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Work Hours, Inequality and Redistribution: Veblen Effects Reconsidered

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Abstract: In this paper we examine link between work hours and inequality in 12 countries. Our pooled regressions indicate that increase in top 1 per cent income share will increase average annual hours worked. Our results are in line with Bowles and Park (2005) who proposed that the explanation for this relationship might be the Veblen effect of the consumption of the rich on the behaviour of those of less well off. Furthermore, we show that the effect varies between time periods and country groups. However, we also find that considerable amount of the total effect of previous evidence is due to residual autocorrelation. We also study normative policy implications of Veblen effects in the context of optimal nonlinear income taxation. Using numerical simulation we study how Veblen effects affect the extent of optimal redistribution both with welfarist and non-welfarist social objectives. Our numerical results provide some support for the view that optimal tax policy may mitigate externalities arising from Veblen effects.

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1. Introduction

Within the OECD countries, there are significant differences in the trend and level of aggregate hours worked. Recently several studies have tried to get insight to the question why there is such a wide variety in aggregate hours worked (see e.g. Alesina et al. 2005, Faggio and Nickell 2006 or Boeri et al. 2008). Several studies have proposed that one reason for the wide cross-country differences in hours worked is the impact of taxes on labour supply (see e.g. Prescott 2004, Davis and Henrekson 2004). Alesina et al. (2005), however, argue that much of the negative impact of taxes on labour supply rests on higher labour supply elasticities than normally observed (cf. Prescott 2004) or exclusion of relevant institutional variables i.e. unionisation or labour market regulation in cross-country regressions (cf. Davis and Henrekson 2004). On the other hand, there has been interest to answer the question why do working hours matter for inequality and growth. However, only relatively few studies have discussed the relationship between hours worked and income inequality.

Bell and Freeman (2000) have argued that greater inequality in the United States provides the incentive that motivates work effort by Americans. Furthermore, it is not only the current wage, but any change in future probability of promotion or higher wage that counts. Because greater inequality signals an incentive system that elicits greater hours of work, there is an explicit link between wage inequality and differences in average hours worked. Cowling and Poolsombat (2006) provide an alternative explanation for increasing hours worked and the change in the utility, but in this time from the point of consumption of goods side of the utility function. They argue that the main difference between the United States and other countries is that in the United States the intensity of advertising is at the much higher level. Therefore, if advertising creates a continuing dissatisfaction with current levels of consumption, people may be encouraged to offer a larger fraction of their time for the generation of income in order to satisfy their increased demands for material consumption.

There is a growing empirical evidence suggesting that the assumption – individual's preferences are independent in the sense that people do not want things because others want them – may not be entirely appropriate.[1] The major alternative to this assumption is that people care about relative consumption (income). In this alternative model, an individual's well-being depends on his or her

[1] Clark, Frijters and Shields (2007) provide a good survey.

relative consumption – how they compare to some selected groups of others. This idea is not new. More than one hundred years ago Thorstein Veblen maintained that consumption is motivated by a desire for social standing as well as for enjoyment of the goods and services per se.[2] This implies that people compare consumption not leisure.[3] Bowles and Park (2005) provide an interpretation on the relationship between working hours and inequality based on Veblen effects. In particular, Bowles and Park (2005) argue that people refer upwards, i.e., choosing their hours of work and spending activities in order to be more like of higher income group.

In this paper we investigate link between working hours and inequality based on Veblen effects .We use recent data on top income shares in 12 countries. This data have several advantages. First, as noted above important aspect of status consideration is upward and thus, it is not the entire distribution which is relevant for the comparisons. Second, top income shares are available for much longer time span than the conventional inequality measures. Therefore we are able to investigate the trend in our hours worked and top income share variables since the 1950s up to year 1998 for industrialised countries, namely Australia, Canada, Finland, France, (West) Germany, Japan, the Netherlands, New Zealand, Norway, Sweden, the United Kingdom and the Unites States.

If the driving force behind the relationship between working hours and inequality is Veblen effects as suggested by Bowles and Park (2005), it is also interesting to consider its normative policy implications in the context of optimal nonlinear income taxation. Using numerical simulation we study how Veblen effects affect the extent of optimal redistribution both with welfarist and non-welfarist social objectives. In particular we focus in numerical simulations on the interplay of increasing inherent inequality and the degree of Veblen effects.

The paper is organised as follows. First, we provide a short survey of hours and inequality literature. We put some emphasis in surveying the modifications of classical labour supply and, in particular, the comparison based utility function. In section 3 we investigate the cross-country evidence on the relationship aggregate annual hours worked and top 1 per cent income share. In section 4 we consider normative implications of Veblen effects in the optimal nonlinear income tax

[2] Later on Duesenberry (1949), Galbraith (1958), Hirsch (1976), Layard (1980) and Frank (1985, 1997) among others have written about the importance of relative position as a dominant spending motivation.

[3] In their empirical research findings Clark and Oswald (1996) show that relative consumption concerns have important effects on consumption but little, if any, on leisure. On the other hand, Osberg (2002) and Jenkins and Osberg (2003) suggest another mechanism of utility interdependence. Their argument is based on the idea, that there are interdependences in individuals' utility of leisure time, because much of leisure is spend in common activities. For example it is more fun to bowl with friends or other like minded persons than alone. Thus, marginal utility of leisure time of each person is conditional on how many hours other people are working.

model when relative income concern matters. We also consider the case, where the government's and the individual's objective functions differ. Section 5 concludes.

2. Work hours and inequality

2.1. Previous evidence

In a series of papers Bell and Freeman (1994, 2000, 2001) investigate the differences between Germany and the USA in the working hours. Their main hypothesis is that workers choose current hours to gain promotions and advance in the distribution of earnings. Thus, the decision of labour supply is forward looking: longer hours worked will be rewarded by promotion or higher wages in tomorrow. In the cross-country context, the more unequal distribution of wages is in given the country the more hours worked compared to countries with more equal distribution of wages. Bell and Freeman (1994, 2000, 2001) utilised data from Germany and the United States to illustrate these cross-country differences in working hours and inequality. In particular Bell and Freeman (2001) found that longer hours worked in one period improved the wages of workers in the future (i.e., around the mid 1990s) in both the United States and Germany, with a somewhat larger impact in the United states and also improved actual (US) or perceived (German) promotion probability of workers.

Bell and Freeman's work has inspired several further investigations with alternative interpretations on the relationship between working hours and inequality (see e.g. Osberg 2001, Bowles and Park 2005). Osberg (2001), in particular, puts a lot effort to investigate the differences in the hours worked between the United States and Germany. His main conclusions are that first, the main difference between the United States and Germany is in labour market participation rates and second, for the adults aged 18 and 64 the top half of the hours distribution is much the same. According to Osberg (2001) the latter finding should cast doubt of incentives explanation proposed by Bell and Freeman (1994, 2000, 2001). Osberg (2001) points out that the given the difference in aggregate trend in hours worked between the United States and Germany since the early 1980s was not due to changes in hours worked among prime age males but decreased hours of work among youth aged 18 to 24 and older workers aged 55 to 64 and most importantly in Germany there was no increase in paid working time of women. Such a differences between the US and German women may be at least partly explained by differences in tax/transfer incentives which support in Germany the traditional single earner model of the family. Furthermore, Osberg (2002) compares

average working hours per household adult in six countries and found that in all decile points of the income distribution, more hours is worked in the United States. But although the U.S. incentive system has its greatest differentials in hourly rewards at the top of income distribution, the differential in hours of work is significantly smaller at the top of income distribution than at the bottom.

Bowles and Park (2005) provide evidence on the relationship between working hours and inequality based on Veblen effects. In particular, Bowles and Park (2005) argue that people refer upwards, choosing their hours of work and spending activities in order to be more like of higher income group. Using fairly unbalanced data on 10 OECD countries over the time period 1963–1998 they find that total hours worked is positively associated with higher inequality as measured by the 90/50 ratio of gross earnings and the Gini coefficient of after tax income, as well as Theil index calculated from the average inter industry wage differentials.

In their survey of the patterns of work across the 15 OECD countries Faggio and Nickell (2006) find that there does appear to be a strong effect on earnings dispersion on hours worked over the period 1981–1999. In addition to logarithm of 90/50 ratio Faggio and Nickell (2006) include in their panel estimation the logarithm of 50/10 ratio as an explanatory variable. It appears that one percentage point change in the latter variable has at least three times of stronger effect on average annual hours worked by the employed.

2.2. Labour supply and people care about relative consumption

Do people make comparisons between or among individuals of similar incomes? Or is the lifestyle of the upper middle class and the rich a more salient point of reference for people throughout the income distribution? As pointed out by Bowles and Park (2005) Veblen effects have two special characteristics in which they differ from the usual consumption externalities. Veblen effects are asymmetrical, because the individual reference group is the very rich or an intermediate group. Secondly the influence of the reference group may be substantially independent of its size.

A comparison consumption level can be constructed as follows

$$\mu = \int \omega(n)x(n)\,f(n)dn \,/ \int f(n)dn \qquad (1)$$

where a distribution of wages, denoted by n, on the interval (0,∞) is represented by the density function f(n). There are a number of alternative interpretations of the variable μ. The simplest one is obtained if each of the ω weight is equal to one. In this case the average consumption is the comparison consumption level. We can choose the weights ω so that μ is the consumption of the richest individual (this corresponds to Veblen's idea), of the median individual or something in between the richest and the median. It is difficult to say without empirical evidence which is the most plausible interpretation. The drawback of this approach is, as Layard (1980) suggests, that people have different μ values. Assume the following comparison based utility function

$$u = u(ny - \upsilon\mu, y) \tag{2}$$

where following Bowles-Park, $c = ny - \upsilon\mu$, can be called as effective consumption, μ is a comparison consumption level , υ is Veblen constant and y is hours worked.
Totally differentiating the individual's first order condition for the choice of work hours, $nu_c + u_y = 0$, with respect to y and μ we obtain
$(n^2u_{cc} + 2nu_{cy} + u_{yy})dy + (-\upsilon nu_{cc} - \upsilon u_{yy})d\mu = 0$. This implies

$$\frac{dy}{d\mu} = \frac{\upsilon(nu_{cc} + u_{yc})}{n^2u_{cc} + 2nu_{cy} + u_{yy}} \ . \tag{3}$$

With the following assumption $u_c > 0, u_{cc} < 0, u_y < 0, u_{yy} < 0, u_{yc} < 0$ (leisure and consumption are complements) we have $\frac{dy}{d\mu} > 0$. This means that an increase in inequality associated with an increase in the income of the richest group would induce an increase in the hours of work. By the same reasoning we can deduce that $\frac{dy}{d\upsilon} > 0$. Is this true empirically? We now turn to test empirically whether people tend to refer upwards or downwards, seeking social distance from a poorer group.

3. Aggregate cross-country evidence

In this section we provide some further cross-country evidence on the relationship between aggregate annual hours of work and income inequality in twelve industrialised countries between years 1950 and 1998. Figures 1A and 1B provide a general view of average annual hours worked per person between years 1950 and 2006 in five Anglo-American and in seven other countries, respectively. With exception of Japan there has been a general downward trend in hours worked until the early 1980s and thereafter the trend has stabilised in most of the eleven countries. At the beginning of the twenty first century countries can be roughly grouped into two groups: in Australia, Canada, Japan, the New Zealand and the United States average annual hours of work are around 1800 hours and less than 1600 hours in France, Germany, the Netherlands, Norway and Sweden. Only Finland and the UK seem to be somewhere in between.

Figure 1A Average annual hours of work in Anglo-American countries between 1950 and 2006

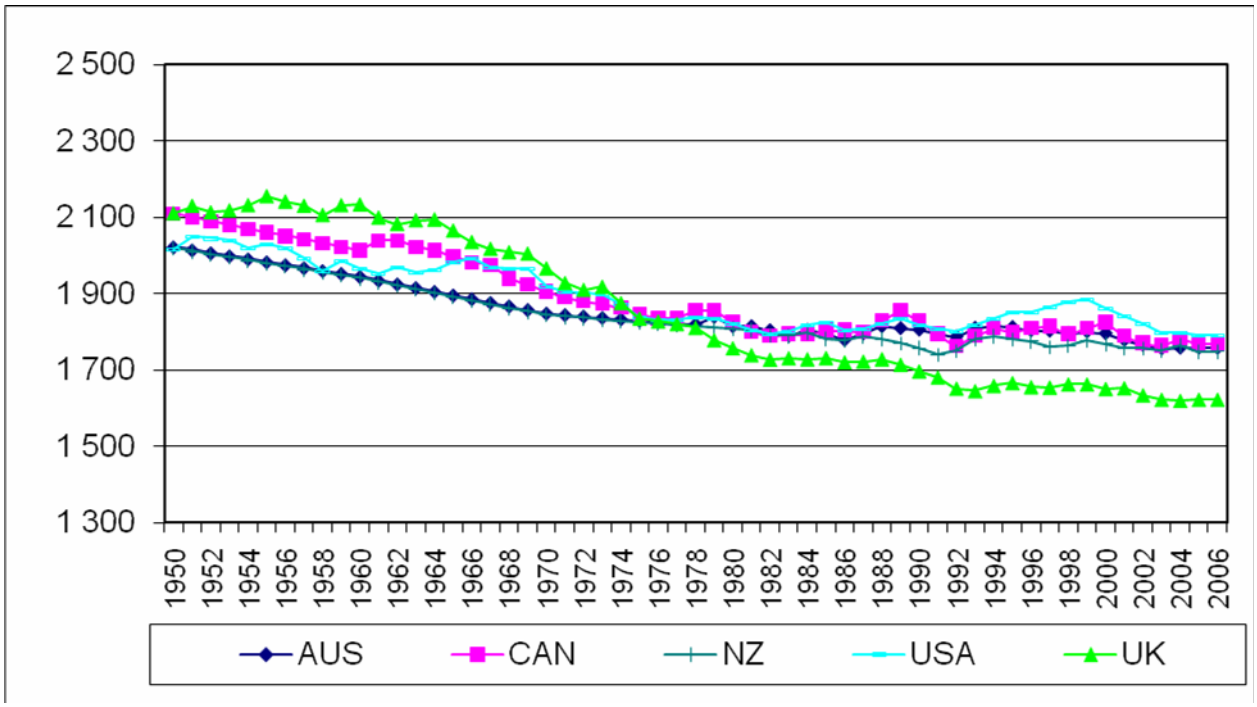
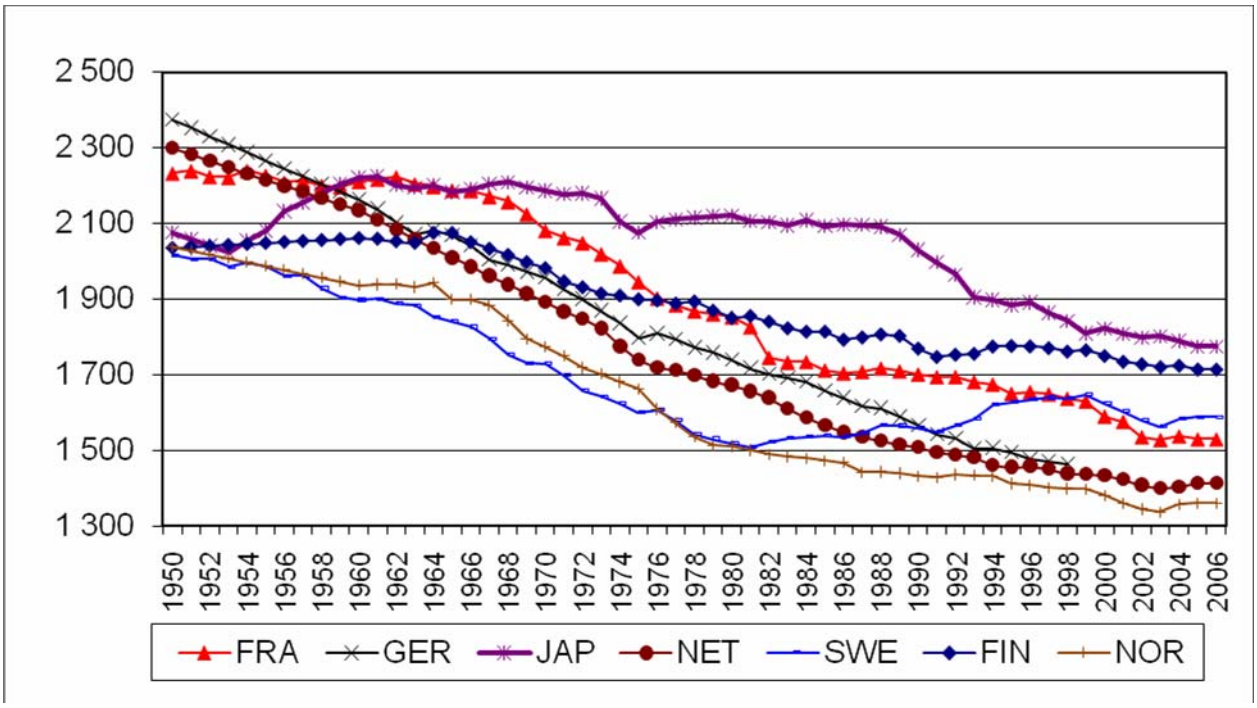


Figure 1B Average annual hours of work in the rest of the countries between 1950 and 2006



As a measure of inequality we use top 1 per cent income share. There are several reasons to employ top income shares. Firstly, for Veblen effects it is the most plausible measure. Secondly, annual top income series are now available for several countries covering most of the 20th century (see Piketty and Saez 2007). Figures 2A and 2B show the general pattern for our income inequality measure between 1949 and 1998. The decline in top income shares until the mid-1970s or even longer can be found almost in every country studied, but as Piketty and Saez (2007) stress there is a sharp contrast between English speaking or Anglo-American countries and other (non-Anglo) countries ever since. As a result at the beginning of twenty first century income concentration is much lower in France, Japan and the Netherlands than in the United States, Canada and the United Kingdom. Such a conclusion can be found in several other studies (see e.g. Atkinson and Leigh 2004, Atkinson 2005 and Piketty 2005).[4] Interestingly this division between Anglo-American countries and other countries is present in the aggregate hours data with the exception of Japan and to some extent Finland (see Figures 1A and 1B). Over the whole period 1950–1998 the simple correlation between log annual work hours and top one per cent income share is 0.38, while it is 0.15 and 0.53 among Anglo-American and non-Anglo countries, respectively.

[4] This picture has changed subsequently since 1998 as new data has become available in several non-Anglo countries (see e.g. Aaberge and Atkinson 2008).

Figure 2A Top 1 per cent income shares in Anglo-American countries between 1949 and 1998

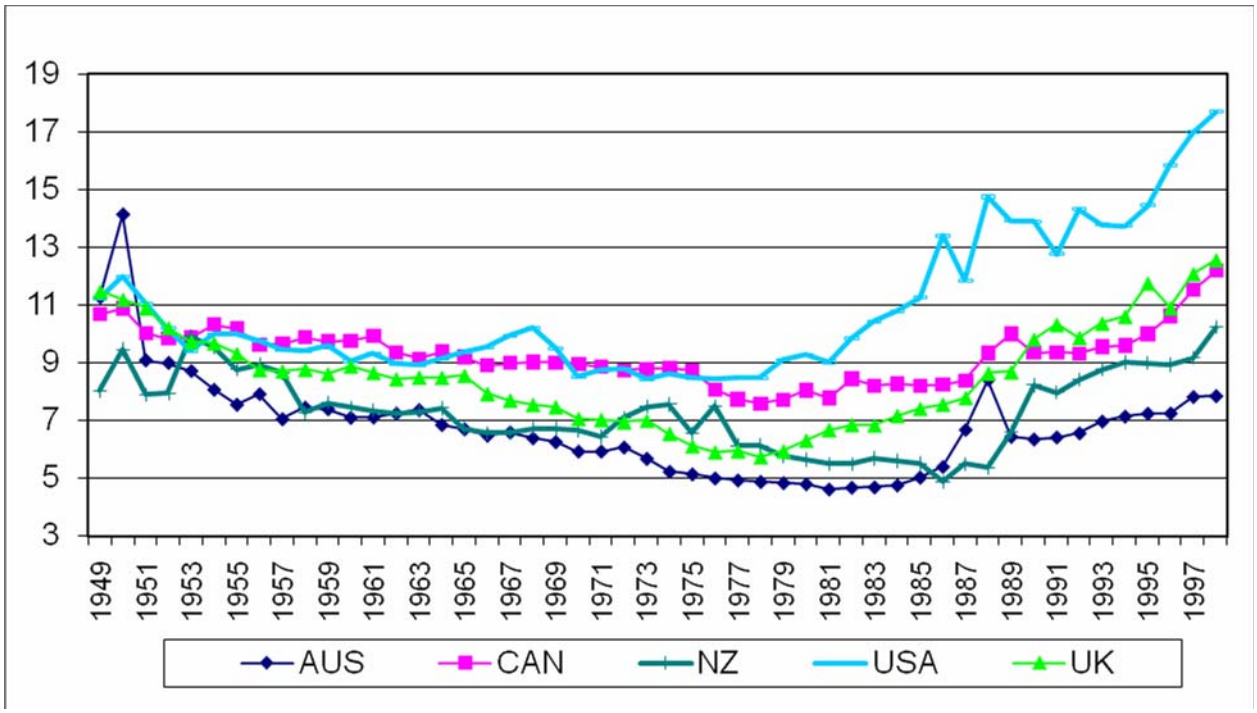
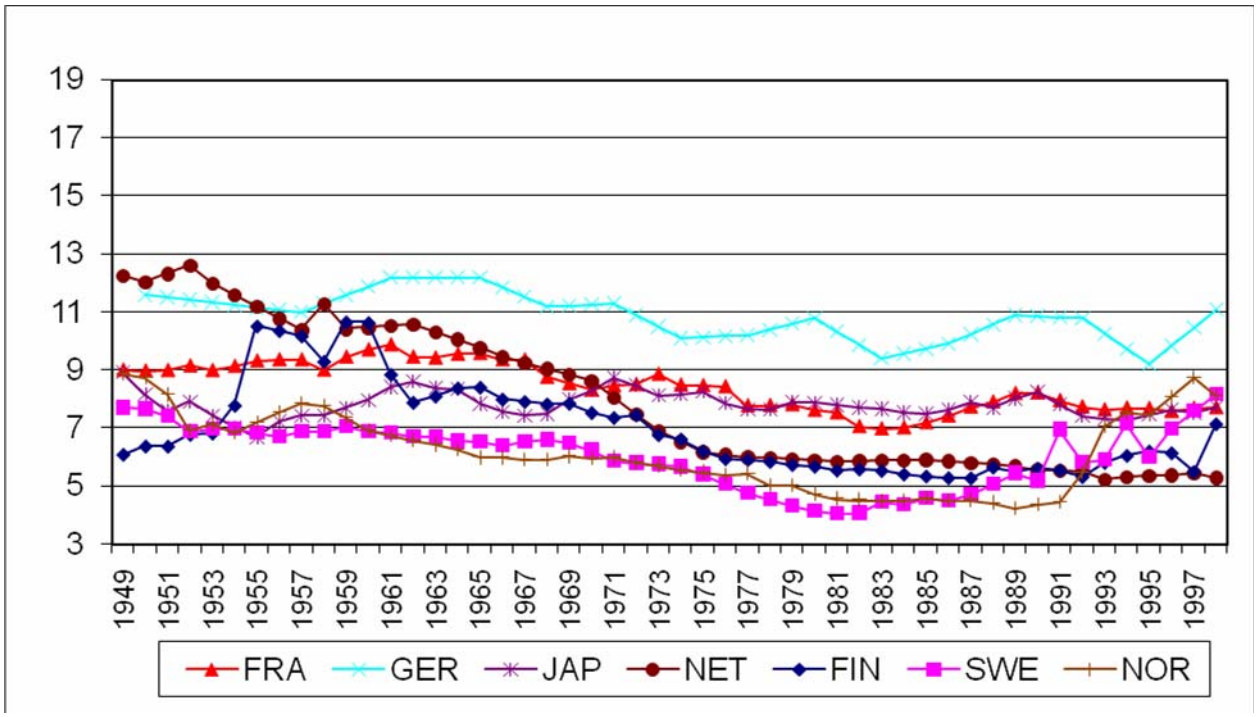


Figure 2B Top 1 per cent income shares in non-Anglo countries between 1949 and 1998



To investigate this division of countries further we present the change in the relationship between average annual hours of work and top 1 per cent income share from the 1950s to the 1970s and from the 1970s to the 1990s, respectively in Figures 3 and 4. As seen in the Figure 3, excluding

Japan, in all countries both hours worked and top income share declined from the 1950s to the 1970s, but the reduction income share was relatively smaller in Sweden, France and West Germany compared to the Anglo-American countries and the Netherlands where both hours worked and income share reduced most. During the latter period from the 1970s to the 1990s both hours worked and top income share declined while in the Anglo-American countries and in two Nordic countries (Sweden and Norway) the reduction in log work hours was relatively mild and top 1 per cent income shares increased markedly. Although there is a lot of within group variation, in both groups correlation between log hours and top income share is substantial in pre oil shock period (r = 0.67 and r = 0.63, respectively in Anglo-American and non-Anglo countries) while since 1974 the relationship is nonexistent for Anglo-American countries as a group and less than half of previous period for non-Anglo group of countries (r = 0.28).

Figure 3 Changes from the 1950s to the 1970s

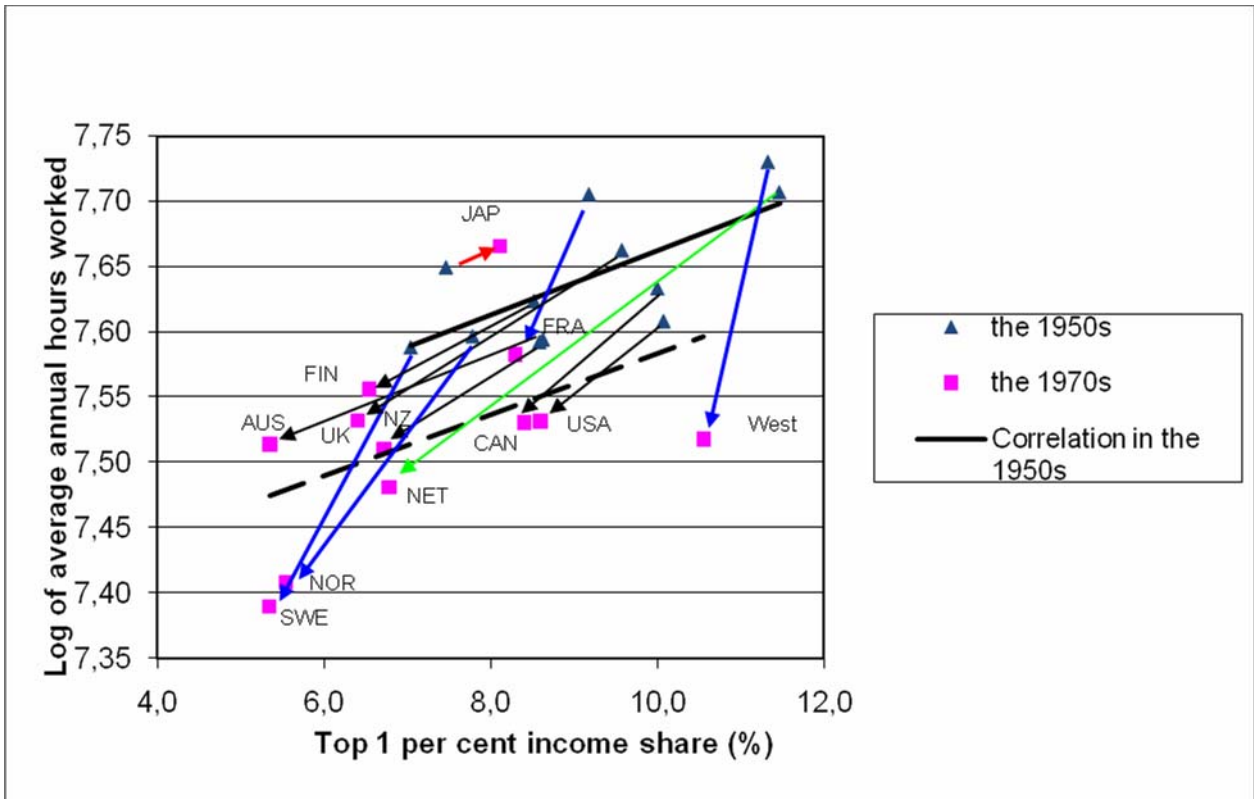
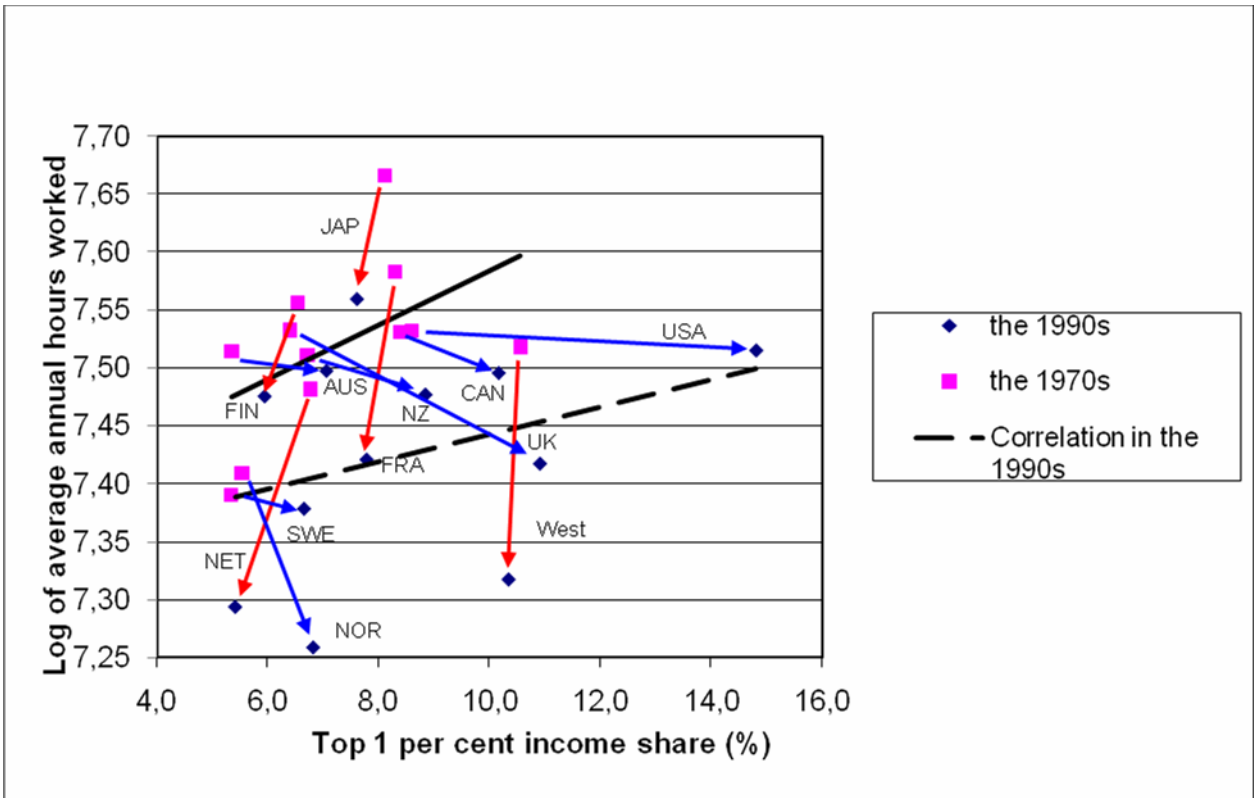


Figure 4 Changes from the 1970s to the 1990s



Next we estimate the relationship between inequality and hours worked with a set of conventional control variables:

$$y_{it} = c + aI_{it} + bx_{it} + \pi_i + \delta_{it} \qquad (3)$$

where y_{it} is the natural logarithm of average annual hours worked per employed in country i in time t, I_{it} is the top 1 per cent income share (TOP1), x_{it} is a vector of other possible exogenous influence on hours worked. We consider log of real GDP per capita (LGDP), unemployment ratio (U), net union density (DENS), the average tax rate on labour income (LTAX), the share of total general government outlays to GDP (GOV), the share of government employment to total employment (GEMPL), log of real manufacturing earnings index LMEARN, the share of employment in industry to total civilian employment (INDE), the share of female employment to total civilian employment (FEMPL) and dependency ratio (DEPR). π_i is a country fixed effect an δ_{it} is an error term. Table 1 provides the results with country fixed effects and year dummies in line with Bowles and Park (2005) and Faggio and Nickell (2006).

The relationship between top 1 per cent income share and average annual hours worked for twelve countries over the period 1950–1998 as shown in the first column of Table 1. Controlling the country fixed effects the positive relationship between top 1 per cent income share and average annual hours worked per employed is strong: if all countries have the same average top income share as the United States in the 1990s, average annual working time would be on average 230 hours (or 14 per cent) longer in the remaining eleven countries. Our only control variable at this specification the real GDP per capita suggests that there is a positive but insignificant income effect.

In the second column of Table 1 we have added a wider set of control variables and estimated an unbalanced pooled regression for ten countries over the period 1960–1998.[5] The relationship between top 1 per cent income share and average annual hours worked per employed becomes even stronger: the average annual working time would increase on average almost 300 hours (or 18 per cent) in the 1990s if the top income share would be the same in all countries as in the United States.

What regards to our control variables at this specification the real GDP per capita enters into regression equation with a positive and significant income effect: increase in average income in the economy increases hours worked. However, this result is not robust for shorter time period and our two different country groups as seen in other columns of Table 1.[6] Second, and somewhat surprisingly, unemployment rate enters into our estimation in Column 2 with significant positive coefficient. This is in contrast to Bowles and Park (2005) who found negative and significant relationship between unemployment and hours worked. On the other hand, Faggio and Nickell (2006) found weak positive relationship between male unemployment rate and hours worked.

Third, in line with Bowles and Park (2005) we found that the coefficient for net union density changed its sign from negative to positive when included in fixed effect model. The observed positive coefficient for union density is inconsistent with the idea that trade unions encourage shorter working hours (see e.g. Alesina et al. 2005). On explanation is that the country fixed effects may be capturing some of the institutional differences associated with the degree of unionisation. For example Kramarz et al. (2008) argue that in more centralised wage bargaining strong unions tend to put more weight on employment, which in the form of reduced utility for individual worker

[5] New Zealand and Norway are excluded from this specification due to the lack of the data on labour tax rates (see McDaniel 2007).
[6] One reason for this instability might be that real GDP per capita and real manufacturing earnings index are highly correlated and have a strong positive trend. The similar kind of problem applies to measures of the government size, i.e., average tax rate on labour income, government total outlays and government employment share.

leads to compensation in the form of higher hours. On the other hand, Faggio and Nickell (2006) show that some amount of negative effect of union density on hours worked may become indirectly via reduced earnings dispersion. In their study, however, this indirect effect did not fully offset the found positive effect of union density on hours worked.

Table 1 Top 1 per cent income share and average annual hours of work; pooled least squares

	1950–1998	1960–1998	1974–1998			1950–1998
	All	All	All	Anglo	non-Anglo	All
TOP1	1.897 (10.66)	2.389 (14.90)	1.426 (10.99)	0.192 (2.11)	1.581 (4.71)	0.135 (2.30)
LGDP	0.007 (0.34)	0.092 (2.10)	-0.213 (-5.41)	0.163 (4.20)	-0.177 (-2.70)	0.0892 (6.25)
U		0.333 (3.27)			0.393 (3.18)	
DENS		0.149 (3.95)				
LTAX		-0.348 (-4.46)				
GOV		0.286 (4.43)			-0.221 (-3.64)	
GEMPL		0.269 (2.30)	0.211 (3.27)	0.348 (4.12)	0.464 (1.93)	
LMEARN			0.028 (2.44)	-0.079 (-7.00)	-0.037 (-2.01)	
INDE		0.946 (7.60)	1.168 (6.98)	0.233 (2.35)	0.886 (3.69)	
FEMPL		0.814 (6.45)	0.252 (2.05)			
DEPR			1.356 (6.21)	-1.385 (-5.14)	2.231 (7.38)	
AR(1)						1.339 (29.43)
AR(2)						-0.3461 (-7.69)
Fixed effcets:	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	no
No. of countr.	12	10	12	5	7	12
No. of obs.	588	354	274	100	175	564
$\bar{R}^2$	0.836	0.928	0.959	0.963	0.968	0.996
S.E.E.	0.045	0.027	0.019	0.006	0.020	0.0071
DW	0.068	0.311	0.388	1.161	0.306	2.016

Note: White's heteroscedasticity-consistent covariance matrix has been used. Individual year dummies are not reported.

Fourth, several studies have proposed the negative relationship between taxes and hours worked Prescott (2004) goes so far that he argues that differences in hours worked between the United States and four European countries are almost entirely due to differences is marginal labour tax rates. However, this view is widely questioned (see e.g. Alesina et al. 2006, Faggio and Nickell 2006 and Boeri et al. 2008). Our aggregate labour tax rate variable enters into equation 2 of Table 1 with negative and statistically significant coefficient. The negative effect is in general rather small but not negligible for European countries: for the highest labour tax rate country Sweden reducing the labour tax rate by 21 percentage points (the difference with the United States in the 1990s) would increase annual working time by 85 hours which is about one third of total difference in average annual working time between the U.S. and Sweden. In addition to tax effects we should take into account other effects of government on working hours. Government total outlays have a positive coefficient. In case of Sweden the effect of government total outlays more than fully offsets the calculated negative effect of labour taxes relative to the U.S. One explanation for the positive effect could be that in several countries a significant part of government spending is directed to producing public services and also might therefore have a positive impact on hours worked (or employment i.e. the extensive margin). However, we have taken public employment directly into account in column 2. The share of government employment to total employment has a positive effect on average annual working time. It should noted that these variables measuring government size in the economy are highly correlated and therefore in several specifications only one of them enters into significantly into estimated equation as also seen in Table 1.

Furthermore, we have tried control several structural differences between the countries. The relative size of industrial employment has positive impact on hours worked. Somewhat surprisingly share of female employment of total employment enters into our estimation with significant positive coefficient. Dependency rate, which is measuring the share of population not at working age, do not enter into this specification with significant coefficient, nor does the real manufacturing earnings index.

In the next three columns of Table 1 we investigate only post oil shock period. Shortening period reduces the value of the coefficient of top one per cent income share. Furthermore, there is a clear difference between two country groups. First, in the Anglo-American countries there seem to be less significant effect of top income shares on hours worked while in non-Anglo countries the effect

is fairly strong. For example 0.024 increase in top one per cent income share (i.e., average one standard deviation during the period 1974–1998) would increase on average 8 or 60 hours annual working time, respectively in Anglo-American and non-Anglo countries. Second, what is striking, labour tax rates do not enter significantly into these three equations for the post oil shock period although in the case of non-Anglo countries government total outlays may catch the negative impact of labour taxes. One the other hand, government employment share seems to have positive effect on hours worked in both groups.

We should remark that even though our results are in line with previous study by Bowles and Park (2005) and Faggio and Nickell (2006), all the estimations suffer strong autocorrelation of error terms. In order to take it account we have included in our pooled estimations first and second order autocorrelation terms. Such an inclusion of AR-terms reduces the effect of top one per cent income share to one tenth and in several specifications the coefficient is barely significant as reported for the period 1950–1998 in the last column of Table 1.

In sum: Our aggregate evidence gives support to the idea that higher inequality is related to higher number of aggregate hours worked. It also suggests that the relationship varies between time periods and country groups.

4. Veblen effects and optimal nonlinear income taxation

If Veblen effects are important as our empirical results seem to suggest, taxing consumption externalities might be welfare enhancing just in the same way as any other Pigouvian tax. This simply intuition does not tell us anything about the effects on the tax schedule. Do Veblen effects lead a more progressive tax system or a less progressive tax system? Is income tax an effective tool for reducing inequalities and attenuating possible externalities arising from Veblen effects? There are some papers asking these questions in an optimal nonlinear tax framework[7], see Oswald (1983), Tuomala (1990), Ireland (2001)[8]. Two latter papers are able to say something on the shape of tax schedule. Using numerical simulation we study how Veblen effects affect the extent of optimal redistribution.

[7] Aronsson and Johansson-Stenman (2008) address public good provision in this framework.

[8] Boskin and Sheshinski (1978) and Blomquist (1993) consider linear income tax policy with relative consumption. Bowles and Park (2005) consider a simple two-class tax model. Their model takes each individual's reference consumption to be exogenous.

We consider a one period model with labour as the only source of income. There is a continuum of individuals, each having the same preference ordering, which is represented by an additive utility function $u = U(x - \upsilon\mu) - V(y)$, where x is a composite consumption good ($c = x - \upsilon\mu$ is effective consumption) and μ is the consumption of the individual belonging to top one percentile and υ refers to Veblen constant,and hours worked y, with $U_x > 0$ and $V_y < 0$ (subscripts indicating partial derivatives) and where V(.) is convex. μ and υ are exogenous. Hence our analysis differs from Oswald (1983) and Tuomala (1990) where μ, comparison consumption**,** is endogenous. As typical in optimal tax literature, we have to make simplifying assumption like this separability assumption to be able make progress in our understanding of the optimal schedules. Workers differ only in the pre-tax wage n they can earn. There is a distribution of n on the interval (0,∞) represented by the density function $f(n)$.Gross income $z = ny$.

Suppose that the aim of policy can be expressed as maximizing the following social welfare criterion

$$S = \int_0^\infty W(u(n))\, f(n) dn \tag{4}$$

where $W(.)$ is an increasing and concave function of utility. We should note before moving on that there are many difficult problem with formulation of the social welfare function. For example, we must decide whether the government ought to accept relative income concerns in social welfare. This is closely related to the awkward question of whether we should include antisocial preference such as envy, malice etc. in social welfare function or not. It may be so that people are willing to respect individual preferences based on a positive concern for the welfare of others, but they may not be prepared to accept negative interdependencies. But to the extent relative concerns or Veblen effects are real, it should, of course, be respected when evaluating social welfare.

We first assume that the government respects the individual preferences, i.e. it is a 'welfarist' government. However, there are some elements in Veblen effects that may or may not be desirable from the social welfare point of view. Therefore, we also consider the case where the government is 'non-welfarist' (paternalistic) and its objective function may differ from that used by the

individuals. This approach is relatively common in conventional public economics, and has been used recently in the behavioural public economics literature as well.[9]

The government cannot observe individuals' productivities and thus is restricted to setting taxes and transfers as a function only of earnings, $T(z(n))$. The government maximizes S subject to the revenue constraint

$$\int_0^\infty T(z(n))\, f(n) dn = R \tag{5}$$

where in the Mirrlees tradition R is interpreted as the required revenue for essential public goods. The more non-tax revenue a government receives from external sources, the lower is R. In addition to the revenue constraint, the government faces incentive compatibility constraints. These in turn state that each n individual maximizes utility by choice of hour.

Totally differentiating utility with respect to n, and making use of workers utility maximization condition, we obtain the incentive compatibility constraints,

$$\frac{du}{dn} = -\frac{yV_y}{n} = g\,.^{10} \tag{6}$$

Omitting details (for an exposition see Atkinson and Stiglitz, 1980 or Saez, 2001), from the first order conditions of government's maximization of (4) subject to the revenue requirement (5) and the incentive compatibility condition (6), we obtain the following condition for relative optimal marginal tax rate $t(z) = T'(z)$ [11];

[9] Examples of the former include Kanbur, Keen and Tuomala (1994) and Pirttilä and Tuomala (2004), while O'Donoghue and Rabin (2003) and Bernheim and Rangel (2007) are examples of the latter. See Seade (1980) for seminal work.

[10] The 1.order condition of individual's optimisation problem is only a necessary condition for the individual's choice to be optimal, but we assume here that it is sufficient as well. Assumptions that assure sufficiency are provided by Mirrlees (1976). Note also that while we here presume an internal solution for y, (6) remains valid even if individuals were bunched at y=0 since, for them, du/dn=0.

[11] Note: $\frac{t}{1-t} = \frac{1}{1-t} - 1 = \frac{U_x n}{V_Y} - 1$

$$\frac{t}{1-t} = \underbrace{[1+\zeta]}_{A_n} \underbrace{\left[\frac{[1-F(n)]}{nf(n)}\right]}_{B_n} \underbrace{\left[\frac{U_c \int_n^{\infty} [\frac{\lambda}{U_c^{(p)}} - W'] f(p)dp}{\lambda(1-F(n))}\right]}_{C_n} \tag{7}$$

where $\zeta = \frac{yV_{yy}}{V_y}$.

It should be clear from (7) that the variation of the optimal marginal tax rate with the level of income is a complex matter. Applying (7) it appears that four elements on the right hand side of (7) that determine optimum tax rates: labour supply elasticity (A) and income effects (A&C), the shape of the skill distribution (B&C) (B is the inverse hasard ratio or the Mills ratio) and social marginal weights (C). B is not affected by Veblen effects. They enter through the terms A and C.

It is important to note that when comparison consumption is exogenous we get qualitatively the same results as in the standard nonlinear income tax model. Therefore, following the lead of Mirrlees (1971), numerical simulations have proved useful in generating useful results[12]. We also follow this route here.

4.1. Numerical simulations

We assume the following parametric assumptions. We use a constant absolute utility-inequality aversion form for the social welfare function of the government

$$S(u) = -\frac{1}{\beta} e^{-\beta u} \tag{8}$$

where β measures the degree of inequality aversion in the social welfare function of the government (in the case of $\beta = 0$, we define $W = u$). Simulations were carried out for the following utility function

[12] Tuomala (1984, 1990) gives details of the computational procedure.

$$u = -\frac{1}{(x - \upsilon\mu)} - \frac{1}{(1-y)} \tag{9}$$

where μ is the consumption of the individual belonging to top one percentile and υ refers to Veblen constant.

The results of the simulations are summarized below in Tables 2 and 3 (and Tables a1-a5 in appendix). The Tables give labour supply, y, gross income, z, net income, x and optimal average (ATR) and marginal tax rates (MTR) at various percentiles of the ability distribution (F(n) = cumulative distribution function). R (or X/Z) is revenue requirement (R=0 means pure redistributive system). Tables also provide the decile ratio (P90/P10) for net income and gross income. Unlike the scalar inequality measures the use of fractile measures such as the decile ratio allows us to consider changes in inequality at various different points in the distribution. Since marginal tax rates may be a poor indication of the redistribution powers of an optimal tax structure we measure the extent of redistribution, denoted by RD, as the proportional reduction between the decile ratio for market income, z, and the decile ratio for disposable income, x.

We assume n to be distributed according to the Champernowne distribution[13]. As commonly known the lognormal distribution fits reasonable well over a large part of income range but diverges markedly at the both tails. The Pareto distribution in turn fits well at the upper tail. Champernowne (1952) proposes a model in which individual incomes were assumed to follow a random walk in the logarithmic scale. Here we use the two parameter version of the Champernowne distribution. This distribution approaches asymptotically a form of Pareto distribution for large values of wages but it also has an interior maximum. As the lognormal the Champernowne distribution exhibits the following features: asymmetry, a left humpback and long right-hand tail, it has a thicker upper tail than in the lognormal case.

The probability density function of the Champernowne distribution

$$f(n) = \theta\left(\frac{m^{\theta} n^{\theta-1}}{(m^{\theta} + n^{\theta})^2}\right) \tag{10}$$

[13] It is often referred to as the Fisk distribution (see Fisk, 1961)

in which θ is a shape parameter[14] and m is a scale parameter (in numerical simulations we assume $m=e^{-1}$) . The cumulative distribution function is

$$F(n) = 1 - \frac{m^{\theta}}{(m^{\theta} + n^{\theta})} \tag{11}$$

For the inverse hazard ratio

$$\lim_{n\to\infty} \frac{1-F(n)}{nf(n)} = \lim_{n\to\infty} \frac{m^{\theta} + n^{\theta}}{\theta n^{\theta}} \to \frac{1}{\theta}. \tag{12}$$

(12) shows that the Champernowne distribution approaches asymptotically a form of Pareto distribution for large values of wages.

Table 2 $u = -\frac{1}{(x - \upsilon\mu)} - \frac{1}{(1-y)}$

β= 0	θ=3.3	R=0.1	ν=0	μ=0		θ=3.3	R= 0.1	ν=.1	μ=0.45	
F(n)	y	z	x	ATR%	MTR%	y	z	x	ATR%	MTR%
0.10	0.50	0.09	0.14	-50	58	0.55	0.10	0.16	-55	65
0.50	0.55	0.20	0.19	6	52	0.59	0.22	0.21	-6	58
0.90	0.53	0.38	0.28	27	52	0.57	0.41	0.29	30	57
0.97	0.51	0.54	0.35	33	53	0.54	0.57	0.36	37	56
0.99	0.49	0.72	0.44	39	51	0.52	0.77	0.45	42	53
P90/P10		4.22	2.0				3.9	1.77		
RD(%)			52.6					54.6		

[14] Based on the Finnish income distribution data θ varies from 3.3 to 2.5 (1987–2004)

Table 3 $u = -\frac{1}{(x-\upsilon\mu)} - \frac{1}{(1-y)}$

β= 0	θ=2.5	R= 0.1	ν=.1	μ=0.5	
F(n)	y	z	x	ATR%	MTR%
0.10	0.46	0.07	0.17	-100	68
0.50	0.54	0.20	0.21	-5	66
0.90	0.53	0.47	0.30	36	67
0.97	0.51	0.74	0.39	48	68
0.99	0.48	1.10	0.50	54	67
P(90/10)		6.71	1.76		
RD%			73.8		

Figure 5 Marginal tax rates $u = -\frac{1}{(x-\upsilon\mu)} - \frac{1}{(1-y)}$, θ=3.3, R=0.1 (X/Z=0.9)

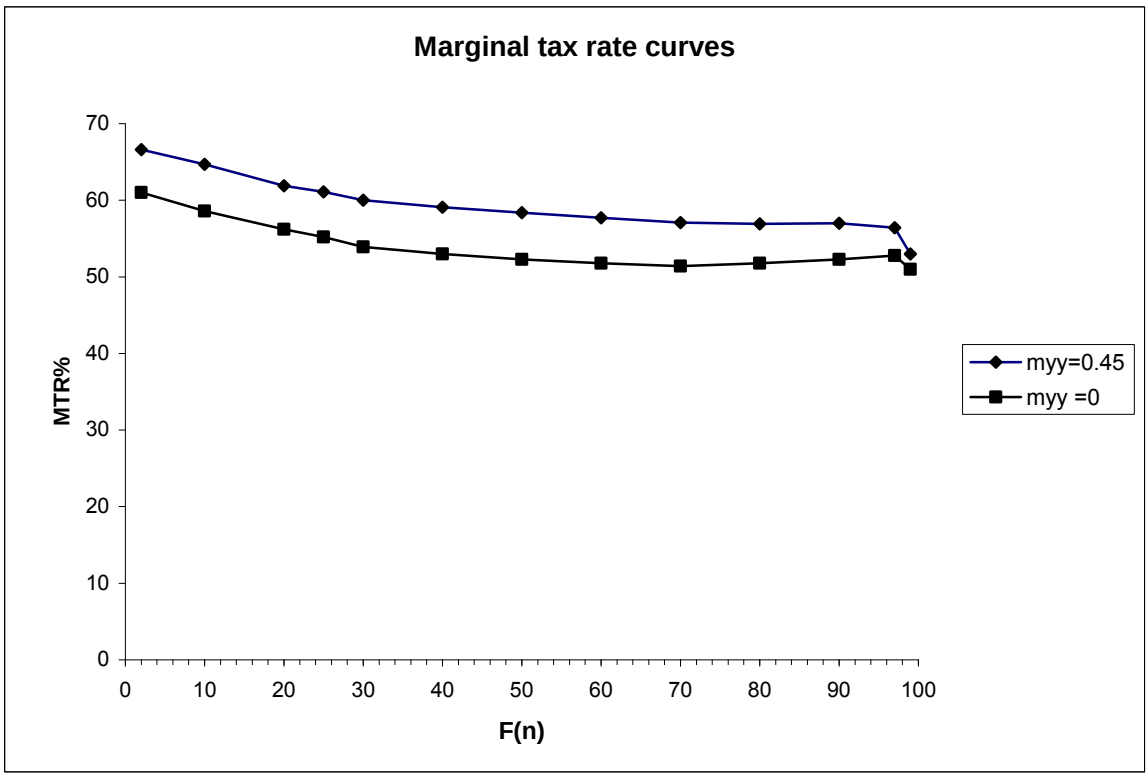


Figure 6 Labour supply (0-100), $u = -\frac{1}{(x-\upsilon\mu)} - \frac{1}{(1-y)}$, θ=3.3, R=0.1 (X/Z=0.9)

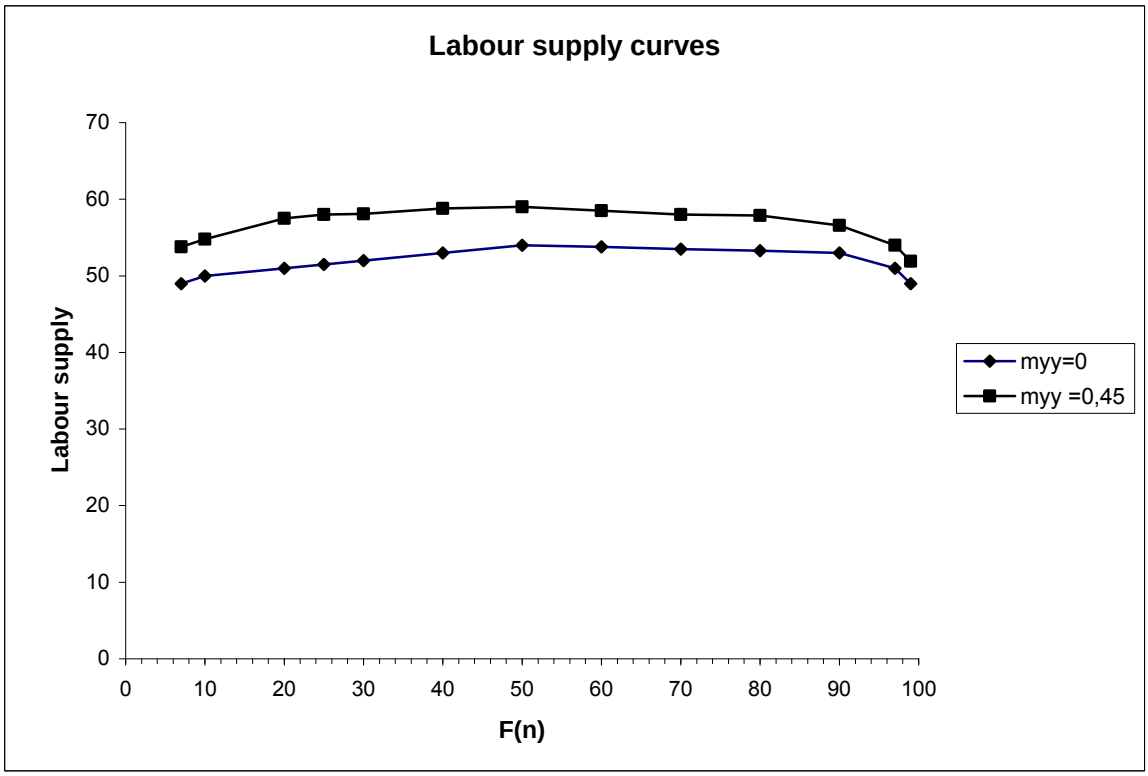
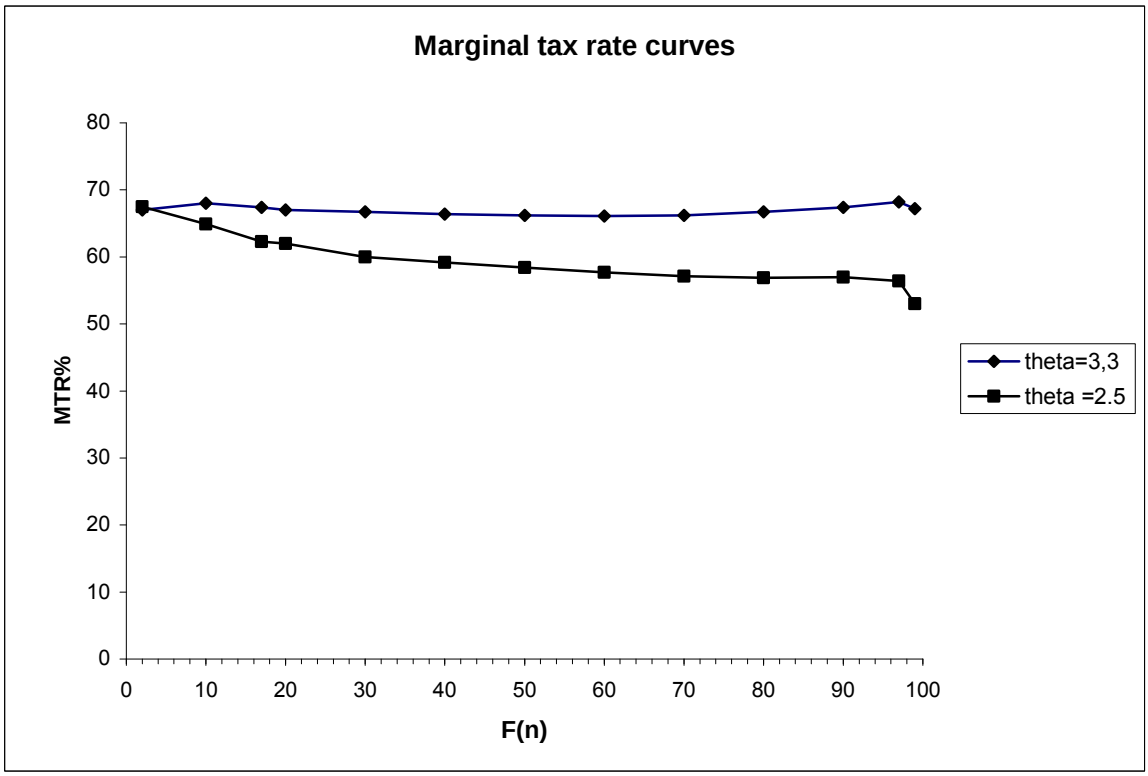


Figure 7 Marginal tax rates $u = -\frac{1}{(x-\upsilon\mu)} - \frac{1}{(1-y)}$, θ=3.3 and =2.5, R=0.1 (X/Z=0.9)



Tables 2 and 3 and figures 5-7 reveal some interesting features of optimal solution. In Tables 2 and 3 we can compare optimum solution without and with Veblen effects. As it might be expected that labour hours are uniformly higher with Veblen effects (with the same θ).[15] Marginal taxes are also uniformly higher in the presence of Veblen effects (with the same θ)[16]. We can also find a slight U-shaped marginal tax rate curve when μ=0, but it disappears with Veblen effect in the specification displayed in Table 2. On the other when we increase pre tax inequality ie. θ decreases we again find a slight U-shaped marginal tax rate curve and marginal rates are higher(see Table 3 an Figure 7). As expected the marginal tax rates are higher when inequality aversion is higher (see Table a4 and a5 in Appendix A). With the CES utility function (9) we find that there is slightly more redistribution in the case with Veblen effects (RD=54.6% Table 2) than in the case without that effect (52.60% Table 2). With higher inherent inequality (θ=2.5) and Veblen effects the extent of redistribution is 73.8%. When we increase simultaneously both reference consumption μ and inherent inequality (lower θ), then those at the lower tail of the distribution (below the median income) decrease working hours see Table 2,3, a1,a4 and a5). This suggests that optimal tax policy may attenuate the economic distortion arisen by relative income concerns or Veblen effects.

4.2. Government's and individuals' preferences differ: Non-welfarism vs welfarism

It is not necessarily clear that the government ought to accept Veblen effects when forming its social objectives. The utility function governing individuals' long-term welfare may be different from that of their short-term welfare. Perhaps a stronger case for paternalism could be built on the idea that the government is not willing to accept the consequences of Veblen effects. In other words market behavior is generated by one set of preferences, but the society evaluates it with respect to another set of preferences. In many respects, the situation described above is fairly common in welfare and normative public economics. Perhaps the most well-known example is the analysis of so-called merit goods (Sandmo 1983). The consumption of these goods, in the viewpoint of the

[15] We can also compare the marginal tax rate columns when ν= 0, μ=0 , (ν= 0.1, μ=0.2 (average consumption), and ν= 0.1, μ=0.45 (top one percent). see Appendix A Table a2 and a3)

[16] Note that these (in Tables 2 , 3 and Appendix) are marginal rates for all taxes that vary with income, and should be compared with the total of taxes on income and expenditures in real economies.

government, is meritorious and should be encouraged or imposed, ignoring individual choice. Optimal taxation when the government attempts to alleviate poverty (e.g. Kanbur et al 1994a) is another application of a much larger literature on "non-welfarist" public economics, where the social planner explicitly uses some other criterion for evaluating an individual's welfare than the preferences of that individual. Perhaps at some level one could also argue that redistribution – where the government can evaluate individual welfare in a different way than the individuals themselves – and correction of externalities are additional examples in which the social welfare function differs from the individual utility.

The society may want to restrict individuals's choices on work hours. This may happen indirectly as in income taxation or directly. The direct way would be efficient but may be difficult to implement in practice. We assume now that the individual still maximises the same utility function (9) as in the previous section, but the government's objective function rules out Veblen effects. For example, in situations in which a rise in income inequality will cause an increase in hours worked, as our empirical results suggest, individuals might benefit if an outsider induced them to behave according to preferences they wish they had.

Our numerical simulations show (figure 8) that the marginal tax rates are higher at the lower part of the distribution (below the 30 th per cent) in the non-welfarist case than in the welfarist case whereas it is other way round at the top decile of the income distribution. Also over the same range hours worked are smaller in the non-welfarist case than in the welfarist case (figure 9). Some other interesting results emerge from the comparison of these solutions. The value of n_0[17] is considerably higher in the non-welfarist case, with 3 per cent of the population choosing not work. In the welfarist case almost everyone is brought in to the labour force. We also find that there is slightly more redistribution in the non-welfarist case (RD=74.5%) than in the welfarist case (70.8%).

[17] $n_0 (> 0)$ is such an ability level that all individuals with $n \in (0, n_0)$ do not work, i.e. $y(n) > 0,$ for $n > n_0$

Figure 8 Marginal tax rates $u = -\frac{1}{(x-\upsilon\mu)} - \frac{1}{(1-y)}$,θ=3.3, β=1 , R=0.1 (X/Z=0.9)

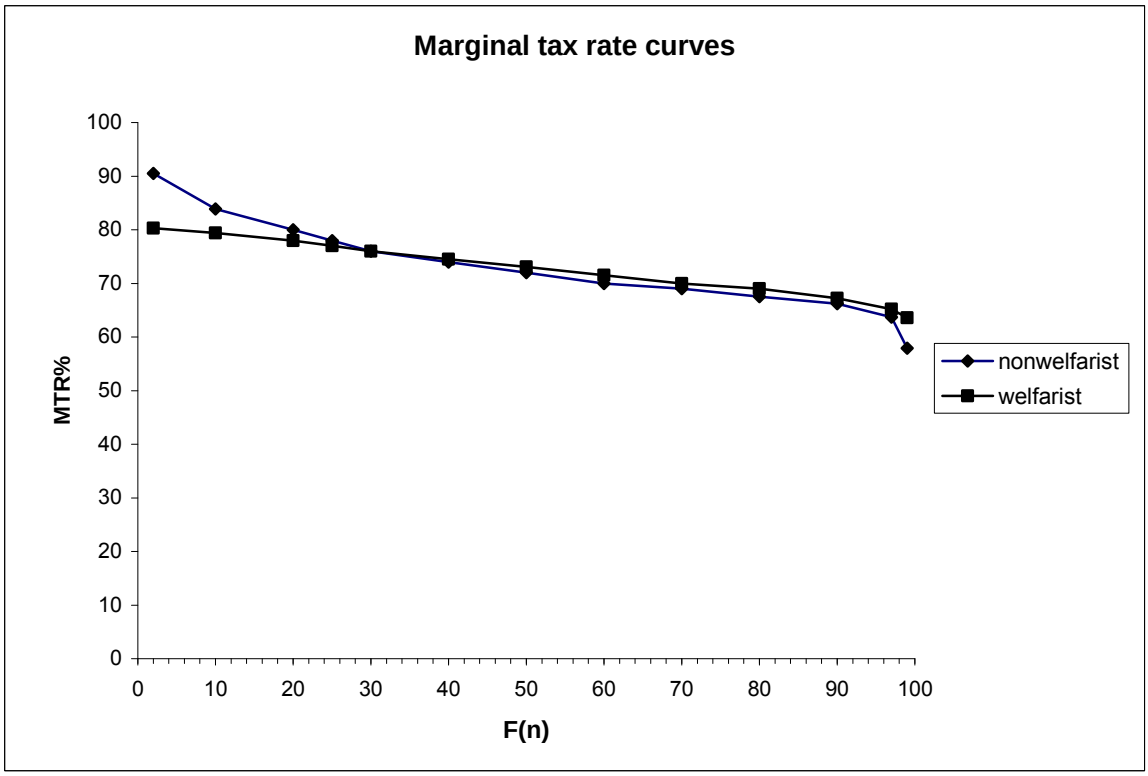
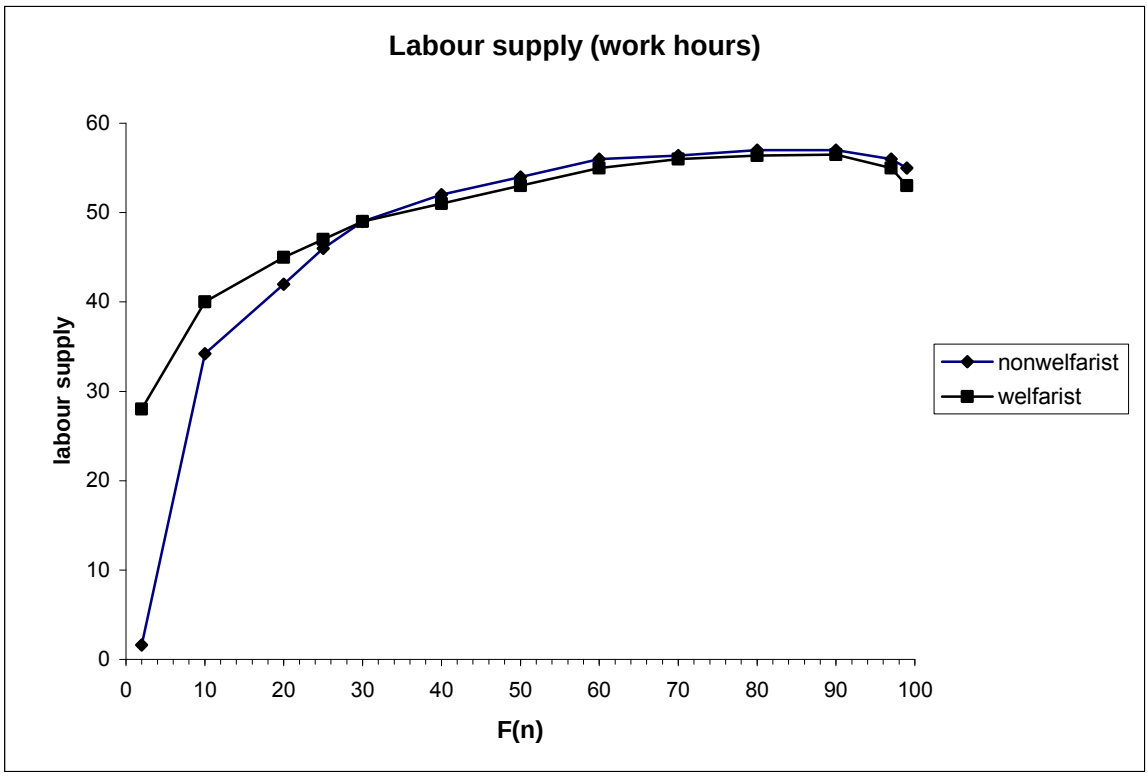


Figure 9 Labour supply (0-100) $u = -\frac{1}{(x-\upsilon\mu)} - \frac{1}{(1-y)}$, θ=3.3, β=1, R=0.1 (X/Z=0.9)



5. Conclusions

In this paper we have examined link between work hours and inequality. We have provided evidence that the underlying cause for increased inequality and longer work hours might arise from Veblen effects. We have utilised recent data on top income shares in 12 countries. Our pooled regressions indicate that increase in top 1 per cent income share will increase average annual hours worked. Furthermore, we found that there is a difference between Anglo-American countries and the other countries. One explanation for the found relationship might be Veblen effects proposed by Bowles and Park (2005). We also studied normative policy implications in the context of optimal nonlinear income taxation when people care about relative consumption. Numerical results showed that the marginal tax rates and hours worked are higher at the optimum in the case of Veblen effect than in the absence of the Veblen effects. Our numerical simulations suggest that the utilitarian optimal tax system is slightly more redistributive with Veblen effects than in the absence of Veblen effects. Our numerical results also provide some support for the view that optimal tax policy may mitigate externalities arising from relative consumption concerns or Veblen effects.

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Data appendix

Average annual hours worked (in logs: LHOURS). Source: Groningen Growth and Development Centre and the Conference Board, Total Economy Database, January 2007, http://www.ggdc.net

Top 1 per cent income share (TOP1). Source: various individual country studies, see Atkinson and Piketty (2007), Sweden: Roine. and Waldenström (2005), Finland: Jäntti et al (2008),. Norway: Aaberge and Atkinson (2008)

Real GDP per capita in 1990 PPPUSD (LGDP). Source: Maddison (2007).

Net union density (DENS). Source: Golden-Wallerstein data on "Union Centralization Among Advanced Industrialized Societies; Update 1995/2000. For New Zealand net union density for years 1960-1993 from Nickell et al. (20005) and for years 1995-98 union density from Nickell (2006) and adjusted with net density series.

Unemployment ratio (U). Source: OECD. Economic outlook, various issues.

Aggregate labour tax ratio (LTAX). Source: McDaniel (2007). Tax data for New Zealand and Norway is missing.

The share of total outlays of government to GDP (GOV). Source: OECD. Economic outlook, various issues.

The share of government employment to total employment (GEMPL). Source: OECD. Economic outlook, various issues.

The share of female employment to total civilian employment (FEMPL). Source: OECD. Annual labour force statistics. Extracted from OECD.Stat

The share of employment in industry to total civilian employment (INDE). Source: OECD. Annual labour force statistics. Extracted from OECD.Stat

Real manufacturing earnings index, 2000 = 100 (in logs LMEARN). Source: OECD. MEI. Extracted from OECD.Stat

Dependency ratio (DEPR). The share of population 14 and younger and 65 and older to total population. Source: OECD. Annual labour force statistics. Extracted from OECD.Stat

Summary statistics:

Variable	"Full period"				1990-1998			
	aver.	min	max	st.dev.	aver.	min	max	st.dev.
Log hours	7.531	7.244	7.772	0.1113	7.426	7.244	7.616	0.0932
Top 1 per cent income share	0.081	0.041	0.177	0.0215	0.085	0.044	0.177	0.0270
Log GDP per capita	9.362	7.560	10.189	0.4261	9.816	9.508	10.189	0.1358
Unemployment ratio	0.045	0.000	0.168	0.0329	0.077	0.017	0.168	0.0307
Union density ratio	0.387	0.085	0.828	0.1613	0.350	0.085	0.799	0.2021
Aggregate labour tax ratio	0.229	0.051	0.473	0.1044	0.301	0.129	0.471	0.1001
Government total outlays	0.417	0.193	0.730	0.1042	0.481	0.318	0.730	0.0922
Government employment share	0.180	0.077	0.353	0.0642	0.196	0.081	0.353	0.0754
Female employment share	0.391	0.236	0.490	0.0583	0.445	0.384	0.490	0.0258
Industry employment share	0.337	0.216	0.493	0.0641	0.268	0.216	0.409	0.0462
Dependency ratio	0.353	0.299	0.417	0.0270	0.335	0.300	0.363	0.0172
Log real earnings index, manuf.	3.392	0.831	4.602	1.0101	4.421	4.114	4.602	0.1023

Notes:

- Log hours: 1950–1998
- Top 1 per cent income share: 1950–1998
- Log GDP per capita: 1950–1998
- Unemployment ratio:1955–1998
- Union density ratio: 1950–1998, except 1953–1998 for Japan and 1960–1998 for New Zealand
- Aggregate labour tax ratio: 1950–1998, except 1960–1998 for Australia and 1952–1998 for Japan; no data for New Zealand and Norway
- Government total outlays: 1960–1998, except 1986–1998 for New Zealand
- Government employment share: 1960–1998, except 1961–1998 for New Zealand and the UK, 1962-1998 for Japan and Norway, 1963–1998 for France, and 1966–1998
- Industry employment share: 1956–1998
- Dependency ratio: 1956–1998, except for Japan 1955–1998
- Log real earnings index, manufacturing: 1955–1998, except 1956–1998 for France, 1957–1998 for Germany, 1959–1998 for Norway, 1963–1998 for the UK, 1970–1998

Appendix A

Table a1 $u = -\frac{1}{(x-\upsilon\mu)} - \frac{1}{(1-y)}$

β= 0	θ=3.3	R=0	ν= 0	μ=0	
F(n)	y	z	x	ATR%	MTR%
0.10	0.47	0.09	0.16	-74	55
0.50	0.52	0.19	0.21	- 31	49
0.90	0.51	0.37	0.29	-6	50
0.99	0.47	0.70	0.46	34	49
P90/P10		4.11	1.81		
RD(%)			56		

Table a2 $u = -\frac{1}{(x-\upsilon\mu)} - \frac{1}{(1-y)}$ **, μ=**average consumption

β= 1	θ=3.3	R= 0.0	ν=.1	μ=0.2	
F(n)	y	z	x	ATR%	MTR%
0.10	0.36	0.07	0.17	-100	73
0.50	0.49	0.18	0.20	-11	67
0.90	0.53	0.38	0.27	28	63
0.99	0.50	0.74	0.41	44	59
P(90/10)		1.62	5.43		
RD%			70.4		

Table a3 $u = -\frac{1}{(x-\upsilon\mu)} - \frac{1}{(1-y)}$

β= 1	θ=3.3	R= 0.0	ν=.1	μ=0.45	
F(n)	y	z	x	ATR%	MTR%
0.10	0.39	0.07	0.17	-100	77
0.50	0.51	0.19	0.21	-8	70
0.90	0.55	0.39	0.27	31	64
0.99	0.54	0.80	0.45	44	46
P(90/10)		5..38	1.56		
RD%			71.0		

Table a4 $u = -\frac{1}{(x-\upsilon\mu)} - \frac{1}{(1-y)}$

β= 0	θ=2.5	R= 0.0	ν=.0	μ=0	
F(n)	y	z	x	ATR%	MTR%
0.10	0.26	0.04	0.16	-100	70
0.50	0.42	0.16	0.19	-23	70
0.90	0.48	0.42	0.27	35	69
0.99	0.43	0.92	0.43	55	67
P(90/10)		10.5	1.68		
RD%			84		

Table a5 $u = -\frac{1}{(x-\upsilon\mu)} - \frac{1}{(1-y)}$

β= 0	θ=2.5	R= 0.0	ν=.1	μ=0.45	
F(n)	y	z	x	ATR%	MTR%
0.10	0.29	0.04	0.18	-100	76
0.50	0.46	0.17	0.21	-24	75
0.90	0.51	0.45	0.29	37	73
0.99	0.49	0.97	0.43	55	71
P(90/10)		11.25	1.61		
RD%			85.7		