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Work hours and wage inequality: Evidence from the 2004 WERS

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ABSTRACT

This paper uses the 2004 wave of the Workplace Employment Relations Survey to test whether work hours and wage inequality are positively correlated because of financial incentives associated with inequality. Workers may work longer hours in order to increase their expected income through performance pay or promotion, resulting in a positive correlation between inequality and work hours. Contrary to other work, it is found that the relationship between wage inequality and the occupation and firm level and work hours cannot be attributed to the effect of financial incentives. Demand constraints faced by workers explains the positive correlation between occupation inequality and work hours attributed to financial incentives by others.

1. Introduction

One of the most studied issues in labor economics is labor supply. Much of the empirical research in this field focuses on estimating wage elasticities.[1] Some recent empirical labor supply research, however, has broadened its focus to include the effect of financial incentives beyond the wage. Paralleling research on effort and consumption, this new breed of labor supply research has included topics as diverse as conspicuous consumption, tournament behavior modeled after Lazear and Rosen (1981), financial incentives more broadly, and the probability of getting promoted.[2]

Though the datasets and empirical strategies used in these studies vary greatly, they all generate the same basic result. Conditional on the wage earned, there is a positive correlation between income inequality and various measures of labor supply. This result holds whether inequality is defined at the country (Bowles and Park, 2005), occupation (Bell and Freeman, 2001; Kuhn and Lozano, 2008), or within demographic groups (Park, 2005). It also holds whether the dependent variable is work hours (Bell and Freeman, 2001; Bowles and Park, 2005), the probability of a spouse being in the labor market (Park, 2005), or the share of workers working long hours (Kuhn and Lozano, 2008). All of these papers, however, suffer from a similar set of limitations. First, they lack the ability to control for group specific characteristics that may drive both wage setting and work hours.[3] And, they use inequality as a proxy for a particular type of incentive, without the ability to e.g. include the presence of certain specific financial incentives that may be tied to work hours and inequality.

This paper tests the hypothesis that the positive correlation between work hours and wage inequality is due to the incentive that inequality generates to work longer hours, regardless of the underlying explanation. Specifically, an augmented labor supply regression is estimated, where total weekly work hours including overtime is the dependent variable. In addition to explanatory variables typically included in labor supply regressions, two inequality measures are added: firm inequality and occupation inequality. Data come from the 2004 Workplace Employment Relations Survey (WERS), collected in the United Kingdom. The WERS has several additional desirable features compared to standard labor market data. Most importantly, it has multiple observations within each firm, allowing the calculation of within firm inequality, it is possible to identify roughly whether a worker is eligible for performance and/or merit pay, and it is possible to identify which workers have some flexibility in their weekly work hours. The use of these variables marks the critical distinction between this paper and the ones that come before it.

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[1] See Blundell and MaCurdy (1999) for an overview of the empirical labor supply literature. See Killingsworth (1983) for an overview of the theoretical base of labor supply.

[2] For consumption see Bowles and Park (2005) and Park (2005); for tournament behavior see Bell and Freeman (2001); for general financial incentives see Kuhn and Lozano (2008); and for promotions see Anger (2005, 2008).

[3] Bowles and Park (2005) are able to use country fixed effects. However, cannot control for important country characteristics that may vary over time.

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Little support is found for the hypothesis that work hours and inequality are positively correlated because of financial incentives. Occupation inequality is the only measure that is positively correlated with work hours. The coefficient on firm inequality is quite frequently negative. Further, the coefficient on occupation inequality does not follow the expected pattern. The estimated coefficient on occupation inequality is the same for (i) workers in upper management and administrative positions versus other workers, (ii) for workers who are eligible for performance and/or merit pay, and (ii) for workers who work in large firms versus smallish firms. The conclusion is that occupation and firm level inequality is better understood as a structural variable describing contract setting practices rather than a financial incentive. This interpretation is supported by findings in the internal labor markets literature regarding how pay structures are determined (Baker et al., 1994a,b; Levine, 1993).

The paper is organized as follows. Section 2 reviews the existing theoretical and empirical literature on tournament theory. Section 3 discusses the empirical methodology as well as the dataset, the Workplace Employment Relations Survey. Section 4 reports the results as well as some robustness checks. Section 5 discusses the results and concludes.

2. Literature

The literature linking wage inequality to work hours because of the financial incentive wage inequality generates is small.[4] At this point, it consists largely of four papers: Kuhn and Lozano (2008), Bell and Freeman (2001), Bowles and Park (2005) and Park (2005). These papers are quite different in many respects – from the data used, to the level of aggregation, to the specification of the dependent variable, and the estimation technique – though they all find a positive correlation between some measure of inequality and some measure of labor supply. The two that are most applicable to this study are Bell and Freeman (2001) and Kuhn and Lozano (2008), though the other two are worth mentioning.

Both Bowles and Park (2005) and Park (2005) argue that inequality and labor supply are positively correlated because of the incentive that inequality generates to consume more, which they refer to as Veblen effects (Veblen, 1899).[5] Bowles and Park (2005), using a cross-country panel of OECD countries, finds that the gini coefficient and yearly work hours are positively correlated. Park (2005), using Current Population Data on the U.S. from the 1970s, finds that inequality within demographic groups is positively correlated with the probability of a man's spouse entering the labor market.

Bell and Freeman (2001) use data from the German Socio-Economic Panel and the National Longitudinal Study of Youth (from the U.S.) to study the correlation between occupation level inequality and work hours. Using both occupation and individual level data, they find a positive correlation between the standard deviation of log wages within an occupation and work hours. Unlike Bowles and Park (2005), Bell and Freeman (2001) argue that the observed positive correlation is driven by the increased incentive to gain a promotion that inequality generates. Appealing to Lazear and Rosen (1981), it is argued that an increase in wage inequality increases the marginal return to promotion, which then increases work hours, in a manner consistent with tournament theory.[6]

Kuhn and Lozano (2008) use a panel of occupations based on the Current Population survey and the U.S. census. They find that the share of salaried male workers who work greater than 45 h per week is positively correlated with the standard deviation of wages within an occupation. Based on a series of robustness checks, they conclude that the financial incentive inequality generates is the most likely explanation of this correlation. They discuss tournament behavior as one possible incentive, but note that other incentives could be correlated with occupation inequality as well. In particular, performance, merit, and other forms of bonus pay.

However, they find that the difference between expected earnings at 40 h per week and expected earnings at 65 h per week, called the long-hours premium, is slightly negatively correlated with the incidence of working long hours. Presumably, the latter measure is a more direct representation of the expected return to working long hours. And, though not mentioned in the paper, the inconsistency between the coefficient on occupation inequality and the long-hours premium should cast doubt on the interpretation of the coefficient on occupation inequality.

For both Bell and Freeman (2001) and Kuhn and Lozano (2008), the critical linkage between wage inequality and work hours is the fact that, somehow, working longer work hours results in increased pay. This can happen largely for one of the three reasons, two of which hinge on the argument that work hours serve as a signal of effort or dedication to the firm. Hourly workers obviously earn more money if they work longer hours, though both exclude hourly workers. A number of studies, including Bell and Freeman (2001), have found a positive correlation between work hours and promotion (Anger, 2008, 2005; Booth et al., 2003; Francesconi, 2001). Anger (2008) explicitly argues that this due to the signaling value of work hours, especially overtime hours. And presumably, if working longer hours increases the likelihood of promotion, it also increases the likelihood of earning performance and/or merit pay, conditional upon being eligible. Thus, having the capacity to influence one's work hours, and being eligible for performance pay, should both play a critical role in shaping a worker's sensitivity to wage inequality if it captures the financial incentives a worker faces. But, as mentioned, none of the these studies have the ability to explicitly introduce these potentially important attributes of the workplace structure and pay. Especially given the likelihood that these institutions are over-represented in particular occupations.

3. Methodology and data

3.1. Methodology

The above discussion highlights three important limitations to the studies linking inequality to work hours because of financial incentives. A key issue in identifying behavior consistent with the idea that inequality generates a financial incentive to work long hours is specifying the correct group within which inequality is measured. Kuhn and Lozano (2008) and Bell and Freeman (2001) use occupations. This may be too narrow a group because many promotions come with a change in occupation (Prendergast, 1999), thus failing to accurately capture the within-firm promotion ladder

[4] There are a few studies that argue for a causal link between wage inequality and labor supply, but they are not driven by the relationship between inequality and pecuniary incentives (Devereux, 2004; Juhn and Murphy, 1997; Pencavel, 2007; Landers et al., 1996).

[5] See Frank (1985) for a modern presentation of consumption externalities. It is interesting to note that, although Frank (1985) is the most frequently cited model of consumption externalities, it does not predict a positive correlation between inequality and consumption.

[6] Although the empirical tournament literature is quite large, to the author's knowledge Bell and Freeman (2001) is the only paper which applies this argument to work hours. For empirical studies of tournaments using more traditional data on effort and performance see Lambert et al. (1991), Main et al. (1993), Eriksson (1999), Conyon et al. (2001), and Bognanno (2001) for studies of firm behavior, and Ehrenberg and Bognanno (1990a,b), Becker and Huselid (1992), Knoeber (1989), Knoeber and Thurman (1994), and Audus et al. (2004) for studies of worker behavior. Harbring and Irlenbusch (2003) reviews the experimental tournament literature.

Table 1
Descriptive statistics.

	Mean	Std. dev.	Min	Max	*N*
Hours	40.30	7.78	21.00	90.00	11,701
Wage	11.05	4.94	4.00	43.00	11,701
Firm wage ineq. [a]	0.30	0.11	0.06	0.87	11,701
Occ wage ienq. [b]	0.24	0.05	0.13	0.40	11,701
Firm size	491.16	933.55	11.00	9873.00	
Firm *N* [c]	14.48	3.28	10.00	24.00	808
Occ. *N* [d]	167.16	154.92	25.00	690.00	70

Notes: based on author's calculations using 2004 wave of the WERS. Sample is limited to workers who work between 20 and 90 h per week, including overtime.

[a] Represented by the standard deviation of wages within the firm.

[b] Represented by the standard deviation of wages within three digit SOC occupations.

[c] Characterizes number of observations used to calculate firm inequality.

[d] Characterizes number of observations used to calculate occupation inequality.

Table 2
Pairwise correlations between key variables.

	Log hours	Log wage	Firm wage ineq.	Occ. wage ineq.
Log hours	1.00			
Log wage	0.11 ***	1.00		
Firm wage ineq. [a]	−0.04 ***	0.11 ***	1.00	
Occ wage ineq. [b]	0.18 ***	0.36 ***	0.10 ***	1.00

Notes: based on author's calculations using 2004 wage of the WERS. Sample is limited to individuals who worker between 20 and 90 h per week.

[a] Represented by the standard deviation of log wages within firms with at least 10 observations. Observations are weighted by the number of individuals who earn the same wage.

[b] Represented by the standard deviation of log wages within three-digit occupations with at least 25 observations. Observations are weighted by the number of individuals who earn the same wage.

* $p < 0.10$.

** $p < 0.05$.

*** $p < 0.01$.

(Chan, 1996; De Varo, 2006; Malcomson, 1984). Further, and what will be addressed here, there are likely unobserved variables that are correlated with both occupation work hours and wage inequality that cannot be controlled for using three digit occupation level data alone. Direct comparison of specification with Bowles and Park (2005) and Park (2005) is difficult because, as mentioned, the former's dataset is very different and the latter's specification very different.

An adequate representation of the pay structure a given worker faces should include both within-firm promotion possibilities, and across firm promotion possibilities. Ideally, these would be measured separately: one representing the firm wage structure, and the other measuring the wage structure within occupational categories across firms. To accomplish this, two measures of financial incentives will be used: firm level inequality and occupation level inequality. Both will be represented by the standard deviation of wages within the respective groups. Occupation inequality will be calculated at the three digit SOC level. This construction is chosen for two reasons. First, it is comparable to the measures of inequality used in other studies. Second, it is the only measure of inequality found to be positively correlated with inequality in Bell and Freeman (2001) and Kuhn and Lozano (2008).

Because, in some cases, work hours are taken as a signal of effort, the labor supply regressions should also include variables associated with effort.[7] However, for the sake of comparability, variables thought to pertain only to effort will be omitted from the regressions. Instead, some key determinants of effort will be used as robustness checks. Thus, the regressions will include only standard labor supply variables (Blundell and MaCurdy, 1999).

3.2. Data and descriptive statistics

The data come from the worker and occupation files of the 2004 wave of the Workplace Employment Relations Survey (WERS) sponsored and collected in the United Kingdom by the Department of Trade and Industry, ACAS, the Economic and Social Research Council, and the Policy Studies Institute. The WERS survey is a nationally representative stratified random sample of United Kingdom workplaces with at least 10 employees, and samples no more than 25 employees from a given firm. There are approximately 2300 workplaces and 22,500 employees in the 2004 WERS.

Table 1 contains the descriptive statistics. The final subsample of the data contains 11,701 observations. There are four primary sources of excluded observations. The first is missing observations. The second source comes from discarding wages that seem implausible. All wages that are less than 75% of the United Kingdom minimum wage, or in the top 1% of the wage distribution are excluded. One limitation of the WERS is that it only has categorical versions of weekly income and hourly wages. Further, the hourly wage variable only has four categories, with 75% of individuals falling into one wage category. The weekly income variable is disaggregated enough to be useful, but partly because there is no way to distinguish between salaried and hourly workers, using weekly income will generate a large positive bias on the coefficient on the wage. And, will absorb much of the effect of variation in work hours across individuals.

Instead, a wage is calculated in the standard way, by dividing weekly income by usual weekly work hours. If weekly income was used, then it would be unnecessary to discard implausible incomes. However, the implied implausible wage would still be included, because wages that are too high are generated by a combination of high weekly wages and low work hours. The same goes for exceedingly low wages.

It is well known that this procedure can generate a negative bias on the coefficient on the wage, and this bias is likely further exaggerated using a categorical weekly income variable. However, this bias is likely much smaller than the bias resulting from using weekly income. Though, admittedly, it is difficult to tell whether using the hourly wage distribution is the correct measure. This is especially true for hourly workers or workers who are eligible for performance based pay, both of which may have the opportunity to increase their weekly income without getting a promotion. For them, arguably weekly income is a better reflection of the financial incentives they face. For the sake of comparability, hourly wages are used.

Third, all workers who work less than 20 h a week are excluded. This is for two reasons. First, part-time workers who work a very small number of hours likely have a different level of labor force attachment than part-time worker who work more than 20 h per week and full-time workers. Second, a quantile regression of log work hours on the log wage, firm wage inequality, and occupation wage inequality revealed that the correlation between the distributional measures are work hours is very different for workers who work less than 20 h than for workers who work more than 20 h. However, the estimated coefficients are quite stable for workers who greater than 20 h.[8]

[7] The key determinants of effort are job satisfaction (Carr and Mellizo, 2009; Cooper-Hakim and Viswesvaran, 2005; Harrison et al., 2006; Meyer et al., 2002; Riketta, 2002), the wage level because of either reciprocity (Akerlof, 1982; Fehr and Schmidt, 1999), fairness concerns (Akerlof and Yellen, 1990) or the cost of job loss (Bowles, 1985; Shapiro and Stiglitz, 1984), and job security (Bowles, 1985).

[8] Results of this exercise are available in a data appendix available from the author by request.

Table 3
Regression results for work hours.

	Base	Inequality	Higher administrative	Lower administrative	Non-administrative
Log wage	0.0031	−0.0135	−0.0828 **	0.0219	−0.0475 *
	(0.0193)	(0.0179)	(0.0398)	(0.0144)	(0.0251)
Occ. wage ineq. [a]		0.5013 ***	0.2955	0.3858 ***	0.3120 **
		(0.1263)	(0.2152)	(0.1352)	(0.1275)
Firm wage ineq. [b]		−0.0417	0.0508	−0.0450 *	−0.1231
		(0.0509)	(0.0369)	(0.0241)	(0.0899)
Constant	3.7415 ***	3.6659 ***	3.8547 ***	3.6016 ***	3.8096 ***
	(0.0418)	(0.0537)	(0.1186)	(0.0451)	(0.0646)
N	11,701	11,701	3381	4603	3717
Adj. R^2	0.155	0.167	0.078	0.141	0.237

Notes: data come from the 2004 wave of the WERS. Dependent variable is usual weekly work hours, including overtime. Sample is limited to individuals who worker between 20 and 90 h per week. Other control variables include age, education, marital status, and gender. Standard errors are in brackets, and are cluster on the firm and three digit occupation. Occupational classification based on author's grouping of one digit SOC occupations.

[a] Represented by the standard deviation of log wages within three-digit occupations with at least 25 observations. Observations are weighted by the number of individuals who earn the same wage.

[b] Represented by the standard deviation of log wages within firms with at least 10 observations. Observations are weighted by the number of individuals who earn the same wage.

* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

Finally, the analysis requires calculating distributional measures within both three digit occupations and firms, respectively. In order to make the calculations as reliable as possible, all small occupations and firms are dropped. The final dataset contains firms with at least 10 observations, and occupations with at least 25 observations. As can be seen in the bottom two rows of Table 1, this leaves 808 of a possible 2300 firms, and 70 of a possible 81 occupations. Firm statistics are calculated on an average of 14.48 observations, and occupation statistics are calculated on an average of 167.16 observations. Fortunately, response rates to the survey differed enough across firms that limiting the sample in this manner does not entirely eliminate all small firms, though it does raise average firm size somewhat.

There are a couple of other important pieces of information contained in Table 1. First, both the hours and the wage distributions are skewed right. Because of this, and for the sake of comparability, the log of hours and wages will be used in the regressions and to calculate all distributional variables. Second, there is considerably more variation in firm wage inequality than occupation wage inequality. This is not surprising given the relatively small number of observations within each firm.

Table 2 reports pairwise correlations between the key variables. Notice that there is a statistically significant positive correlation between occupation wage inequality and work hours, which is consistent with existing research. However, there is a negative correlation between firm inequality and work hours. Assuming that firm level financial incentives are more prominent than occupation level incentives, this immediately calls into question the tournament explanation of work hours variation. However, both firm inequality and occupation inequality are positively correlated with the wage. Thus, these correlations may not hold up in a regression analysis.

4. Results

4.1. Main results

Table 3 reports the results of the main regressions. The dependent variable in all regressions is the log of usual weekly work hours, including overtime and any other routine additional work hours. Occupation and firm inequality are both represented by the standard deviation of wages within each respective group. In addition to the reported coefficients, all regressions also include controls for age, education, marital status, and gender. Because there are repeated observations on both firms and occupations, the standard errors should be clustered (Moulton, 1990). But, because firms and occupations do not completely overlap, the standard errors should be clustered on both firms and occupations, simultaneously. Cameron et al. (2006) develop a routine for multi-way clustering.[9]

Column 1 is a basic labor supply regression. The estimated elasticity is very small, slightly positive, and statistically insignificant. This is not an uncommon finding for a sample consisting of largely full-time workers (Blundell and MaCurdy, 1999). The second column adds occupation and firm level inequality. The results are quite striking.

The variables of interest are the two inequality measures. The estimated coefficient on occupation wage inequality is statistically significant and positive. The coefficient implies that a one standard deviation (0.05) increase in occupation wage inequality is associated with a 0.025 increase in work hours. This effect may seem small. It is difficult to compare the magnitude of the coefficient on inequality with that on the wage, but a one standard deviation increase in the wage is associated with a 0.06 decrease in work hours, roughly 2.5 times the absolute magnitude of the coefficient on occupation inequality. Further, this coefficient is nearly 3 times larger than that found in a comparable estimation by Bell and Freeman (2001), though they use different data. The coefficient on firm inequality is negative, insignificant, and economically very small. This result is surprising given the intuitive assumption that firm incentives should be more salient than occupation incentives.

The main concern with the results in column 1 of Table 3 is that, although the wage distribution may be a determinant of work hours, it is also a result of work hours. This is the case for a number of reasons. First, the implied hourly wage for salaried workers is tied directly to work hours. Second, because work hours are related to the probability of promotion, work hours decisions in the past are related to current earnings. This point is not an issue for causality. And, third, work hours may be tied to the amount of performance or merit pay an individual earns, again affecting the implied hourly wage, particularly in this dataset. Finally, and more importantly, the fact that work hours and the wage distribution are so intimately tied suggests that there are likely firm and occupational characteristics that shape both wages and work hours within those respective groups.

[9] A program that can be added to a commonly statistical analysis software package is available at http://gelbach.eller.arizona.edu/~gelbach/ado/cgmreg.ado to implement multi-way clustering in OLS regressions.

Table 4
Selected descriptive statistics by occupation group.

Occ. group [a]	Higher administrative	Lower administrative	Non-administrative	Total
Log hours	3.74	3.62	3.69	3.68
	(0.18)	(0.18)	(0.21)	(0.20)
Log wage	2.64	2.30	2.03	2.31
	(0.34)	(0.37)	(0.36)	(0.43)
Occ. wage ineq. [b]	0.41	0.39	0.36	0.39
	(0.06)	(0.04)	(0.05)	(0.05)
Firm wage ineq. [c]	0.39	0.37	0.35	0.37
	(0.12)	(0.12)	(0.13)	(0.12)
Large firm [d]	499.80	530.56	464.24	500.61
	(965.31)	(1046.30)	(824.60)	(957.35)
Performance pay [e]	0.30	0.24	0.22	0.25
	(0.46)	(0.42)	(0.41)	(0.43)
Can choose hours [f]	0.36	0.31	0.19	0.28
	(0.48)	(0.46)	(0.39)	(0.45)
	3381.00	4603.00	3717.00	11,701.00

Notes: based on author's calculations using the 2004 WERS. Standard deviations are in brackets.

[a] Occupational classification based on author's group of one digit SOC occupations. Grouping can be found in Appendix A.

[b] Represented by the standard deviation of log wages within three-digit occupations with at least 25 observations. Observations are weighted by the number of individuals who earn the same wage.

[c] Represented by the standard deviation of log wages within firms with at least 10 observations. Observations are weighted by the number of individuals who earn the same wage.

[d] Represents difference between largest one-third and smallest one-third of firms. Middle third is discarded. Variable = 1 for large firms.

[e] Based on manager's report of whether a worker in a given occupational category in a given firm receives performance or merit pay. Variable = 1 for workers with performance pay.

[f] Based on self-reported ability to choose daily start and/or stop times. Variable = 1 for workers who can choose hours.

In terms of identification, the coefficient of particular concern is that on occupation wage inequality. This concern is partly data driven – it is the distributional coefficient that is statistically significant and positive – and partly by wage setting practices. For example, some evidence suggests that firms attempt to keep the wages of similar occupations within a firm in proportion to each other. But, across broad occupational categories (e.g. blue collar v. white collar) market forces play a much larger role (Levine, 1993; Baker et al., 1994a,b). This pattern tends to generate a strong correlation among wages within occupations, but across firms, in addition to the correlation between wages within a firm. Although not addressed in Levine (1993), it is likely that the terms of employment contracts in general follow this pattern.

The finding in Levine (1993) suggests that a useful starting point for assessing the stability of the coefficient on occupation wage inequality is to divide the sample in to broad occupational categories. Columns 3–5 of Table 3 report estimates for the same regression model in column 2, except within each of three occupational groups.[10] The three groups are, roughly, high level administrative and managerial occupations; low level administrative, managerial, and some clerical occupations; and non-administrative, non-managerial, and unskilled occupations. Table 4 provides descriptive statistics by broad occupational group.

There are clear differences in both the level of work hours, the level of wages, and the degree of wage inequality across occupational groups. This is evidence enough to be concerned that the coefficient on occupation inequality is biased upwards by the level difference in work hours. The results in Table 3 confirm this. The estimated coefficient on occupation wage inequality is roughly half the size within each group than when the groups were pooled.

Because of differences in the characteristics of both workers and workplaces across these groups, the magnitude of the coefficients must be interpreted with some caution. However, four other interesting patterns emerge. First, although the coefficient on occupation wage inequality is positive for all groups, it is considerably larger for the middle group than either the top or bottom group. This result is important because it is somewhat inconsistent with other research on the effects of financial incentives. This will be discussed in more detail later. Second, as evidenced by the adjusted R^2, there is considerable variation in the explanatory power of the model across groups, with the best fit coming within lower-level occupations. Again, this finding is somewhat inconsistent with the effect of financial incentives. Third, the coefficient on the wage is highly unstable. And fourth, the effect of firm inequality is positive only for upper level management, a result that is consistent with other literature on the effect of financial incentives.

As can be seen in Table 4, there is considerable variation across occupations in average firm size, share of workers who are eligible for performance and/or merit pay, and the share of workers who have some freedom to choose work hours. This suggests that dividing workers by occupation is not the the proper division when considering the effect of financial incentives. If wage inequality somehow reflects the financial incentives workers face, then these three characteristics should play an important role in shaping the correlation between financial incentives and work hours.

4.2. Auxilliary results

A positive causal relationship running from financial incentives – represented by wage inequality – to work hours exists if and only if working longer hours increases the probability of receiving increased earnings. It follows that workers who have a higher baseline probability of increasing earnings by working longer hours should be more sensitive to the magnitude of the incentive. Two indications of this possibility are firm size and eligibility for performance and/or merit pay.

First, work hours are a much better signal of work effort to a worker's current firm than to other firms.[11] And, there are likely

[10] A detailed breakdown of the occupational classification scheme is available in a data appendix from the author.

[11] This is not to say that working long hours at one's current firm would not help to get a job at another firm, but simply that the signal is weaker because in most cases the only method other firms have to learn a worker's current work habits is either by asking the worker or asking the employer. But, obviously, the current employer can observe work hours directly.

Table 5
Oaxaca decompositions.

Sample	All			Can choose hours [a]	
	Firm size [b]	Choose hours [c]	Perf. pay [d]	Firm size	Perf. pay
Overall					
Mean Ln. hours (=1)	3.6820 ***	3.6955 ***	3.6974 ***	3.6892 ***	3.7172 ***
	(0.0111)	(0.0138)	(0.0120)	(0.0133)	(0.0144)
Mean Ln. hours (=0)	3.6660 ***	3.6704 ***	3.6709 ***	3.6965 ***	3.6865 ***
	(0.0182)	(0.0124)	(0.0132)	(0.0168)	(0.0142)
Difference	0.0159	0.0251 ***	0.0265 **	−0.0073	0.0307 ***
	(0.0144)	(0.0084)	(0.0103)	(0.0111)	(0.0105)
Endowments	0.0144 *	0.0036	0.0178 ***	0.0006	0.0188 ***
	(0.0078)	(0.0049)	(0.0060)	(0.0072)	(0.0061)
Coefficients	0.0011	0.0159 **	0.0125	−0.0138	0.0123
	(0.0130)	(0.0063)	(0.0087)	(0.0091)	(0.0086)
Endowments					
Log wage	−0.0009	−0.0030	−0.0011	−0.0003	−0.0009
	(0.0023)	(0.0028)	(0.0018)	(0.0014)	(0.0019)
Occ. wage ineq. [e]	0.0011	0.0035 *	0.0044 **	−0.0021	0.0061 **
	(0.0023)	(0.0018)	(0.0020)	(0.0030)	(0.0028)
Firm wage ineq. [f]	0.0008	−0.0002	0.0009	0.0001	−0.0001
	(0.0016)	(0.0003)	(0.0009)	(0.0006)	(0.0005)
Coefficients					
Log wage	0.0061	0.0349	−0.0272	0.0197	0.0104
	(0.0666)	(0.0358)	(0.0480)	(0.0608)	(0.0562)
Occ wage ineq.	−0.0575	0.0596 *	0.0224	−0.0544	−0.0136
	(0.0420)	(0.0321)	(0.0262)	(0.0486)	(0.0438)
Firm wage ineq.	−0.0168	0.0156	0.0326	−0.0215	−0.0122
	(0.0274)	(0.0122)	(0.0199)	(0.0267)	(0.0286)
N	7681	11,701	11,701	2224	3329

Notes: data come from the 2004 wave of the WERS. Dependent variable is the log of usual weekly work hours, including overtime. Other control variables include age, education, marital status, and gender. Standard errors are in brackets, and are clustered on the firm and three-digit occupation. Sample is limited to employees who work between 20 and 90 h per week.

[a] Sample consists of all workers who report the ability to choose daily start and/or stop times.
[b] Variable = 1 for large firms. Middle third of firms is discarded.
[c] Variable = 1 for workers who can choose hours.
[d] Variable = 1 for workers eligible for performance pay and/or merit pay.
[e] Standard deviation of log wages within three-digit occupations with at least 25 observations.
[f] Represented by the standard deviation of log wages within firms with at least 10 observations.
* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

more internal promotion opportunities in large firms where the internal labor market is better defined.[12] Thus, the work hours choices of workers in large firms should be more sensitive to both dimensions of inequality than those in small firms. And, the estimated coefficients should be positive.

Second, the positive correlation between work hours and promotion implies that there is likely a positive correlation between receiving performance and/or merit pay and work hours as well (Anger, 2008). As with firm size, workers who are eligible for performance pay stand to gain more by working hard than workers who are not. Because of this, if inequality captures financial incentives, there should be a stronger correlation between inequality and work hours for workers who are eligible for performance pay.

Finally, the entire argument that inequality is a determinant of work hours choices is premised on the assumption that workers have some freedom to choose their own work hours. Therefore, by definition, workers who can choose their work hours should be more sensitive to inequality than workers who cannot. Further, the patterns described above for firm size and performance pay should hold within the group of workers who can choose their own work hours.

Table 5 reports a set of three Oaxaca decompositions for firm size, performance pay, and the ability to choose work hours using the entire sample, and within the group of workers who have some freedom to choose their own work hours. Oaxaca decompositions are used because, as the occupation statistics in Table 4 suggest, there are differences in the characteristics of the workers in the different groups. In situations like this, the differences in the characteristics across the groups can bias the estimated coefficients (Oaxaca, 1973; Blinder, 1973).[13]

Starting with columns 1–3 of Table 5, if wage inequality represents a financial incentive to work longer hours, the same pattern of coefficients should be present. The mean of group one (row 1) should be larger than the mean of group two (row 2), and the coefficients on both inequality measures should be larger for group one than for group two. Mean log hours is indeed larger for workers in large firms, workers who have the ability to choose their own work hours, and workers who are eligible for performance pay, though this difference is not statistically significant for firm size. However, as can be seen in the second pane of Table 5, for firm size and performance pay, respectively, the majority of the difference is explained by differences in endowments between the two groups. For firm size, 90% of the difference is explained by endowments, while for performance pay about 65% of the difference is explained by endowments.

The difference in the estimated coefficients on the inequality measures are not statistically significant for either firm size or performance pay either. And, in the case of firm size, the differences are actually negative, indicating that the correlation between work

[12] I am indebted to a reviewer for pointing this out.

[13] An estimation strategy developed by Jann (2008) is used.

hours and both firm and occupation inequality, respectively, is smaller for workers in large firms. In short, although the pattern in mean work hours across the groups fits the pattern suggested by the argument presented above, the pattern on the coefficients does not.[14]

The pattern by ability to choose hours, however, is somewhat different (column 2 of Table 5). For this grouping, approximately 60% of the difference between the two groups is explained by differences in the coefficients. Further, the estimated difference in coefficients on occupation wage inequality by ability to choose hours is statistically significant and positive. Consistent with the predicted pattern.

Although the results for the decomposition by ability to choose work hours are consistent with the argument that work hours and financial incentives are positively correlated, it is the only decomposition that produced the predicted pattern. Further, the fact that the correlation between work hours and all of the financial incentive variables is larger should not come as a surprise. Arguably, this decomposition is a stronger test of whether workers who claim to have control over their work hours do in fact have control and exercise this control. Decomposing by firm size and performance pay within the group of workers who can control their work hours is probably the best test of the financial incentives hypothesis.

Columns 4 and 5 of Table 5 report the results of these decompositions. Some of the basic qualitative results hold when compared to the earlier decompositions using the entire sample, with one big exception. Workers who are eligible for performance pay still work longer hours, but are slightly less sensitive to both occupation and firm inequality. This decomposition does not follow the predicted patterns either.

5. Discussion of results

Before discussing the broader implications of the results, a brief summary is warranted. The purpose of this paper is to test the claim that there is a causal relationship running from financial incentives other than the wage to work hours. Two additional measures of the financial incentives a worker faces are used: firm wage inequality and occupation wage inequality. It is found that occupation wage inequality, represented by the standard deviation of wages within a given occupation, is the only measure of financial incentives that is consistently positively correlated with work hours. But, this correlation varies by subgroup. Using a Blinder–Oaxaca decomposition, it is found that the variation in the correlation across subgroups is driven largely by differences in the characteristics of workers in groups divided by eligibility for performance pay and firm size, respectively. Further, within the group of workers who can set their own work hours, workers who are eligible for performance pay are slightly less sensitive to financial incentives. It is argued that this pattern is largely inconsistent with the idea that work hours are positively correlated with inequality because inequality represents the financial incentives a worker faces. The results highlight important short-comings to the claims made in existing research (Kuhn and Lozano, 2008; Bell and Freeman, 2001; Bowles and Park, 2005; Park, 2005).

So what does explain the positive correlation between occupation wage inequality and work hours? Based on these results alone, it is difficult to give a definitive answer to this question. But, the results do suggest possible avenues to explore.

First, one of the most important strands of research that links the return to increased effort to pay increases is the tournament literature (Lazear and Rosen, 1981). If work hours are a signal of effort, and wage inequality represents the return to promotion as argued by Bell and Freeman (2001), then it is reasonable to expect that some of the findings in the empirical tournament literature will hold in this context as well. Although De Varo (2006) finds behavior consistent with tournaments using a dataset covering a wide range of workers in the U.S., most of the tournament literature has focused on CEOs and other upper level managers (Eriksson, 1999; Main et al., 1993). The argument is that this is the context where the promotion ladder is most well-defined, and tournaments are most applicable.

This may or may not be the pattern found here, depending on how the results are interpreted. When considering occupation inequality, it is found that middle level occupations are the most sensitive, followed by lower level, and finally upper level occupations. To the extent that workers in the upper level occupations set the pay and work hours of those in the other groups, this pattern of coefficients is much more consistent with an argument based on demand constraints and employer preferences over work hours, described in more detail below. The coefficient on firm inequality, however, does follow a pattern consistent with some findings in the tournament literature.[15] Though, as was seen in the Blinder–Oaxaca decomposition, the coefficient on firm inequality does not follow any of the other expected patterns.

Second, there is an important limitation to using a Blinder–Oaxaca decomposition in this context. Typically, decomposition would take place between subgroups based on fixed characteristics of an individual (e.g. race/ethnicity, gender, or age). In this case, however, partially voluntary sorting across workplaces plays a role in which workers are eligible for performance or merit pay, work in large versus small firms, or have some freedom over choice of work hours. Because of this, the decomposition cannot rule out the possibility that the saliency of financial incentives plays no role in a worker's response to the incentive. And, the results are consistent with this claim. Workers who are eligible for performance pay, work in larger firms, and can choose their work hours also work in occupations with higher levels of inequality. However, to understand what precisely the claim that the reaction is the same within the various groups means, let us consider the case of eligibility for performance and/or merit pay.

The argument that larger financial incentives leads to longer work hours is premised largely on the argument that work hours are a signal of underlying effort and/or output. As mentioned, this claim is supported by the observation that work hours and the probability of promotion are positively correlated (Bell and Freeman, 2001; Anger, 2005, 2008). It seems reasonable, therefore, to assume that work hours are also positively correlated with the probability of receiving performance and/or merit pay, conditional upon being eligible. This means that workers who are eligible for performance and/or merit pay should have a much larger expected return to providing longer work hours. The fact that this does not show up as being more sensitive to occupation inequality, which is higher among workers who are eligible, implies that performance and/or merit pay does not work. This, of course, flies in the face of essentially the entirety of received wisdom in economics.[16] An analogous line of reasoning applies to decomposition by firm size as well.

The beginnings of an explanation for the positive correlation between occupation inequality and work hours can be found

[14] Complete regression results for the decomposition are available in a data appendix from the author.

[15] It is important to note, however, that the many of the tests of tournament theory using real world data not from sporting events has had difficulty confirming the predictions of tournament theory.

[16] There is evidence that profit-sharing pay schemes do not increase effort without the presence of other institutions in the firm (Dube and Freeman, 2008). But, profit-sharing and performance/merit pay function very differently.

Table 6
Pairwise correlations between key variables.

	Log wage	Occ. wage ineq.	Perf. pay	Choose hours	Large firm	Union
Log wage	1.00					
Occ. wage ineq. [a]	0.53 ***	1.00				
Performance pay [b]	0.08	0.13	1.00			
Can choose hours [c]	0.48 ***	0.19	0.24 **	1.00		
Large firm [d]	0.13	0.14	0.07	−0.23 *	1.00	
Union [e]	−0.01	−0.15	−0.57 ***	−0.38 ***	0.26 **	1.00

Notes: based on author's calculations using 2004 wage of the WERS. Sample is limited to individuals who worker between 20 and 90 h per week.

[a] Represented by the standard deviation of log wages within three-digit occupations with at least 25 observations. Observations are weighted by the number of individuals who earn the same wage.

[b] Share of workers in a given occupation eligible for performance and/or merit pay.

[c] Share of workers in a given occupation who can choose their own work hours.

[d] Share of workers in a given occupation who work in a large firm.

[e] Share of workers in a union.

* $p < 0.10$.

** $p < 0.05$.

*** $p < 0.01$.

in Table 6. Variation in the standard deviation of wages across occupations can be interpreted as reflecting variation in the standardization of employment contracts across firms within each occupation. Table 6 shows that, at the occupation level, there are non-negligible correlations between occupation inequality and variables that describe the "contract setting structure" of an occupation. And, although the estimated coefficient on occupation inequality remains positive and statistically significant, its magnitude is reduced by about 60% when dummies for performance pay, ability to choose hours, firm size, and union status are included in a regression similar to that in column 2 of Table 3.[17] This suggests that there are likely other omitted variables that, if included, would further reduce the coefficient.

This interpretation, that occupation inequality reflects the structure of contracting setting within an occupation rather than the magnitude of financial incentives facing a worker is further supported by the internal job markets literature.[18] Baker et al. (1994b), using data from a single firm, find that promotion premiums are quite small relative to the gaps in pay across different pay levels. For the most part, only large firms will have multiple job levels within a single occupation. Thus, it is unlikely that within occupation inequality captures the return to promotion at all.

Up to this point, we have basically ignored the pattern of the coefficients on firm wage inequality. Although the coefficients are never statistically significant, the pattern of the signs is revealing. For the full sample, column 2 of Table 3, the coefficient on firm inequality is negative. When the sample is divided by occupation, the coefficient is negative for non-administrative and lower administrative workers, but positive for upper administrative workers. The most commonly known models of fairness argue that if workers earn a wage lower than what they deem fair, they will provide less than maximum effort (Akerlof and Yellen, 1990; Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000). Because a typical firm's wage distribution is right skewed, depending on how the "fair wage" is determined, it is possible that the majority of workers within a firm will earn less than what they deem fair. This would generate an overall coefficient on firm wage inequality that is negative.

When the sample is divided by occupation, it is also implicitly divided by position in the firm hierarchy. Upper administrative workers are typically the highest paid, implying that an increase in firm inequality will result in upper administrative workers in a given firm earning even more relative to everyone else in the firm. Thus, upper administrative workers respond by increasing (or at least not decreasing) their work hours, while everyone else responds by working less.

Although this interpretation is consistent with the results, and the importance of firm inequality has been emphasized by a number of studies, it is important to stress that there are a lot of intermediate steps between the results here and this interpretation. First, it would have to be the case that upper level managers make downward comparisons when determining the fairness of pay. Second, the fair wage would have to be determined by a firm level mean or something based on the mean. This is the only way to ensure that the majority of workers earn below the fair wage, but some earn above the fair wage. And, finally, much of the experimental evidence on fairness shows that individuals respond negatively to being either below or above the fair wage (Fehr and Schmidt, 1999). The present results do not suggest a negative reaction to advantageous inequality, so this would have to be reconciled somehow.

What this pattern of correlations and regression results certainly does suggest is that it is important to take into account the nature of employment contracts within a given occupation when making comparisons across occupations. Evidence in support of this interpretation has been found elsewhere. Altonji and Paxson (1988) and Dickens and Lundberg (1993) both find that labor supply elasticities are biased when no adjustment is made for employer preferences over work hours. Stewart and Swaffield (1997) find that over one-third of British men would prefer to work fewer hours. Golden and Gebreselassie (2007), using data on the United States, also finds that a nontrivial number of workers would prefer to work fewer hours. And, more importantly, that the percentage of workers who would be willing to trade income to work fewer hours increases with the amount of income earned. This finding is consistent with the finding in Table 6 that occupation inequality and wages are strongly positively correlated.

Taken together, the evidence strongly suggests that the observed association between work hours and occupation wage inequality is not capturing the effect of financial incentives. Instead, this relationship captures variation in the employment experiences of workers across different occupations. A divergence that is likely to grow even larger as labor markets become increasingly deregulated, and wage inequality continues to grow. This is, in fact, precisely the pattern that has been documented in the United States over the last thirty years (Jacobs and Gerson, 2005), namely, a simultaneous increase in both wage inequality and variation in

[17] Results of this regression are reported in a data appendix available from the author.

[18] See Baker et al. (1994a,b), Baker and Holmstrom (1995), Gibbons and Waldman (2006, 1999), and Lazear (1992) for some more recent representative work. The classic example is Doeringer and Piore (1971).

weekly work hours. But, only modest growth in the mean of weekly work hours and mean wages.

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Appendix A. Further results and occupation groups

Figs. A.1–A.3 show the results of a quantile regression of log work hours on the log wage, occupation wage inequality, and firm wage inequality. It shows the instability of the coefficient in the lower 20% of the work hours distribution. This corresponds to work hours of approximately 20 h per week. Thus, these observations are excluded from the later OLS regressions.

Table A.1 shows the occupation groupings used to divide the sample in Table 3.

Table A.2 contains the regression results used as the basis for the Blinder–Oaxaca decomposition in Table 5. Comparison of Table A.2 with Table 5 demonstrates that the bias generated by not taking into account group characteristics varies. It is important to take this into account for ability to choose hours and performance pay, while the qualitative conclusions would be the same in the case of firm size. This indicates that performance pay and the ability

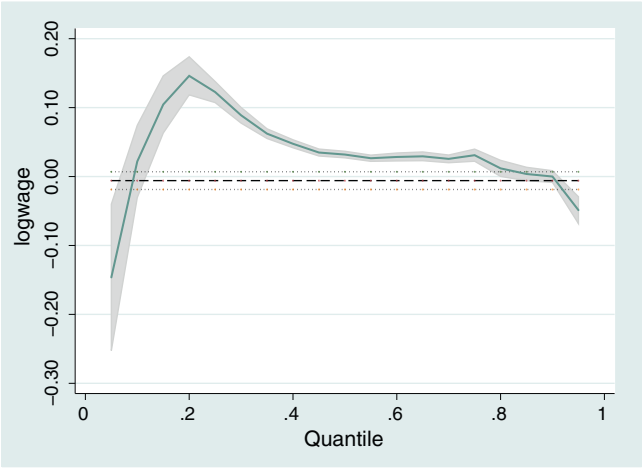

Fig. A.1. Quantile regression: coefficient on log wage. *Source*: Author's calculations based on 2004 WERS. Dependent variable is log hours. Sample includes individuals who work between 0 and 96 h per week. Coefficient calculated at quantile 1–99 of log hours. Other controls are occupation and firm inequality.

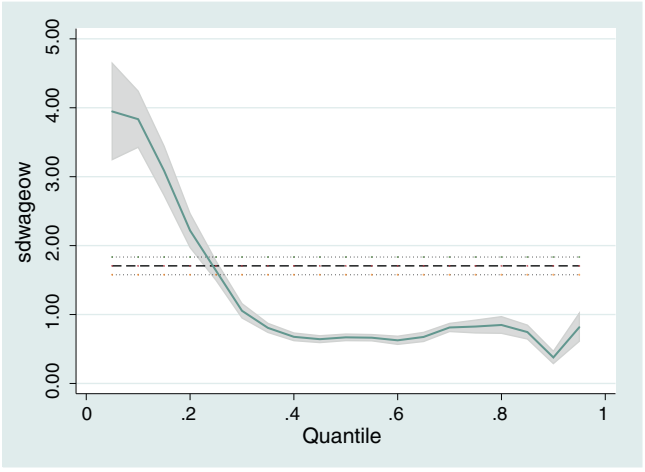

Fig. A.2. Quantile regression: coefficient on occupation wage inequality. *Source*: Author's calculations based on 2004 WERS. Dependent variable is log hours. Sample includes individuals who work between 0 and 96 h per week. Coefficient calculated at quantile 1–99 of log hours. Other controls are log wage and firm inequality. Inequality measured by standard deviation of wages within occupations.

Table A.1
Occupation groupings.

Group 1 Upper admin., manag., and professional		Group 2 Lower admin. and manag., skilled trades		Group 3 Non-admin, non manag.	
111	Corp. managers and senior officials	311	Science and engin. techs.	521	Metal Forming, welding and related trades
112	Production managers	312	Draughtperson and building inspectors	522	Metal machining, fitting and instrument making
113	Functional managers	313	IT service delivery	523	Vehicle trades
114	Quality and customer care mangers	321	Health associate professionals	524	Electrical trades
115	Financial institution and office managers	322	Therapists	531	Construction trades
116	Managers in distribution, storage and retailing	323	Social welfare associate professionals	532	Building trades
117	Protective service officers	331	Protective service occupations	542	Printing trades
118	Health and social services managers	342	Design associate professionals	543	Food preparation trades
122	Managers and proprietors in hosp. serv.	343	Media associate professionals	549	Skilled trades n.e.c.
123	Managers and proprietors in other serv.	351	Transport associate professionals	611	Healthcare and related personal services
211	Science professionals	352	Legal associate professionals	612	Childcare and related personal services
212	Engineering professionals	353	Business and finance associate pro.	621	Leisure and travel service occupations
213	Information and communication tech.	354	Sales and related associate professionals	623	Housekeeping occupations
221	Health professionals	355	Conservation associate professionals	711	Sales assistants and retail cashiers
231	Teaching professionals	356	Public service and other associate professionals	712	Sales related occupations
232	Research professionals	411	Administrative occupations: govt.	721	Customer service occupations
241	Legal professionals	412	Administrative occupations: finance	811	Process operatives
242	Business and statistical professionals	413	Administrative occupations: records	812	Plant and machine operatives
243	Architects, town planners, surveyors	414	Administrative occupations: communications	813	Assemblers and routine operatives
244	Public service professionals	415	Administrative occupations: general	814	Construction operatives
		421	Secretarial and related occupations	821	Transport drivers and operatives
				822	Mobile machine drivers and operatives
				912	Elementary construction
				913	Elementary process plant
				914	Elementary goods storage
				921	Elementary administrative
				922	Elementary personal services
				923	Elementary cleaning
				924	Elementary security

Notes: based on author's calculations using 2004 wage of the WERS.

Table A.2
Robustness checks.

	Firm size[c]		Performance pay		Choose hours[d]	
	Large	Small	Eligible	Ineligible	Can	Cannot
Log wage	−0.0089	−0.0120	−0.0239	−0.0120	−0.0056	−0.0210
	(0.0193)	(0.0280)	(0.0194)	(0.0201)	(0.0155)	(0.0201)
Occ. wage ineq. [a]	0.3690 **	0.5987 ***	0.5616 ***	0.4690 ***	0.6694 ***	0.4223 ***
	(0.1534)	(0.1545)	(0.1700)	(0.1180)	(0.1802)	(0.1155)
Firm wage ineq. [b]	−0.1025 *	−0.0468	0.0461	−0.0615	−0.0017	−0.0539
	(0.0581)	(0.0892)	(0.0595)	(0.0574)	(0.0468)	(0.0568)
Constant	3.7013 ***	3.6564 ***	3.6375 ***	3.6803 ***	3.5805 ***	3.7092 ***
	(0.0700)	(0.0641)	(0.0626)	(0.0560)	(0.0546)	(0.0552)
N	3885	3928	2909	8792	3329	8372
Adj. R^2	0.162	0.176	0.172	0.166	0.172	0.169

Notes: based on author's calculations using 2004 wage of the WERS. Sample is limited to individuals who worker between 20 and 90 h per week.

[a] Standard deviation of log wages within three-digit occupations with at least 25 observations. Observations are weighted by the number of individuals who earn the same wage.

[b] Standard deviation of log wages within the firm. Weighted by number of individuals who earn the same wage.

[c] Large firms defined as top 33% of firms by number employees. Small firms are bottom 33% of firms by number of employees.

[d] Self-reported ability to choose daily start and/or stop times.

* $p < 0.10$.

** $p < 0.05$.

*** $p < 0.01$.

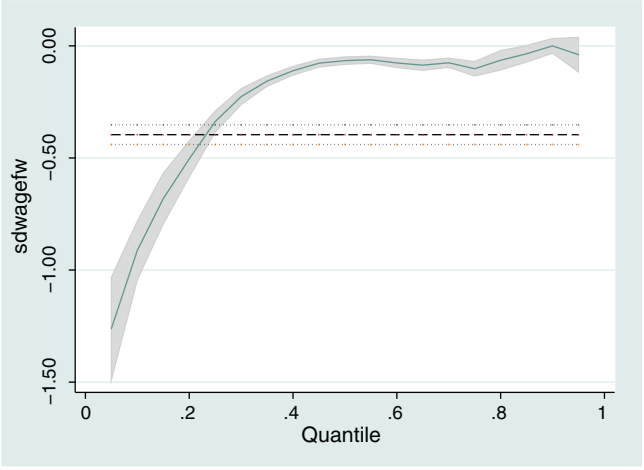

Fig. A.3. Quantile regression: coefficient on firm wage inequality. *Source*: Author's calculations based on 2004 WERS. Dependent variable is log hours. Sample includes individuals who work between 0 and 96 h per week. Coefficient calculated at quantile 1–99 of log hours. Other controls are log wage and firm wage inequality. Inequality measured by standard deviation of wages within the firm.

to choose hours are more strongly correlated with worker and job characteristics than firm size, a result that is intuitively appealing.

References

Akerlof, G., 1982. Labor contracts as partial gift exchange. Quarterly Journal of Economics 97, 543–569.

Akerlof, G.A., Yellen, J.L., 1990. The fair wage-effort hypothesis and unemployment. The Quarterly Journal of Economics 105, 255–283.

Altonji, J.G., Paxson, C.H., 1988. Labor supply preferences, hours constraints, and hours-wage trade-offs. Journal of Labor Economics 6, 254–276.

Anger, S., 2005. Unpaid overtime in germany: differences between east and west. Journal of Applied Social Science Studies 125, 17–27.

Anger, S., 2008. Overtime work as a signaling device. Scottish Journal of Political Economy 55, 167–189.

Audus, R., Barmby, T., Treble, J., 2004. Luck, effort, and reward in an organizational hierarchy. Journal of Labor Economics 22, 379–395.

Baker, G., Gibbs, M., Holmstrom, B., 1994a. The internal economics of the firm: evidence from personnel data. The Quarterly Journal of Economics 109, 881–919.

Baker, G., Gibbs, M., Holmstrom, B., 1994b. The wage policy of a firm. The Quarterly Journal of Economics 109, 921–955.

Baker, G., Holmstrom, B., 1995. Internal labor markets: too many theories, too few facts. The American Economic Review 85, 255–259.

Becker, B.E., Huselid, M.A., 1992. The incentive effects of tournament compensation systems. Administrative Science Quarterly 37, 336–350.

Bell, L., Freeman, R., 2001. The incentive for working hard: explaining hours worked differences in the us and germany. Labour Economics 8, 181–202.

Blinder, A.S., 1973. Wage discrimination: reduced form and structural variables. Journal of Human Resources 8, 436–455.

Blundell, R., MaCurdy, T., 1999. Labor supply: a review of alternative approaches. In: Ashenfelter, O., Card, D. (Eds.), Handbook of Labor Economics, vol. 3A. Elsevier Science, Amstrdam.

Bognanno, M.L., 2001. Corporate tournaments. Journal of Labor Economics 19, 290–315.

Bolton, G.E., Ockenfels, A., 2000. Erc: a theory of equity, recriprocity and competition. The American Economic Review 90, 166–193.

Booth, A.L., Francesconi, M., Frank, J., 2003. A sticky floors model of promotion, pay, and gender. European Economic Review 47, 295–322.

Bowles, S., 1985. The production process in a competitive economy: Walrasian, neo-Hobbesian, and Marxian. The American Economic Review 75, 83–102.

Bowles, S., Park, Y., 2005. Emulation, inequality, and work hours: was Thorsten Veblen right? Economic Journal 115, F397–F412.

Cameron, A.C., Gelbach, J.B., Miller, D.L., 2006. Robust inference with multi-way clustering. NBER Technical Working Paper No. 327.

Carr, M., Mellizo, P., 2009. Is it satisfaction or wage inequality? An investigation into worker motivation. Ph.D. Thesis. University of Massachusetts, Amherst.

Chan, W., 1996. External recruitment versus internal promotion. Journal of Labor Economics 14, 555–570.

Conyon, M.J., Peck, S.I., Sadler, G.V., 2001. Corporate tournaments and executive compensation: evidence from the U.K. Strategic Management Journal 22, 805–815.

Cooper-Hakim, A., Viswesvaran, C., 2005. The construct of work commitment: testing an integrative framework. Psychological Bulletin 131, 241–259.

De Varo, J., 2006. Internal promotion competitions in firms. The RAND Journal of Economics 37, 521–542.

Devereux, P.J., 2004. Changes in relative wages and family labor supply. Journal of Human Resources 39, 696–722.

Dickens, W.T., Lundberg, S.J., 1993. Hours restrictions and labor supply. International Economic Review 34, 163–191.

Doeringer, P., Piore, M., 1971. Internal Labor Markets and Manpower Analysis. Heath, Lexington, MA.

Dube, A., Freeman, R.B., 2008. Complementarity of shared compensation and decision-making systems: evidence from the American labor market. In: Kruse, D.L., Freeman, R.B., Blasi, J.R. (Eds.), Shared Capitalism at Work: Employee Ownership, Profit and Gain Sharing, and Broad-based Stock Options. National Bureau of Economic Research.

Ehrenberg, R.G., Bognanno, M.L., 1990a. Do tournaments have incentive effects? The Journal of Political Economy 98, 1307–1324.

Ehrenberg, R.G., Bognanno, M.L., 1990b. The incentive effects of tournaments revisited: evidence from the European PGA tour. Industrial and Labor Relations Review 43, 74S–88S.

Eriksson, T., 1999. Executive compensation and tournament theory: empirical tests on Danish data. Journal of Labor Economics 17, 262–280.

Fehr, E., Schmidt, K.M., 1999. A theory of fairness, competition, and cooperation. Quarterly Journal of Economics 114, 817–868.

Francesconi, M., 2001. Determinations and consequences of promotions in Britain. Oxford Bulletin of Economics & Statistics 63, 279–310.

Frank, R.H., 1985. The demand for unobservable and other nonpositional goods. The American Economic Review 75, 101–116.
Gibbons, R., Waldman, M., 1999. A theory of wage and promotion dynamics inside firms. The Quarterly Journal of Economics 114, 1321–1358.
Gibbons, R., Waldman, M., 2006. Enriching a theory of wage and promotion dynamics inside firms. Journal of Labor Economics 24, 59–107.
Golden, L., Gebreselassie, T., 2007. Overemployment mismatches: the preference for fewer work hours. Monthly Labor Review 130, 18–37.
Harbring, C., Irlenbusch, B., 2003. An experimental study on tournament design. Labour Economics 10, 443–464.
Harrison, D.A., Newman, D.A., Roth, P.L., 2006. How important are job attitudes? Meta-analytic comparisons of integrative behavioral outcomes and time sequences. Academy of Management Journal 49, 305–325.
Jacobs, J.A., Gerson, K., 2005. The Time Divide: Work, Family, and Gender Inequality. Harvard University Press, Cambridge, MA.
Jann, B., 2008. A stata implementation of the Blinder–Oaxaca decomposition. ETH Zurich Sociology Working Papers.
Juhn, C., Murphy, K.M., 1997. Wage inequality and family labor supply. Journal of Labor Economics 15, 72–97.
Killingsworth, M., 1983. Labor Supply. Cambridge University Press, Cambridge.
Knoeber, C.R., 1989. A real game of chicken: contracts, tournaments, and the production of broilers. Journal of Law, Economics, & Organization 5, 271–292.
Knoeber, C.R., Thurman, W.N., 1994. Testing the theory of tournaments: an empirical analysis of broiler production. Journal of Labor Economics 12, 155–179.
Kuhn, P., Lozano, F., 2008. The expanding workweek? Understanding trends in long work hours among U.S. men, 1979–2006. Journal of Labor Economics 26, 311–343.
Lambert, R.A., Larcker, D.F., Weigelt, K., 1991. How sensitive is executive compensation to organizational size? Strategic Management Journal 12, 395–402.
Landers, R.M., Rebitzer, J., Taylor, L.J., 1996. Rat race redux: adverse selection in the determination of work hours in law firms. The American Economic Review 86, 329–348.
Lazear, E.P., 1992. The job as a concept. In: William, J., Bruns, J. (Eds.), Performance Measurement, Evaluation, and Incentives. Harvard Business School Press, Boston, MA, pp. 183–215.
Lazear, E.P., Rosen, S., 1981. Rank-order tournaments as optimum labor contracts. Journal of Political Economy 89, 841–864.
Levine, D.I., 1993. Fairness, markets, and ability to pay: evidence from compensation executives. The American Economic Review 83, 1241–1259.
Main, B.G.M., O'Reilly, C.A., Wade III, J., 1993. Top executive pay: tournament or teamwork? Journal of Labor Economics 11, 606–628.
Malcomson, J.M., 1984. Work incentives, hierarchy, and internal labor markets. The Journal of Political Economy 92, 486–507.
Meyer, J.P., Stanley, D.J., Herscovitch, L., Topolnytsky, L., 2002. Affective, continuance, and normative commitment to the organization: a meta-analysis of antecedents, correlates, and consequences. Journal of Vocational Behavior 61, 20–52.
Moulton, B.R., 1990. An illustration of a pitfall in estimating the effects of aggregate variables on micro units. The Review of Economics and Statistics 72.
Oaxaca, R., 1973. Male–female wage differentials in urban markets. International Economic Review 14, 693–709.
Park, Y., 2005. The second payckeck to keep up with the joneses: relative income concerns and labor market decisions of married women, University of Massachusetts, Amherst Working Paper 1005-10.
Pencavel, J.H., 2007. Earnings inequality, labour supply and schooling in husband–wife families. Bulletin of Economic Research 59, 83–124.
Prendergast, C., 1999. The provision of incentives in firms. Journal of Economic Literature 37, 7–63.
Riketta, M., 2002. Attitudinal organizational commitment and job performance: a meta-analysis. Journal of Organizational Behavior 23, 257–266.
Shapiro, C., Stiglitz, J.E., 1984. Equilibrium unemployment as a worker discipline device. The American Economic Review 74, 433–444.
Stewart, M., Swaffield, J., 1997. Constraints on the desired hours of work of British men. Economic Journal 107, 520–535.
Veblen, T., 1899. The Theory of the Leisure Class. Macmillan, New York.