Online Appendix

How do Hours Worked Vary with Income? Cross-Country Evidence and Implications

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A Data Appendix

A.1 Survey Time Coverage

Our core countries have the restriction that their surveys cover the entire calendar year. Because surveys are structured differently across countries, this classification is however not as straightforward as one may think. We categorize the surveys as follows, based on how much we know about the timing of household interviews:

(a) For any individual interview the week is known.

(b) For any individual interview the month is known, but not the week.

(c) Any individual interview falls within a period longer than a month and shorter than a quarter, but neither the week nor the month is known.

(d) Any individual interview falls within a quarter, but neither the week nor the month is known.

(e) Any individual interview falls within a period longer than a quarter, but neither the week nor the month is known.

Going from (a) to (e), the information about the individual interview date becomes less precise. In order to qualify as a core country, a country has to either

i. fall in category (a) or (b) and cover each month of the year

ii. fall in category (d) and cover each quarter

iii. fall in category (c) or (e) and cover the entire year.

To give a concrete example, the CPS in the US is conducted in each month but only covers one week (specifically, the reference week contains the 12th of a month). Hence, the US falls into category (a) and in our set of core countries. Brazil also falls in category (a) since we know the exact reference week. However, the Brazilian survey was conducted only in one week of the year, such that Brazil is not a core country. Except for case i, it may very well be that not each month is covered since we do not know for sure whether for countries in categories (c) to (e) interviews took place in each month. Of the 49 core countries, 4 low-income, 5 middle-income, and one high-income country fall into categories (c) to (e), though. Figures A.1 and A.2 split the countries by core and non-core countries, respectively, and show for each country the relevant category (a) to (e) and the covered weeks. Angola is not a core country despite covering the entire year since it misses information on actual hours worked.

Figure A.1: Survey Coverage – Core Countries

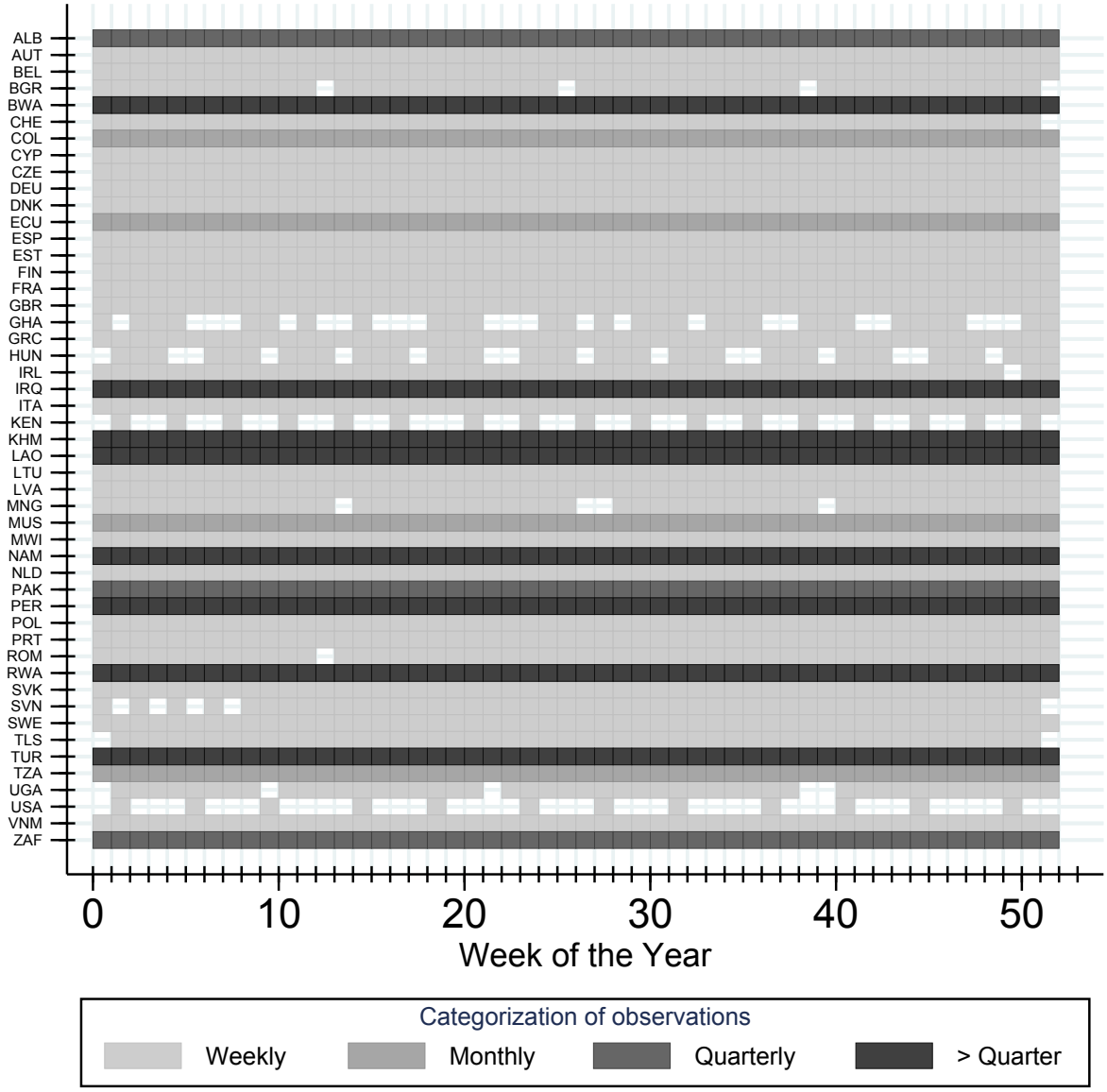
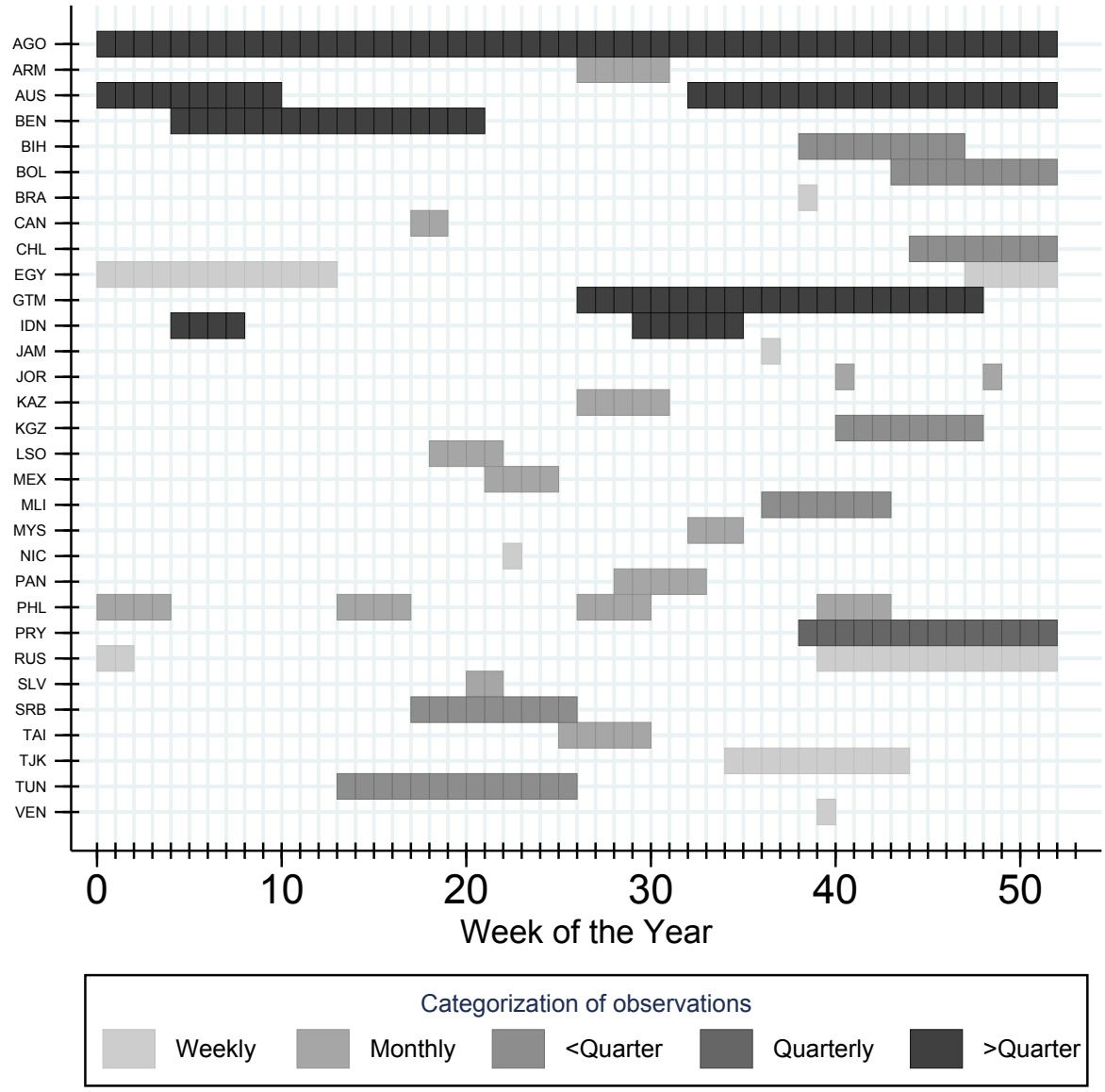


Figure A.2: Survey Coverage – Non-core Countries



A.2 Measuring Employment and Hours Worked

Our population of interest contains $i = 1, ..., N$ individuals and may be only a subset of all individuals in our survey data (e.g., only men). For all our calculations, we use individual survey weights, but refrain from displaying them in the following paragraphs for the ease of notation. To measure employment, we use the self-reported employment status e_i of each individual i. e_i takes the value of 1 for anyone reporting to be employed, which includes self-employed and unpaid family workers, and 0 otherwise. We replace a missing employment status (including answers like "Don't know" and "Refuse to Answer") with 1 if positive actual hours worked are reported, and leave it missing otherwise. In general, missing employment status information is not very common in our data, with 42 of the 49 core countries having less than one percent of observations with missing employment status.

Letting the indicator $\mathbf{1}_{\mathbf{e_i=nm}}$ (where nm stands for non-missing) take the value of 1 if the employment status is known and 0 otherwise, the employment rate (ER) is given by

$$ER = \frac{\sum_{i=1}^{N} e_i \mathbf{1}_{\mathbf{e_i=nm}}}{\sum_{i=1}^{N} \mathbf{1}_{\mathbf{e_i=nm}}}. \tag{A.1}$$

Our measure of hours per worker (H^e) is based on the actual number of hours worked in all jobs h_i in the reference period. This variable is directly available in some surveys, while in other surveys we add up actual hours in the main job and in all additional jobs. We assign zero hours to non-employed individuals. Employed individuals may have zero hours if they have been absent from work for the entire reference period, e.g. because of annual leave or sickness.

We impose a common cap of 112 weekly hours (7 days x 16 hours per day), though slightly lower country-specific caps may in fact be binding, since the maximum possible hours reported vary by survey. For example, for the United States, the reported number of actual hours worked in all jobs cannot exceed 99, while in the ELFS the reported actual hours in the main job are capped at 80 and in all additional jobs at 80 as well. In our data, the number of observations that are top-coded is small and exceeds 0.1 percent in only seven core countries, with the maximum being 0.87 percent in Tanzania. Bick et al. (2017) show that capping of hours in all jobs at 80 hours makes little difference for the United States and a subset of European countries from the ELFS.

Letting $\mathbf{1}_{\mathbf{h_i=nm}}$ take the value of 1 if actual hours worked in all jobs are available, hours worked employed are given by

$$H^e = \frac{\sum_{i=1}^{N} e_i h_i \mathbf{1}_{\mathbf{h_i=nm}}}{\sum_{i=1}^{N} e_i \mathbf{1}_{\mathbf{h_i=nm}}}. \tag{A.2}$$

Our measure of hours per adult (H^a) is then obtained by multiplying the extensive (ER) with the intensive (H^e) margin of labor supply:

$$H^a = ER \times H^e = \frac{\sum_{i=1}^{N} e_i \mathbf{1}_{\mathbf{e_i=nm}}}{\sum_{i=1}^{N} \mathbf{1}_{\mathbf{e_i=nm}}} \times \frac{\sum_{i=1}^{N} e_i h_i \mathbf{1}_{\mathbf{h_i=nm}}}{\sum_{i=1}^{N} e_i \mathbf{1}_{\mathbf{h_i=nm}}}, \tag{A.3}$$

which is how Ramey and Francis (2009) measure hours per adult as well. For each country in our data we use (A.1), (A.2) and (A.3) to compute H^a, H^e and ER in the aggregate, and by sex, age and education groups, as well as H^e by sector. Note that an alternative approach is to drop all individuals with any missing data, and to compute H^a as the sum of hours over the sum of adults. We prefer our current approach since it drops fewer observations, though in practice the two approaches provide similar results, since missing observations are a small fraction of the total in our data.

A.3 Decomposing Hours per Adult

There are several ways to calculate the contribution of differences in the employment rate (ER) and hours per worker (H^e) to the differences in hours per adult (H^a) across country income groups. One possibility is as follows:

$$\begin{aligned}
\ln(H^a_{low}) - \ln(H^a_{high}) &= [\ln(ER_{low}) + \ln(H^e_{low})] - [\ln(ER_{high}) + \ln(H^e_{high})] \\
\ln(H^a_{low}) - \ln(H^a_{high}) &= [\ln(ER_{low}) - \ln(ER_{high})] + [\ln(H^e_{low}) - \ln(H^e_{high})] \\
1 &= \underbrace{\frac{\ln(ER_{low}) - \ln(ER_{high})}{\ln(H^a_{low}) - \ln(H^a_{high})}}_{ER \text{ Contribution}} + \underbrace{\frac{\ln(H^e_{low}) - \ln(H^e_{high})}{\ln(H^a_{low}) - \ln(H^a_{high})}}_{H^e \text{ Contribution}}
\end{aligned} \tag{A.4}$$

Using the averages for each country-income group yields a contribution of the log employment rate differences of 79.3% and of 22.4% of the log hours per worker differences. Note that the two numbers do not add up to 100% as suggested by Equation (A.4). This is because average hours per adult in country income group i are not equal to the product of the average employment rate in country group i and the average hours per worker in country group i:

$$H^a_i = \frac{1}{N_i}\sum_c^{N_i} H^a_c = \sum_c^{N_i} ER_c \times H^e_c \neq \frac{1}{N_i}\sum_c^{N_i} ER_c \times \frac{1}{N_i}\sum_c^{N_i} H^e_c \;\forall\; i = low, med, high.$$

If we would do this composition between two countries rather than country groups, the two contributions would add up to 100%. Obviously, this is not the only possible decomposition. An alternative to the log hours decomposition via the levels works as follows:

$$\begin{aligned}
H^a_{low} - H^a_{high} &= ER_{low} \times H^e_{low} - ER_{high} \times H^e_{high} \\
H^a_{low} - H^a_{high} &= ER_{low}\left(H^e_{low} - H^e_{high}\right) + H^e_{high}\left(ER_{low} - ER_{high}\right) \\
1 &= \underbrace{\frac{ER_{low}\left(H^e_{low} - H^e_{high}\right)}{H^a_{low} - H^a_{high}}}_{H^e \text{ Contribution}} + \underbrace{\frac{H^e_{high}\left(ER_{low} - ER_{high}\right)}{H^a_{low} - H^a_{high}}}_{ER \text{ Contribution}}
\end{aligned} \tag{A.5}$$

Using this specification, the contribution of the employment rate differences to the hours per adult difference is 76.3% and of the contribution of hours per worker is 26.4%. For the same reason as explained above the two fractions do not add up to 100%. Moreover, this decomposition is not unique. We weight the hours per employed difference by ER_{low} and the employment rate difference by H^e_{high}. Using as weights ER_{high} and H^e_{low} yields a contribution of the employment rate differences to the hours per adult difference of 83.6% and of hours per worker of 19.1%. Based on these three possible decompositions, we conclude that employment rates account for around three quarters of the cross-country differences in hours per adult, while hours per employed account for around one quarter.

A.4 Hours Data from Penn World Tables and Total Economy Database

Recently, the Penn World Tables (PWT, version 8.1 onwards) and the Total Economy Database (TED), run by the Conference Board, also released data on annual hours worked per worker, in addition to employment rates, for an unbalanced panel of countries, with the earliest data coming from the year 1950. The following comparison is based on PWT 8.1 and TED May 2015 Release. Data on hours worked per worker are missing much more often than data on employment rates. In the recent cross-section of countries, the hours data from both data sources cover less countries from the bottom third of the world income distribution than we do: compared to our 9 core countries and 20 total countries, the TED covers only 4 countries (Bangladesh, Pakistan, Sri Lanka, and Vietnam), and the PWT none. Moreover, the four countries in the TED have an average GDP per capita that is one third higher than the average GDP per capita in our bottom tercile countries. As such, both data sets are ill suited to answer the question of how hours worked in poor countries compare to the ones in rich countries nowadays.

Yet, going back in time, both data sources cover more countries that would qualify as low-income countries today. Several notable concerns arose from reading the documentation and the sources cited to construct these databases,

however. The PWT report that hours worked are taken from the TED. Yet, the PWT apparently decided to include less observations and in many cases, the year-country observations between both data sets do not coincide, pointing to data revisions. TED itself reports the sources for each country-year observation. Many of these observations are either interpolated between two years (often spread a decade apart), or even extrapolated based on average growth rates from countries with available data in the same continent. Once we exclude these inter- or extrapolated observations, we are left with 215 observations from 14 countries (down from originally 304 observations from 17 countries) that would qualify as low-income countries today.

Looking further into the sources of these data, we still find extrapolated or interpolated values. For example, the value for Peru in 1950 is taken from Maddison (1995), who in turn reports that it is set to the average value of six other available Latin American countries. Most of the 215 observations, namely 196 observations from 8 countries, come from the Asian Productivity Organization (APO). The APO, while being generally very careful in constructing total hours worked, itself uses interpolations and extrapolations to get complete time series of hours for the Asian countries. From conversations with the APO,[1] we got some information on the sources of their data for five out of the eight countries (China, Indonesia, Sri Lanka, Thailand, and Vietnam). Only for 42 out of the 113 respective country-year observations do the original sources include any data on hours. Even for these, the sources might not necessarily use the same concept of hours across countries, and the hours measurement might not necessarily cover the entire year, but we have no further information on this. As an example for a richer country, namely Singapore, Nomura and Amano (2012) report for the APO construction of hours that, while in theory they would like to use actual hours, they have to rely on "mid-year estimates of usual weekly hours worked multiplied by 48 weeks per year as a crude assumption".

Thus, we want to stress that the comparability over time and across countries of data from the TED is much more questionable than the comparability of our data. Moreover, there are much less independent observations in the country-year database than a first look suggests.

A.5 Potential Biases Resulting from Survey Methodology

No matter how carefully one tries to ensure comparability of different surveys across countries, there is still the potential for bias arising from limitations in the survey methodology. One such potential bias may arise from surveyors avoiding specific regions during periods of peak regional labor demand, such as harvest times, to maximize participation in the surveys. If anything, we argue that it would bias downward our measured average hours in low-income countries, which have higher shares of employment in agriculture. Thus, the actual difference between hours in low- and high-income countries would be even larger than the one we report above for our core countries. An indication for our prior is that hours in low-income countries fall if we add countries with partial-year surveys to the set of core countries, as shown in Table 1. This is much less pronounced in middle- and high-income countries, in which seasonality likely plays less of a role.

A second potential bias may arise from vacation periods, such as annual leave and public holidays. As Bick et al. (2017) show, hours lost due to vacation days and public holidays are likely underreported even in surveys that cover each week of the year. While data on vacation days across countries are not readily available, we suspect that vacation days are increasing in GDP per capita, which would imply that hours worked are likely overstated to a larger degree in high-income countries than in low-income ones.

A third possible bias comes from child labor, i.e. hours worked by individuals under our lower age bound of fifteen. Since child labor is more prevalent in low-income countries (Basu, 1999), this would mean that actual hours worked may be even higher in low-income countries compared to rich countries than our current calculations suggest. Thus, all these three potential biases indicate that our reported hours difference between low- and high-income countries is likely a lower bound of the true difference.

A fourth potential concern is that innumeracy among survey respondents in poor countries could lead to potential over- or underestimates of hours worked there. In this regard, it is reassuring that hours worked per adult are substantially higher in poor countries even for highly educated individuals.

[1] We are extremely grateful to Koji Nomura for providing this information.

A.6 Constructing Hourly Wages from the Micro Data

A.6.1 The European Union Statistics on Income and Living Conditions

We use the year 2005 for all countries from the EU-SILC, except for Hungary (2006), Romania and Latvia (2007), Bulgaria and the UK (2008), Ireland (2009), and Switzerland (2010). For UK and Ireland, these are the first years in which their ELFS surveys cover the entire year, so we use the same years here as in the main analysis. For the other countries, these are the first years in which the needed earnings measures are available in the EU-SILC. There are two earnings measures available in the EU-SILC, though not both for all countries. The first is a measure of annual earnings from the previous year, distinguishing between earnings from paid employment and from self-employment; the second is a measure of current monthly earnings in the main job from paid employment. The EU-SILC only contain a measure of usual weekly hours worked, not a measure of actual hours worked. Therefore, we use usual hours rather than actual hours as the variable to construct the wage rate. When we rely on monthly earnings from the main job, we divide by usual hours from the main job; when we rely on total earnings from all jobs, we divide by usual hours from all jobs. The question of usual hours refers to the current time period. Therefore, if available, we use the measure of current monthly earnings in the main job (this is the case for Austria, Belgium, Bulgaria, Greece, Hungary, Ireland, Italy, Poland, Portugal, Spain, Switzerland, and the UK); only if this variable is not available we recur to annual earnings. To correct for the use of usual hours rather than actual hours, we multiply individual hours with the country-specific ratio of average actual hours worked (from the ELFS) to average usual hours worked (from the EU-SILC). Thereby, we make sure that the average hours measure in each country is the same as in our aggregate analysis. Note that this correction has no effect on the estimation of individual hours on wages within each country, i.e. the estimation of equation 2.

A.6.2 Wage from Paid Employment

We exclude Namibia, Laos and South Africa because of missing earnings data. For Namibia, the data set provides a measure of total household per capita income, which however amounts on average to almost twice GDP per worker and thus seems implausible.

Earnings refer to gross earnings whenever available, but in some countries to net earnings, and in many countries it is not clear whether reported earnings are gross or net. If earnings are provided at another frequency than monthly, we convert them to monthly earnings by multiplying with an appropriate factor (i.e. 4.33 for weekly earnings, 0.33 for quarterly earnings, etc.). For daily earnings, we multiply with days worked per week times 4.33 or days worked per month; if none of these are reported, we drop the observation from the sample, since we do not want to make an assumption how many days an individual works per month.

Calculating a wage is not always straightforward if an individual has multiple jobs. Our main priority is to calculate a wage by dividing earnings and hours referring to the same job(s). Both earnings and hours can in principle be available for (i) main job, (ii) all paid employment jobs, and/or (iii) all jobs, but the actual availability differs across countries. We proceed in five steps to calculate the best available wage rate for each individual (referring here always to individuals whose main job is from paid employment):

1. If an individual has only one job, we divide total earnings by total hours.
2. If an individual has multiple jobs, but all of them are from paid employment, we proceed the same way.
3. If an individual has multiple jobs, but not all of them from paid employment, we divide earnings from all paid employment jobs by hours from all paid employment jobs, i.e. excluding both earnings and hours from self-employment.
4. If an individual has multiple jobs, but either earnings or hours from a second (or further) job in paid employment are not available, we divide earnings from the main job by hours from the main job. Since for the US we know earnings only from the main job, the US falls in this category.
5. Last, for all other individuals, to whom we could not yet assign a wage rate because of missing information, we divide total earnings from paid employment jobs, or if not available earnings from main job, by total hours.

In the US we only have earnings in the main job (i.e. the fourth case above), but no actual hours worked in the main job (only in all jobs). Thus we construct a wage rate dividing earnings in the main job by usual hours worked in the

main job as recommended by NBER in the documentation of the dataset. As for the European countries, we correct for the use of usual hours rather than actual hours by multiplying individual hours with the ratio of average actual hours worked to average usual hours worked.

Within each country, we omit the top and bottom one percent of the constructed wage observations. Table A.1 shows the share of workers in paid employment, as well as average hours of workers in paid employment, for the three country income groups. Workers in paid employment are clearly a positively selected sample in the low-income countries.

In the baseline regressions of hours on wages, we always use the same hours variable on the left hand side that we use to construct the wage rate on the right hand side. Table A.2 shows that our results from Table 8 are robust to including only individuals with exactly one job, and excluding the top and bottom decile of wages within each country.

A.6.3 Wage from Paid Employment Plus Self-Employment

For the majority of countries, we have a measure of self-employment earnings on the individual level. In this case, we calculate the hourly wage as the sum of total earnings from paid and self-employment divided by total hours in paid and self employment. We now go through the exceptions. In Cambodia, Iraq, Kenya, Malawi, Rwanda, Timor L'Este, Uganda, and Vietnam, self-employment earnings are only available at the household level. In Tanzania, agricultural self-employment earnings are available at the household level, but non-agricultural self-employment earnings (only from the main job) are available at the individual level, and we sum all self-employment earnings up at the household level. In these nine countries, we calculate total household earnings by adding all individual earnings from paid employment to the household earnings from self-employment. Total household earnings are then divided by the sum of the hours worked of all household members to get a household wage rate. Similarly, the sum of hours worked of all household members is divided by the number of employed household members to get average household hours conditional on working. Thus, in the end each household is represented with the same household wage rate and average household hours observation assigned to each working member. For Mauritius, self-employment earnings only refer to the main job, not all jobs. The surveys from Pakistan, Turkey, and the US do not include any self-employment earnings, and for these three countries total earnings are thus equal to earnings from paid employment. For self-employment from farming activities, we typically calculate earnings as revenues minus costs, which are often reported for individual crops, animals, etc., and then added up. The value of own consumption of self-produced goods is mostly explicitly asked for and then added to revenues. Self-employment earnings in the EU-SILC are sometimes gross and sometimes net earnings; if both are available in a country, we always take gross earnings. Since self-employment earnings in the EU-SILC are only available as annual earnings from the previous year, we also use annual earnings from paid employment from the previous year in this analysis, even if monthly earnings from paid employment in the current period are available. The only exception is if someone does not have any additional earnings apart from earnings from paid employment in the main job; in this case, we continue to work with monthly earnings, if available.

Within each country, we again omit the top and bottom one percent of the constructed wage observations. Table A.3 shows the share of workers from paid and self employment with missing wages, and the hours per worker conditional on observing a wage. The cross-country pattern in these hours resembles the one of hours per worker for the full sample.

A.6.4 Validity Check of Wage Measures

Given that clearly the earnings measures face shortcomings and the underlying data are sometimes of unclear quality, we conduct a validity check to gauge their general reliability. To do that, we construct a measure of average earnings per worker in each country, summing up all earnings from paid employment and dividing by workers in paid employment for the first earnings measure, and summing up all earnings (including self-employment earnings) and dividing by all individuals working positive hours for the second earnings measure. We then compare the respective average earnings per worker to GDP per worker reported in the Penn World Tables. Figure A.3 shows these two ratios. Focusing first on the earnings measure from paid employment, the ratio amounts on average to 0.57 in the low-income countries, 0.31 in the middle-income countries, and 0.34 in the high-income countries. This confirms positive selection into paid employment jobs in low-income countries. For total earnings, the ratios amount on average to 0.47, 0.31, and 0.37, respectively, for the low-, middle-, and high-income countries. Given that the labor share of GDP is roughly two thirds, but that the labor share also includes some components not measured in earnings (e.g. employer contributions

to social security), these ratios are somewhat on the low side, but overall not too far off. While for some individual countries they raise some concerns about the measurement of earnings (e.g. in Kenia the ratio is over 1.2 for earnings from paid employment, but in Malawi just over 0.1), this validity check shows that our earnings measures are overall reasonable.

Table A.1: Hours Worked and Shares of Workers in Paid Employment

	Country Income Group		
	Low	Middle	High
Hours per Worker: All Workers	38.4	41.7	35.4
Hours per Worker: Wage Workers (*Non-Missing Wages*)	48.2	43.6	34.5
Share of Wage Workers (in %)	23.4	56.7	82.3
Share of Workers w/ Missing Status (in %)	3.7	0.7	0.1
Share of Wage Workers w/ Missing Wage (in %)	16.1	10.9	3.0

Note: This table shows in row 1 hours per worker from our main sample, and in row 2 hours per worker from the sample of wage workers for whom we can construct a wage observation. Rows 3 gives the share of wage workers among all workers, and row 4 gives the share of workers for whom we don't know whether they are in paid employment or self-employed; thus, 100 minus the shares in rows 3 and 4 give the share of self-employed workers. Row 5 gives the share of wage workers for whom we do not observe a wage among all wage workers.

Table A.2: Robustness Exercises on Elasticities of Hours

Panel A: All Individuals with Only One Job

	ln Hours	ln Hours	ln Hours	ln Hours
ln (GDP per Hour)	−0.148	–	−0.001	–
	(0.040)		(0.059)	
ln (Hourly Wage)	–	−0.161	−0.160	−0.133
		(0.018)	(0.039)	(0.030)
Country Fixed Effects	No	No	No	Yes
R^2	0.107	0.189	0.189	0.270
Obs.	457,715	457,715	457,715	457,715

Panel B: Excl. Individuals with Wage in 1st and 10th Decile in Each Country

	ln Hours	ln Hours	ln Hours	ln Hours
ln (GDP per Hour)	−0.120	–	−0.040	–
	(0.038)		(0.077)	
ln (Hourly Wage)	–	−0.098	−0.071	−0.088
		(0.040)	(0.078)	(0.052)
Country Fixed Effects	No	No	No	Yes
R^2	0.096	0.104	0.106	0.249
Obs.	560,288	560,288	560,288	560,288

This table reports the coefficients from estimating Equation 2 on a data set containing individual observations with only wages from paid employment of both sexes but with different samples from 42 and 46 countries in Panels A and B, respectively. The dependent variable is the logarithm of individual hours worked per worker. The explanatory variables are the ones listed in each row, plus age and age squared. The first panel includes only individuals for which we know that they have exactly one job, which is a job in paid employment. The second panel excludes the top and bottom decile of individual wage observations within each country. Standard errors are clustered at the country level and given in parentheses.

Table A.3: Hours Worked and Shares of Workers in Paid or Self Employment

	Country Income Group		
	Low	Middle	High
Hours per Worker: All Workers	38.4	41.7	35.4
Hours per Worker: All Workers (*Non-Missing Wages*)	39.3	43.9	35.4
Share of Workers w/ Missing Wage (in %)	2.7	17.9	0.6

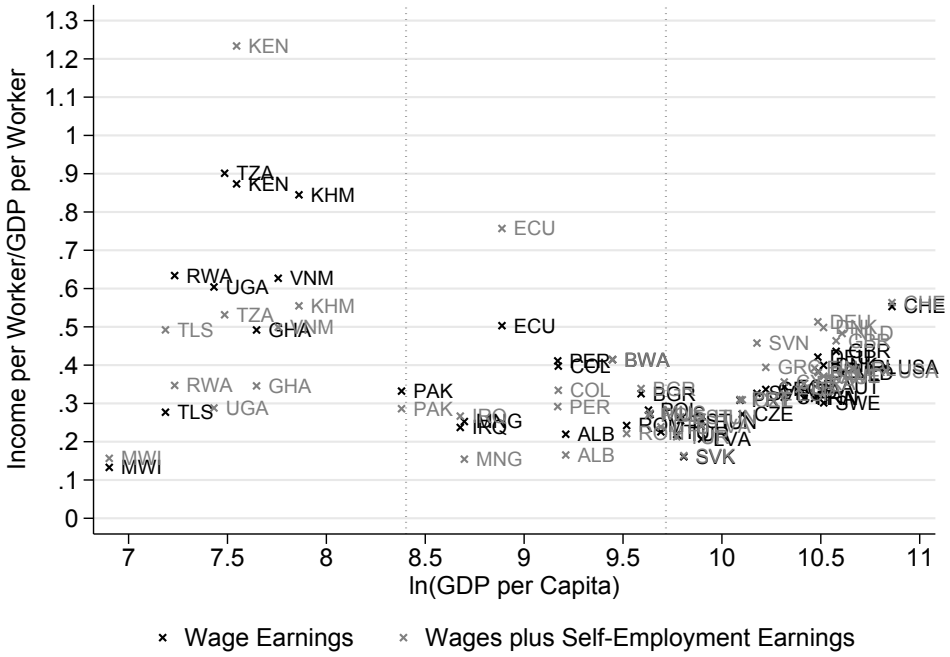
Note: This table shows in row 1 hours per worker from our main sample, and in row 2 hours per worker from the sample of workers for whom we can construct a wage observation from paid or self-employment. Row 3 gives the share of workers for whom we do not observe a wage.

Table A.4: Evidence on Division Bias

	Dep. Var.: Hours	β_w	Obs.
Baseline - USA	Usual Main J.	0.125 (0.002)	162,281
Robustness	Usual Main J.	0.124 (0.002)	156,348
	Actual All J.	0.125 (0.002)	
Baseline - Turkey	Actual All J.	−0.303 (0.002)	88,138
Robustness	Actual All J.	−0.303 (0.002)	88,138
	Usual Main J.	−0.211 (0.001)	
Baseline - Peru	Actual All J.	−0.108 (0.006)	15,356
Robustness	Actual All J.	−0.150 (0.014)	3,262
	Usual All J.	0.056 (0.011)	
Baseline - Mongolia	Actual All J.	−0.213 (0.012)	1,222
Robustness	Actual All J.	−0.213 (0.012)	1,222
	Usual Main J.	−0.189 (0.014)	
Baseline - Uganda	Actual All J.	−0.176 (0.022)	671
Robustness	Actual All J.	−0.155 (0.035)	360
	Usual All J.	−0.055 (0.030)	
	Usual Main J.	−0.070 (0.033)	

Note: This table reports the coefficient β_w from an estimation of the log of individual hours worked on the log of the individual wage in data from the US, Turkey, Peru, Mongolia, and Uganda, including age and age squared as explanatory variables. Standard errors are given in parentheses. The first row for each country shows baseline results, in which the dependent hours variable corresponds to the one used to construct hourly wages. The second row for each country repeats the baseline estimation on a restricted sample of individuals for whom an alternative hours measure to the one used in the baseline estimation is available. The third row then shows results if the alternative hours measure is used as the dependent variable. For Turkey, Peru, Mongolia, and Uganda, the baseline hours measure is a measure of actual hours worked, while the alternative one is a measure of usual hours worked (either in the main job or in all jobs). For the US, it is the other way round. For Uganda, there are two alternative hours measures.

Figure A.3: Ratio of Income per Worker over GDP per Worker



Note: This figure shows the ratio of income per worker over GDP per worker from the Penn World Tables, plotted against the logarithm of GDP per capita. Income per worker is defined as earnings from paid employment divided by number of workers in paid employment for the black dots, and as earnings from paid employment plus earnings from self-employment divided by the total number of workers for the gray dots.

B Model Appendix

In the following paragraphs, we first provide more details on the model setup. We then describe the calibration and model fit.

The household budget constraint amounts to $c_t + k_{t+1} = w_t h_t + (1 + r_t)k_t$, where w_t and r_t are the return to working and capital k_t. There is a representative firm with a Cobb-Douglas production function $y_t = A_t k_t^{\theta} h_t^{1-\theta}$, where y_t denotes output, A_t the efficiency of production, and θ the capital share. As is standard, household optimality implies that the marginal rate of substitution between leisure and consumption equals the price ratio. Profit maximization of the representative firm implies that the marginal product of labor equals the wage. Combining these two conditions yields the following Equation (4), which we restate here:

$$h_t = \left[\frac{1-\theta}{\left(\frac{c_t}{y_t} - \frac{\bar{c}}{y_t} \right) \alpha} \right]^{\frac{\phi}{1+\phi}}.$$

Rather than solving the full-dynamic model, Prescott (2004) interprets Equation (4) as the equilibrium value of hours worked given parameters and values for the consumption-output ratio. Our specification adds values for the subsistence consumption-output ratio as in Ohanian et al. (2008). The consumption-output ratio, directly taken from the data, captures the dynamic component of the neo-classical growth model. The difference between the consumption-output ratio and the subsistence consumption-output ratio in turn determines the size of the income effect. In the context of our data, the higher is output, y, the lower is the role of subsistence consumption for determining hours, holding everything else equal. This naturally generates a decreasing relationship between hours worked and output. Figure B.1 shows the model inputs for each country, evaluated at the calibrated value of $\bar{c}$, and Figure B.2 plots the data and model hours against GDP per capita. One key observation is that for Malawi the calibrated subsistence consumption exceeds actual consumption. As a consequence, Equation (4) does not predict hours for Malawi. This is however not a problem for our welfare analysis, in which the calibrated value of subsistence consumption cancels out as it is the same across countries. While we match on average hours per adult perfectly in low- and high-income countries, the model explains about half of the difference between middle- and high-income countries. Finally, Figure B.3 plots the ratio of welfare to consumption in each country.

As a last remark, it is worthwhile to mention that Prescott (2004) and Ohanian et al. (2008) use the above framework to quantify in how far cross-country differences in consumption taxes, labor income taxes, and government consumption can account for the differences in hours per adult across countries and over time in OECD countries. To keep the analysis focused, we abstract from these public policies. In a robustness exercise for a subset of countries for which we have information on these policies, we find that introducing them does not substantively change our main conclusions; results are available on request.

Figure B.1: Country-specific $\frac{c}{y} - \frac{\bar{c}}{y}$

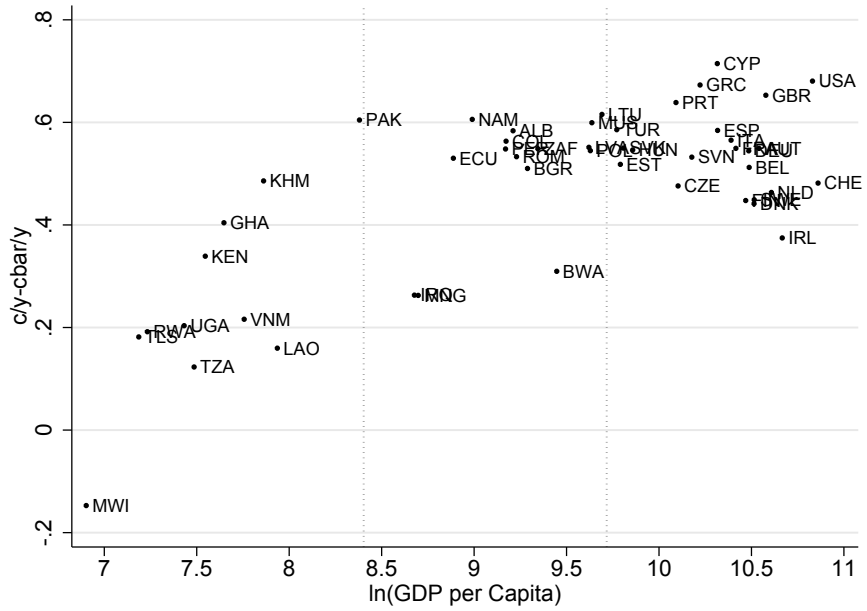


Figure B.2: Average Hours per Adult – Model vs. Data

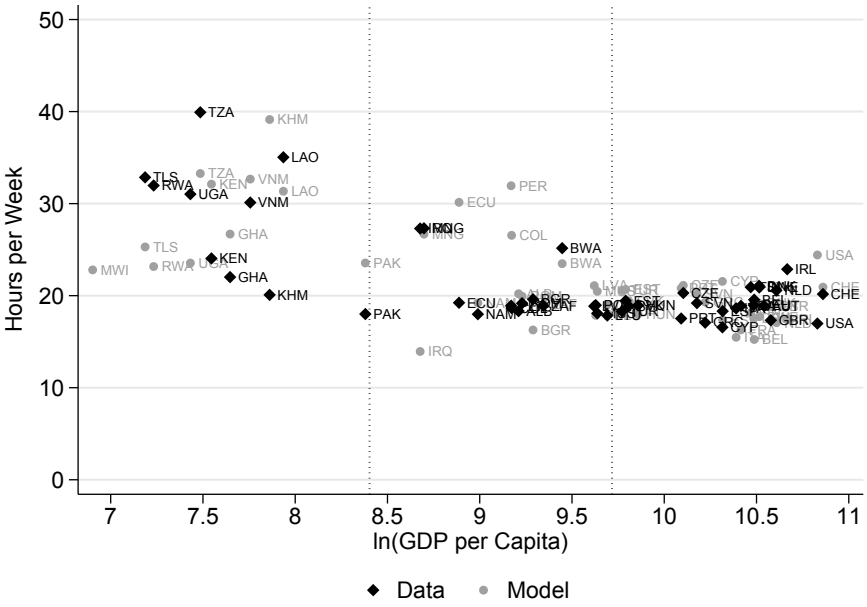
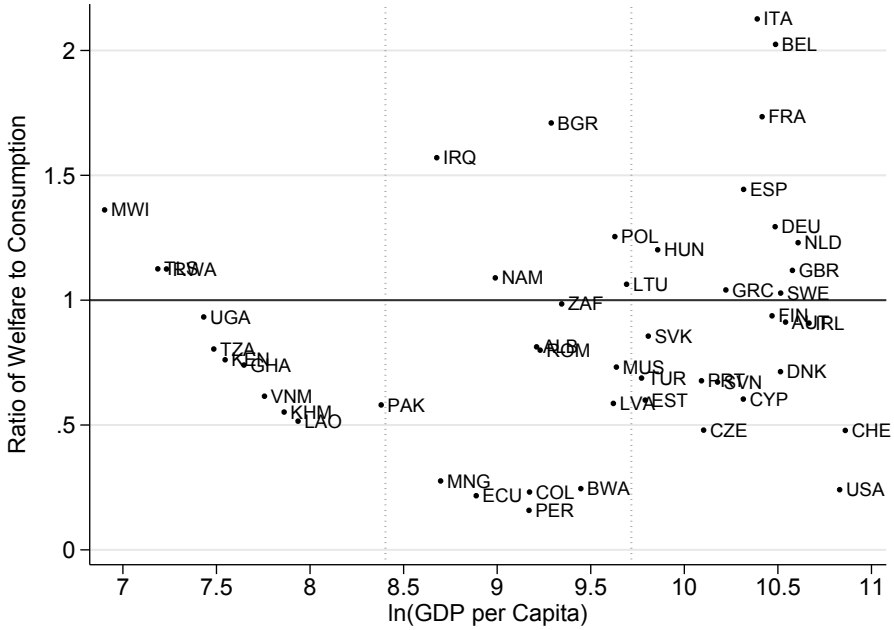


Figure B.3: Welfare vs. Consumption



C Appendix Tables and Figures

Table C.1: Data Sources

Country	Source	Year	Tercile	Core	Sample Size
Albania	Labor Force Survey	2012	2	Yes	39,820
Angola	Inquerito Integrado sobre o Bem-Estar da Populacao (IBEP)	2008	2	No	30,622
Armenia	Labor Force Survey	2008	2	No	6,065
Australia	Household, Income and Labor Dynamics in Australia (HILDA-CNEF)	2005	3	No	13,571
Austria	European Union Labor Force Survey	2005	3	Yes	168,399
Belgium	European Union Labor Force Survey	2005	3	Yes	88,670
Benin	Enquete Modulaire Integree sur les Conditions de Vie des Menages (EMICOV)	2010	1	No	41,515
Bolivia	Encuesta de Hogares (RIGA)	2005	1	No	10,436
Bosnia and Herzegovina	Living Standards Measurement Survey (LSMS)	2001	2	No	7,738
Botswana	Labor Force Survey	2005	2	Yes	19,390
Brazil	National Household Sample Survey (PNAD)	2009	2	No	300,734
Bulgaria	European Union Labor Force Survey	2005	2	Yes	123,108
Cambodia	Cambodia Socio-Economic Survey (CSES)	2011	1	Yes	11,542
Canada	Census of Canada (IPUMS)	2001	3	No	119,179
Chile	National Socioeconomic Survey (CASEN)	2009	3	No	193,231
Colombia	Integrated Household Survey (GEIH)	2008	2	Yes	593,287
Cyprus	European Union Labor Force Survey	2005	3	Yes	31,719
Czech Republic	European Union Labor Force Survey	2005	3	Yes	213,620
Denmark	European Union Labor Force Survey	2005	3	Yes	47,280
Ecuador	Encuesta de Condiciones de Vida (LSMS)	2005	2	Yes	35,947
Egypt	Labor Market Panel Survey	2006	2	No	25,661
El Salvador	VI Population and V Housing Census	2007	2	No	75,106
Estonia	European Union Labor Force Survey	2005	3	Yes	15,006
Finland	European Union Labor Force Survey	2005	3	Yes	36,544
France	European Union Labor Force Survey	2005	3	Yes	278,613
Germany	European Union Labor Force Survey	2005	3	Yes	406,931
Ghana	Living Standards Survey (LSMS)	1998	1	Yes	15,003
Greece	European Union Labor Force Survey	2005	3	Yes	271,319

Table C.1: Data Sources

Country	Source	Year	Tercile	Core	Sample Size
Guatemala	Encuesta Nacional Sobre Condiciones de Vida (ENCOVI) (LSMS)	2000	2	No	21,204
Hungary	European Union Labor Force Survey	2005	3	Yes	265,945
Indonesia	Sakernas (National Labor Force Survey)	2010	2	No	776,344
Iraq	Household Socio-Economic Survey (LSMS)	2007	2	Yes	75,500
Ireland	European Union Labor Force Survey	2009	3	Yes	211,337
Italy	European Union Labor Force Survey	2005	3	Yes	605,063
Jamaica	Population Census (IPUMS)	2001	2	No	111,153
Jordan	Population and Housing Census (IPUMS)	2004	2	No	95,908
Kazakhstan	Living Standards Measurement Survey (LSMS)	1996	2	No	5,141
Kenya	Kenya Integrated Household Budget Survey	2005	1	Yes	38,732
Kyrgyzstan	Living Standards Measurement Survey (LSMS)	1998	1	No	9,720
Lao PDR	Expenditure and Consumption Survey	2007	1	Yes	29,785
Latvia	European Union Labor Force Survey	2005	2	Yes	18,639
Lesotho	Integrated Labor Force Survey	2008	1	No	32,799
Lithuania	European Union Labor Force Survey	2005	2	Yes	40,232
Malawi	Integrated Household Survey (LSMS)	2004	1	Yes	27,526
Malaysia	Population and Housing Census (IPUMS)	1991	2	No	110,172
Mali	Permanent Household Survey (EPAM)	2010	1	No	9,383
Mauritius	Continuous Multi Purpose Household Survey (CMPHS)	2010	2	Yes	31,746
Mexico	Population and Housing Census (IPUMS) 2010	2010	2	No	80,761
Mongolia	Labor Force Survey	2006	2	Yes	10,371
Namibia	Household Income and Expenditure Survey	2009	2	Yes	27,852
Netherlands	European Union Labor Force Survey	2005	3	Yes	359,045
Nicaragua	National Household Survey Measurements on Living Standards (EMNV) (LSMS)	2005	1	No	97,193
Pakistan	Labor Force Survey	2011	1	Yes	149,566
Panama	Encuesta de Niveles de Vida (ENV) (LSMS)	2008	2	No	18,493
Paraguay	Encuesta de Hogares (Household Survey)	2011	2	No	13,758
Peru	Encuesta Nacional de Hogares (ENAHO)	2010	2	Yes	61,695
Philippines	Labor Force Survey (Jan, Apr, Jul, Oct)	2010	2	No	540,352

Table C.1: Data Sources

Country	Source	Year	Tercile	Core	Sample Size
Poland	European Union Labor Force Survey	2005	2	Yes	186,439
Portugal	European Union Labor Force Survey	2005	3	Yes	162,255
Romania	European Union Labor Force Survey	2005	2	Yes	234,399
Russia	Russia Longitudinal Monitoring Survey (RLMS)	2009	3	No	11,677
Rwanda	Enquete Integrale sur les conditions de vie des menages 2010-2011	2011	1	Yes	39,197
Serbia	Living Standards Measurement Survey (LSMS)	2007	2	No	14,925
Slovak Republic	European Union Labor Force Survey	2005	3	Yes	97,867
Slovenia	European Union Labor Force Survey	2005	3	Yes	62,173
South Africa	Combined Quarterly Labor Force Surveys	2008	2	Yes	255,039
Spain	European Union Labor Force Survey	2005	3	Yes	522,325
Sweden	European Union Labor Force Survey	2005	3	Yes	147,131
Switzerland	European Union Labor Force Survey	2010	3	Yes	67,121
Taiwan	Labor Force Survey	2011	3	No	682,792
Tajikistan	Living Standards Survey (LSMS)	2007	1	No	19,032
Tanzania	National Panel Survey (LSMS)	2009	1	Yes	9,519
Timor Leste	Living Standards Survey (LSMS)	2007	1	Yes	14,368
Tunisia	Enquete Nationale sur la Population et l'Emploi de 2010 (ENPE 2010)	2010	2	No	409,242
Turkey	Household Labor Force Survey	2011	3	Yes	385,180
Uganda	National Panel Survey (LSMS)	2010	1	Yes	9,050
United Kingdom	European Union Labor Force Survey	2008	3	Yes	156,469
United States	Current Population Survey - Merged Outgoing Rotation Group (NBER)	2005	3	Yes	322,991
Venezuela	Population and Housing Census (IPUMS)	2001	2	No	76,502
Vietnam	Household Living Standards Survey (LSMS)	2002	1	Yes	92,718

Table C.2: GDP per Capita in 2011 US-Dollar, PPP-adjusted

Sample	Country Income Group		
	Low	Middle	High
Penn World Tables 9.0 (2005)	2,130	9,139	36,284
	(60)	(61)	(61)
Core Countries	2,113	10,882	32,384
	(11)	(15)	(23)
Core + All non-core Countries	2,228	9,122	32,052
	(18)	(34)	(28)

Note: The number of countries in each group is in parentheses. The last version of the PWT that includes Timor L'Este is version 7.1. We impute GDP per capita for Timor L'Este as follows. We use the ratio of GDP per capita (based on *rgdpch*) in Timor L'Este to GDP per capita in Indonesia for the year 2007 from PWT 7.1 and then multiply that ratio with GDP per capita (based on *rgdpe*) from Indonesia from PWT 9.0 for 2007.

Table C.3: Home Production Hours by Individual Country and Category

	cooking	cleaning	childcare	shopping	collwf	Tercile
BEN	–	6.9	–	3.9	–	1
GHA	6.9	1.9	8.0	2.8	3.1	1
KGZ	–	–	9.8	–	3.7	1
LSO	–	–	2.1	0.1	1.9	1
MLI	5.1	2.7	3.3	–	3.1	1
PAK	16.4	13.9	7.2	2.1	0.8	1
RWA	6.9	4.3	–	1.3	3.4	1
TLS	–	–	2.6	–	5.0	1
EGY	10.8	9.3	9.6	2.6	0.3	2
GTM	8.6	8.3	10.3	1.7	3.6	2
IRQ	7.3	5.7	3.2	2.1	–	2
KAZ	9.1	8.2	10.1	3.2	–	2
MNG	6.3	4.4	2.0	1.0	4.3	2
ZAF	7.7	7.2	2.2	1.4	0.0	2
AUT	6.6	7.8	3.0	4.4	0.0	3
DEU	5.5	6.1	2.3	3.7	0.0	3
ESP	7.3	6.5	2.1	3.3	0.0	3
FRA	6.4	6.0	2.1	4.4	0.0	3
GBR	4.8	4.9	3.8	3.9	0.0	3
ITA	7.6	7.8	1.9	3.9	0.0	3
NLD	5.9	3.6	2.9	3.8	0.0	3
RUS	4.6	4.4	3.7	2.4	–	3
USA	3.6	4.9	3.0	4.3	0.0	3

Table C.4: Elasticities of Hours to Aggregate and Individual Income (Incl. Earnings from Self-Employment)

Panel A: Both Sexes

	ln Hours	ln Hours	ln Hours	ln Hours
ln (GDP per Hour)	−0.033	–	0.055	–
	(0.037)		(0.044)	
ln (Hourly Wage)	–	−0.050	−0.081	−0.088
		(0.027)	(0.031)	(0.020)
Country Fixed Effects	No	No	No	Yes
R^2	0.023	0.040	0.046	0.174
Obs.	1,043,812	1,041,707	1,041,707	1,041,707

Panel B: Men

	ln Hours	ln Hours	ln Hours	ln Hours
ln (GDP per Hour)	−0.024	–	0.085	–
	(0.040)		(0.043)	
ln (Hourly Wage)	–	−0.054	−0.102	−0.107
		(0.030)	(0.033)	(0.022)
Country Fixed Effects	No	No	No	Yes
R^2	0.027	0.055	0.071	0.225
Obs.	604,743	604,031	604,031	604,031

Panel C: Women

	ln Hours	ln Hours	ln Hours	ln Hours
ln (GDP per Hour)	−0.045	–	0.026	–
	(0.033)		(0.041)	
ln (Hourly Wage)	–	−0.050	−0.066	−0.084
		(0.025)	(0.028)	(0.018)
Country Fixed Effects	No	No	No	Yes
R^2	0.028	0.039	0.040	0.146
Obs.	439,069	437,676	437,676	437,676

Note: This table reports the coefficients from an estimation of a variant of equation 2 on a data set containing individual observations from 46 countries. The dependent variable is the logarithm of individual hours worked per worker. The explanatory variables are the ones listed in each row, plus age and age squared. Standard errors are clustered at the country level and given in parentheses.

Table C.5: Labor Productivity Differences Across Countries Using *rgdpo* Instead of *rgdpe*

	Country Income Group			
	Low	Middle	High	High/Low
GDP per Worker	7.7	39.2	100.0	13.0
GDP per Hour Worked	6.7	32.2	100.0	15.0

Note: Labor productivity is computed as the average labor productivity within each country income group relative to the average labor productivity of the high-income group, which is normalized to 100. Only core countries are included in the analysis. In our baseline exercise, we use *rgdpe* to calculate GDP per hour and find 15 percent larger labor productivity differences across countries than implied by GDP per worker. Feenstra et al. (2015) recommend using *rgdpo* rather than *rgdpe* for productivity comparisons across countries. This also implies 15 percent larger labor productivity differences across countries when relying on GDP per hour worked than implied by GDP per worker.

Figure C.1: Average Hours Worked per Adult: Core vs. All Non-Core Countries

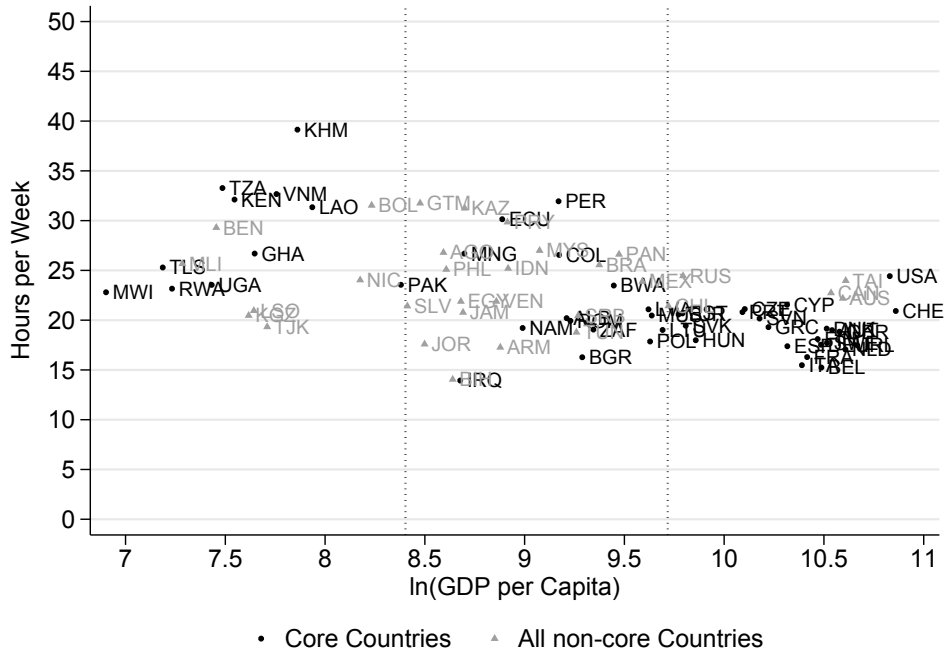


Figure C.2: ln(Hours per Adult) vs. ln(GDP per hour)

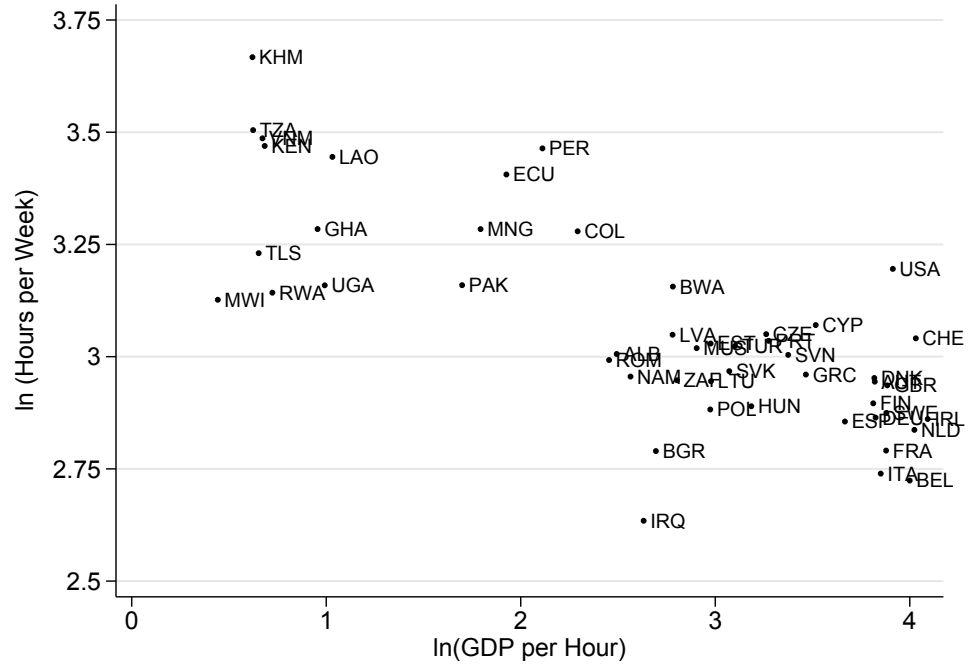
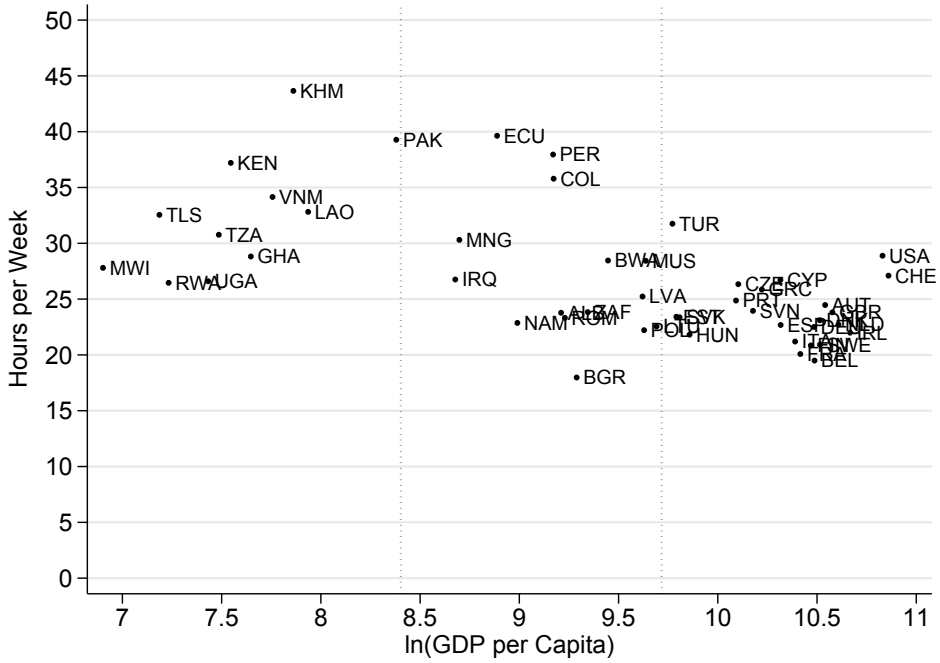


Figure C.3: Average Hours per Adult by Sex

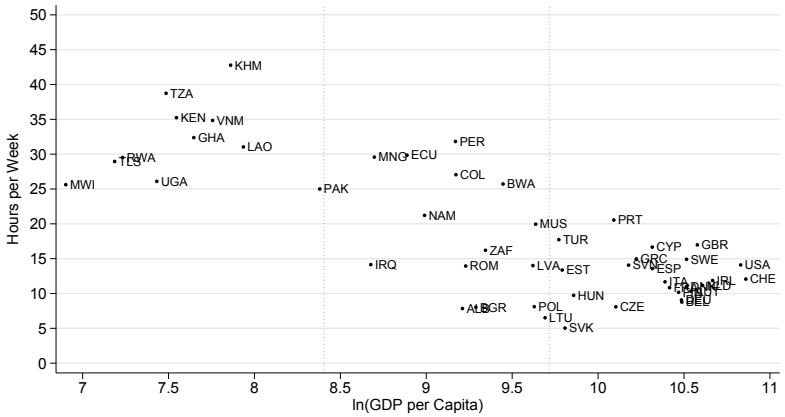
(a) Men



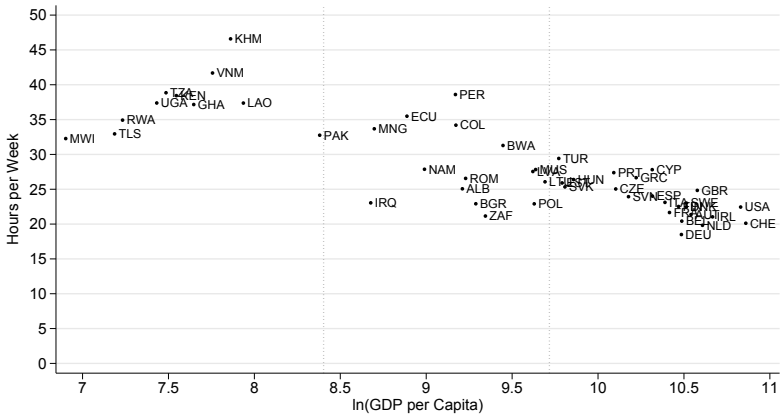
(b) Women

Figure C.4: Average Hours per Adult by Education (Ages 25+ only)

(a) Less than Secondary School



(b) Secondary School Completed



(c) More than Secondary School

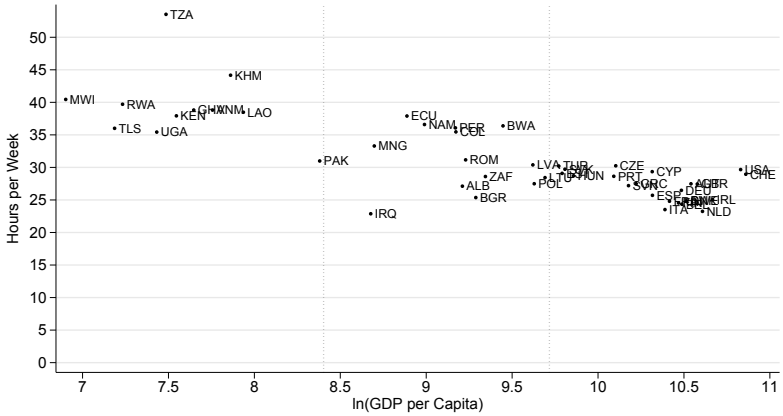
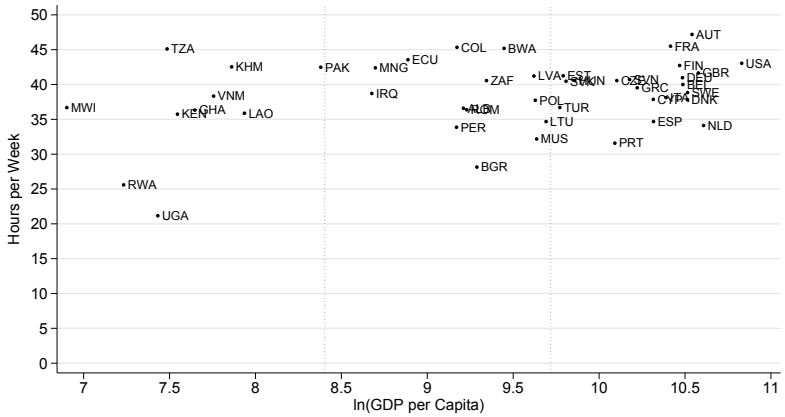
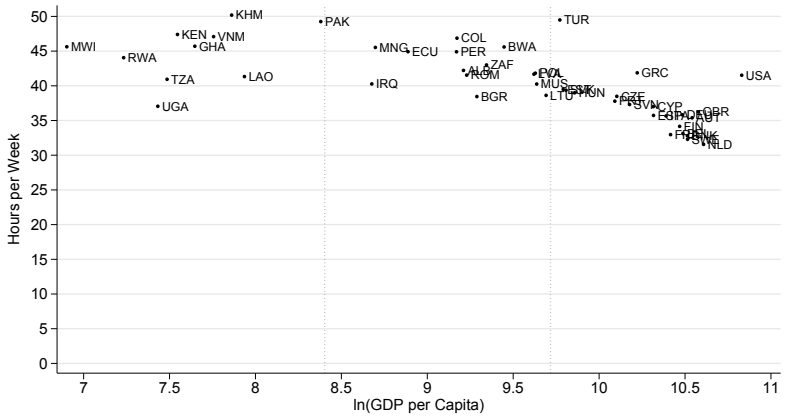


Figure C.5: Average Hours per Worker by Sector

(a) Agriculture



(b) Manufacturing



(c) Services

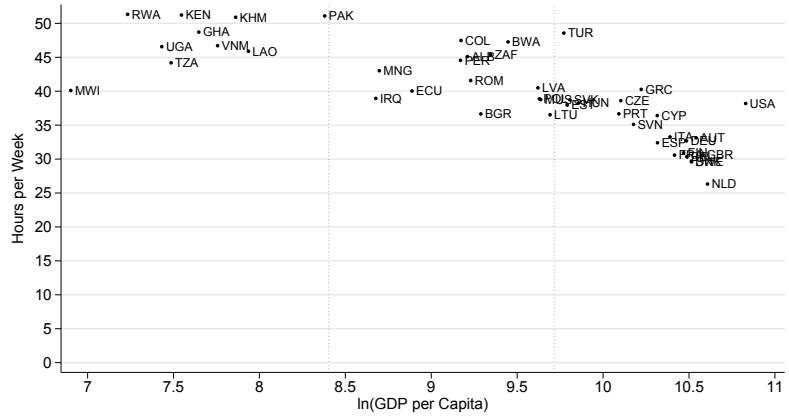


Figure C.6: Hours By Wage (Incl. Earnings from Self-Employment) Deciles For All Employees

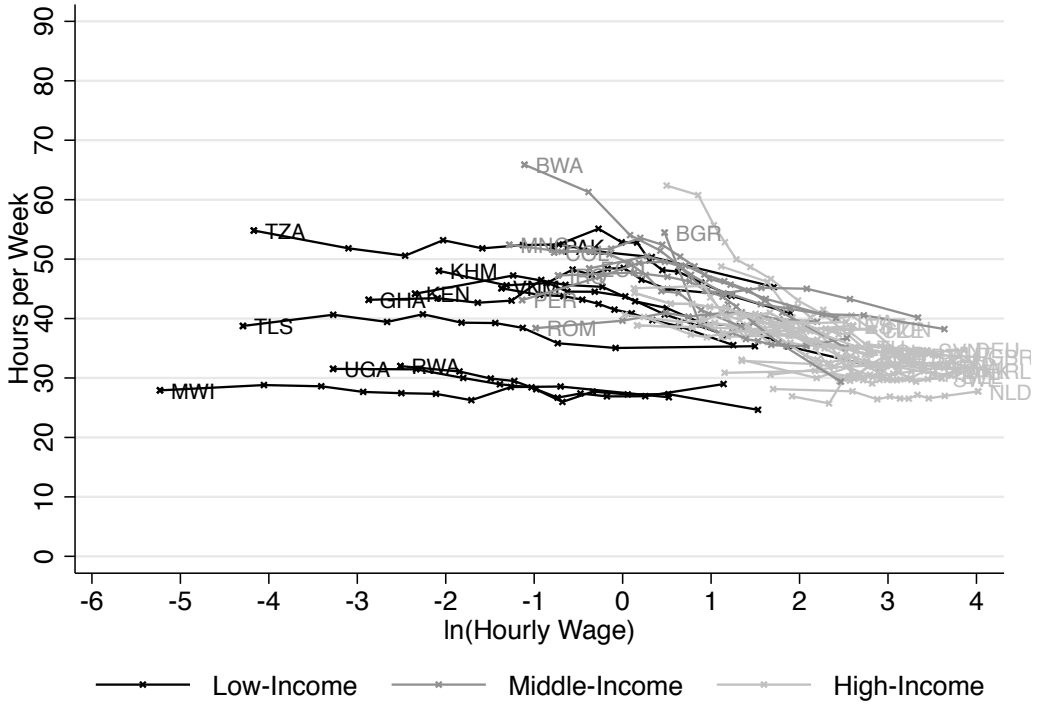
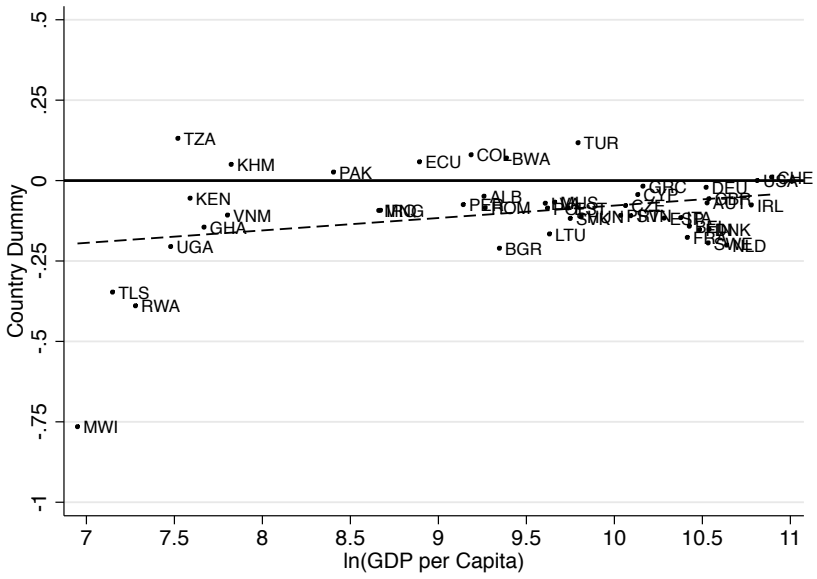
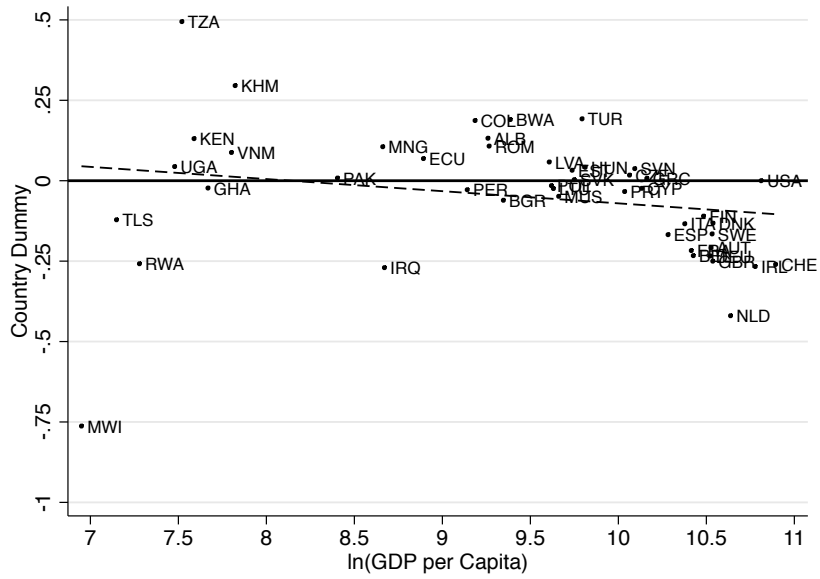


Figure C.7: Country Fixed Effects from Regression in Column 4 of Table 8

(a) Men



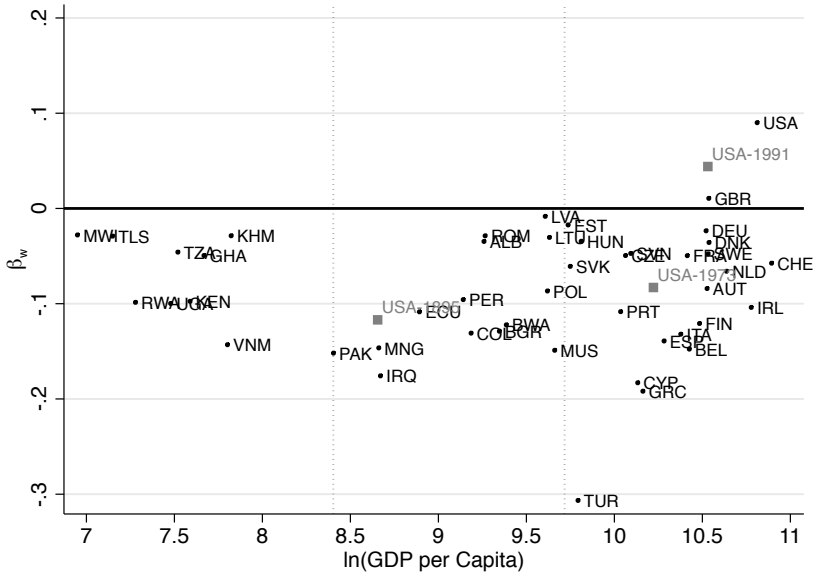
(b) Women



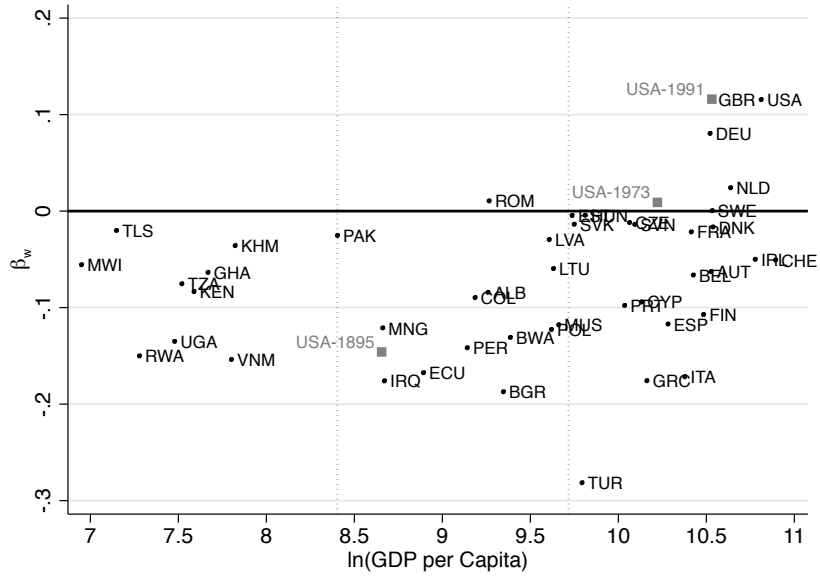
Note: The figure plots the country fixed effects from the regression in column 4 of Table 8 against the logarithm of GDP per adult in each country. The fixed effects for men come from Panel B of Table 8, and the fixed effects for women from Panel C. A linear fit is included.

Figure C.8: Country-Specific Elasticities of Hours to Wages (Incl. Earnings from Self-Employment)

(a) Men



(b) Women



Note: The figure shows the country-specific elasticities of hours to wages, represented by the coefficient β_w from a regression of individual hours worked on individual wages, controlling for age and age squared. Wages include earnings from self-employment. The upper panel shows results for a sample of men only, and the lower panel of women only. The gray data points are corresponding coefficients from US samples of different years (1890s, 1973, and 1991) reported in Costa (2000).

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