



# Dynamic effects of labor supply: A mechanism explaining cross-sectional differences in hours



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## ABSTRACT

This paper first establishes the empirical fact that over the last quarter of the 20th century, the average weekly hours worked increased for workers in the highest wage quintile while it decreased for the ones at the lowest. In 1976, a worker in the lowest quintile worked 2.8 hours more per week than a high wage worker (worker in the highest quintile), but by 2006, the low wage worker worked 1 hour less. During this period, there was also a wide increase in wage inequality. The typical mechanism in which hours are only determined by contemporaneous wages cannot simultaneously explain the pattern found in both variables for every quintile.

This paper attempts to reconcile these cross-sectional trends in both hours and wages for the US during this time period. As a first step, we show that compositional changes (in education, occupation and age) within quintiles can only explain a fraction of the observed pattern. Next, we propose a mechanism in which individuals' current decisions of how much to work take into account two components: the contemporaneous benefit of the wage received, and also how current hours worked affects the probability of moving across the wage distribution in later periods. The latter dynamic component is estimated from our dataset. We find that changes over time in how hours affect these probabilities provided incentives that differ across the quintiles, and are consistent with the labor supply decisions observed in the data. We incorporate these two components into an equilibrium model of heterogeneous agents with uninsurable income risk. We are able to replicate the decline in hours for the bottom of the distribution as well as the increase at the top. The ratio of hours worked between the two groups delivered by the model also fits the trend found in the data.

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## 1. Introduction

The average number of hours worked per week has not changed significantly for the US population as a whole since 1976. However, the relatively stable behavior of market hours for the aggregate masks important differences in hours worked between wage groups. Fig. 1 shows the average weekly market hours for working white males, segmented by wage quintile from  $h_1$  (lowest quintile) to  $h_5$  (highest). Workers at the bottom of the distribution decreased their average hours of work,

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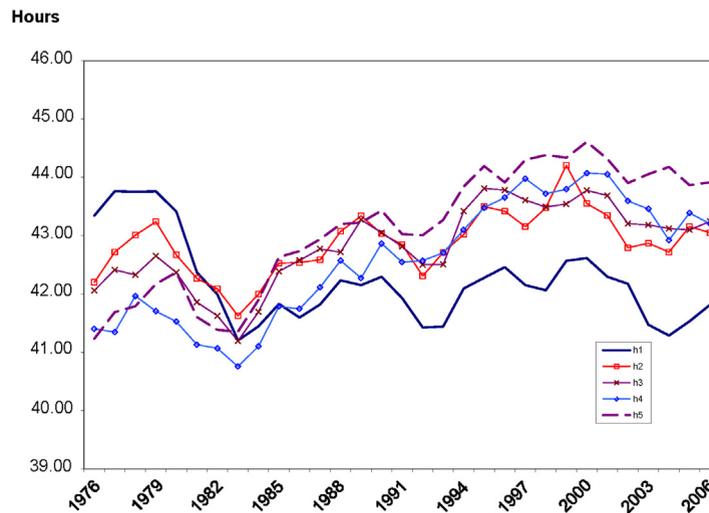


Fig. 1. Weekly hours for US white males.

Table 1.1

Trends in real wages for white males.

Year	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	W <sub>4</sub>	W <sub>5</sub>	W <sub>5</sub> /W <sub>1</sub>
1976	6.01	8.83	11.17	13.94	23.55	3.92
1986	4.99	7.89	10.60	13.83	23.62	4.73
1996	4.44	6.97	9.47	12.84	26.00	5.85
2006	4.57	7.23	9.89	13.79	30.47	6.66
2006–1976	–1.44	–1.59	–1.29	–0.15	6.92	2.74

while for all other quintiles, the average weekly hours worked increased. The largest changes occurred at the highest hourly wage levels.<sup>2,3</sup> It can also be observed that there was a rank reversal between the highest and lowest quintiles in 1983.

Costa (2000) documents this cross-sectional trend for white males, and shows that an increase in the ratio of hours worked between the top and the bottom decile occurred in the first three quarters of the 20th century as well as during the latter quarter. In the first three quarters there was a decline in hours for every decile, but the drop was particularly severe among the bottom of the distribution. Vandembroucke (2009) focuses on the first fifty years of that period and successfully explains the cross-sectional behavior of hours. In his model, the decline in wage inequality that took place in that period (real wages increased for all groups, but relatively more for the ones at the bottom), is the only reason for the relative change in the distribution of hours. Vandembroucke's model assumes a preference structure where the income effect from the rise in the wage rate dominates the substitution effect. Thus, the overall real wage increase can also explain why hours declined for each of the groups.<sup>4</sup>

Could lower wage inequality explain trends in hours over the last 30 years? Table 1.1 illustrates that it could not. It shows the average real wage for each of the quintiles from 1976 to 2006. First, notice that the relationship observed between wages and hours in the first half of the century is not visible in the latter quarter: while the ratio of hours worked per week between the highest and the lowest quintile continued to increase, wage inequality now increases as well. The real wage ratio between the two groups went from 3.92 to 6.66 (70% increase).<sup>5,6</sup> The second and more important reason, is that regardless of the assumption made about preferences, changes in the level of wages by itself cannot deliver the correct trend in hours for every group. It is shown in the table that the average hourly real wage increased 29% for the highest paid workers, while all remaining quintiles experienced a real wage loss: 24%, 18%, 12%, and 1.1% for the 1st, 2nd, 3rd, and

<sup>2</sup> The averages displayed are from the Current Population Survey (CPS). For each of the years displayed, we apply the criteria with respect to demographics and employed workers described in Appendix A. There we provide a detailed explanation about the construction of our sample.

<sup>3</sup> The calculations take into account the number of weeks each individual worked in each of the years. Therefore, the trends shown cannot be the result of trading longer vacations for more intensive work weeks.

<sup>4</sup> Vandembroucke's model also includes the decline in the price of leisure goods as an additional driving force for the decline in hours in the US for that period. He concludes though, that this effect only explains 6% of the decline in aggregate hours, and has no effect across the distribution.

<sup>5</sup> Assuming stronger income effects is then consistent with the first period but not the latter, while the opposite happens if stronger substitution effects are assumed.

<sup>6</sup> Katz and Autor (1999) show that inequality in wages by education groups increased post-1985. Goldin and Katz (2001) also present evidence about the wage distribution back to 1890. They show that the wage distribution narrowed until 1950, bounced back slightly until the 1980's, and then sharply widened again. Consequently, Vandembroucke (2009) cannot explain the trends in hours going back to 1950 either. As explained in Section 2, we can only collect panel data about hours and wages since 1976 onwards, and therefore, we only focus in the last quarter of the 20th century.

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