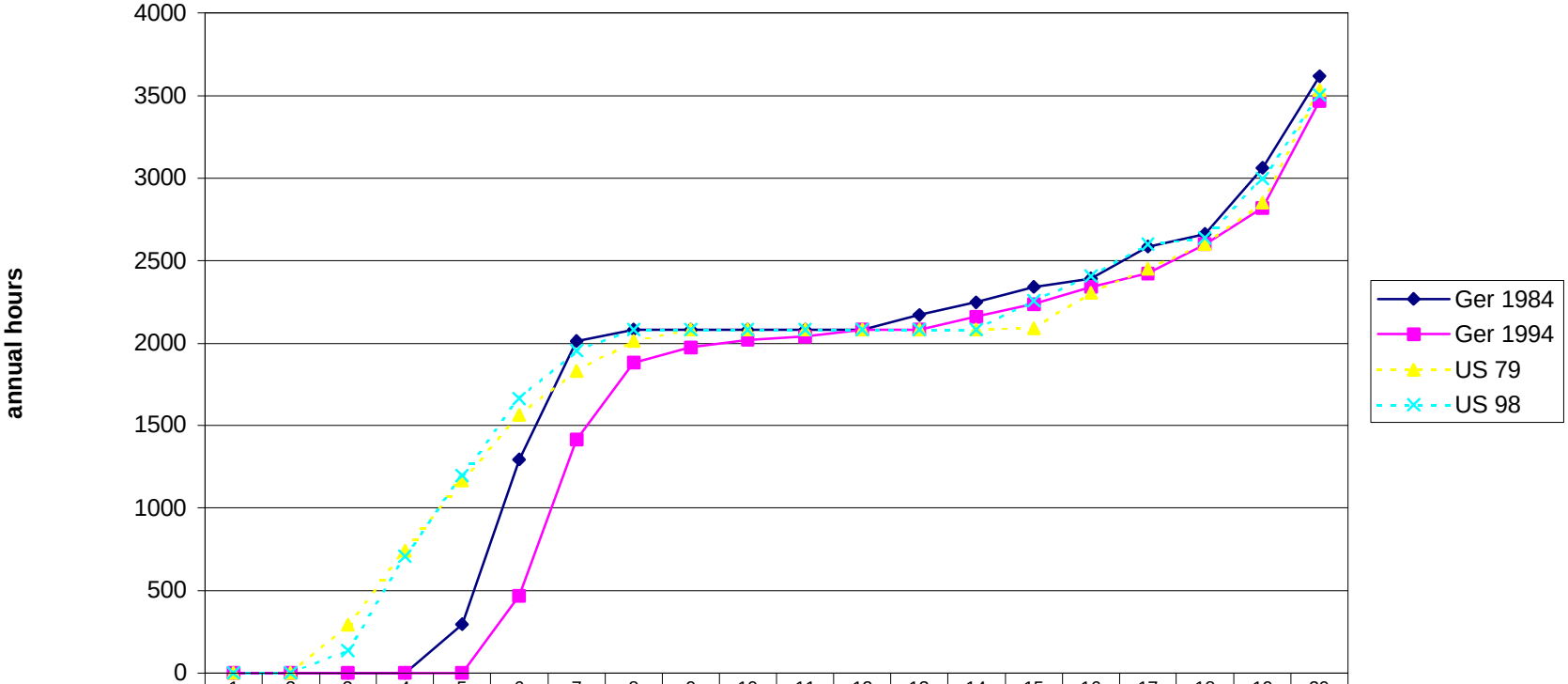
**Figure 7**
**Usual Annual Paid Hours by Vingtile**
**Germany and the United States**
**All Males 18-64**




| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ger 1984 | 0 | 0 | 0 | 0 | 296 | 1294 | 2012 | 2080 | 2080 | 2080 | 2080 | 2082 | 2171 | 2248 | 2340 | 2391 | 2584 | 2661 | 3063 | 3616 |
| Ger 1994 | 0 | 0 | 0 | 0 | 0 | 470 | 1414 | 1882 | 1975 | 2017 | 2039 | 2080 | 2082 | 2161 | 2236 | 2340 | 2424 | 2600 | 2819 | 3468 |
| US 79 | 0 | 0 | 293 | 742 | 1168 | 1562 | 1831 | 2013 | 2080 | 2080 | 2080 | 2080 | 2080 | 2080 | 2092 | 2305 | 2449 | 2600 | 2849 | 3535 |
| US 98 | 0 | 0 | 136 | 707 | 1199 | 1662 | 1954 | 2080 | 2080 | 2080 | 2080 | 2080 | 2080 | 2080 | 2256 | 2405 | 2600 | 2637 | 2995 | 3501 |

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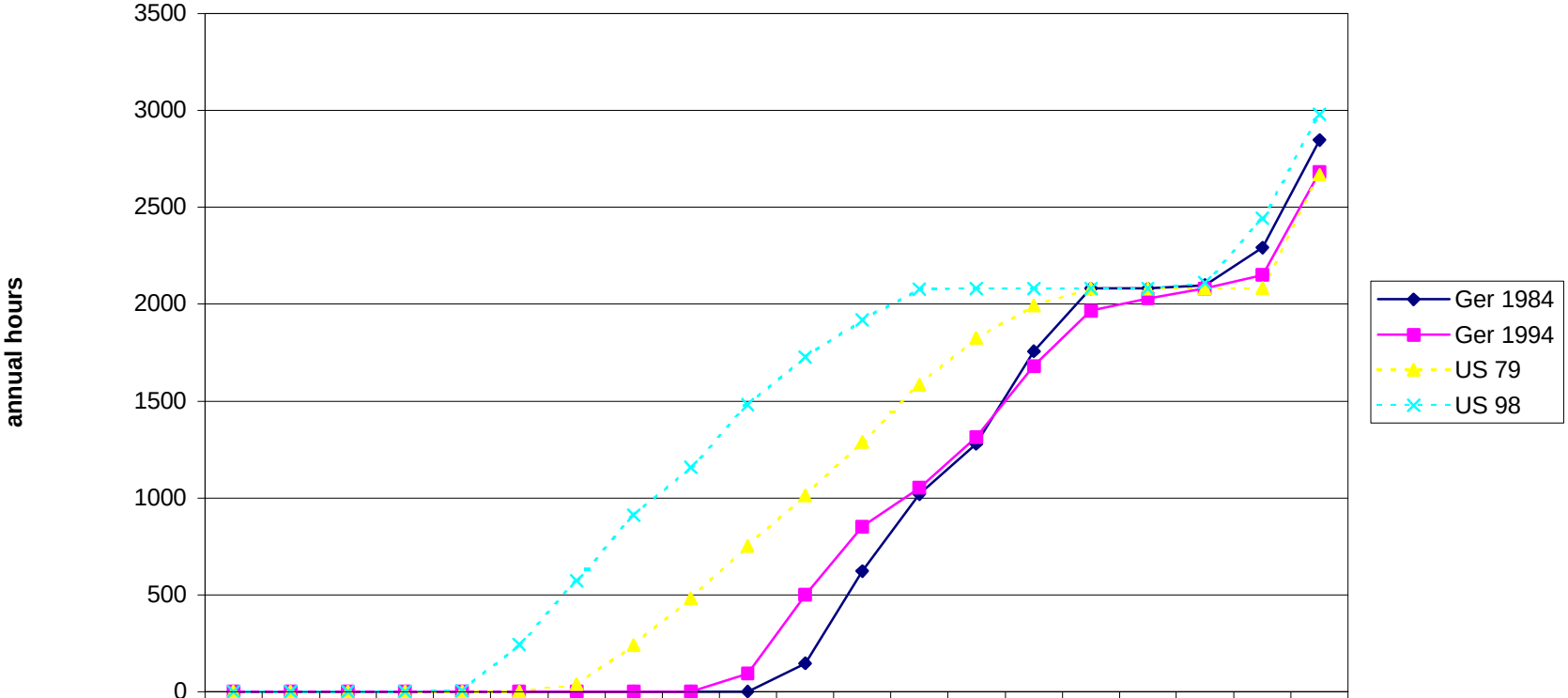
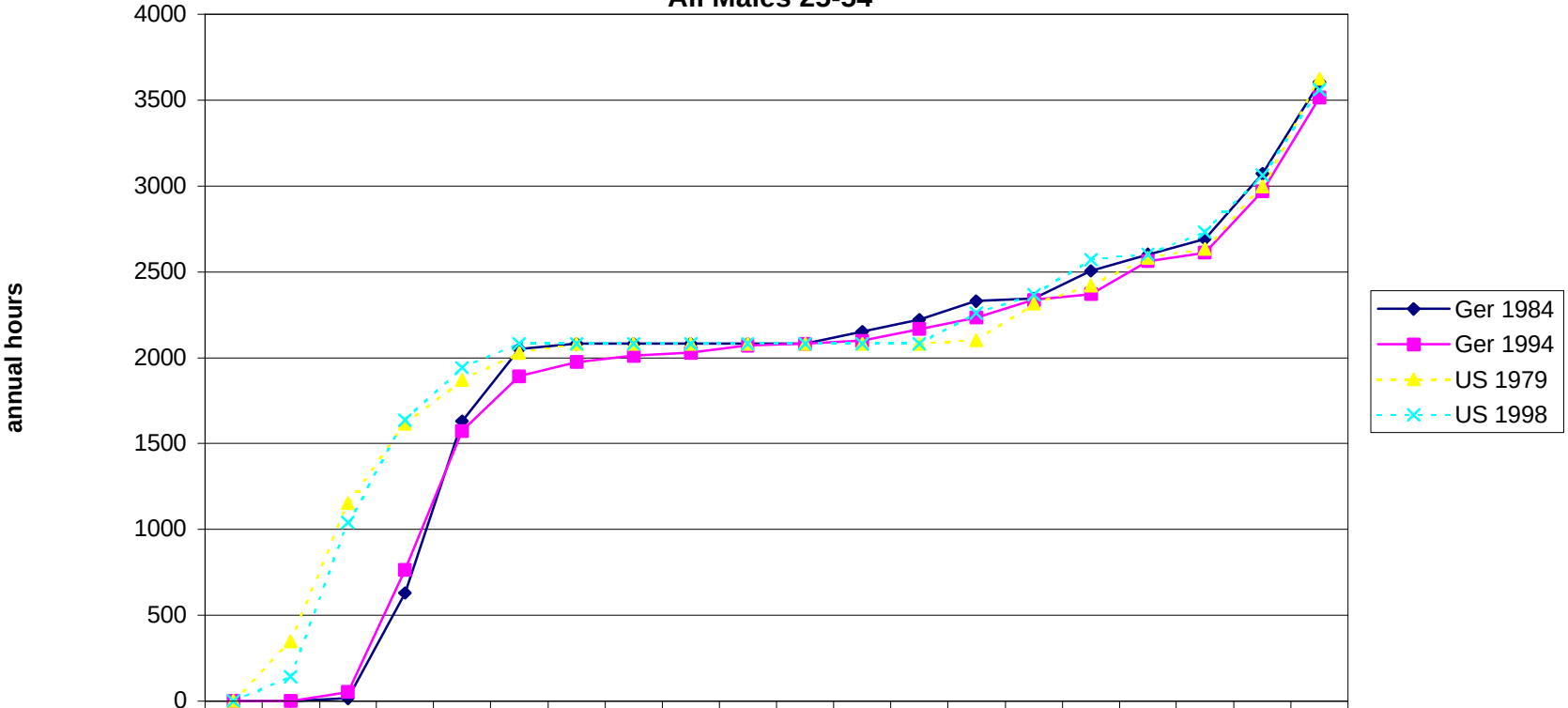
**Figure 8**
**Usual Annual Paid Hours by Vingtile**
**Germany and the United States**
**All Females 18-64**




| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ger 1984 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 146 | 624 | 1019 | 1277 | 1756 | 2080 | 2080 | 2098 | 2292 | 2849 |
| Ger 1994 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 95 | 500 | 852 | 1053 | 1313 | 1681 | 1965 | 2030 | 2080 | 2151 | 2683 |
| US 79 | 0 | 0 | 0 | 0 | 0 | 0 | 38 | 242 | 482 | 751 | 1014 | 1289 | 1584 | 1824 | 1993 | 2080 | 2080 | 2080 | 2083 | 2669 |
| US 98 | 0 | 0 | 0 | 0 | 7 | 245 | 572 | 912 | 1159 | 1481 | 1728 | 1918 | 2079 | 2080 | 2080 | 2080 | 2080 | 2109 | 2443 | 2979 |

**Figure 9**
**Usual Annual Paid Hours by Vingtile**
**Germany and the United States**
**All Males 25-54**




| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ger 1984 | 0 | 0 | 15 | 628 | 1630 | 2052 | 2080 | 2080 | 2080 | 2080 | 2080 | 2151 | 2220 | 2328 | 2342 | 2504 | 2600 | 2691 | 3074 | 3604 |
| Ger 1994 | 0 | 0 | 53 | 765 | 1576 | 1893 | 1976 | 2010 | 2028 | 2072 | 2080 | 2099 | 2168 | 2234 | 2335 | 2370 | 2562 | 2610 | 2969 | 3515 |
| US 1979 | 0 | 349 | 1153 | 1615 | 1868 | 2029 | 2080 | 2080 | 2080 | 2080 | 2080 | 2080 | 2080 | 2101 | 2312 | 2420 | 2580 | 2635 | 2995 | 3623 |
| US 1998 | 0 | 141 | 1041 | 1636 | 1941 | 2080 | 2080 | 2080 | 2080 | 2080 | 2080 | 2080 | 2080 | 2261 | 2365 | 2572 | 2600 | 2730 | 3061 | 3560 |

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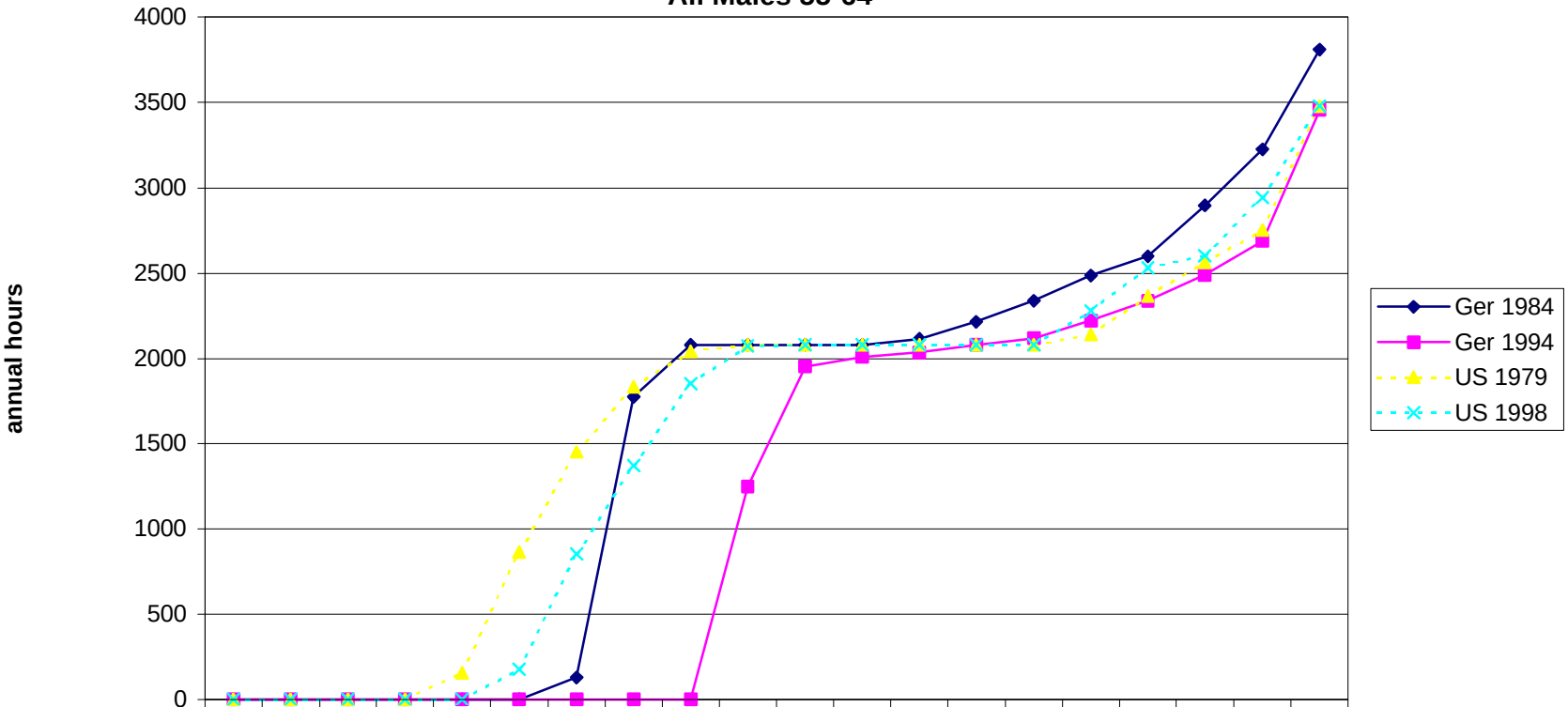
**Figure 10**
**Usual Annual Paid Hours by Vingtile**
**Germany and the United States**
**All Males 55-64**




| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ger 1984 | 0 | 0 | 0 | 0 | 0 | 0 | 132 | 1775 | 2080 | 2080 | 2080 | 2080 | 2115 | 2216 | 2340 | 2484 | 2600 | 2896 | 3228 | 3809 |
| Ger 1994 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1249 | 1952 | 2007 | 2035 | 2080 | 2118 | 2220 | 2340 | 2489 | 2688 | 3456 |
| US 1979 | 0 | 0 | 0 | 0 | 158 | 866 | 1452 | 1834 | 2041 | 2080 | 2080 | 2080 | 2080 | 2080 | 2080 | 2140 | 2364 | 2561 | 2751 | 3481 |
| US 1998 | 0 | 0 | 0 | 0 | 0 | 177 | 853 | 1372 | 1851 | 2073 | 2080 | 2080 | 2080 | 2080 | 2080 | 2279 | 2530 | 2603 | 2942 | 3478 |

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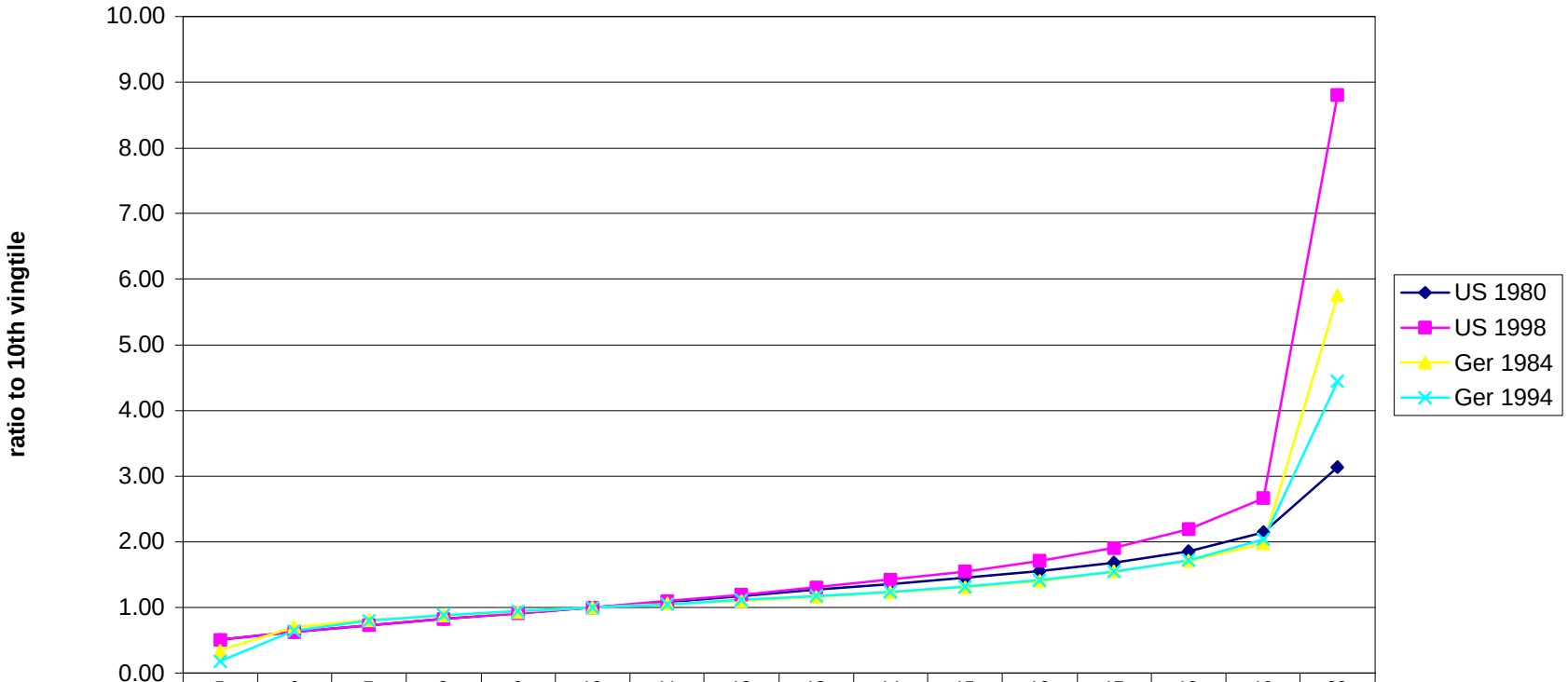
**Figure 11**
**Ratio of Pre-tax Hourly Wages to Median Vingtile**
**Males 25-54**




| | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| US 1980 | 0.50 | 0.63 | 0.74 | 0.82 | 0.91 | 1.00 | 1.09 | 1.18 | 1.27 | 1.36 | 1.46 | 1.56 | 1.69 | 1.85 | 2.15 | 3.13 |
| US 1998 | 0.51 | 0.63 | 0.73 | 0.82 | 0.92 | 1.00 | 1.10 | 1.19 | 1.31 | 1.42 | 1.55 | 1.71 | 1.91 | 2.19 | 2.67 | 8.80 |
| Ger 1984 | 0.34 | 0.71 | 0.81 | 0.88 | 0.94 | 1.00 | 1.06 | 1.10 | 1.16 | 1.23 | 1.30 | 1.40 | 1.55 | 1.71 | 1.98 | 5.76 |
| Ger 1994 | 0.18 | 0.64 | 0.80 | 0.88 | 0.95 | 1.00 | 1.05 | 1.12 | 1.18 | 1.24 | 1.31 | 1.42 | 1.55 | 1.72 | 2.04 | 4.45 |

**vingtile**

Figure 10 presents data for men aged 55 to 64, and the picture is very different than for younger males. From 1984 to 1994, Germany saw both a twenty percentage point increase in the fraction of men aged 55 to 64 with no paid work and a quite significant decline in hours of work throughout the hours distribution. In the USA, even over a considerably longer period of time (1979 to 1998) changes were much smaller and more ambiguous. The hardest working twenty percent of 55 to 64 year old males worked even harder, and the second hardest working quintile worked the same amount, but others cut their work hours and the percentage of complete non participants rose by 4.7. percentage points.

However, a striking feature of the working hours distributions is their essential similarity in the top end. Differences in working hours appear to arise primarily in the degree of non-participation, and are concentrated by age and gender. Although Bell and Freeman rely on the idea of extra effort as a signaling device for promotion, and the greater inequality of wages in the USA as indicative of a greater incentive to get promoted, presumably this sort of tournament model would have its greatest impact on the frequency and extent of "above normal" working hours[11]. And presumably the greatest impact on above normal hours should be detected among prime age males, who are the demographic group least likely to expect periods of labour force withdrawal which would reduce the payoff to promotion. Yet it is precisely among above normal working hours males aged 25 to 54 that there is least difference between the USA and Germany, and least change over time. As Figure 11 illustrates, there has been a fairly substantial widening of wages differentials in the USA compared

[11]As well, since Figure 1 indicates that aggregate working hours were much the same in Germany and the US in 1980, it is the *change* in aggregate working hours that needs explanation - not the *level* difference. To make this argument, Bell and Freeman should be appealing to *widening differentials in wage inequality* (an issue on which they present no evidence) rather than to point in time differences in the level of wage inequality.

to Germany, but changes in hours worked are rather small. Any explanation of German/American differences must somehow cope with the fact that there is least difference in labour supply among the group most likely to be influenced by greater monetary incentives to labour supply.

The differences between American and German women may be at least partly explained by public policy emphasis. German social policy has been expressly framed to provide substantial financial incentives, for up to two years, for women to remain at home and care for their children (Phipps:1994,1998). Tax/transfer incentives strongly favor the "Traditional" model of the family and child care by stay-at-home mothers. By contrast, American social policy has provided no such support for mothers to stay at home (indeed welfare policy has shifted strongly to encouraging/requiring the labour force participation of social assistance clients).

Figures 7 to 10 present the behavior of specific demographic groups, but over time average working hours can also change because the relative weight of different demographic groups in the population changes. In particular, over the last twenty years the youth of 1980 have become the prime age workers of today. Demographic unevenness in cohort size has been more important in the USA than in Germany. In the US, the percentage of the population aged 18 to 24 (which has relatively low average annual work hours) fell considerably (from 21.3% to 15.5%) between 1979 and 1998, with a corresponding increase in the proportion of the population in their peak working years of 25 to 54. In Germany, the shift was noticeably smaller.

Table 1 therefore decomposes the change over time between 1979 and 1998 in average work hours in the USA into that difference that results from a change in the average hours of work of a particular age/sex cohort and that difference that results from a change in the relative population February 7, 2001weight of a particular age/sex cohort. Table 2 does the same for Germany between

1984 and 1994 while Table 3 decomposes the USA - Germany differential in average work hours, comparing Germany in 1994 to 1998 data on the USA.

Overall, as Table 1 indicates, average working time in the US increased by 167 hours, but that was largely due to increases in the working hours of the 25 to 54 age group, although for different reasons among men and women. Among prime age women, the increase in average hours per woman was the important issue, contributing (122/167=) 73% of the overall increase in US working hours. The increased proportion of men in the prime age category was responsible for the male contribution to greater average hours, on net contributing 20% (=33.3/167) of the increased average. For men as a group the contribution of changes in average annual work hours within cohorts was actually negative, which (since this was a period of rising inequality in male earnings) is further evidence against the argument that inequality is an incentive to greater labour supply.

In Table 2, the German experience is notably different. In the shorter period 1984 to 1994, average working hours in Germany fell by approximately eighty hours per year - which was essentially all due to the decline in working time among German men. The principle difference with the US is the lack of any appreciable increase in paid working time among women. The aggregate impact of changes in demographic weight was positive, but fairly small (+11.1 hours). The main event was not working hours changes among prime age males (which contributed a relatively modest 19.7% (=-15.9/-80.4) of the total decline in hours) but decreased hours of work among youth aged 18 to 24 and older workers aged 55 to 64 - and this was largely a labour force participation effect. Again, if the issue is to explain *differing trends* in labour supply and if it were "incentives to promotion in an unequal society" that drove working hours, one would have expected to see the biggest changes in the labour supply behavior of prime age male *workers.*

Table 1

Contributions of Differences in Average Hours and Population Weight to Total Average Hours Differential

USA 1998 - USA 1979

| | Males | | Females | | All | |
|---|---|---|---|---|---|---|
| | Average Hours[1] | Population Weight[2] | Average Hours[1] | Population Weight[2] | Average Hours[1] | Population Weight[2] |
| Ages 18-24 | -7.5 | -35.3 | -0.2 | -29.6 | -7.2 | -65.4 |
| Ages 25-54 | 5.4 | 83.1 | 122.4 | 41.6 | 130.2 | 122.3 |
| Ages 55-64 | -5.1 | -14.5 | 15.9 | -9.1 | 11.5 | -24.3 |
| Total | -7.2 | 33.3 | 138.2 | 2.9 | 134.5 | 32.6 |

Note: Cell entries represent the contribution of average hours changes and population weight changes as per the decomposition:

$$\overline{H}_2 - \overline{H}_1 = \sum i\, \alpha_{2i} ( \overline{H}_{2i} - \overline{H}_{1i} ) + \sum i\, \overline{H}_{1i} ( \alpha_{2i} - \alpha_{1i})$$

where $\alpha_{ki}$ = population share of cohort I in period k.

$\overline{H}_{ki}$ =average hours work of cohort I in period k.

[1] "average hours" effect of cohort i = $\alpha_{2i} ( \overline{H}_{2i} - \overline{H}_{1i})$

[2] "population weight" effect of cohort i = $\overline{H}_{1i} ( \alpha_{2i} - \alpha_{1i})$

Table 2

Contributions of Differences in Average Hours and Population Weight to Total Average Hours Differential

Germany 1994 - Germany 1984

| | Males | | Females | | All | |
|---|---|---|---|---|---|---|
| | Average Hours[1] | Population Weight[2] | Average Hours[1] | Population Weight[2] | Average Hours[1] | Population Weight[2] |
| Ages 18-24 | -42.0 | -44.2 | -31.1 | -25.0 | -74.1 | -68.2 |
| Ages 25-54 | -15.9 | 26.9 | 24.0 | 34.1 | -4.9 | 74.0 |
| Ages 55-64 | -32.9 | 14.5 | 12.5 | -1.3 | -12.5 | 5.3 |
| Total | -90.9 | -2.8 | 5.5 | 7.9 | -91.5 | 11.1 |

Note: Cell entries represent the contribution of average hours changes and population weight changes as per the decomposition:

$$\overline{H}_2 - \overline{H}_1 = \sum_i \alpha_{2i} ( \overline{H}_{2i} - \overline{H}_{1i} ) + \sum_i \overline{H}_{1i} ( \alpha_{2i} - \alpha_{1i})$$

where $\alpha_{ki}$ = population share of cohort I in period k.

$\overline{H}_{ki}$ =average hours work of cohort I in period k.

[1] "average hours" effect of cohort i= $\alpha_{2i} ( \overline{H}_{2i} - \overline{H}_{1i})$

[2] "population weight" effect of cohort i = $\overline{H}_{1i} ( \alpha_{2i} - \alpha_{1i})$

Table 3

Contributions of Differences in Average Hours and Population Weight to Total Average Hours Differential

USA 1998 - Germany 1994

| | Males | | Females | | All | |
|---|---|---|---|---|---|---|
| | Average Hours[1] | Population Weight[2] | Average Hours[1] | Population Weight[2] | Average Hours[1] | Population Weight[2] |
| Ages 18-24 | 50.0 | 11.9 | 35.3 | 9.5 | 85.4 | 21.3 |
| Ages 25-54 | 55.8 | 8.4 | 172.4 | 3.8 | 228.5 | 11.8 |
| Ages 55-64 | 19.1 | -29.8 | 33.2 | -12.8 | 52.0 | -42.2 |
| Total | 124.9 | -9.5 | 240.9 | 0.5 | 365.9 | -9.1 |

Note: Cell entries represent the contribution of average hours changes and population weight changes as per the decomposition:

$$\overline{H}_2 - \overline{H}_1 = \sum i\, \alpha_{2i} ( \overline{H}_{2i} - \overline{H}_{1i} ) + \sum i\, \overline{H}_{1i} ( \alpha_{2i} - \alpha_{1i})$$

where $\alpha_{ki}$ = population share of cohort I in period k.

$\overline{H}_{ki}$ =average hours work of cohort I in period k.

[1] "average hours" effect of cohort i= $\alpha_{2i} ( \overline{H}_{2i} - \overline{H}_{1i})$

[2] "population weight" effect of cohort i= $\overline{H}_{1i} ( \alpha_{2i} - \alpha_{1i})$

Table 3 looks at cross sectional USA - Germany differences in the 1990s. Over all, differences are very substantial - Americans worked 356.8 hours, or almost an hour a day more than Germans, on average. Differences in population weight explain essentially none of this - indeed if the USA had German population weights, average working hours in the USA would be marginally (9.1 hours) less than it is. Approximately two thirds of the working hours differential (240.9/356.8 = 67.5%) is contributed by the different behavior of German and American women. About half of the remaining difference (55.8/(356.8-240.9) = 48.1%) is contributed by the behavior of prime age males - but as Figure 9 indicates, these differences are concentrated at the labour force participation margin.

The bottom line of all this is that it is extremely hard to argue that the differences in average working hours in Germany and the USA, either at a point in time or as they have changed over time, represent *general* differences in labour supply behavior - and it is even harder to argue that greater US earnings inequality plays a causal role in working hours differentials. However, although differences in working hours may not be *caused* by differences in inequality, they do represent a challenge for the *interpretation* of statistics on inequality and growth - an issue to which we now turn.

Table 4 sums up. It decomposes the total change over time, and difference across countries, into the influence of change at the "intensive" margin of hours of work *per employee* and the "extensive" margin of a changing *employment rate.* Across country differences are primarily due to differences in the employment rate - i.e. differences in labour supply at the *extensive* margin. Over time, within countries there are smaller differences to be explained, and changes at the *intensive* margin are more important.

Table 4
Change in Average Usual Hours of Paid Work per Person
Ages 18-64

| | total | intensive | extensive |
|---|---|---|---|
| Germany 1994-1984 | -80 | -81 | 1 |
| United States 1998-1979 | 167 | 110 | 57 |
| USA 1998 - Germany 1994 | 357 | 4 | 353 |

If $P_i$ = employment/population ratio in period, country $_I$
$\overline{H}_I$ =Average hours per person = P(Average hours per worker)
$\overline{h}_I$ =Average hours per worker

$$\overline{H}_2 - \overline{H}_1 = P_2 (\overline{h}_2 - \overline{h}_1) + (P_2 - P_1)\overline{h}_I$$
= “intensive” + “extensive”

## 3. The Interpretation of "Growth" and "Inequality"

Economists are interested in the growth rate and inequality of money incomes because they think that these correspond in some way to growth in average utility and the inequality of utility. Some economists would argue that "well-being" would be a better term to use than "utility", and there is a provocative and profound literature on just what we want to say in using such terms (see Sen (1987) or Elster and Roemer (1991)) - but there is no real disagreement with the idea that income and consumption are *intermediate inputs* in the production of utility or well-being, and not ends in themselves. The question then is: (1) *How* do changes in average income over time, and differentials in individual income at a point in time, affect utility or well-being? (2) *What else* influences utility/well-being ?

Although there is a literature on subjective well being that finds "surprisingly small correlations" between individual income and self reported happiness (see Diener and Suh, 1997:201), economics as a discipline relies heavily on the idea that annual money income does matter. *Why* income matters is another issue. Cross sectional correlations between individual income and measures of self reported happiness may simply reflect the relative status that conspicuous consumption and relative "success" produce. Since the consumption norms of individuals habituate fairly rapidly to changes in average incomes, it may not be surprising that once countries have passed a threshold of average incomes sufficient to maintain nutrition and basic public services, further increases in average incomes produce little or no increase in self reported happiness or life satisfaction.(see Frank, 1999:64-75)[12]

[12]Hill (2000) also provides a comprehensive list of references. Wilkinson (1997) notes that at average income levels below approximately $5,000 (US), trends in per capita GDP dominate mortality rates, but above that the level of inequality is the primary determinant of mortality differentials.

However, whether or not it is absolute or relative income that matters for individual well-being, most economists would agree that utility also depends on the amount of non-working time available. If rising average incomes are attained only at the cost of greater labour hours, there is a utility cost associated with decreased leisure time. It is clear that rising average money incomes in the USA are partly due to greater hours of work, and that this is true throughout the income distribution. Figure 12 compares American work hours per household adult at each point in the distribution of equivalent income from 1974 to 1997, both absolutely and as a fraction of 1997 hours. If one looks at life in terms of dollars available to finance consumption, and time available in which to do it, then the increase in money income of American households overstates the increase in utility or economic well being.

Table 5 examines the question - "How different would things be if each working household supplied the same amount of work time to the paid labour market?" Historically, social policy in both North America and Europe has been influenced by the idea of a "living wage" - that the earnings of one person, working full time, full year, should be able to support a family. Table 5 therefor compares the actual distribution of income (after taxes and transfers, and adjusted for economies of scale using the LIS equivalence scale) with a simulated distribution of income which supposes that the higher income spouse in all working households supplied the same number of hours of paid work (2000 = 50 weeks @ 40 hours) and there was only one paid worker in each household.

The top panel of Table 5 presents mean and median income and some summary statistics on the distribution of income (Gini, Theil, 90/10 ratio and the poverty rate, average poverty gap and SST index of poverty intensity) for the population as a whole. Since some households have no working members, the middle panel presents the same statistics for the population of people who live in

households wwith some labour market earnings. The bottom panel looks at those working households and simulates the distribution of income on the assumption that each working household supplies 2000 hours of work.

Comparing actual and simulated money income, the actual increase in average equivalent income (USA 15.5%, Germany 10.4%) was considerably greater than would have occurred had labour supply per working household been a constant 2000 hours (i.e. 9.4% increase in the US, 6.6% increase in Germany). However, as the substantial increase in Gini and Theil indices of inequality in the top panel of Table 5 might lead one to suspect, increases in income were concentrated at the top end of the distribution. In actual money income the rise in median income was less (USA 7.9%, Germany 9.3%) than the increase in average income, and if working hours had been held constant the median person in a working household in the USA would have had a small ($262, or about 2%) decline in real equivalent income. However, doing the same standardization for Germans produces a 14.7% *increase* in median income - which is substantially greater than the increase in median money income, uncorrected for labour supply changes. Hence, if the median person were the reference point, one can say that American households fended off a decline in living standards by working more hours, while German households took out part of their increase in living standards in the form of relatively less working time.

In the USA, comparing the actual increase in the Gini (10.4%) and the Theil (35.3%) is an important clue to inequality trends since the Theil is more low end sensitive than the Gini. Moreover, the increase in the Gini (20.1%) and the Theil (120.1%) of the simulated distribution is much greater - indicating that increased labour supply by households in the lower part of the distribution in the US fended off much of the increase in inequality, by increasing work effort. In Germany, by contrast, the

simulated distributions of income show a *decline* in inequality measures if household work hours are held constant. Hence, if working hours were standardized across these countries, one would perceive a much larger increase in US inequality than observed in actual money income (combined with a decline in median income), while German data would show a decline in inequality (combined witha substantial increase in median income).

Trends in working hours therefore have major implications for the interpretation of trends in inequality and growth in incomes. However, when changes in labour supply are so heavily concentrated among women, one cannot really discuss utility and labour supply at the household level without some consideration of changing gender norms and roles within households. It would be more convenient if preferences did not change or if the answer to the question "How much better off or worse off are you ?"did not depend on whether well-being was evaluated using the initial, or the final, set of preferences - but that seems a poor guide to the social reality of the last thirty years.

Table 5
Standardizing Household Hours of Work - What Difference would it make ?
Post-Tax, Post-Transfer Equivalent Income Among Individuals

| | mean[1] | median[1] | Gini | Theil | % poor[2] | poverty gap[2] | Poverty Intensity[2] | 90/10 ratio |
|---|---|---|---|---|---|---|---|---|
| Money Income- All Persons | | | | | | | | |
| USA 1986 | 21,852 | 19,237 | 0.337 | 0.187 | 17.9 | 0.354 | 11.9 | 11.0 |
| USA 1997 | 25,236 | 20,766 | 0.372 | 0.253 | 16.8 | 0.333 | 10.6 | 13.2 |
| Germany 1984 | 15,728 | 14,306 | 0.250 | 0.111 | 6.5 | 0.223 | 2.8 | 5.16 |
| Germany 1994 | 17,371 | 15,633 | 0.272 | 0.141 | 8.5 | 0.310 | 5.2 | 6.59 |
| Money Income- Positive Earnings | | | | | | | | |
| USA 1986 | 23,177 | 20,564 | 0.315 | 0.164 | 13.1 | 0.334 | 8.4 | 9.33 |
| USA 1997 | 26,697 | 22,182 | 0.357 | 0.235 | 12.8 | 0.297 | 7.3 | 11.2 |
| Germany 1984 | 16,558 | 15,161 | 0.233 | 0.092 | 3.3 | 0.213 | 1.4 | 4.48 |
| Germany 1994 | 18,400 | 16,610 | 0.255 | 0.128 | 4.9 | 0.266 | 2.6 | 5.38 |
| Money Income- if 2000 hours[3] | | | | | | | | |
| USA 1986 | 15,946 | 13,473 | 0.338 | 0.219 | 28.2 | 0..320 | 16.5 | 10.2 |
| USA 1997 | 17,450 | 13,211 | 0.406 | 0.482 | 34.2 | 0.332 | 20.3 | 14.7 |
| Germany 1984 | 12,868 | 9,986 | 0.339 | 0.350 | 17.0 | 0.222 | 7.2 | 8.55 |
| Germany 1994 | 13,723 | 11,456 | 0.303 | 0.228 | 16.1 | 0.262 | 8.1 | 7.73 |

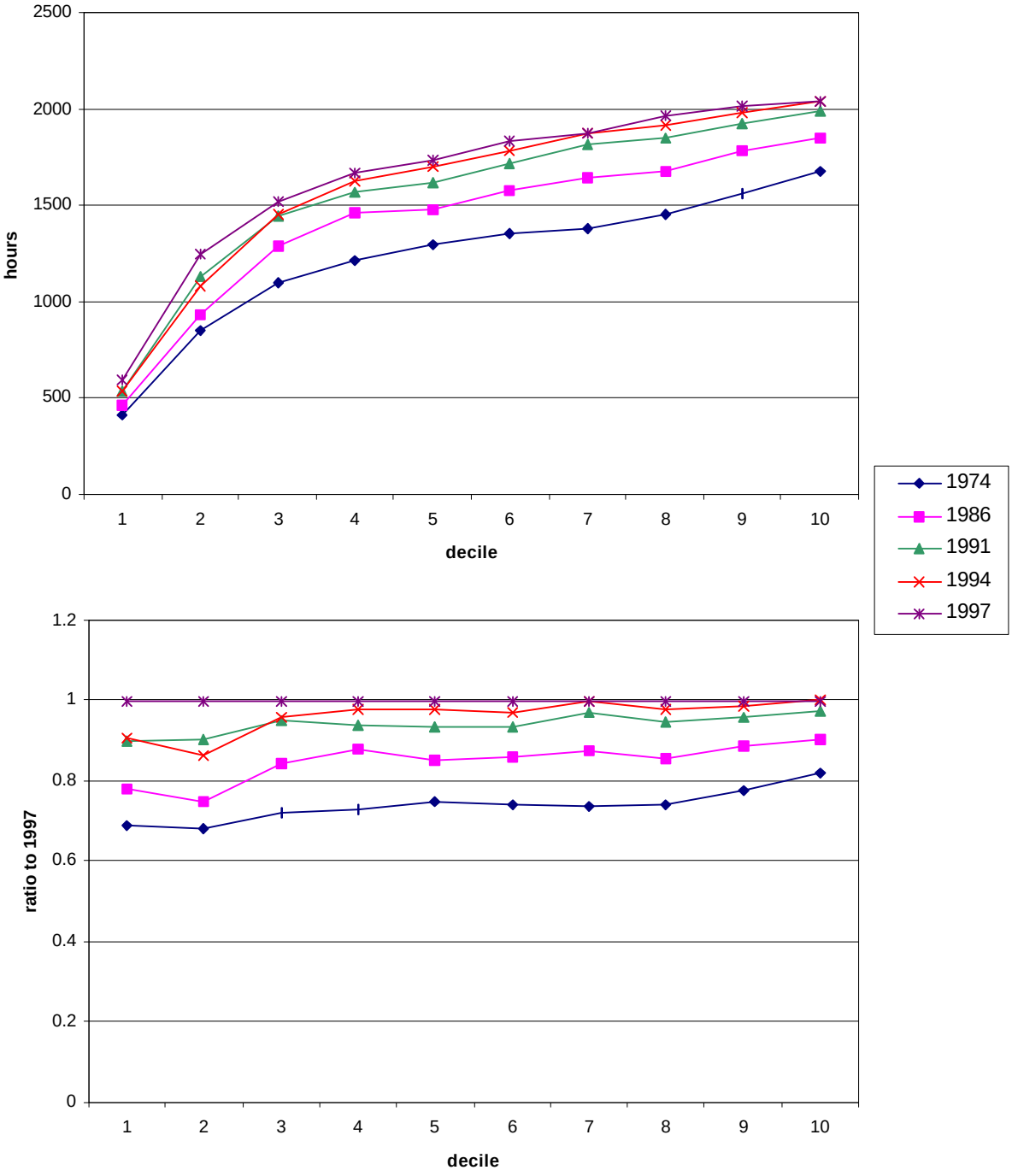
[1] Converted to 1997 US dollars using purchasing power parities (OECD); Household income after taxes and transfers is converted to equivalent income using the LIS equivalence scale.
[2] Poverty rate, average poverty gap and Sen Shorrocks Thon index of poverty intensity calculated using one half median equivalent income of all persons as poverty line
[3] Simulation results where households with $Y_L > 0$ are assumed to have one earner who works 2000 hours in the year. The hourly wage used is that of the higher income spouse.
Note: German data excludes former East German states.
Source: Author's calculations using the Luxembourg Income Study micro data

## 4. Conclusion

International differences in inequality, growth and hours worked per person present an almost irresistable temptation to generalize about the work habits of nationalities, the rewards to work and the overall distribution of resources. However, detailed disaggregation paints a more shaded picture. There are significant differences between countries - particularly the USA and Germany - in both inequality and hours of work, but work hours differences are mostly at the extensive margin of labour supply. Although broad assertions and fearless stereotypes are most vivid when they refer to common categories - as in comparisons of "German workers" and "American workers"- the vast majority of German and American *workers* seem to behave in fairly similar ways. Differences in total working time are primarily explained by the fraction of the working age population that works. Hence, since the vast majority of prime age males in both countries continue (as always) to be in the labour force, for this cohort there is not a lot of difference in labour supply for differences in net after tax wage to explain. The greater equality of the German income distribution seems to come without much cost in decreased labour supply - ***among workers.***

When looking at the population as a whole, however, the overall difference in probability of employment among people of working age is strikingly large. Differences this large between countries - particularly in the behaviour of women - are hard to explain as marginally diifferent responses to marginal differences in incentives. It seems more likely that there are national differences in preferences and choice of lifestyle - particularly those that concern gender roles and the appropriate locus of care for young children. However, differences in tastes greatly complicate the international comparison of statistics on trends in the inequality or the average level of money income and their correspondence to trends in the inequality and level of economic well being.

**Figure 12**
**Average Work Hours per Household Adult by Decile of Equivalent Income in the USA**



# Appendix A

## A Simple Model of Work Hours

If people typically (a) work in teams and (b) enjoy leisure time more in convivial company, the choice of working hours by individuals has externalities, for both the marginal utility of leisure of other people and the marginal product of labour at firms.

Basically, this section argues that both individuals and firms have a search/matching problem. Individuals, if they are to enjoy fully their leisure hours, have to locate compatible playmates and find time to play together. Firms, if they are to maximize output, must group people with complementary skills into production teams and synchronize work hours. The more time that other individuals devote to leisure, the easier it is for each person to find a leisure match. Similarly, the more time workers spend on the job, the easier it is for firms to synchronize schedules - and although the payoff to matching unskilled workers may be small, the returns to matching highly specialized workers can be plausibly argued to be increasing in skill levels.

These dual externalities to the choice of work and leisure hours create the possibility that uncoordinated private choices of working hours may produce socially sub-optimal results. Trends in average working hours, money income inequality and social interaction outside work may, at least

in part, have a common cause - changing work hours norms. If so, societies with stronger co-ordination mechanisms may be able to choose work hour norms which, over time, increase the returns to both leisure and work.

Typically, the labour supply literature has started from the premise that individuals maximize utility, which is derived from the individual consumption of market goods and non-work time, as summarized in (1).

(1) Max $U_i = u(C_i, L_i)$

Subject to (2) $H_i + L_i = 1$ $L_i$ = non-work time

(3) $C_i \leq W_i H_i$ $C_i$ = market goods

$W_i$ = real wage

$$\frac{\partial U_i}{\partial C_i} \equiv MU_c > 0$$

$$\frac{\partial U_i}{\partial L_i} \equiv MU_L > 0$$

It is standard practice to consider the utility maximizing choices of each individual in isolation - which might be thought a bit odd, since time in isolation is only pleasurable in small doses. Most of the things that people actually do in their non-work time involve other people, in one way or another.

Indeed, although truly solitary activities are always available, there are actually very few leisure activities that are intrinsically asocial. Most leisure activities can be arranged on a continuum of "teamness", and the vast majority of them are distinctly more pleasurable if done with others. Playing softball or hockey are activities that make no sense, if done alone. Singing to oneself may be something done in the shower, but generally joining a choral group is a different level of experience. Even growing rhododendrums or going for a walk or watching television is often more pleasurable if done in a club or with someone else. Reading a book is certainly solitary, but many people also like to talk about it afterwards - either formally in a book club or informally with friends over dinner. However, just listing these activities underscores the variety of leisure tastes that individuals have - and it is this variety which creates the problem of locating "somebody (similar) to play with", and scheduling the simultaneous free time to do so.

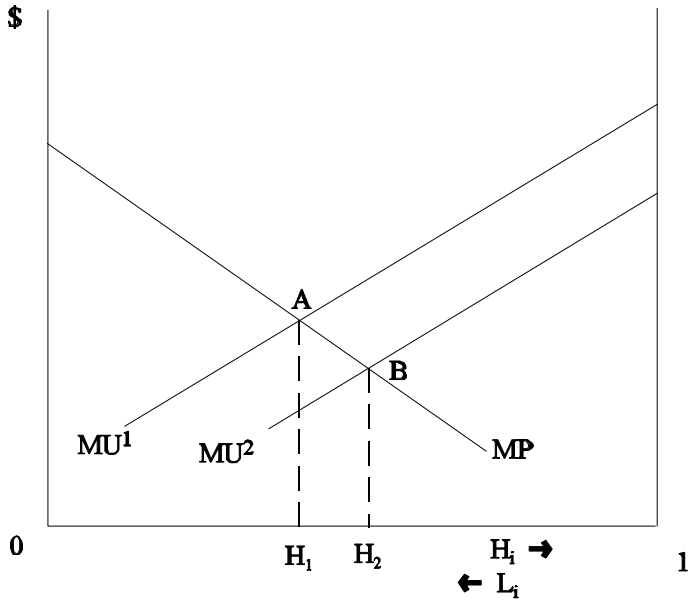
However, if paid work absorbs more of other people's time, each person will find their own leisure time scheduling and matching problem more difficult to solve. For many people, the time in which they are effectively available for leisure is very imperfectly captured by actual work hours. For example, those who work weekends and nights, or are on a rotating shift schedule, employed in an "on-call" working relationship or subject to occasional mandatory overtime (including those with a nominal choice of overtime, but de facto requirement) will find it much more difficult to schedule activities (such as. participating in a baseball or bowling league) than those who work the same number of hours in a predictable Monday to Friday, 9 to 5 arrangement. [In this respect, there do seem to be fairly clear USA/Germany differences. Bell and Freeman (1994:5) report that "Americans

are twice as likely to work Saturdays, three times as likely to work Sundays and three times as likely to work seven days in the week as are Germans. Finally, Americans are also more likely to do shift work and night work; and are more likely to moonlight with second jobs than are German workers."] However, this paper has concentrated on the analytically simpler case where each person must choose the level of their own work hours given the work hours of other people.

If a general rise in the percentage of total time at work or available for work means that birdwatching clubs close because "everybody is too busy to organize outings" and chess clubs fold because "people don't go anymore", then the marginal utility of the leisure time of bird watchers and chess players will decline. Since both formally organized activities (like bowling leagues) or informal matching (such as the chances of picking up a singles game at the tennis club) depend on how many other like-minded people have free time, at the same time, the marginal utility of leisure time of each person is conditional on how many hours other people are working.[13] One can therefore amend the specification of the utility maximization problem:

(1.1) Max $U_i = u(C_i, L_i | \overline{H})$ where $\overline{H}$ = average work time

[13] Analytically, one can distinguish between the search/matching problem (finding other persons who share the same interests) and the scheduling problem (arranging simultaneous free time). Although the distinction may be useful for analysis of the dynamics of leisure use, both searching and scheduling have less chance of success as work hours increase.




$$MU_L^1 = \frac{\partial U(c, L|\overline{H}_1)}{\partial L}$$

$$MU_L^2 = \frac{\partial U(c, L|\overline{H}_2)}{\partial L}$$

$$H + L = 1$$

$$\overline{H}_2 > \overline{H}_1$$

$$\frac{\partial MU_L}{\partial \overline{H}} < 0$$

$$\frac{\partial MU_c}{\partial \overline{H}} = 0$$

Figure 1

Leisure Externalities and Labour Supply

Thus far, the discussion can be summarized diagrammatically in Figure 1, which represents the marginal utility of leisure and desired hours of work ( $H_i$ is measured left to right) of a given individual, conditional on two possible levels of the average working time of everyone else. $(\overline{H}_2 > \overline{H}_i)$. For a population of identical individuals, equilibrium requires $H_i = \overline{H}$ . This equilibrium will be unstable if $\P H_i / \P \overline{H} > 1,$ and the point of Figure 1 is to illustrate that in general, this depends on both the marginal product of labour $\left[\frac{\P Q}{\P H}\right]$ and the magnitude of the leisure externality affect $\left[\frac{\P MU_L}{\P \overline{H}}\right]$. Since economic theory is agnostic about the functional form of both, multiple equilibria (some of which are locally unstable) cannot be ruled out. Ceteris paribus, however, looking only at the household side, one would predict a negative relationship between average hours and the hourly wage.

However, when a marginal product of labour function for each person is drawn (as in Figure 1) which is unchanged as average hours change, the implicit assumption is that there are no increasing returns to matching in production. Although it may be reasonable to assume that low skill workers have much the same productivity whoever they work with, the productivity of highly specialized workers usually depends on being matched in a production team with other complementary specialists.

It is commonplace to observe employers encouraging very long work hours among highly skilled professionals (e.g. software designers, lawyers, surgeons). Partial appropriation by the firm of the returns to individual learning by doing may be one explanation, but the emphasis in this paper is on the idea that most production is based on teamwork. If so, there are likely to be set-up costs, each day[14], to getting team production rolling. By itself, setup costs imply that average net hourly output is increasing in working day length. As well, in team production the output of the team depends on the level of skills of the least skilled team member (hence is multiplicative in their skill level) and persists only as long as all team members are present (hence is multiplicative in minimum overlapping hours). For highly skilled teams, it is therefore worth the firm's while to pay an hourly wage which increases with both the human capital $\left(K_i\right)$ of the individual worker and the minimum work hours of each member of their work team $\left(\overline{H}_I\right)$. [15]

One can summarize all this as:

(4) $w_i = w\left(K_i, \overline{H}_I\right)$ $\overline{H}_I$ - work time of work group I $I \subset I$

$K_i$ - Human Capital of worker I

[14]By "day", I mean each production period.

[15] Since, by hypothesis, an incomplete work team cannot function, $\overline{H}_I$ is the work hours of all team members. Over time, technological change - in both the "hard" technology of capital equipment and the "soft" technology of motivation and organization - will alter the size and nature of work teams. To the extent that old technology was less skill homogeneous (e.g. a foreman plus a work crew) compared to newer technologies (e.g. a software design group), the emphasis on returns to time matching among highly skilled workers may be more relevant now than in past periods.

$$\frac{\partial w_i}{\partial K_i} > 0; \frac{\partial w_i}{\partial \overline{H}_I} > 0; \frac{\partial^2 w}{\partial K_i \partial \overline{H}_I} > 0$$

Although there are systematic social class differences in preferred type of leisure activity, there is still a substantial amount of randomness in leisure tastes. One can think of individuals as being characterized by a vector of leisure attributes ( $A_i$ ) as well as by some level of work place productivity (i.e. human capital - $K_i$ ). All that is required for present purposes is to argue that $A$ and $K$ are imperfectly correlated, but to draw things strongly, let us assume that leisure attributes and human capital are uncorrelated - specifically, that $A_i$ is randomly distributed in the population.

If so, working time externalities on the marginal utility of leisure and the marginal product of labour are not quite symmetric. Shifts in the marginal utility of leisure will be driven by changes in the average working time of all persons, while shifts in the marginal product of labour are driven by changes in the average working time of individuals of similar skill level - which can be influenced by changes in the relative wage of skill groups. Figure 2 illustrates the point.

In Figure 2, two levels of worker skill are represented - and for both it is assumed that individual utility from consumption goods and leisure time is contingent on the average work hours of all other persons, as in Equation 1.1. If both skilled and unskilled workers want to supply $H_1$ hours, conditional on their expectation that average hours of work are $\left(\overline{H}_1\right).$, then the utility maximizing

choices of each group are represented by points A and D respectively, and equal hours of work is a

possible equilibrium result[16].

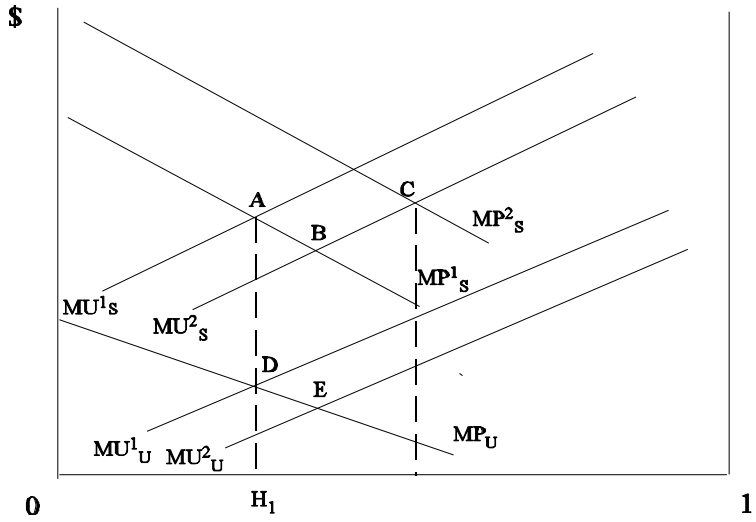
However, if a shock to the system were to occur, other equilibria are possible. If workers come to expect that other workers will supply more $\left(\overline{H}_2\right).$ hours, then (because bowling alone is less fun than bowling in a league) the marginal utility of leisure of both skilled and unskilled labour falls. Assuming leisure tastes to be randomly distributed in the population, the shift is similar for both skilled and unskilled workers - as represented by points B and E in Figure 7. However, if there is matching in production that is more valuable for skilled workers than for unskilled workers, the relative wages of skilled workers will rise. To keep Figure 7 simple, it is assumed that the marginal productivity of unskilled workers is unaffected by changes in working hours, while the net marginal productivity of skilled workers shifts up as average working hours increases.

The key point of Figure 2 is that the equilibrium outcome for skilled labour is represented by point C, which illustrates the idea that the working hours of skilled workers increases by more than that of unskilled workers ( $H_{2S} > H_{2U}$ ). This is consistent with overall equilibrium if $\alpha H_{2U} + (1-\alpha)H_{2S} = \overline{H_2}$ , where $\alpha$ is the proportion unskilled. In this case, the tendency for rising hours of labour supply to encounter diminishing marginal productivity of labour is countered, for skilled workers, by increasing returns to matching. This implies a widening of skilled/unskilled hourly wage differentials, accentuating the emerging differentials in hours worked.

[16]In cross sectional regressions of hours of work on hourly wages, it is fairly common to find an uncompensated elasticity of labour supply of approximately zero. (E.g. Osberg and Phipps (1994))

Figure 2

Work and Leisure Externalities For Skilled and Unskilled Labour




$$MP^{i}_{Hj} = \frac{\P Q(H_j|\overline{H}_i}{\P H_j} \qquad j = S,U;\ i = 1,2$$

$$MU = \frac{\P U(c,L_j|\overline{H}_i)}{\P L_j}$$

$$H_j + L_j = 1 \qquad \overline{H}_2 > \overline{H}_1$$

This model therefore predicts that in one possible equilibrium working hours are relatively equal. In another possible equilibrium, working hours diverge, with greater increases in work time at the top than at the bottom of the income distribution. In this second scenario, rising work hours differentials are compounded by increasing wage differentials, which accentuates the trend to rising earnings inequality. The trend in overall average wages and labour productivity depends on the relative size of skilled and unskilled groups and the net impact of team externalities on skilled wages compared to the size of the absolute decline in unskilled wages.

Appendix - Table A1
Percentage with Zero paid Hours by Age Group
United States and Germany

| | | US 98 | US 94 | US 84 | US 79 | Germany 94 | Germany 84 |
|---|---|---|---|---|---|---|---|
| males and females | Ages 18-64 | 18.1% | 18.7% | 21.4% | 21.3% | 36.7% | 36.8% |
| | Ages 18-24 | 21.1% | 20.5% | 20.1% | 17.7% | 66.9% | 39.1% |
| | Ages 25-54 | 14.2% | 14.9% | 17.4% | 18.3% | 26.7% | 30.2% |
| | Ages 55-64 | 34.9% | 37.1% | 40.1% | 38.1% | 55.6% | 58.1% |
| males | Ages 18-64 | 11.9% | 12.0% | 12.4% | 10.0% | 25.6% | 21.4% |
| | Ages 18-24 | 18.1% | 16.3% | 16.3% | 12.5% | 65.8% | 36.8% |
| | Ages 25-54 | 7.8% | 8.2% | 8.0% | 6.3% | 13.9% | 14.4% |
| | Ages 55-64 | 26.5% | 28.2% | 26.5% | 21.8% | 45.3% | 33.2% |
| females | Ages 18-64 | 24.1% | 25.1% | 30.0% | 32.0% | 47.3% | 52.0% |
| | Ages 18-24 | 24.0% | 24.8% | 23.8% | 22.7% | 67.9% | 41.7% |
| | Ages 25-54 | 20.4% | 21.5% | 26.5% | 29.8% | 39.1% | 46.6% |
| | Ages 55-64 | 42.8% | 45.1% | 52.0% | 52.6% | 65.1% | 78.2% |

Note: Germany 1994 excludes those living in the former East German states.
Source: Author's calculations using the Luxembourg Income Study (Germany) and the Current Population Survey (United States)

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