Declining Hours Worked Among Entrepreneurs

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Abstract

I document that average weekly hours worked of entrepreneurs in the US decreased by around five hours between 1989–2022. At the same time, the hours of workers only decreased by around one hour. Compositional changes account for one fifth of the decline and the trend is robust along several dimensions including gender, age, occupation, industry, number of children and status of incorporation. I show that this is not unique to the US and a similar trend can be observed in Germany as well. I use an occupational choice model disciplined by data on hours, income and the aggregate share of entrepreneurs to explore possible sources. The model suggests a key role for a drop in the curvature of the entrepreneurial profit function possibly coming from a change in the competitive environment.

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1 Introduction

The declining trend in market hours in the US economy is a well-established fact, as evidenced by Aguiar and Hurst (2016) for males aged between 21 and 75 years. However, it is noteworthy that this decline is primarily associated with the extensive margin, while the intensive margin is believed to be relatively stable. The picture is slightly different for women who increased their labor supply steadily up until 2000, with most of the increase again coming from the extensive margin. This paper uses data from the Current Population Survey (CPS) to show that there was also a significant decline along the intensive margin of hours worked for both male and female entrepreneurs.[1] More specifically, in 1989 the average entrepreneur worked around 4.4 hours more than the average worker conditional on working positive hours. Three decades later, this gap has entirely disappeared. In the first part of the paper, I show that compositional changes can only account for about one fifth of the average decline and that this trend is surprisingly broad-based and visible regardless of gender, age, occupation, industry, number of children and income. Changes in the share of entrepreneurs working more than 45 hours seems to suggest that this decline is primarily driven by a reduction of long hours. In addition, I confirm that this trend is also visible in the Socio-Economic Panel of Germany during the same time period. This finding is of significant importance, given the commonly held belief that entrepreneurs are vital drivers of economic growth and young firms account for a big share of newly created jobs. Recent papers have pointed to a drop in the share of entrepreneurs and a slowing business dynamism (see Decker et al., 2014 and Decker et al., 2016) with lower entry and exit rates. However, to the best of my knowledge this paper is the first to document a decline in the working hours of entrepreneurs.

Where does this decline come from and what implications does this have? The paper tries to answer these questions by first carefully documenting the declining hours worked for entrepreneurs and then ruling out possible explanations that can be directly verified in the data: a change in the composition of entrepreneurs (e.g a higher share of female entrepreneurs with lower hours), a shift of hours within the household, a shift of hours within the year and the role of other jobs. None of these possible explanations can account for the decline in the hours of entrepreneurs. I then set up a simple model of labor supply and explore several mechanisms that the model suggests could have caused the decline: 1) entrepreneurs have seen a much higher increase in their unearned income, 2) the level of wages and entrepreneurial productivity have developed differently or 3) the shape of the profit function has changed in a way such that it affected the earnings elasticity with respect to hours of entrepreneurs. While the first two predictions of the simple model can be verified in the data, the third hypothesis is more difficult to test directly.

The paper proceeds as follows. Section 2 describes the data sources used for hours and income and Section 3 documents the empirical facts about the declining hours and the income development of entrepreneurs and workers. I then introduce a simple static model of labor supply and derive some predictions for different potential causes in Section 4. Section 5 concludes.

[1] In this paper, entrepreneurs are defined as both unincorporated and incorporated self-employed individuals.

2 Data

The main data source used to document the evolution of hours worked among workers and entrepreneurs is the Current Population Survey (CPS) basic monthly survey. A survey administered by the Census Bureau. Each household in the survey is interviewed for four consecutive months and after a break of eight months again for the same four months of the calendar year. Thus, the survey contains a short panel dimension. I restrict the sample to individuals in the labor force between 22 and 60 years old. This is to exclude individuals entering part-time retirement. The hours worked are measured using the question on actual hours worked on all jobs including overtime in the week before the interview. This question is asked from 1989 and onward in each month. The distinction whether a respondent is a worker or an entrepreneur is made using the variable describing the class of worker. I classify respondents as entrepreneurs if they report "working for self". That includes unincorporated as well as incorporated self-employed individuals.[2] I also exclude unpaid family members from my sample. The final sample consists of around 700,000 observations per year, of which 80,000 observations are from entrepreneurs. This large sample allows me to analyze differences in hours worked among many sub-groups. In all analyses I use the CPS sample weights.

In addition, data on income is taken from the March Annual Social and Economic Supplement of the CPS (CPS ASEC). Unfortunately, self-employed respondents are not included in the earner-study of the outgoing rotation group (interview month four and eight), which provides good estimates of earnings and is usually the preferred way to measure wages (see Bick et al., 2022). In order to measure income consistently for workers and entrepreneurs I use information on total personal income that includes income from all sources including capital income. I define earned income coming from wage, business and farm income and use this to separate earned income from unearned income contained in total personal income. Information on federal and state tax liability does not come from direct questioning of respondents, but are simulation outputs of the Census Bureau's tax model. The March supplement also started asking the question on actual hours worked already at the beginning of the survey in 1962. However, up until 1983 the incorporated self-employed individuals were included in the group of people that "work for other". Since this supplement is only asked in March every year, the resulting sample size with the same restrictions as for the basic monthly survey is 50,000 with about 5,000 observations on entrepreneurs. All data from the CPS is extracted using IPUMS-CPS (see Flood et al., 2022).

As a robustness analysis, I also document that the same decline is visible in other surveys that ask about hours worked: the Survey of Consumer Finances (SCF) and the Panel Study of Income Dynamics (PSID), where I make equivalent sample restrictions.[3] Furthermore, I also use the Socio-Economic Panel (SOEP), a German longitudinal survey starting in 1984, to confirm that the declining trend is also visible in Germany.

[2]The precise question text in the survey is the following: "(Were/Was) (name/you) employed by government, by a private company, a nonprofit organization, or (was/were) (you/he/she) self -(or working in the family business?)?" The respondent is then asked follow-up questions about the incorporation status of the business.

[3]The analysis of this part is not yet included in this version of the draft.

3 Empirical Findings

The first part of this section documents the fall in hours worked among entrepreneurs and decomposes the average decline into components from different sub-groups. It shows that compositional changes cannot account for the decline, which is broad based among all demographic sub-groups. The second part of this section documents the development of income between workers and entrepreneurs. It shows that there was a significant fall in the income of entrepreneurs and that any differences to workers have disappeared. Since entrepreneurs reduced their hours worked as well, the hourly income of entrepreneurs and the hourly wage of workers have evolved similarly.

3.1 Hours

Figure 1 shows the average actual hours worked of workers and entrepreneurs in the week prior to the CPS basic monthly interview for everyone in the sample that has positive working hours. It shows a strong decline in the hours of entrepreneurs over the last 30 years, while those of workers have remained relatively stable. The CPS ASEC allows us to go slightly further back in time, but we cannot separate the incorporated self-employed from the workers. Nevertheless, Figure 9 in Appendix A shows that this declining trend has already started in the 1960s for the unincorporated self-employed males. The fact that this trend is visible among males only, indicates that the decline is not driven by a higher share of female entrepreneurs, who work on average a few hours less. A more thorough analysis of the contribution of compositional changes to the declining trend follows further down.

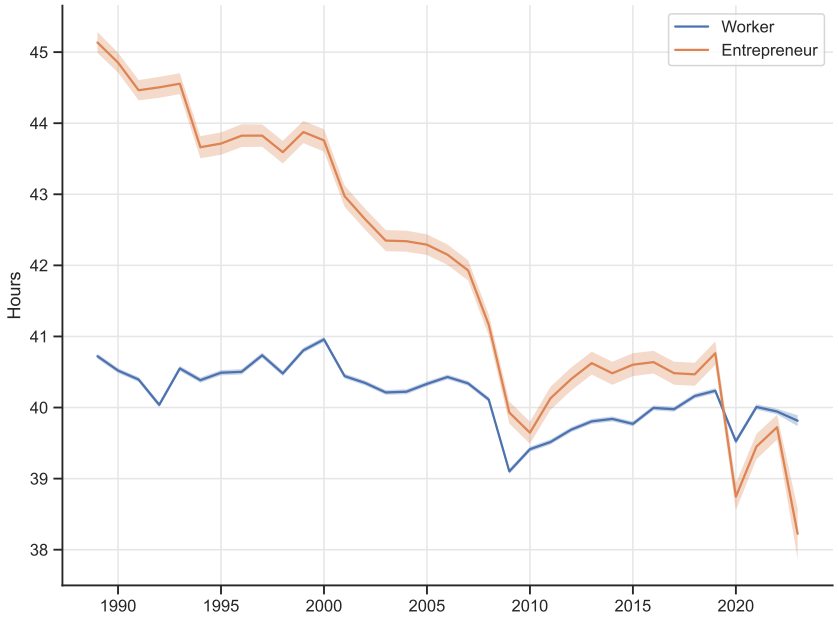


Figure 1: Average weekly hours worked of workers and entrepreneurs.

Notes: Data from the CPS basic monthly survey. The average hours are conditional on working positive hours. Weighted by the CPS sample weights. Shaded areas indicate 95 % confidence intervals.

Table 1: Average annual decline in hours worked.

Dependent Variable:	Weekly Hours				
Model:	(1)	(2)	(3)	(4)	(5)
Variables					
Entr	4.370***	2.880***	1.108***		
	(0.0501)	(0.0484)	(0.0573)		
t × Entr	-0.1477***	-0.1279***	-0.1334***	-0.1233***	-0.1158***
	(0.0027)	(0.0026)	(0.0031)	(0.0031)	(0.0031)
Fixed-effects					
Year	Yes	Yes	Yes	Yes	Yes
Year-Gender		Yes	Yes	Yes	Yes
Year-Age		Yes	Yes	Yes	Yes
Year-Education		Yes	Yes	Yes	Yes
Year-Children		Yes	Yes	Yes	Yes
Year-Occ.			Yes	Yes	Yes
Year-Ind.			Yes	Yes	Yes
Year-Incorporated			Yes	Yes	Yes
Entr-Gender				Yes	Yes
Entr-Age				Yes	Yes
Entr-Education				Yes	Yes
Entr-Children				Yes	Yes
Entr-Occupation					Yes
Entr-Industry					Yes
Entr-Incorporated					Yes
Fit statistics					
Observations	19,305,283	19,305,283	19,305,283	19,305,283	19,305,283
R^2	0.006	0.071	0.105	0.107	0.113
Within R^2	0.004	0.001	0.001	0.0006	0.0005

Clustered (individual) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Notes: Data from the CPS basic monthly survey. "Entr" denotes entrepreneur. Age codes 3-year age bins. Education codes 5 different educational attainment groups ranging from "less than high-school" to "more than Bachelor". Occupation (Occ.) codes 25 occupation groups and industry (Ind.) codes 9 industry groups. "t" is coded as years since 1989.

At the same time as there was a decline in hours, also the share of entrepreneurs declined. Several papers have pointed at a slowing business dynamism, e.g. Decker et al. (2014, 2016), Salgado (2020) and Jiang and Sohail (2023), that has changed the composition of entrepreneurs. Figure 10 in Appendix A shows the evolution of the share of entrepreneurs by gender over the same time period. In order to formerly decompose the decline in the difference of the hours between workers and entrepreneurs by sub-groups, I first run a fixed-effects regression that takes out flexible time trends for different sub-groups by: gender, age, education, number of children, occupation group, industry group and incorporation status, that are common to both entrepreneurs and workers. However, taking out different time trends by sub-groups does not account for the fact that entrepreneurs in these different sub-groups might have different *levels* of hours worked and a change in the composition of male entrepreneurs towards more female entrepreneurs could thereby create a decline in the average hours worked among entrepreneurs. In order to keep the composition fixed, we can add different means for entrepreneurs in the different sub-groups. The last column of Table 1 does exactly this and reports that weekly hours worked

within each sub-group has declined by around 0.116 hours. We can now decompose this coefficient and report the decline separately by the different sub-groups.

Let us first start with a decomposition by basic characteristics. Figure 2 shows how the slope coefficient varies along different dimension (e.g. gender or education). The average decline estimated in Table 1 is depicted with the dashed vertical line. Note that the horizontal axis has negative numbers and thus a marker further to the left indicates a stronger decline. The figure reveals that we can detect a significant decline among all sub-groups and that it is stronger among males and individuals with more children. Appendix A contains more figures that decompose the slope coefficient along age (Figure 11), occupation groups (Figure 12) and industry groups (Figure 13). They all confirm that this decline is broad-based along all age-groups, 23 out of 25 occupation groups (four insignificant) and all twelve industry groups (one being insignificant).

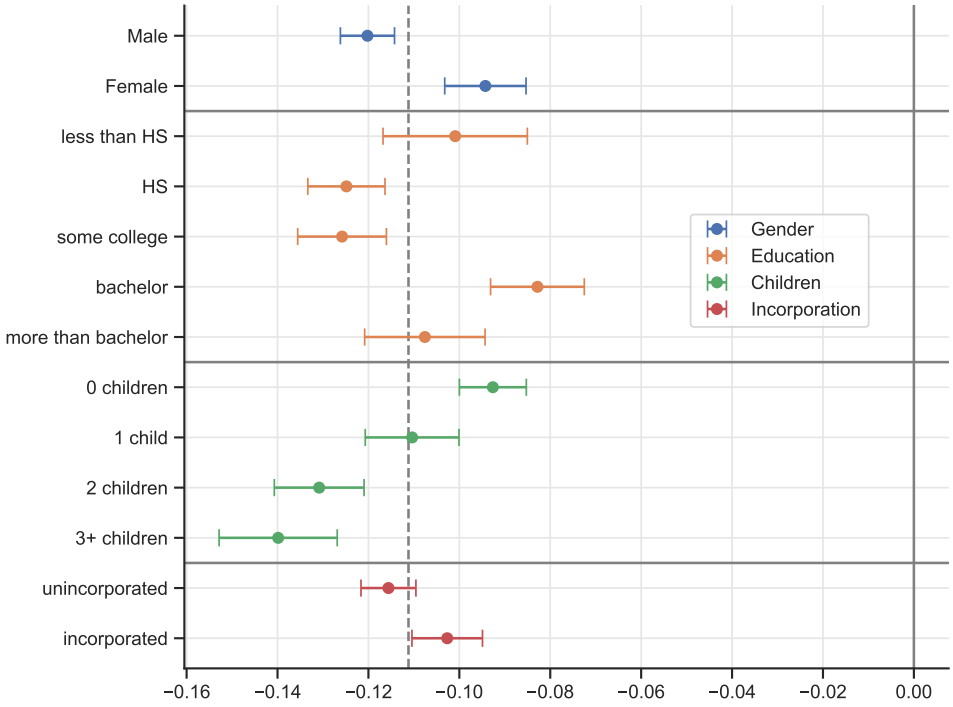


Figure 2: Decomposition of the decline in average weekly hours worked of entrepreneurs relative to workers by basic characteristics.

Notes: Data from the CPS basic monthly survey. Whiskers indicate 95 % confidence intervals.

In order to see where in the hours distribution the decline of the weekly hours comes from, we can look at the changes of the composition of weekly hours by nine hours bins in Figure 3. Not surprisingly, the hours distribution of workers is very concentrated at 36-40 hours and this concentration has slightly increased over time mainly due to the fact that it became more common for women to work full time. Generally, the distribution of hours among entrepreneurs is less concentrated and one can clearly see that they work longer hours in the beginning of my sample. Looking at the shifts in the composition of the hours distribution reveals that the decline in the average weekly hours comes primarily from the top of the hours distribution. The share of entrepreneurs that work more than 40 hours declines from around 50 percent to around 30 percent. Most of this shift seems

to be absorbed by the 36-40 hours bin, while also the share of entrepreneurs working 35 hours or less has increased slightly.

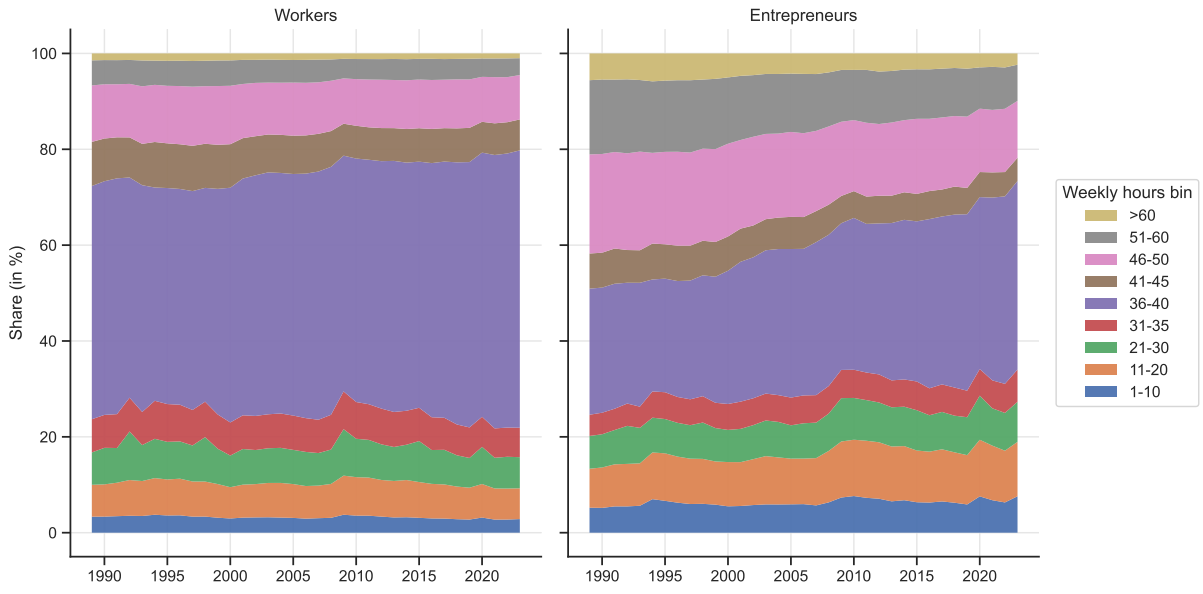


Figure 3: The distribution of hours over time for workers and entrepreneurs.

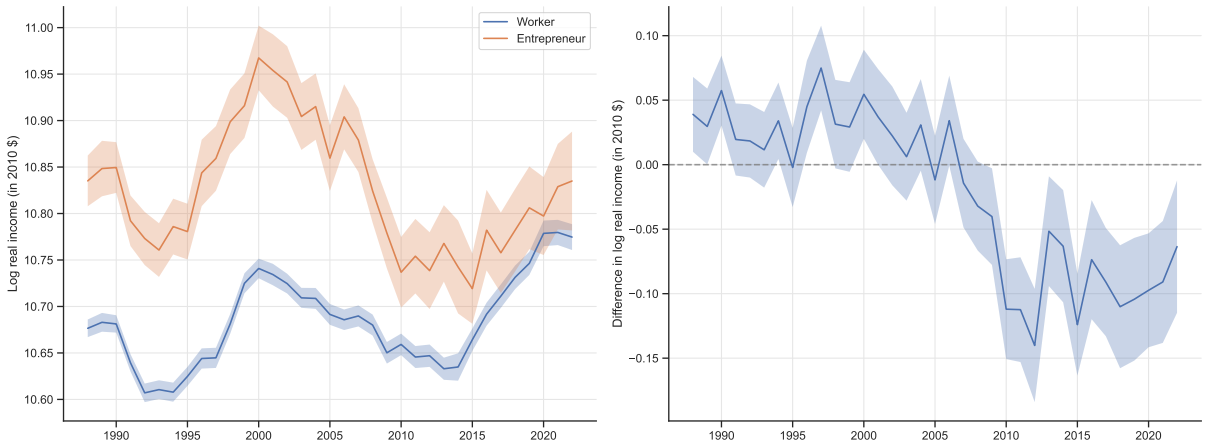
Notes: Data from the CPS basic monthly survey.

Furthermore, Appendix A contains more robustness analyses and shows that this is not driven by individuals holding other jobs (see Figure 14), a shift within the year (see Figure 15 for a plot with annual hours) and a shift within the household (see Figure 16 for a plot of hours for the average family member). Interestingly, the same trend with a similar magnitude can also be observed in Germany (see Figure 17).

3.2 Income

As the following section (Section 4) shows, the decision of how many hours of work to supply is tightly linked to the wage or the marginal return of another hour that is put into one's business. This motivates a closer look whether there are differential trends in income for workers and entrepreneurs.

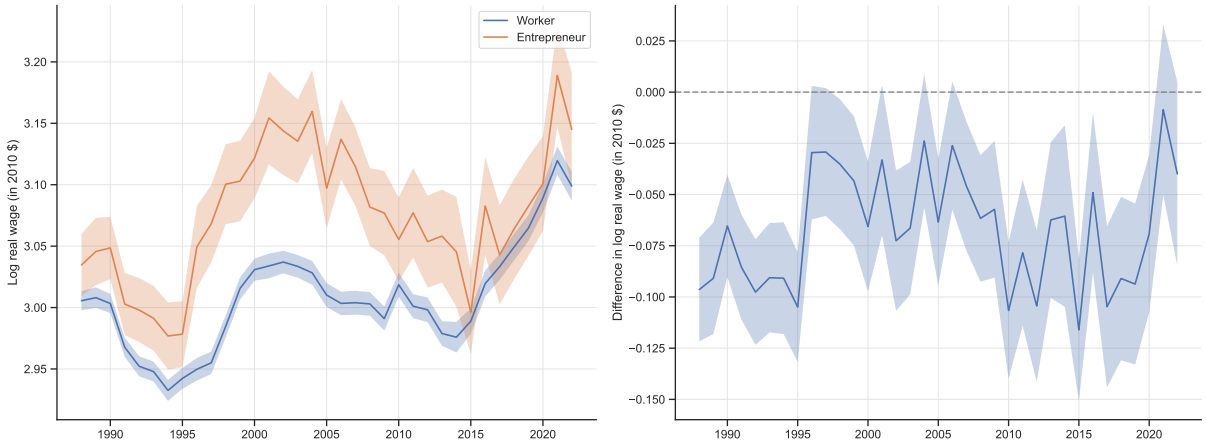
Income for entrepreneurs is only observed in the March supplement and thus the entire analysis on income is based on the CPS ASEC. Since several other mechanisms might have affected the income development of women and the decline in hours worked is even stronger among men, the analysis in this section will only focus on men. Further, I restrict the sample to individuals that reported to have worked at least 350 hours (about 2 months of full-time employment) in the previous year. I then calculate the implied hourly income as total earned income (income from wages, business or farm) divided by total annual hours and exclude everyone that has an implied hourly real income of half the federal minimum wage.



(a) Log real income **(b)** Difference with fixed effects removed

Figure 4: Development of log real income for workers and entrepreneurs.

Notes: Data from the CPS ASEC. Sample includes males with at least 350 annual hours and an implied hourly income of more than half the federal minimum wage. Shaded areas indicate 95 % confidence intervals. Fixed effects in panel (b) include: year x (age, education, number of children, 25 occupation group, 12 industry groups, state).



(a) Log real wage **(b)** Difference with fixed effects removed

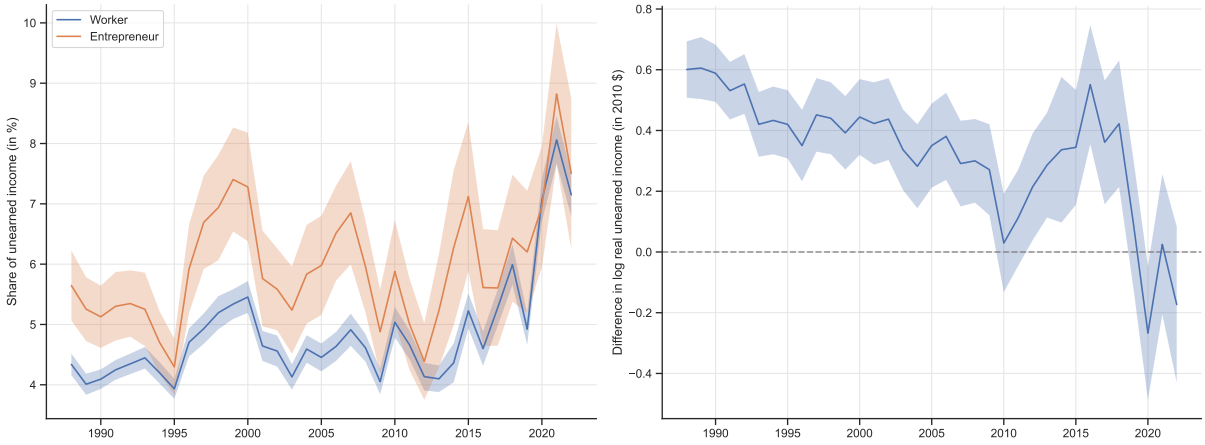
Figure 5: Development of log real wages for workers and entrepreneurs.

Notes: Wage here is defined as the hourly earned income, i.e. the total annual wage, business and farm income divided by annual hours worked. Data from the CPS ASEC. Shaded areas indicate 95 % confidence intervals. Fixed effects in panel (b) include: year x (age, education, number of children, 25 occupation group, 12 industry groups, state).

Figure 4 shows that entrepreneurs had on average slightly higher income than workers, but this gap has disappeared as the income of entrepreneurs decreased and aligned with the income of workers. Panel (b) of Figure 4 shows the log difference in income between entrepreneurs and workers after accounting for some demographic fixed effects. Interestingly, the fixed effects can already account for all of the initial income gap and suggests that there was actually a gap *opening* up in the income between entrepreneurs and workers. At the same time, entrepreneurs also decreased their working hours, thus this gap is much smaller for the log real wage or hourly earned income. This suggests that wages and

the productivity of entrepreneurs evolved similarly. The fairly big jump in the difference of the wage in 1996 in panel (b) of Figure 5 partly comes from the redesign of the CPS questionnaire that captured income sources in more detail and led to an increase in the income of entrepreneurs in my sample. Thus, the data before 1996 should be interpreted with caution.

As the simple model in the next section shows, an increase in unearned income will unambiguously decrease the optimal hours choice. Therefore, I now turn to the role of unearned income and how its share has changed for workers and entrepreneurs. As Figure 6 shows, unearned income is only a small fraction and accounts for about 5-6 % of total personal income. Most importantly, however, is the change of its share over time, which has declined relative to workers. Thus, a simple model of labor supply would predict that the decline in the relative share should increase the relative hours supplied by entrepreneurs. The opposite of what we observe in the data.



(a) Share of unearned income **(b)** Difference in log unearned income

Figure 6: Share of unearned income for workers and entrepreneurs.

Notes: Data from the CPS ASEC. Sample includes males with at least 350 annual hours and an implied hourly income of more than half the federal minimum wage. Shaded areas indicate 95 % confidence intervals.

4 A Simple Model of Labor Supply

As the previous section showed, the decline in hours among entrepreneurs is a relatively stable long-run fact. Here, I describe a simple model that purposefully abstracts from dynamic considerations to illustrate the basic mechanisms that could lie behind this decline.

The model features workers and entrepreneurs that have the same utility over consumption and receive dis-utility from labor. More specifically, I will assume MaCurdy (1981) preferences with the functional form:

$$u(c,h) = \frac{c^{1-\sigma}-1}{1-\sigma} - \varphi\frac{h^{1+\frac{1}{\theta}}}{1+\frac{1}{\theta}}. \tag{1}$$

Both workers and entrepreneurs can choose their hours freely, but they potentially differ in the shape of their earnings function. In order to stay most general, I will assume an earnings function of the following form:

$$E(z,h) = zh^{\eta}. \tag{2}$$

For workers, this earnings function is typically assumed to be linear in hours, i.e. $\eta = 1$ and the productivity z is given by the wage rate. For entrepreneurs, Appendix B.1 shows that this functional form can be derived from a standard decreasing returns to scale production function.[4] One possible mechanism that directly arises from this is if the earnings elasticity with respect to hours η has changed over time for entrepreneurs as their profit function might have changed.

Thus, we can write the utility maximization problem of both workers and entrepreneurs in the following way:

$$\max_{c,h} \; u(c,h) \quad \text{s.t.:} \quad \begin{aligned} c &= E(z,h) + y \\ h &\geq 0, c \geq 0 \end{aligned} \tag{3}$$

where consumption is the sum of earnings $E(z,h)$ and unearned income y that could be anything from unemployment benefits for part of the year to capital income and dividends. Solving this problem gives us a labor-supply condition that implicitly defines optimal hours:

$$h = \left(\frac{[E(z,h)+y]^{-\sigma}}{\varphi} \frac{\partial E(z,h)}{\partial h} \right)^{\theta} = \left(\frac{[zh^{\eta}+y]^{-\sigma}}{\varphi} \eta \frac{zh^{\eta}}{h} \right)^{\theta}. \tag{4}$$

Note that if we have log utility ($\sigma = 1$) and no unearned income ($y = 0$), we get a closed form expression for hours that is independent of productivity z as income and substitution effect cancel:

$$h = \left(\frac{\eta}{\varphi} \right)^{\frac{\theta}{1+\theta}}. \tag{5}$$

In this case average hourly income is given by:

$$\bar{w} \equiv zh^{\eta-1} = z \left(\frac{\eta}{\varphi} \right)^{\frac{\theta(\eta-1)}{1+\theta}} \tag{6}$$

and directly proportional to productivity. This illustrates that both the preference parameter φ and the earnings elasticity η could lead to a drop in hours and a drop in average hourly income at the same time. To illustrate this, we can ask how high η has to be in order to generate a 10 % drop in hours when η falls to one. Figure 7 shows exactly this. We can see that for $\sigma = 1$ a change of η from around 1.3 to 1 decreases hours by 10 % and hourly income by around 4 %. This is very much in line with what we see in the data. However, we don't really have a good way of measuring η directly in the data.[5]

[4] A similar functional form is sometimes also adopted for workers by French (2005), who assumed that earnings are log-linear in hours, and by Bick et al. (2022), who further allowed earnings to be piecewise log-linear in hours.

[5] Bick et al. (2022) performed a structural estimation of this parameter for workers of this log-linear specification, but reported that the loss function is relatively flat in this region and estimated η to lie somewhere in the interval $[1.4, 1.9]$.

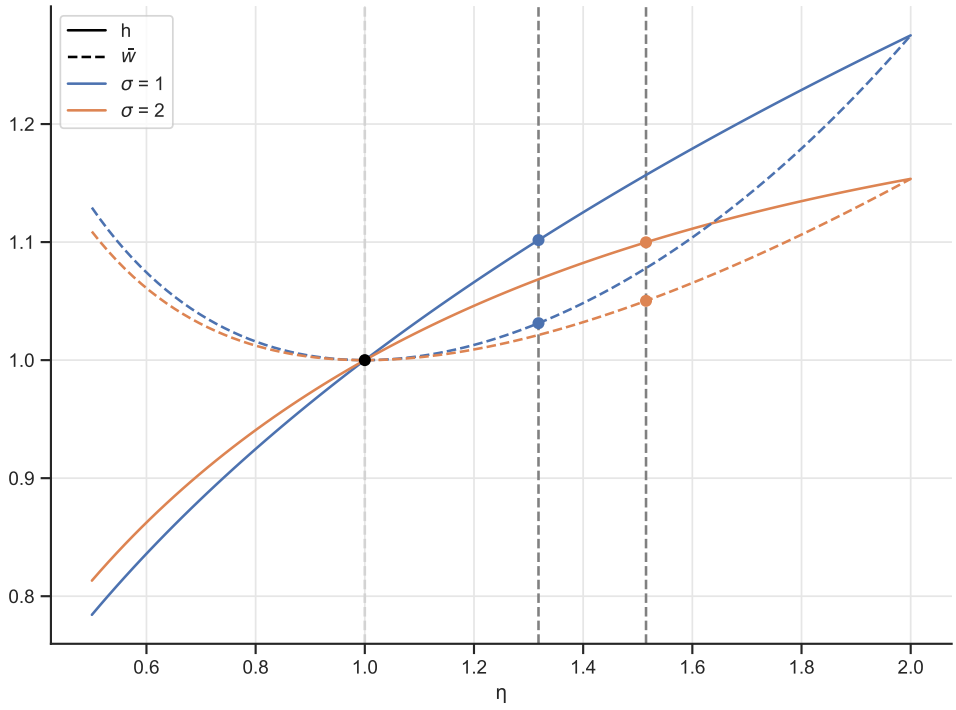


Figure 7: Changes in η necessary to generate a 10 % drop in hours for two different values of σ.

Notes: Value for other parameters: $\theta = 0.54, \varphi = 1, y = 0$.

If we assume a utility function in which income and substitution effects do not cancel, i.e. $\sigma > 1$, but keep unearned income at zero, we still get a closed form expression for hours but the optimal choice of hours now depends on the level of productivity:

$$h = \left(\frac{\eta z^{1-\sigma}}{\varphi}\right)^{\frac{\theta}{1+\theta-\eta(1-\sigma)\theta}} \tag{7}$$

Average hourly income is then given by:

$$\bar{w} = z\left(\frac{\eta z^{1-\sigma}}{\varphi}\right)^{\frac{\theta(\eta-1)}{1+\theta-\eta(1-\sigma)\theta}}. \tag{8}$$

What is directly visible in these two equations is that under standard parameters with $\sigma > 1$ and $\theta \approx 0.5$ a drop in z leads to a drop in hourly income $\bar{w}$, but it *increases* the optimal hours choice. Hence, changes in productivity move hours and average hourly income in opposite directions. This is in contrast to the data, where we see a drop in hours of around 10 %, but a rather flat development or even a decrease of around 5 % in hourly income.

How much does the hourly income has to increase in order to generate a drop in hours of around 10 % as seen in the data? The answer to this question first and foremost depends on whether the income effect (IE) dominates the substitution effect (SE). If the income effect dominates, we need an increase in the wage in order to generate a drop in hours. If, however, the substitution effect dominates, we require a drop in the wage. Figure 8 illustrates the change in $\bar{w}$ necessary to generate a drop in hours h of 10 %. First, in the

case of no unearned income $y = 0$, the income effect always dominates the substitution effect and we have that only an increase in hourly income of around 50 % can generate a drop in hours of 10 %. This is certainly a sizable increase and far away of what we see in the survey data. However, it is not implausible if we think that entrepreneurs can also invest in sweat capital as in Bhandari and McGrattan (2021) and eventually sell their business to a high price. Second, if there is some unearned income $y > 0$, then also a big drop in the hourly income could rationalize a 10 % drop in hours. However, the size of this drop has to be quite significant and certainly not close to the mild drop we see in the data.

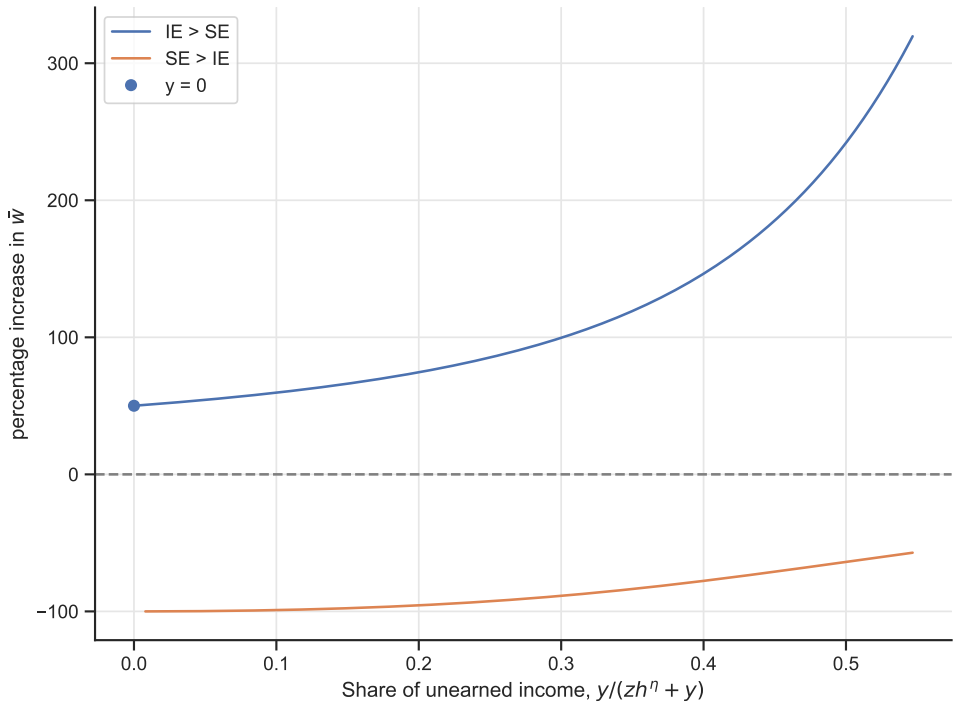


Figure 8: Changes in $\bar{w}$ necessary to generate a 10 % drop in hours by different levels of unearned income.

Notes: Value for other parameters: $\theta = 0.54, \varphi = 1, \sigma = 2$.

From the analysis so far, we can identify three potential mechanism that could have caused the decline in hours among entrepreneurs: 1) entrepreneurs have seen a much higher increase in their unearned income, 2) the level of wages and entrepreneurial productivity have developed differently or 3) the shape of the profit function has changed over time.

5 Conclusion

This paper documents a new fact about the working hours of entrepreneurs. It shows that they have decreased their hours by around 4 hours more than workers in the last 35 years. This number is already controlling for compositional changes in terms of: gender, age, education, 25 occupation groups, 12 industry groups and the number of children. The decline is broad based and visible in almost all sub-groups, except two small occupation

groups. Most of the decline in the working hours seems to originate from the top of the hours distribution, since the share of entrepreneurs working more than 45 hours has dropped by around 20 percentage points.

At the same time as there was a drop in hours, also the average income of entrepreneurs relative to workers has decreased. As a consequence, the hourly income of entrepreneurs has remained relatively stable and dropped at most 5 %. This seems to suggest that an increase in the productivity of entrepreneurs has caused the drop in hours.

Using a simple static labor supply model, I explore several possible mechanisms that could have caused the decline in hours. This analysis reveals that a change in the earnings elasticity specific to entrepreneurs could have caused this decline, but there is no readily available method or data to measure this object directly. Further research to estimate this earnings elasticity for entrepreneurs and wether this has changed over time would offer valuable insights in this direction. Additional predictions of the simple labor supply model show that under a standard calibration of the utility function, the counterfactual increase or decrease of hourly income to generate a 10 % drop in hours would (depending on whether the income or substitution effects dominate) have to be several order of magnitudes larger than what we see in the data.

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A Additional Figures

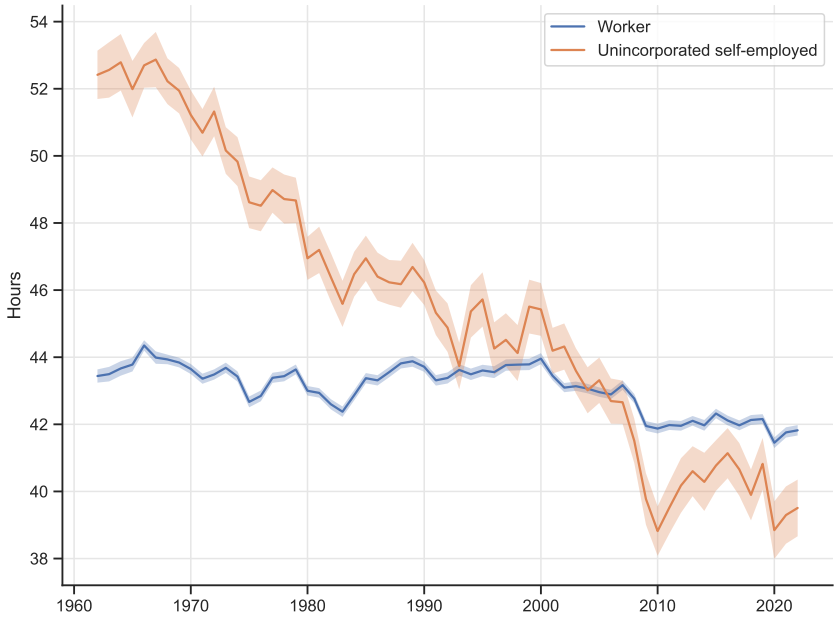


Figure 9: Average weekly hours worked of male workers (including incorporated self-employed) and unincorporated self-employed men.

Notes: The average hours are conditional on working positive hours. Weighted by the CPS sample weights. Shaded areas indicate 95 % confidence intervals.

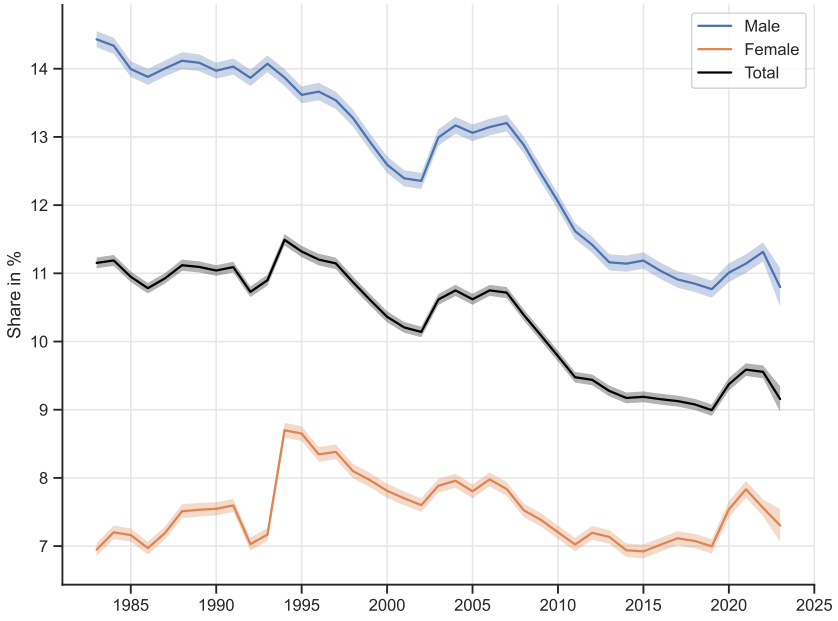


Figure 10: The share of individuals in the sample that are entrepreneurs.

Notes: Weighted by the CPS sample weights. Shaded areas indicate 95 % confidence intervals.

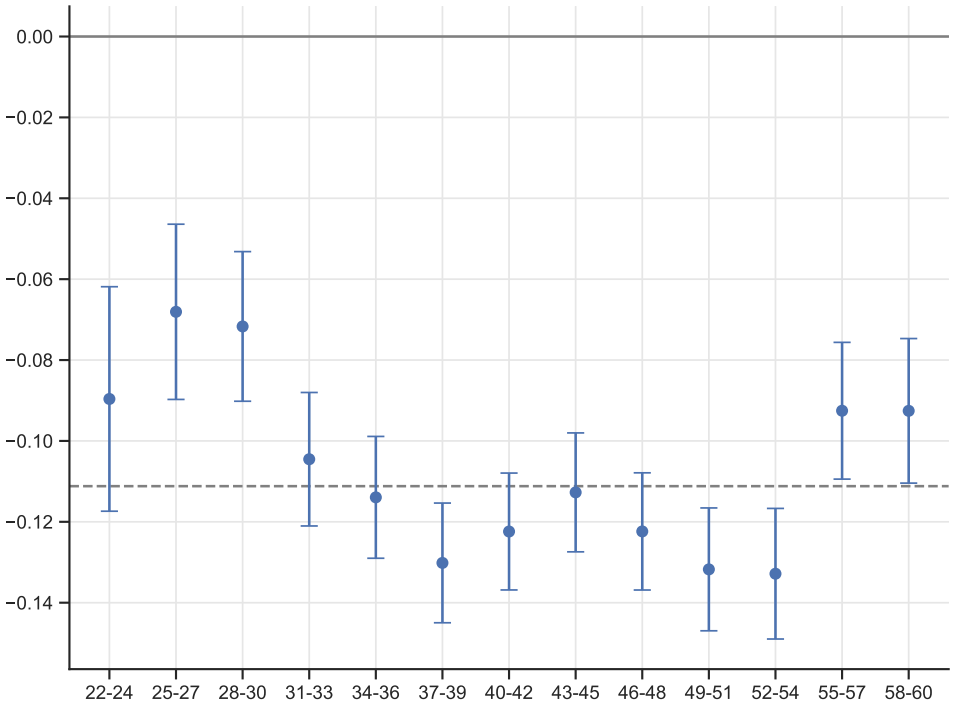


Figure 11: Decomposition of the decline in average weekly hours worked of entrepreneurs relative to workers by age bins.

Notes: Data from the CPS basic monthly survey. Whiskers indicate 95 % confidence intervals.

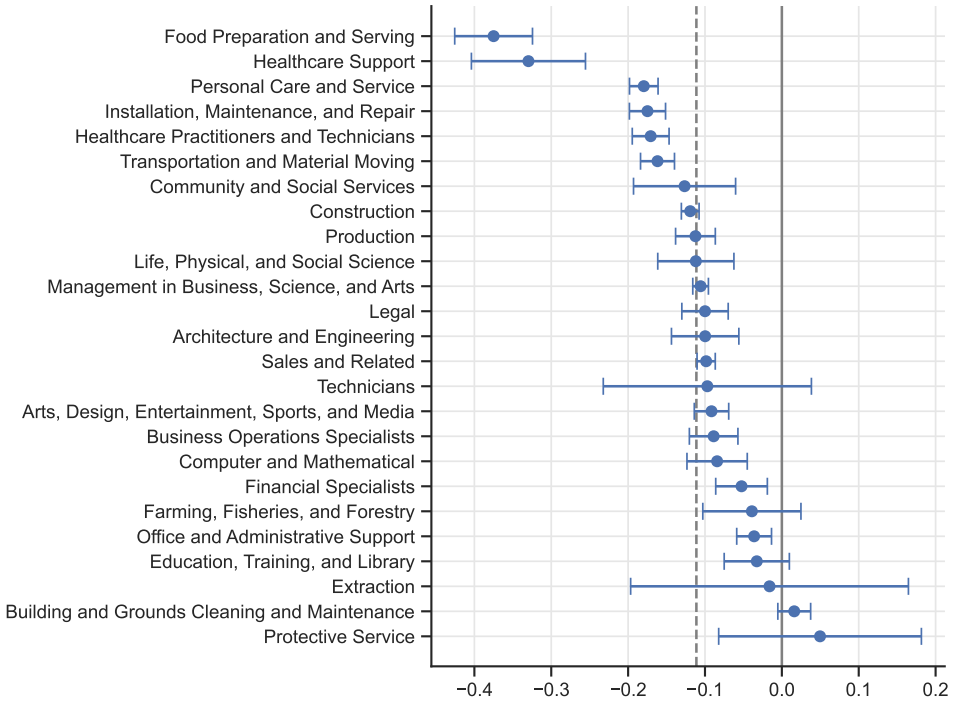


Figure 12: Decomposition of the decline in average weekly hours worked of entrepreneurs relative to workers by occupation groups.

Notes: Data from the CPS basic monthly survey. Whiskers indicate 95 % confidence intervals.

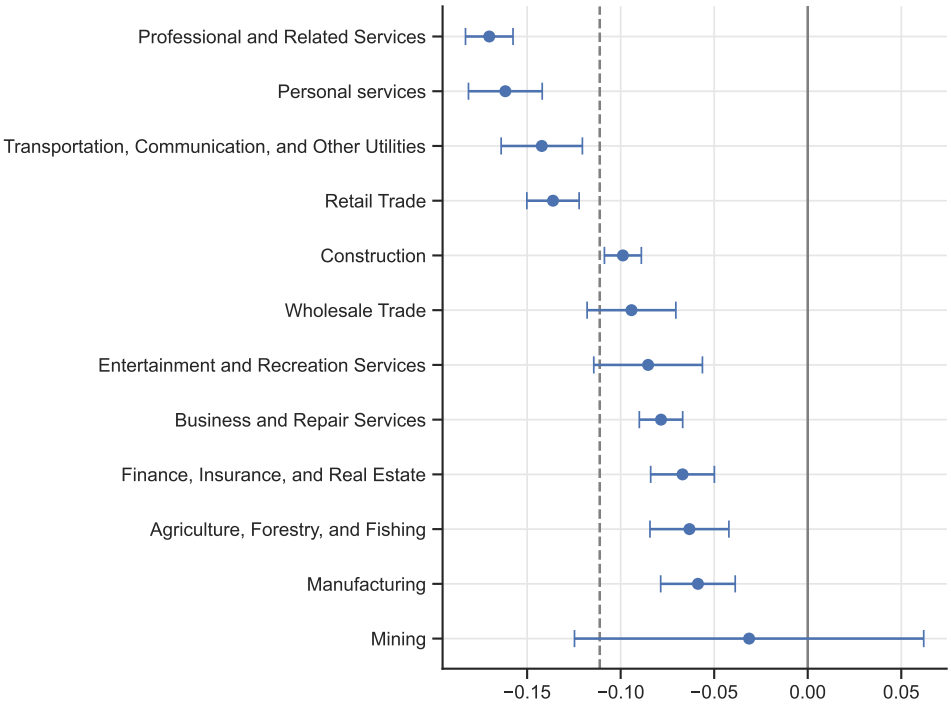
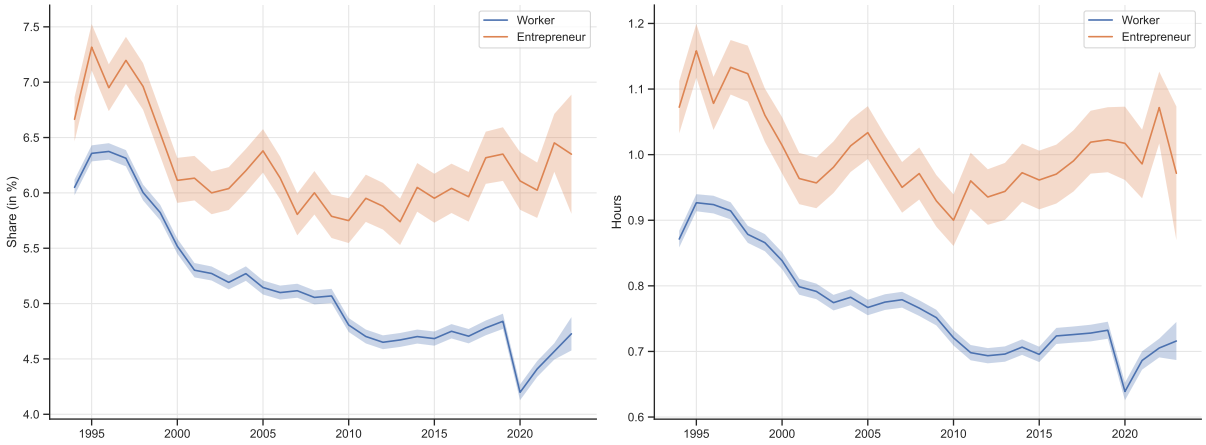


Figure 13: Decomposition of the decline in average weekly hours worked of entrepreneurs relative to workers by industry groups.

Notes: Data from the CPS basic monthly survey. Whiskers indicate 95 % confidence intervals.



(a) Share with other jobs **(b)** Hours worked in other jobs

Figure 14: Share of individuals having more than one job and the total hours worked on these other jobs.

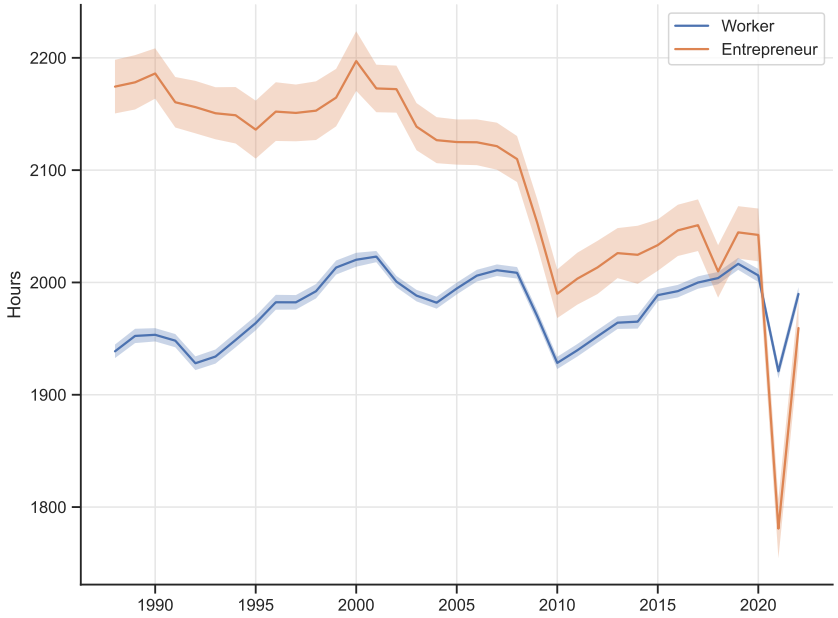


Figure 15: Annual hours worked for workers and entrepreneurs.

Notes: The hours are conditional on working positive hours over the whole year. Weighted by the CPS sample weights. Shaded areas indicate 95 % confidence intervals.

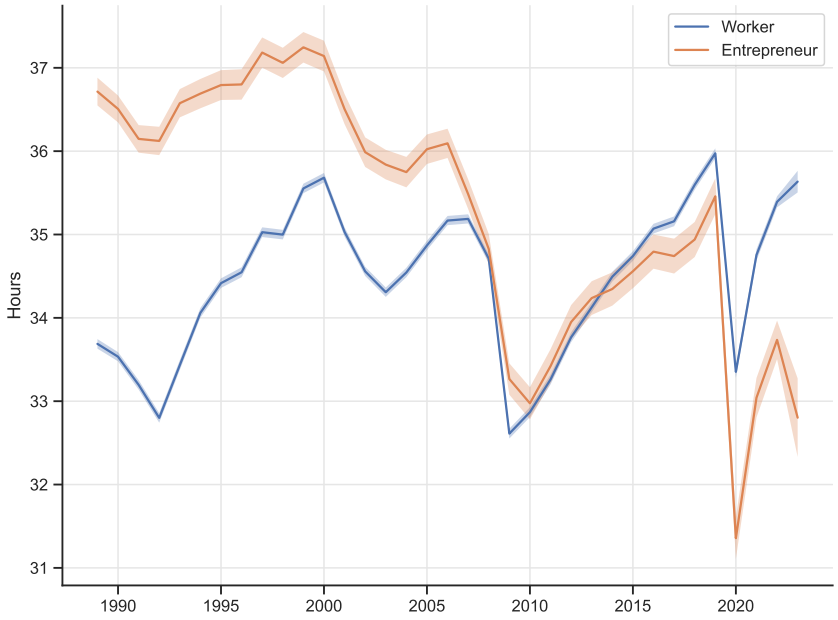


Figure 16: Weekly hours worked by the average family member.

Notes: The hours are conditional on working positive hours. Weighted by the CPS sample weights. Shaded areas indicate 95 % confidence intervals.

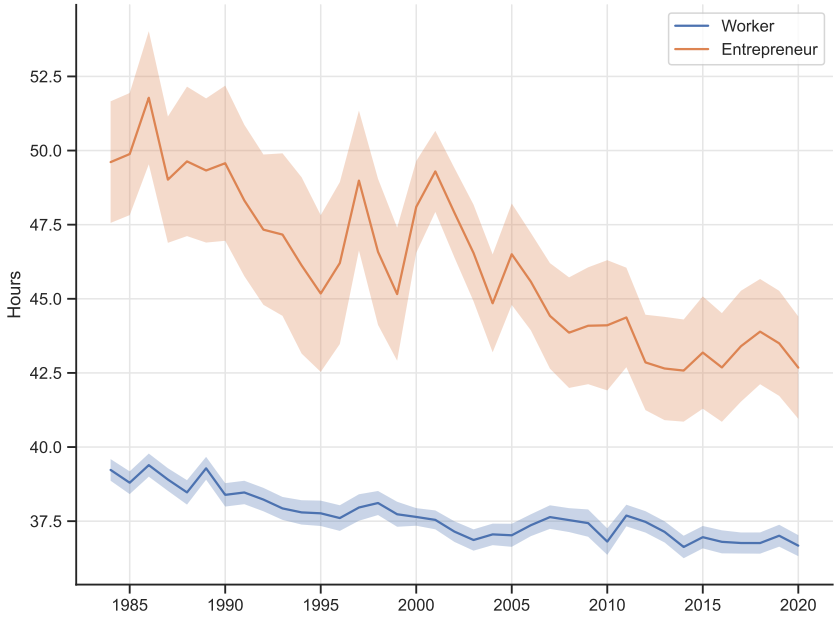


Figure 17: Average weekly hours worked in Germany.

Notes: Data source is the Socio-Economic Panel of Germany. The hours are conditional on working positive hours. Weighted by the SOEP sample weights. Shaded areas indicate 95 % confidence intervals.

B Additional Derivations

B.1 Derivation of the Earnings Function for Entrepreneurs

The earnings function $E(z,h) = zh^{\eta}$ can easily be derived from a production with three inputs: an entrepreneur's own hours h, capital k rented from capital markets and labor l purchased from the labor market. Specifically, the production function of an entrepreneur is assumed to be:

$$(zh^{\eta})^{\nu}\left(k^{\alpha}l^{1-\alpha}\right)^{1-\nu}, \tag{9}$$

where the entrepreneurs own hours h enter together with the entrepreneur's productivity z and is decreasing in scale with $\nu < 1$. Given, that this is a standard decreasing returns to scale production function, the profit share of total output is given by ν and we can write profits as:

$$\pi(z,h) = \max_{k,l}\,(zh^{\eta})^{\nu}\left(k^{\alpha}l^{1-\alpha}\right)^{1-\nu} - (r+\delta)k - wl \tag{10}$$

$$= \nu\left[(1-\nu)\left(\frac{\alpha}{r+\delta_k}\right)^{\alpha}\left(\frac{1-\alpha}{w}\right)^{1-\alpha}\right]^{\frac{1-\nu}{\nu}} zh^{\eta}. \tag{11}$$

Subsuming all coefficients of h into one variable, z, we obtain the earnings functional form of the earnings function of the main text: $E(z,h) = zh^{\eta}$.