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Bend it like Beckham: Hours and Wages across Forty-Eight Countries in 1900

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Thorstein Veblen's critique of consumption has reemerged in current debates on why work hours differ across countries. In 1899, Veblen wrote: "The propensity for emulation is perhaps the strongest and most alert and persistent of the economic motives proper. In an industrial community this propensity for emulation expresses itself in pecuniary emulation (Veblen 1899, p. 85)." Richard Easterlin (1974) gave Veblen's conjectures an empirical basis. Using survey data he showed that for all but the poorest households relative income within a society is the main determinant of the level of satisfaction. The insights of Easterlin and Veblen spawned a literature that dealt with the relative position of households in society and how status can affect a variety of economic decisions. Frank's contributions (1985, 1997) are noteworthy. Like Veblen he emphasized the role of emulation in consumer behavior, but he also drew attention to the relation between status and labor supply.

The focus of this paper is on the relation between wages, per capita income, and hours of work. Diener and Diener (1995), Neumark and Postlewaite (1998), Bell and Freeman (2001) have addressed aspects of the link between emulation and labor supply; and in a recent paper, Bowles and Park (2005) test for it directly. Bowles and Park apply data on the post-1970 period for a group of OECD countries that had similar levels of income, but different degrees of inequality. The idea is that, because social comparisons are upwards to a richer reference group, greater inequality combined with the drive to emulate leads to increased labour supply. In line with this Veblen-inspired view, Bowles and Park find that hours of work increase with the degree of income inequality.

Here, we take a more historical perspective on the relation between emulation and hours of work. In fact our data set covering forty-eight countries was compiled at about the same time Veblen first published *The Theory of the Leisure Class.* Unlike Bowles and Park, we do not have

data on income distributions within countries, but our large sample covering economies at very different stages of development allows us to test for the relation between wages, income levels, and hours of work.

Despite the forces of globalization, the decades before 1900 saw persistent if not growing disparity in GDP per capita between rich and poor countries. A common refrain is that in certain countries and regions economic performance suffered because of constraints on labor supply that had the effect of widening international income disparities. Landes (1999) attributed slower development in the "South" - a region which included Southern Europe, South America and Southern Asia - to a combination of religious and social factors that inhibited longer hours of work. Labor supply in these regions, according to Landes, was not sensitive to wage changes. In the North, in contrast, workers had an internally driven propensity to consume more and a work ethic that promoted long hours. In a somewhat related argument based on the notion of emulation, Clark (1987) concluded that during the early twentieth century low average levels of consumption resulted in inferior or less intense labour effort in India and other poor countries But, whereas Landes was concerned mainly with the impact of labour supply on levels of income, Veblen and Clark emphasized how the level of income or development affected labour input through its effect on perceived standards of consumption, that is the level of consumption to be emulated "after the most elementary physical wants have been provided for (Veblen 1899, p. 85)."

This paper is squarely in the tradition of Veblen, Easterlin, Frank and others who have introduced emulation as a factor in economic decisions; but our work is the first to apply a large, historical, cross-country data set to the issue. The wage and hours data are from the *Fifteenth Annual Report* of the U.S. Department of Labor (1900), which under the supervision of Carroll

Wright, published data on weekly work hours and daily wages for the period 1850 to 1900. The project was not modest. The department consulted over seven hundred official publications covering eighty-eight countries and territories, ranging from Algeria to Venezuela. The coverage for the United States consisted of all the reports of the Federal and State departments of labor. The introduction to the report affirmed unequivocally that the "compilation may be considered exhaustive for the United States and nearly so for foreign countries." The report included both manufacturing and non-manufacturing sectors for male and female workers. There is no information on agriculture. Nonetheless, compared to series that rely on observations from a small sample of businesses, usually textile mills or mines only, it is well suited for international comparisons. Observations were compiled by occupation at the establishment level; for example, the report gives the average wage and hours of work of male cotton-textile spinners in one mill in Lancashire in 1891. Huberman (2004) and Huberman and Minns (2007) provide a detailed analysis of the contents of the report. The wage and hours data are uneven by coverage and occupation, but wherever possible imbalances have been corrected using regression techniques (Huberman 2004). Altogether, 18,000 observations on wages and about 10,000 on hours have been coded for the period 1870 to 1900.

Table 1 presents average hours of work and wages in 1870 and 1900 for forty-eight countries and territories.[1] Levels of income varied greatly across the sample of countries; per capita GDP in Britain was ten times that of China. Because the distribution of the wage data is skewed at the top end, we report figures for the twenty-fifth and fiftieth percentiles which give a better idea of the earnings of the mass of unskilled and semi-skilled workers. Wages are in cents ($US) per hour, converted at the nominal exchange rate by the Department of Labor. The method of conversion does not appear to bias our results. From 1870 to 1900 real wages in the European

core rose by about 70 percent using Williamson's (1995) purchasing-power-parity-adjusted index for unskilled workers. Our corresponding wage data give an increase of 60 percent at the twenty-fifth percentile and 58 percent at the fiftieth percentile.

Our analysis is based mainly on the 1900 series, but we begin by describing aspects of the less complete series for 1870. Notwithstanding that our figures are restricted to the reports assembled by Wright and are not necessarily reflective of the economies as a whole, a clear distinction emerges between Europe and the rest of the world. With the exception of the European core and periphery, an area with large differences in per capita GDP, there was little dispersion in average weekly hours. In 1870 the standard deviation was 2.32 hours in the settler countries and 2.56 hours in Central and South America; whereas in Europe it was 4.25. As well, weekly hours were much higher in Europe, averaging 65.5 as compared to 58.4 in the settler countries and 59.9 in the countries of Central and South America. From 1870 to 1900 average hours either declined or remained about the same in all regions with the exception of the Far East (China and Japan). In Europe the change was greatest with hours falling from 65.5 to 60.1; but hours declined markedly in the settler economies too, from 58.4 to 55.2. Within Europe, Belgium, Denmark, Sweden and Switzerland experienced the largest reductions; while, among settler countries, hours in Australia and New Zealand, already among the lowest hours in 1870, fell significantly more. In fact, with the exception Sierra Leone, only in Australia and New Zealand were weekly hours in 1900 below 50, although hours in India was close to that level.

A strong point of the data set is its dispersion of wages and hours across a wide range of regions at very different levels of development. Australia, New Zealand and South Africa had the shortest workweeks among high-wage countries; and their hours were similar to those of the lowest-wage countries of Southeast Asia. India's workweek of 50.6 hours was practically

identical to New Zealand's 49.8 hours, although wages were more than ninety percent lower in the former. In fact, the longest hours are found not in the high- or low-wage countries, but rather among those with an intermediate level of wages. For the entire sample, hourly wages at the fiftieth percentile range from 1.54 cents in India to 26.44 in Australia, with a median across countries of 7.81 cents. Although the pattern by no means bears out in every case, it was countries close to the median that tended to have the greater hours. Chile and the Philippines, for example, with wages of 8.91 cents and 7.24 cents, respectively, both had average hours of 68.

In Figure 1 we compare hourly wages at the fiftieth percentile and average hours across the forty-eight countries in our sample. The data has the appearance, at least to some degree, of a backward-bending labour supply curve. This pattern is illustrated with two linear regressions of wages on hours, one for wages below the median of 7.81 cents per hour and the other for wages above that level.[2] The coefficient on hours for wages below the median is positive and not significant, while for wages above the median, the coefficient on hours, as the figure describes is negative and significant. Recognizing that many factors can affect labour supply, the regressions, as a summary description of the Wright data provide some support for the view that labour supply curves are backward-bending.

A Model of Cross-Country Comparisons of Hours of Work

We explore the relation between wages and hours with the help of a simple model of working hours that highlights the role of emulation in labour supply decisions. Easterlin found that, beyond some level, only relative consumption had much impact on satisfaction, but if consumption was low enough, the absolute level mattered as well. We allow for the effect of both absolute and relative consumption by introducing a consumption constraint, c^*, where the

constraint is based on both an absolute measure of subsistence and the median level of consumption in the economy:

$$(1) \qquad c^* = c^*\left(s, \bar{c}\right), \qquad \frac{dc^*}{ds}, \frac{dc^*}{d\bar{c}} > 0$$

where $\bar{c}$ is median consumption and s is true subsistence. Equation (1) allows for the Veblen/Easterlin insight that utility depends on relative consumption by assuming a consumption constraint that rises with median consumption income; but it allows for a true subsistence constraint as well.

We apply a conventional utility function in consumption and hours of work, where the consumption constraint enters through a Stone-Geary specification:

$$(2) \qquad u = u(c - c^*, h), \qquad u_1 > 0, u_2 < 0, u_{11} < 0, u_{22} \leq 0$$

where c is total consumption and h is hours of work. Assuming all income is from wages and treating the consumption good as numeraire, the first-order optimization conditions are:

$$(3) \qquad \frac{\partial u / \partial h}{\partial u / \partial (c - c^*)} = -w, \text{ and}$$

$$(4) \qquad w h = c,$$

where w is the wage. Hours of work in this framework can be divided into two components: the hours, $h^* = \frac{c^*}{w}$, needed to meet the consumption constraint and the remaining hours, $h' = \frac{c - c^*}{w}$, that satisfy the first-order conditions. An increase in the wage rate reduces h^*, while the effect of the wage on h' depends on the utility function. From equation (1) it follows that an increase in median consumption, by raising c^*, unambiguously increases work hours. This is the key, in this model, to the emulation effect.

The estimation is based on a utility function separable in net consumption and hours of work.. We assume two forms of the utility function, one that exhibits constant relative risk

aversion with respect to consumption, and the other constant absolute risk aversion (increasing relative risk aversion).[3]

(5a) $$u = k_a \frac{(c - c^*)^{1-\delta}}{1-\delta} - h,$$

(5b) $$u = -k_r e^{-\alpha(c-c^*)} - h.$$

Substituting equation (5a) or (5b) into equations (3) and (4), we derive the hours supply curves as:

(6a) $$h = k^{\frac{1}{\delta}} w^{\frac{1-\delta}{\delta}} + \frac{c^*}{w},$$

(6b) $$h = \frac{\ln(k_a \alpha w)}{\alpha w} + \frac{c^*}{w}.$$

The elasticity of the hours supply where constant relative risk aversion is assumed is:

(7a) $$\varepsilon_r = \frac{1-\delta}{\delta} - \frac{1}{\delta}\frac{c^*}{c}.$$

The sign of the elasticity, ε_r, depends on the magnitude of δ; and importantly, the elasticity is increasing in the ratio, $\frac{c^*}{c}$. The elasticity, ε_r, is -1 at $c^* = c$, and increases asymptotically to $\frac{1-\delta}{\delta}$ as consumption, c, increases.[4] For $\delta < 1$, the elasticity of labour supply, initially negative at low wage rates (and hence low consumption), could become positive, implying the inverse of the usual backward-bending labour supply curve. For $\delta \geq 1$, the labour supply curve would be negatively-sloped throughout.

The formulation that assumes constant absolute risk aversion could give rise to a labour supply curve that over at least part of its exhibits the classic backward-bending shape. The elasticity is:

(7b) $$\varepsilon_u = \frac{1-\ln(k_u \alpha w)}{\alpha c} - \frac{c^*}{c}.$$

Unlike the case of constant relative risk aversion, the elasticity close to $c = c^*$ is greater than -1, where the magnitude and sign depends on the values of α and c^*.[5] The first term of equation (7b) is decreasing in w (note that c is increasing in w). Since the second term ($-c^*/c$) is increasing in w, the net effect of the wage on labour supply depends on which effect dominates.

Important to the cross-country comparison of hours is the relation between the consumption constraint and median consumption in the economy. Here we apply a functional form drawn from discussions of poverty lines across countries. Poverty lines whether determined by a government authority or based on survey reports have been found to be related to the average income in an economy. Madden (2000, p.183) suggests a simple geometric average of the true subsistence and average or median income as a way of reflecting the impact of both measures on the poverty line. We use this same approach to describe the consumption constraint. Thus:

(8) $$c^* = s^{\gamma} \bar{c}^{(1-\gamma)}, \qquad \bar{c} \geq s$$

where γ is the weight on subsistence and 1- γ the weight on median consumption. From equations (6) and (8) the impact of median consumption on hours is:

(9) $$\frac{dh}{d\bar{c}} = \frac{1-\gamma}{w}\frac{c^*}{\bar{c}}.$$

Thus the impact of median consumption, $\bar{c}$, is declining in the wage. In other words, the hours of those with low wages and therefore levels of consumption close to the constraint are affected more by median consumption in the economy. Another implication of equation (9) is that the

effect of a given relative change in the median wage on the absolute number of hours is independent of the median wage.[6]

Labour Supply in 1900: A Cross-Country Comparison

Table 1 describes the hours and wages of our cross-country sample and provides estimates of their per capita GDP. An important implication of the emulation hypothesis is that for a given wage, those in higher income countries will tend to work more hours. Our Stone-Geary utility function captures this effect through the consumption constraint. Taking the view that measures of the poverty line are reasonable indicators of that constraint, we draw on some of the literature on how poverty lines and incomes are related. We also have estimated the parameters of the consumption constraint relation, equation (8), using recent World Bank reports of poverty lines and incomes across a broad range of countries.

There is a large literature concerned with various of aspects of poverty including its very definition. Some of this literature has dealt specifically with determinants of the poverty line. We do not address the question of what should determine the poverty line; rather we accept existing estimates of poverty lines, and use those measures to derive the consumption constraint that is a key feature of our model. Early work on poverty lines in the U.S. using government-based levels argued for a relatively high income elasticity. The suggested range was between 0.8 and 1 (Smolensky 1963). However, Kilpatrick (1973), who derived poverty lines from survey data, concluded that the elasticity of the poverty line with respect to income was closer to 0.6.

Here we estimate the relation between the poverty line and income from contemporary measures of poverty. The data, presented in Table 1A, show the percentage of the population deemed to be in poverty across countries other than those in the high income range. These

percentages are based on "national" poverty lines. The relation between per capita Gross National Income and the poverty line is described in Figure 2. The estimated relation expressed in 1990 US (PPP) dollars is:

$$PL = (381.7)^{.362}\ \overline{GNI}^{.638}, \tag{10}$$

where PL is the national poverty line and $\overline{GNI}$ is per capita Gross National Income.[7] The elasticity is close to the value estimated by Kilpatrick (1973), and the implied subsistence level, s, of 382 dollars corresponds to the one-dollar per-day figure that the World Bank has been suggesting as true subsistence.

How poverty lines relate to decisions on hours of work is by no means clear, but taking the view that the national poverty line represents the income that individuals in a country perceive as necessary for a minimal standard of living, identifying the poverty line with the consumption constraint, c^*, seems a reasonable approach. And importantly, because national poverty lines are positively related to average income, our method captures the emulation effect.

The utility function specifications, equation (5a) and (5b), lead to labour supply functions, equations (6a) and (6b), separable in hours required to meet the consumption constraint and hours that increase utility. Taking the poverty line estimates of equation (10) to be reflective of the relation between per capita GDP and the consumption constraint, we derive the consumption constraint for each of the countries in our sample, where per capita GDP is drawn from Maddison's (2001) comprehensive survey (see Table 2A). For a given level of per capita GDP, a higher wage implies few hours needed to meet the constraint; but, at the same time countries with the higher wages in the Wright sample tended to be those where the consumption constraint was higher as well. In general, the wage effect dominated at least for lower-wage countries, as Figure 3 illustrates. But, beyond wage rates of 10 cents per hour, though, there was little relation between

the median wage and hours needed to meet the constraint. For countries in this range, the higher median wage was almost fully offset by the impact of higher average incomes.

Figure 4 illustrates the relation between wages and net hours, namely hours beyond what was required to meet the consumption constraint. Because the variation in total hours across countries was less than the variation in required hours, the pattern of wages and net hours mirrors to some degree the relation described in Figure 3; net hours are increasing in the wage up to 10 cents per hours, and roughly constant or declining after that. In keeping with equation (6a), we estimate the following relation between net hours and the wage:

$$\ln h' = \underset{(27.28)}{4.590} + \underset{(5.594)}{0.360} \ln w, \qquad R^2 = .405 \tag{11}$$

where t -statistics are in parentheses. The implied elasticity, δ, of the utility function is 0.74. Under the proposed specification net hours are always increasing in the wage.

Tthe pattern in Figure 4 is suggestive of a declining net hours at high wage rates; and so we have also estimated the net hours-wage relation assuming theutility function with constant absolute risk aversion. Equation (6b) gives rise to the following estimates:

$$h' = \frac{\ln(\overline{\alpha k_a} w)}{\overline{\alpha} w}, \tag{12}$$

where $\overline{\alpha k_a}$ is 53.04 (16.82) and $\overline{\alpha}$ is 0.404 (14.56) [t - statistics are in parentheses. The R^2 is 0.909]. The improved fit suggests that constant absolute risk aversion may better account for the observed patterns.

Whether equation (11) or equation (12) is applied, the cross-country comparison of hours and wages in 1900 suggest that, once hours to meet the consumption constraint are subtracted, labour supply was initially upward-sloping, possibly becoming backward bending at the highest wages. But what do these estimates imply about total hours? As described by equation (7a), the

elasticity of total labour supply is initially -1 and increases asymptotically to $1-\delta/\delta$ as the wage increases. The implication is that the labour supply curve cannot be upward-sloping at low wages; but it may become upward-sloping at high wages; and under the utility specification given by equation (5a) that will happen when h^* falls below $1-\delta$. In Figure 5 we illustrate the relation between hours and wages, assuming the equation (11) estimates for different levels of per capita GDP. For countries with a per capita GDP of $750 (US1990), hours are simulated to decline from 64 at a wage of 2 cents per hour to a minimum of 49 where the wage is 6 cents per hour. The median wage of such countries tended to be less than 6 cents, suggesting that, with constant relative risk aversion, increasing the wage in low-income countries reduced hours. Higher incomes imply a greater consumption constraint which leads to more sharply declining hours as the wage increases. At per capita GDP of $1,500 (US1990) minimum hours is 55 at a wage of 8.4 cents per hour. This wage too was higher than the median for countries in this group, suggesting that for these countries as well labour supply was downward sloping for most workers. On the other hand, many workers below the median wage of high-wage countries would, in this scenario, have been on the upward-sloping portion of the labour supply curve.

As noted the assumption of constant absolute risk aversion leads to estimates that correspond more closely to the cross-country relation between net hours and the wage. Figure 6 presents simulations for the same levels of per capita GDP as Figure 5. Because the utility function gives rise to sharply increasing net hours at low wages, the slope of the supply curve is initially positive at the lowest income level, but it becomes negative at 3.8 cents per hours. At a per capita GDP of $1,500 (US1990) the slope becomes negative at 3.2 cent per hour, implying that nearly all workers in countries of intermediate income would be on the downward-sloping

portion of the labour supply curve; and the same would be true of workers in high income countries.

Whether constant absolute or constant relative risk aversion is assumed the estimates imply that labour supply initially declines with the wage with the exception possibly of those very close to subsistence. Where we assume constant relative risk aversion, the labour supply ultimately becomes positively-slope in contrast to the case of constant absolute risk aversion where the curve remains negatively sloped. A comparison of Figure 5 and 6 with the actual wage and hours data reveals that at high median wages constant relative risk aversion leads to an overstatement and constant absolute risk aversion an understatement of hours. For example, at an assumed per capita GDP of $4,000, total hours on the basis of constant relative risk aversion are simulated to be 69 at a wage of 25 cents per hour, which is well above the levels of the high-income countries. On the other hand, if constant absolute risk aversion is assumed, simulated total hours are just 35, which is below even the hours in Australia and New Zealand. It would seem then that a utility function intermediate between constant relative and constant absolute risk aversion would give a better picture.

Wages and Hours in 1900: Evidence from the Micro Data

To this point we have based our estimates using averages obtained from the Department of Labor survey. But as was noted at the outset, there is a wealth of individual data underlying these broad aggregates. We illustrate some relations between hours and wages for specific groups of countries in our sample.

Figure 7 uses the establishment (micro) level data for groups of poor, rich and middle income countries. The underlying data covers the entire period, 1870-1900, although the majority

of observations come from the last ten years. The Panel A groups observations for India, Sri Lanka and China (N = 111). There are two minor spikes at 40 and 60 hours per week, and one major spike in hours at 54 hours. One would be hard pressed to draw a positively or negatively sloped labour supply curve for these countries, the actual correlation coefficient is -0.026 (p = .23). Panel B is for South and Central American countries (N = 327), a low to medium income region. Here the relation is negative, the correlation coefficient is -0.15 (p =.05). Panel C gives the relation for Canada (N = 505), and Panel D for Australia, New Zealand and South Africa (N = 546). These relatively high income countries exhibit a clear negative relation between hours and wages. The correlation coefficient for Canada is -0.24 (p = .03), and for the countries in Panel D it is -0.59 (p = .01). It is premature to be drawing strong inferences from these data, but the lack of correlation for the low-income countries and significant negative correlation for the high-income countries, tends to support the simulations where constant absolute risk aversion is assumed (Figure 6). In the simulations, lower-income countries have upward as well as downward potions of their labour supply curve; and at any wage the elasticity is less the greater the country's income.

Conclusion

This preliminary treatment of the cross-country Department of Labor statistics on hours and wages suggests an approach to labour supply that may have particular application to the historical analysis of labour supply and possibly to the discussion of labour supply in developing countries. Central to our approach is effect of emulation and subsistence on labour supply decisions. Both effects are combined into a consumption constraint, which highlights the decision about hours worked as involving two components: the hours required to meet the constraint, and

the hours that maximize utility. The aggregate data suggested that utility functions in consumption and hours fit the evidence better under the assumption of constant absolute rather than constant relative risk aversion, although a utility function where relative risk aversion increases less than under constant absolute risk aversion is likely more appropriate still. Under either specification labour supply curves are negatively sloped at first, with the possible exception of the lowest-wage workers in the lowest-income countries. This finding is in line with recent literature on labour supply that finds little evidence of that upward-sloping portion which would give the curve a backward-bending shape. In fact, given that the relative importance of hours needed to meet subsistence declines with income, an initially negative rather than positive slope to the labour supply curve would seem the more natural outcome.

With the exception of the data illustrated in Figure 7, this paper has relied on the median and average data computed from the Department of Labor survey of hours and wages. These aggregates are suggestive of an approach to labour supply that can explain cross-country differences in work hours, but more rigorous testing requires that we move to the wealth of micro evidence that is available.

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Endnotes

1. Some of the smaller territories such as some Mediterranean Islands and parts of the Caribbean have been grouped.

2. The estimated equations are: i) Hours = $\underset{(16.2)}{60.35} + \underset{(.289)}{19.57}$ Wage, $R^2 = .004$ for wages below the median (*t*-statistics in parentheses); and ii) Hours = $\underset{(30.1)}{64.06} - \underset{(2.13)}{41.29}$ Wage, $R^2 = .283$, for wages above the median.

3. One could modify the utility to allow for increasing marginal disutility of hours of work with a specification such as: $u = k\frac{(\bar{c} - c^*)^{(1-\delta)}}{1-\delta} - h^{\beta}$, $\beta \geq 1$. Parameter β does not affect the sign of the elasticity of net hours with respect to the wage; but it potentially reduces the magnitude of the elasticity.

4. From equations (4) and (6a) it follows that $c = k^{\frac{1}{\delta}} w^{\frac{1}{\delta}} + c^*$, so that in this formulation, consumption approaches but does not reach the constraint, c^*, as the wage falls.

5. The elasticity is initially positive or negative depending on αc^* is greater than or less than one. The implication would seem to be that for high-income countries, the elasticity of labour supply at low wages is likely to be negative, whereas for low income-countries it would tend to be positive.

6. That is: $\frac{-dh}{c\,dc} = \frac{1-\gamma}{w}$.

7. The estimated equation is: $\ln PL = \underset{(4.507)}{2.152} + \underset{(10.20)}{0.638} \ln \overline{GNI}$, $R^2 = .646$, N = 59 where t-statistics are in parentheses. Assuming, as in equation (8), that the poverty line is a geometricallyweighted average of true subsistence, s and $\overline{GNI}$, the subsistence level implied by the equation is $381.7 (US 1990) [381.7 = EXP (2.152/ .362)].

Table 1 : Wages and Hours, 1870 - 1900

Country/region	Hours per week			Wages (cents/hr)					GDP per capita 1900
	n (s.d)	1870	1900	n (s.d.)	1870 (.25)	1870 (.50)	1900 (.25)	1900 (.50)	
European core									
Austria-Hungary	923 (5.7)	64.3	58.6	1393 (0.31)	2.15	2.80	3.89	6.04	2901
Belgium	172 (5.9)	72.9	64.2	136 (0.19)	3.29	4.86	4.11	5.61	3731
Denmark	46 (6.0)	68.2	56.2	67 (0.39)	2.64	4.66	9.29	10.89	3017
France	650 (5.5)	66.1	65.6	478 (0.41)	3.45	4.36	5.76	7.77	2876
Germany	672 (7.2)	67.6	63.4	468 (0.36)	2.75	5.15	7.29	8.99	2985
Great Britain	2448 (5.0)	56.9	56.0	2448 (0.33)	11.60	13.18	14.89	15.64	4450
Italy	274 (5.4)	63.7	63.7	547 (0.32)	1.88	3.67	3.67	5.27	1785
Netherlands	178 (6.3)	65.0	60.5	183 (0.31)	4.43	5.35	5.06	8.33	3424
Norway	5 (10.3)		66.0	476 (0.26)			4.91	6.00	1937
Sweden	22 (4.0)	67.1	56.8	121 (0.34)	2.41	5.01	4.33	7.61	2515
Switzerland	140 (5.7)	70.0	59.0	255 (0.42)	2.14	3.17	4.58	7.93	3745
mean		**66.2**	**60.9**		**3.7**	**5.2**	**6.2**	**8.2**	**3033.3**
European periphery									
Ireland	284 (7.3)	63.8	58.6	232 (0.29)	3.29	3.57	4.51	5.94	2495
Portugal	23 (64.2)		64.4	258 (0.37)			3.73	4.94	1302
Russia	235 (7.9)	68.8	64.5	843 (0.45)	1.92	2.44	2.98	4.00	1237
Spain	77 (7.3)	64.7	59.1	156 (0.56)	3.25	3.80	4.47	5.58	2040
Med. islands	140 (2.9)	58.3	56.0	175(0.39)	3.09	4.01	4.18	6.21	*1000*
mean		**63.9**	**60.5**		**2.9**	**3.5**	**4.0**	**5.3**	**1394.8**
North America									
Canada	505 (4.3)	57.2	62.6	505 (0.69)	12.48	16.05	13.51	16.58	2911
United States	1570 (5.6)	62.0	57.2	1570 (0.89)	15.97	20.61	19.93	25.49	4091
mean		**59.6**	**59.9**		**14.2**	**18.3**	**16.7**	**21.0**	**3501.0**

Table 1 (cont.)

	Hours			Wages (cents/hr)					GDP
Country/region	**n (s.d)**	**1870**	**1900**	**n (s.d.)**	**1870 (.25)**	**1870 (.50)**	**1900 (.25)**	**1900 (.50)**	**1900**
Other settler countries									
Australia	189 (3.8)	56.2	48.1	949 (0.80)	11.96	16.33	17.71	26.44	4013
New Zealand	110 (7.9)	57.2	49.8	497 (0.69)	9.55	18.36	21.81	25.90	4298
South Africa	133 (6.9)	59.4	58.5	685 (0.97)	9.09	11.72	19.28	21.85	1602
mean		**57.6**	**52.1**		**10.2**	**15.5**	**19.6**	**24.7**	**3304.3**
Central America									
Bahamas	3 (3.5)		56.0	34 (0.30)			3.43	7.18	1451
Belize	17 (0)		54.0	23 (0.44)			5.56	8.67	*940*
Cuba	57 (3.6)	59.2	59.4	96 (1.03)			6.36	10.40	*940*
Dominican Republic	7 (0)		60.0	18 (1.58)			2.20	6.20	*940*
Jamaica	5 (0)		55.0	24 (2.04)			5.24	7.85	*940*
Mexico	65 (6.7)	60.6	69.0	209 (1.22)	2.57	3.96	3.04	6.00	1366
Cen. Am. countries	16 (6.4)	62.0	62.8	60 (1.14)			5.92	9.36	810
mean		**60.6**	**59.5**		**2.6**	**4.0**	**4.5**	**8.0**	**918.1**
South America									
Argentina	31.0 (1.1)	60.0	60.2	90 (1.07)	7.30	12.30	12.66	16.94	2756
Brazil	93 (4.6)	61.2	60.6	169 (0.91)	6.37	8.53	9.31	12.87	678
Chile	6 (8.2)		68.0	56 (0.88)			5.56	8.91	1949
Coumbia	46 (5.1)	64.4	64.2	116 (1.35)	5.12	8.94	6.54	10.28	973
Ecuador	58 (2.0)	60.0	58.5	110 (0.96)			7.69	11.08	*678*
Guyana	20 (14.6)	59.2	60.3	48 (0.62)			6.17	9.25	*678*
Peru	19 (4.1)	55.3	55.2	95 (1.22)			8.70	14.57	817
Uruguay	6 (4.1)	61.2	61.7	33 (1.28)	5.49	14.31	13.71	17.02	2219
Venezuala	50 (5.2)	56.1	53.0	112 (1.16)	7.70	11.98	9.74	19.25	821
mean		**59.7**	**60.2**		**6.4**	**11.2**	**8.9**	**13.4**	**1290.3**

Table 1 (cont.)

	Hours			Wages (cents/hr)					GDP
Country/region	**n (s.d)**	**1870**	**1900**	**n (s.d.)**	**1870 (.25)**	**1870 (.50)**	**1900 (.25)**	**1900 (.50)**	**1900**
Middle East & Turkey									
Algeria	56 (6.5)		64.5	114 (0.28)			4.47	7.26	1123
Iran	1 (0)		66.0	129 (0.21)			1.55	2.73	1000
Morocco	30 (0)		66.0	41 (0.38)			2.55	4.36	710
Turkey	80 (5.1)		66.3	229 (0.85)			3.89	3.62	1213
mean			**65.7**				**3.1**	**4.5**	**1011.5**
Sub-Saharan Africa									
Sierra Leone	16 (0)	48.0	48.0	22 (0.16)	0.00	0.00	2.88	6.75	*652*
Southest Asia									
India	38 (7.9)	56.0	50.6	897 (0.24)	0.75	1.29	0.95	1.54	599
Sri Lanka	37 (1.8)		53.6	67 (0.60)			2.57	4.48	780
mean		**56.0**	**52.1**		**0.8**	**1.3**	**1.8**	**3.0**	**944.5**
Far East									
China	37 (2.0)	60.0	61.8	198 (0.15)	1.10	1.70	2.04	2.43	545
Japan	17 (11.3)	59.3	65.6	246 (0.11)	0.91	1.32	1.55	2.10	1180
mean		**59.7**	**63.7**		**1.0**	**1.5**	**1.8**	**2.3**	**862.5**
Pacific islands									
Hawaii	32 (1.6)		54.2	64 (1.52)			7.31	12.40	*1500*
Philippines	1 (0)		68.0	40 (0.42)			6.26	7.24	1033
mean			**61.10**				**6.79**	**9.82**	**1266.5**

Note : per capita GDP estimates in italics based on region averages.

Table 1A: Per Capita GNI and the Poverty Line, 1995-2004

Country	Year Assessed	Percentage in Poverty	Per Capita GNI 1990 $US	Poverty Line
Albania	2002	25.4	3869	2323
Algeria	1995	22.6	4667	2223
Armenia	2001	50.9	2167	1678
Azerbaijan	2001	49	2294	1710
Bangladesh	2000	49.8	1292	1013
Belarus	2000	41.9	6134	4660
Benin	1999	29	763	407
Bolivia	1999	62.7	1906	1977
Brazil	1998	22	5488	1012
Bulgaria	2001	12.8	5351	2301
Bukina Faso	2003	46.4	898	616
Cambodia	1999	35.9	1119	581
Cameroon	2001	40.2	1254	716
Chile	1998	17	6654	1397
China	1998	4.6	2562	615
Columbia	1999	64	4563	4203
Dominican Rep	1998	28.6	3645	1468
Ecuador	1998	46	2541	1371
Estonia	1995	8.9	3720	818
Gambia	1998	57.6	1200	751
Georgia	2003	54.5	2003	1517
Ghana	1999	39.5	1533	754
Guatamala	2000	56.2	3063	1538
Honduras	1999	48	1882	941
Hungary	1997	17.3	5924	3495
India	2000	28.6	1901	1055
Indonesia	1999	27.1	1873	1032
Jamaica	2000	18.7	2795	1118
Jordon	1997	11.7	3856	1658
Kzakhstan	1996	34.6	2815	1554
Kenya	1997	52	983	440
Kyrgyz Rep	2001	47.6	2088	1697
Lao PDR	1998	38.6	1441	802
Madagascar	1999	71.3	655	779
Malawi	1998	65.3	463	448
Mali	1998	63.8	1206	642
Mauritania	2000	46.3	1324	936
Mexico	2002	20.3	6865	2085
Muldova	2002	48.5	1248	988
Mongolia	1998	35.6	1208	574
Morocco	1999	19	2752	1073
Mozambique	1997	69.4	584	658
Nepal	2004	30.9	1121	487
Nicaragua	1998	47.9	1626	794
Pakistan	1999	32.6	1542	929
Panama	1997	37.3	6020	2372
Peru	1997	49	3517	2377
Phillipines	1997	36.8	3148	1363
Rwanda	2000	60.3	756	775
Sierra Leone	2004	70.2	417	526
Sri Lanka	1996	25	1938	1019
Tunisia	1995	7.6	4383	1008
Turkey	2002	27	4915	2109
Uganda	2003	37.7	1098	530
Ukraine	2003	19.5	4168	2209
Vietnam	2002	28.9	1794	946
Yemen	1998	41.8	826	604
Zambia	1998	72.9	545	724
Zimbabwe	1996	34.9	1903	746

Source: World Bank (2000-2006).

Table 2A:The Consumption Constraint and Weekly Hours, 1900

	GDP per capita 1990 US dollars	Consumption Constraint	Median Wage in 1900 curr. cents/hour	Hours to meet Consumption Constraint	Total Weekly Hours	Net Weekly Hours
Austria	2901	1392	6.04	31.0	58.6	27.6
Belgium	3731	1635	5.61	39.2	64.2	25.0
Denmark	3017	1427	10.89	17.6	56.2	38.6
France	2876	1384	7.77	23.9	65.6	41.7
Germany	2985	1418	8.99	21.2	63.4	42.2
Great Britain	4450	1829	15.64	15.7	56.0	40.3
Italy	1786	1022	5.27	26.0	63.7	37.7
Netherlands	3424	1547	8.33	25.0	60.5	35.5
Norway	1937	1076	6.00	24.1	66.0	41.9
Sweden	2515	1271	7.61	22.5	56.8	34.3
Switzerland	3745	1638	7.93	27.8	59.0	31.2
Ireland	2495	1264	5.94	28.6	58.6	30.0
Portugal	1302	835	4.94	22.7	64.4	41.7
Russia	1237	808	4.00	27.2	64.5	37.3
Spain	2040	1112	5.58	26.8	59.1	32.3
Mediterranean I.	1000	706	6.21	15.3	56.0	40.7
Canada	2911	1395	16.58	11.3	62.6	51.3
United States	4091	1734	25.49	9.1	57.2	48.1
Australia	4013	1712	26.44	8.7	48.1	39.4
New Zealand	4298	1789	25.90	9.3	49.8	40.5
South Africa	1602	953	21.85	5.9	58.5	52.6
Bahamas	1451	895	7.18	16.8	56.0	39.2
Belize	940	678	8.67	10.5	54.0	43.5
Cuba	940	678	10.40	8.8	59.4	50.6
Dominican Rep.	940	678	6.20	14.7	60.0	45.3
Jamaica	940	678	7.85	11.6	55.0	43.4
Mexico	1366	861	6.00	19.3	69.0	49.7
Central Am.	810	617	9.36	8.9	62.8	53.9
Argentina	2756	1347	16.94	10.7	60.2	49.5
Brazil	678	551	12.87	5.7	60.6	54.9
Chile	1949	1080	8.91	16.3	68.0	51.7
Columbia	973	693	10.28	9.1	64.2	55.1
Ecuador	940	678	11.08	8.2	58.5	50.3
Guyana	940	678	9.25	9.9	60.3	50.4
Peru	817	620	14.57	5.7	55.2	49.5
Uruguay	2219	1173	17.02	9.3	61.7	52.4
Venezual	821	622	19.25	4.3	53.0	48.7
Algeria	1123	760	7.26	14.1	64.5	50.4
Iran	1000	706	2.73	34.8	66.0	31.2
Morocco	710	567	4.36	17.5	66.0	48.5
Turkey	1213	798	3.62	29.6	66.3	36.7
Sierra Leone	652	537	5.00	14.4	48.0	33.6
India	599	509	1.54	44.4	50.6	6.2
Sri Lanka	780	602	4.48	18.1	53.6	35.5
China	545	479	2.43	26.5	61.8	35.3
Japan	1180	784	2.10	50.1	65.6	15.5
Hawaii	1500	914	12.40	9.9	54.2	44.3
Philippines	1033	720	7.24	13.4	68.0	54.6

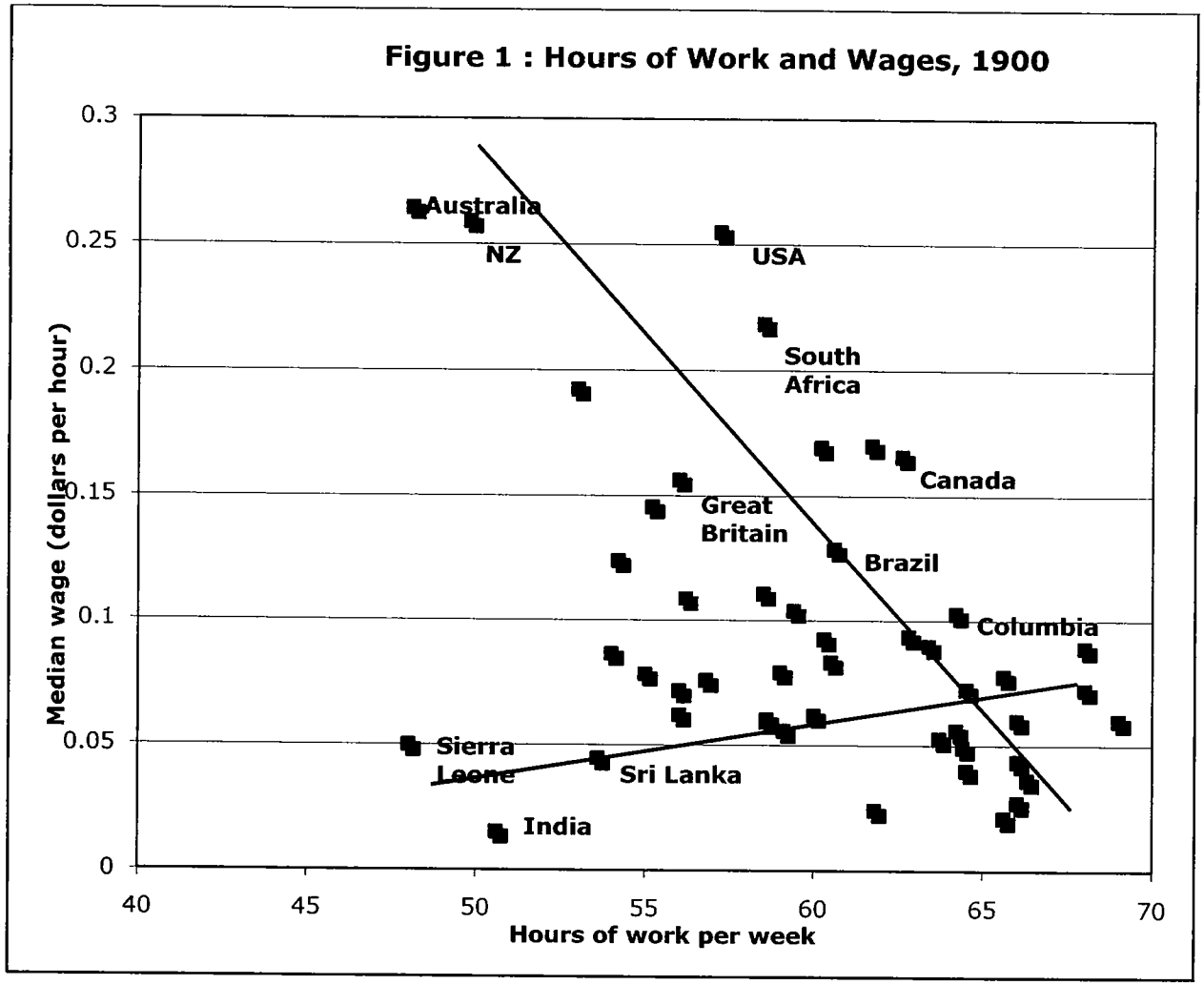


Figure 1 : Hours of Work and Wages, 1900
Median wage (dollars per hour)
0.3
0.25
0.2
0.15
0.1
0.05
0
40
45
50
55
60
65
70
Hours of work per week
Australia
NZ
USA
South Africa
Canada
Great Britain
Brazil
Columbia
Sierra Leone
Sri Lanka
India

Figure 2: Cross-Country Poverty Lines, 1995 - 2003 (1990 US$)

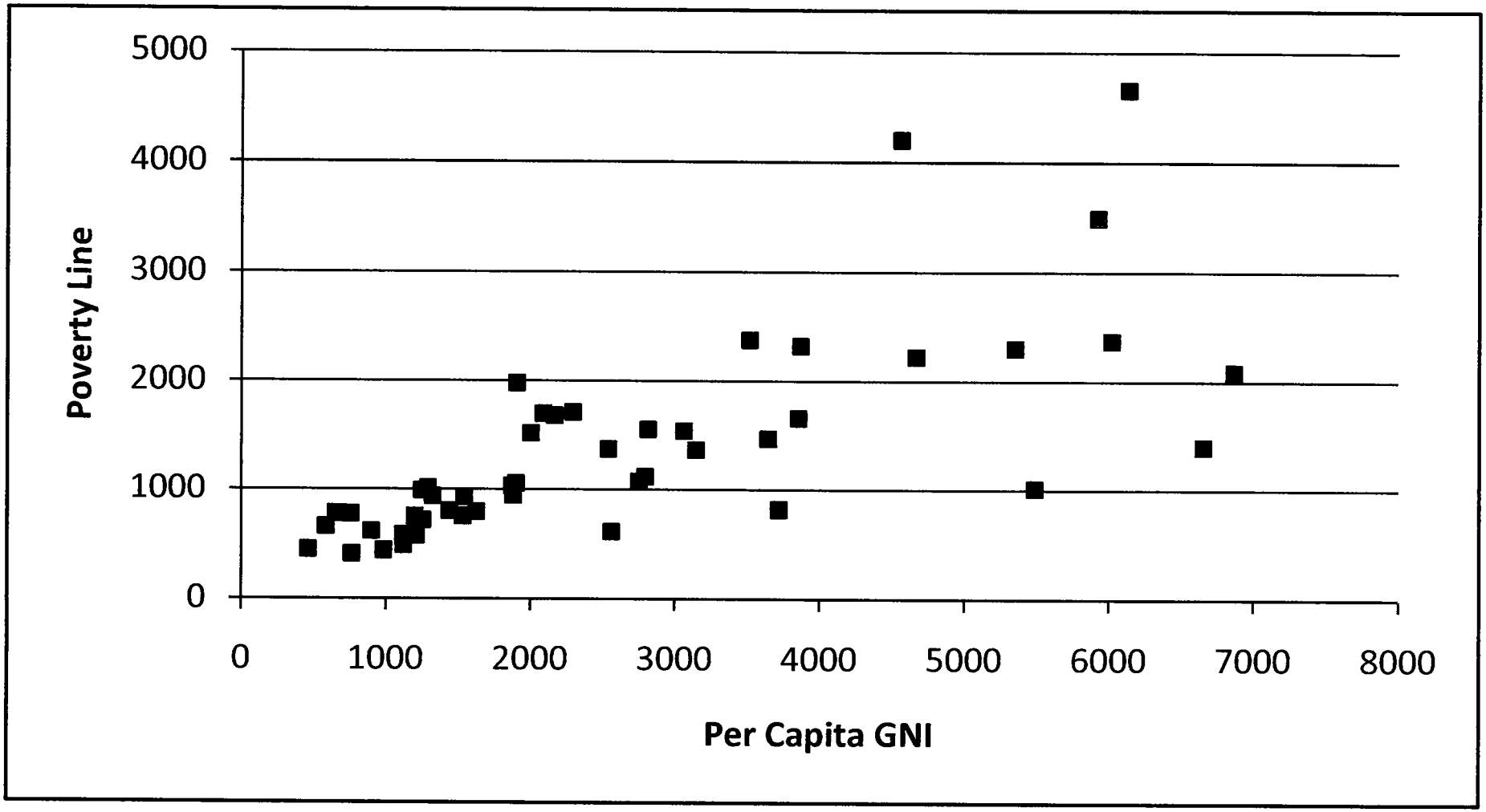


Figure 3: Wages and Hours needed to meet the Consumption Constraint, 1900

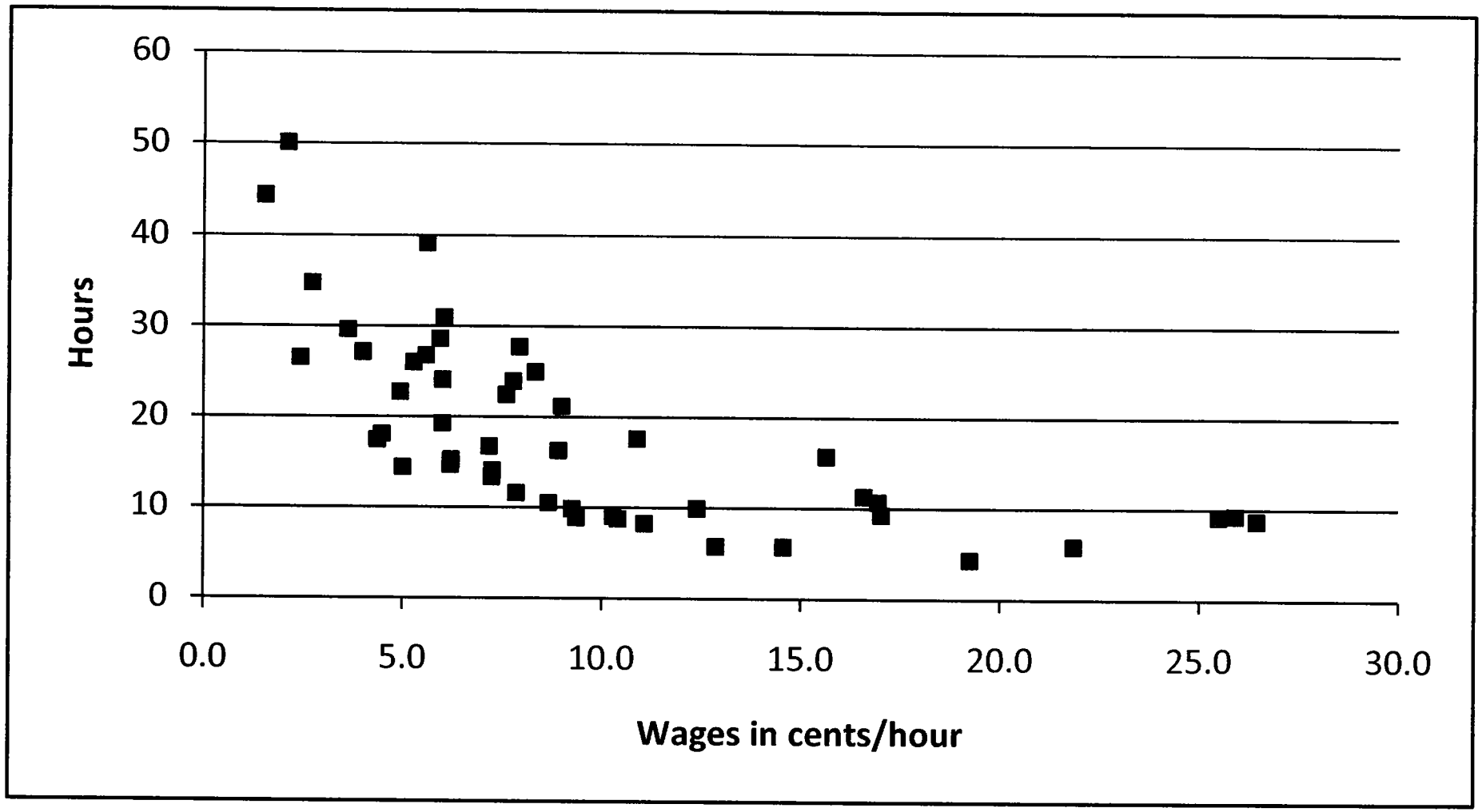


Figure 4: Wages and Net Hours

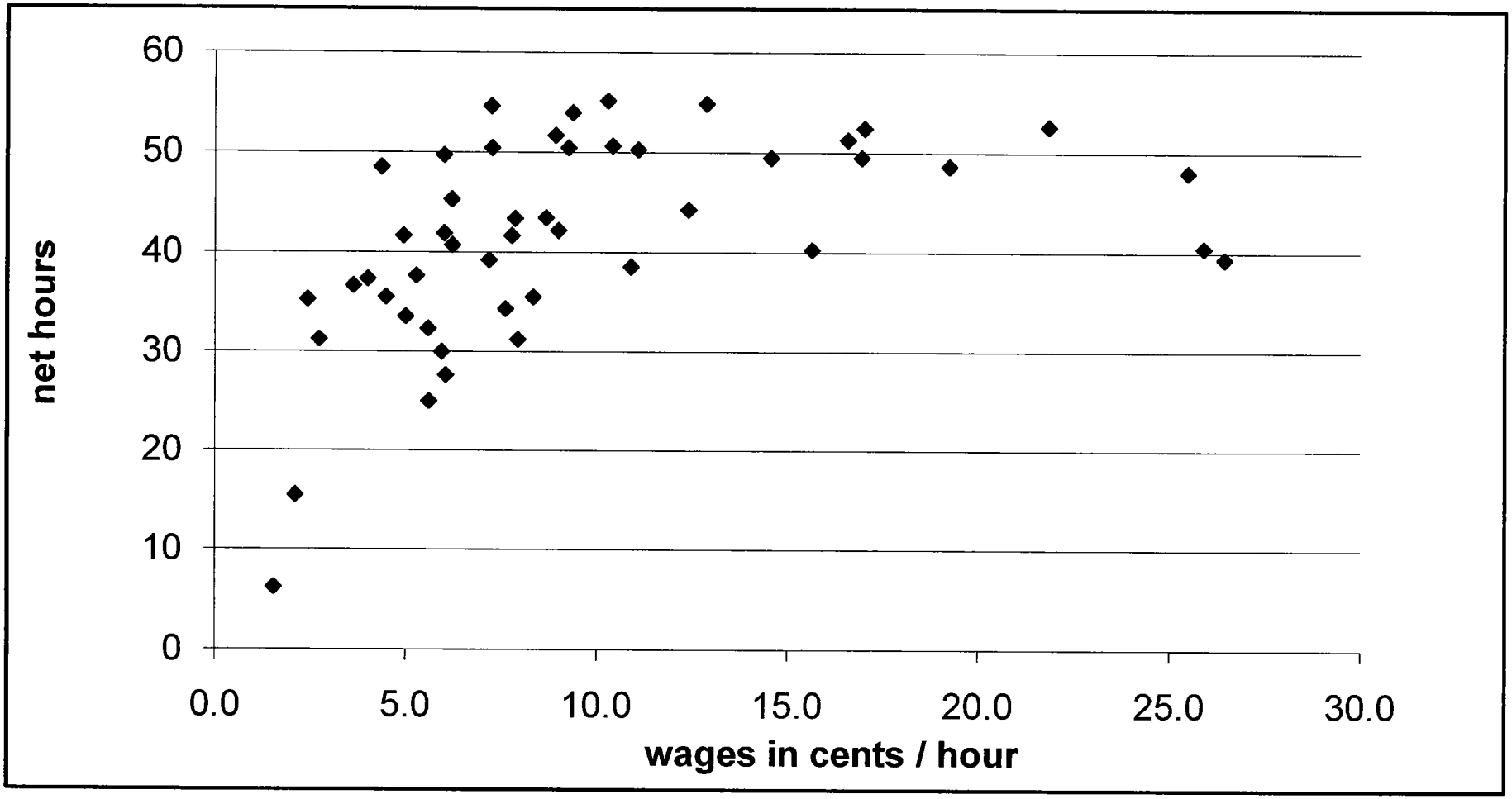


Figure 5: Simulated Wages and Hours - Constant Relative Risk Aversion

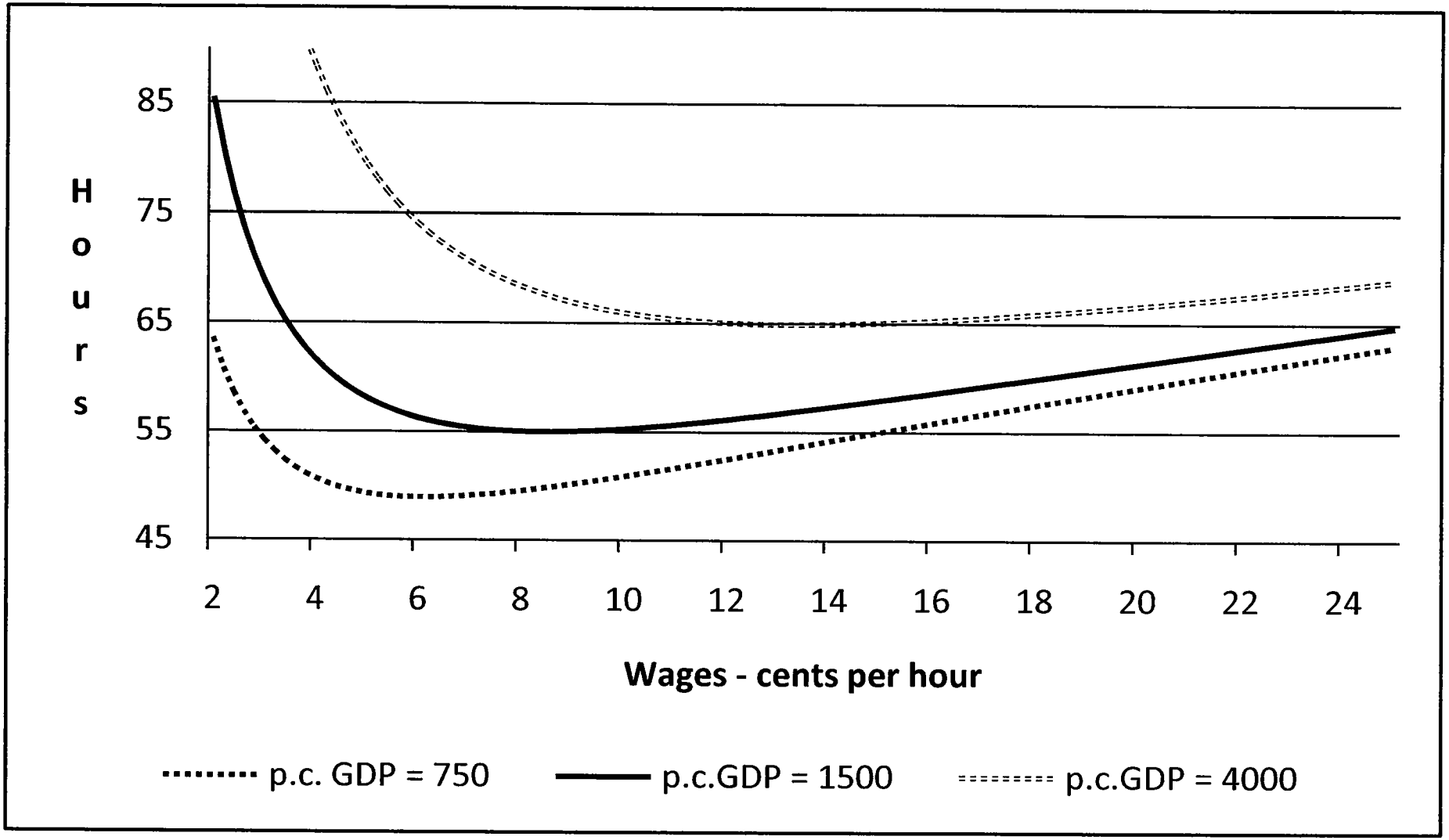


Figure 6: Simulated Wages and Hours: Constant Absolute Risk Aversion

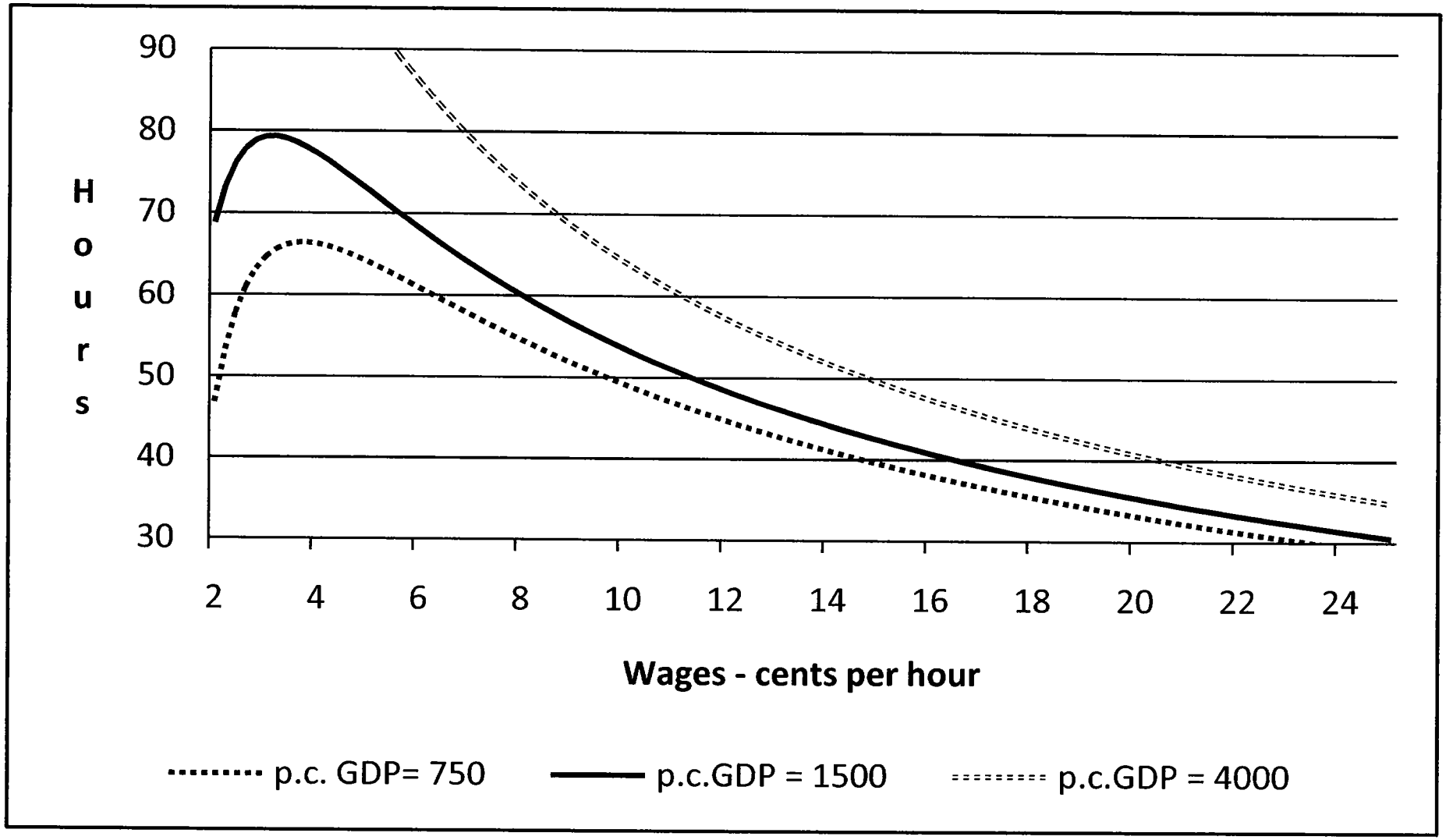
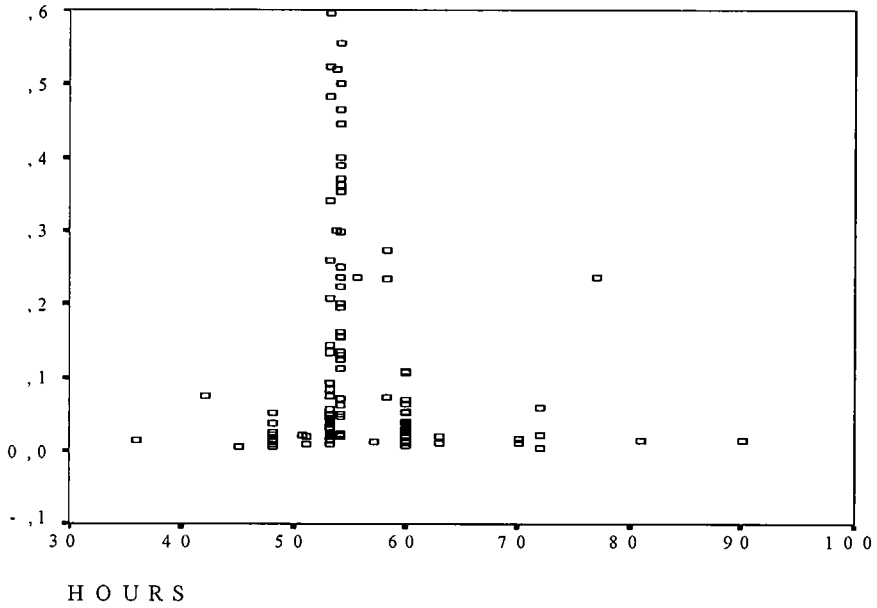


Figure 7: Hours and Wages - Some Micro-Data, 1870 - 1900

Panel A (China, India, Sri Lanka)



Panel B (South and Central America)

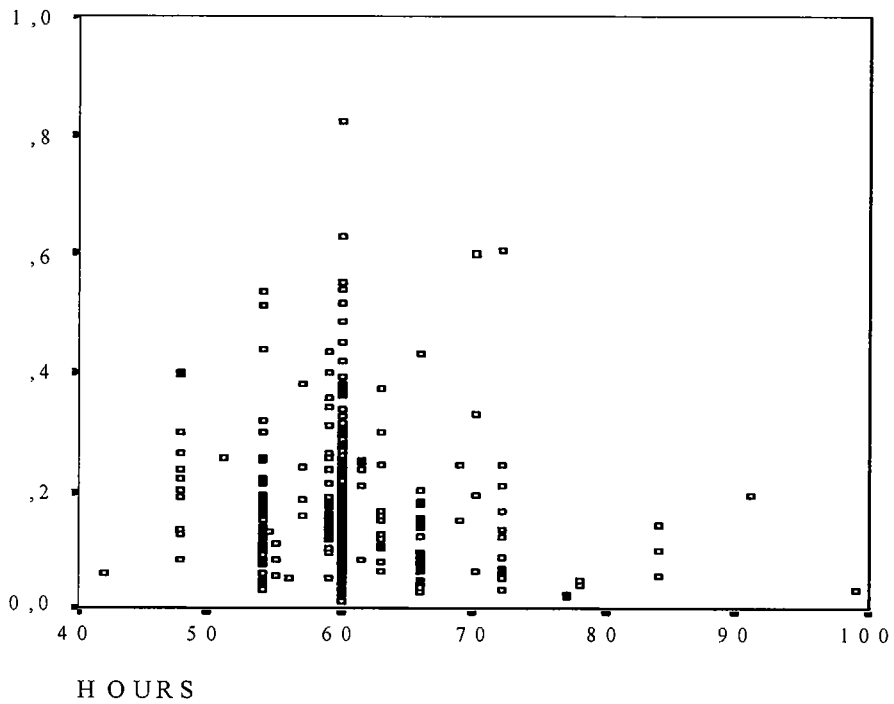
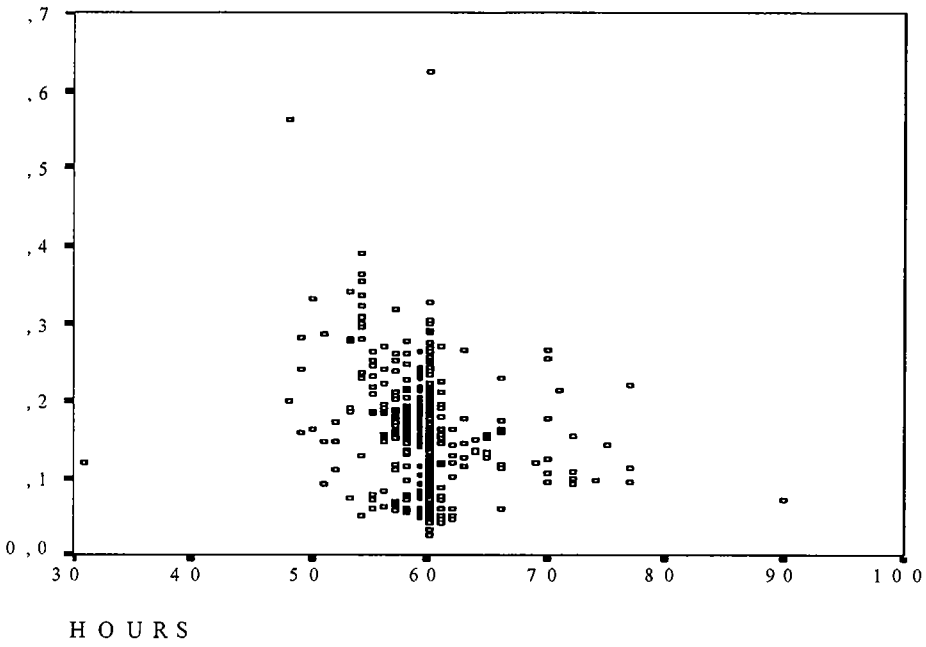


Figure 7 (cont.)

Panel C (Canada)



Panel D (Australia, New Zealand, and South Africa)