Declining Hours Worked Among Entrepreneurs

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Abstract

In this paper I show that, over the last 35 years, hours worked by entrepreneurs have fallen substantially: by five hours more than for workers. This decline accounts for the bulk of the fall in total hours worked and is present in all available sub-groups (gender, age, education, number of children, occupation or industry). It is robust to adjusting for compositional effects and occurred without noticeable changes in the relative hourly income of entrepreneurs. The decline originates from the top of the hours distribution: the share of entrepreneurs working many hours has dropped significantly. I interpret these facts using a Roy model of occupational choice, augmented with an intensive labor supply margin. The model allows the marginal return of working an additional hour to depend on the level of hours. I estimate the model at two points in time and find that a fall in the relative marginal return at higher hours worked is key for explaining the drop in hours and the drop in the share of entrepreneurs. I show that changes in the market structure of the goods or services that entrepreneurs sell can account for this.

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1 Introduction

Empirical measures of business dynamism in the U.S. have trended down in recent decades. Firm entry and exit rates decelerated, fewer young firms account for job creation and the share of entrepreneurs in the labor force has decreased.[1] I contribute a new perspective on the slowing business dynamism and document a decline in working hours among entrepreneurs in the U.S. and Germany. The average entrepreneur in the U.S. worked about 45 hours in 1989, while entrepreneurs in 2022 worked slightly less than 40 hours. At the same time, the hours of workers in paid employment fluctuated around 40 hours and declined by less than one hour during the same period. This fact is surprisingly robust and, after accounting for compositional changes in terms of gender, age, education, number of children, occupation and industry, reduces the decline in hours only to 3.8 hours relative to workers over the last 35 years. The declining trend is not only statistically significant but also economically important if one compares this to the long-run decline of five to six hours for the entire working-age population over the last 100 years (see Ramey and Francis, 2009) or the fairly stable market hours of employed men since the 1970s.

Apart from the decline in working hours of entrepreneurs, this paper establishes two more facts about them. The second fact is a fall in the share of entrepreneurs working many hours. Individuals who are working more than 45 hours are now less likely to be entrepreneurs and hence, the decline in working hours comes from the top of the hours distribution. The third fact is about the income of entrepreneurs. The total income of entrepreneurs moved closely together with their hours, therefore the relative hourly income of entrepreneurs to workers during this period was surprisingly stable. I document these facts with data from the Current Population Survey (CPS) for the U.S. but confirm that the decline in hours is also visible in the Panel Study of Income Dynamics (PSID), the Survey of Consumer Finances (SCF) and the Socio-Economic Panel (SOEP) in Germany.

Entrepreneurs play a prominent role in business dynamism and we would like to measure the hours of those entrepreneurs that are the most important contributors to it. I define an entrepreneur as any individual reporting to work for themselves as opposed to for a private company, the public sector or a non-profit organization. This wide definition includes a diverse group of self-employed individuals with and without employees and of different forms of incorporation but has the benefit that it can be applied in several surveys. However, robustness analyses indicate a broad-based decline and show that this likely also includes those entrepreneurs who are given a prominent role in business dynamism. This raises the question of whether and how the declining hours are connected to the slowing business dynamism and the declining share of entrepreneurs in the labor force.

The paper then sets out to find the most likely explanation for these facts, starting with a simple model of labor supply. The simple model highlights that an income effect going through the level of earnings requires a much larger increase in the hourly income than observed in the data. Importantly, the model allows the returns to an additional hour of work to depend on the level of hours. This means that the model permits the possibility

[1] For an extensive review of recent literature, I refer the interested reader to Akcigit and Ates (2023).

that high returns to an additional hour of work are only realized when working many hours. I show that changes in the earnings schedule and in particular the curvature with respect to hours holds promise in matching the development of hours and income of entrepreneurs. However, without any further restrictions on the model, we cannot identify the most likely mechanism using observations on individuals only.

The simple model is then extended with an occupational choice between being a worker and an entrepreneur. I thus use this model to study the joint decision of the occupational choice with the labor supply decision. This adds further restrictions on the mechanism behind the declining hours of entrepreneurs. In particular, the decline in the share of entrepreneurs and data on workers can be used to shed more light on the mechanism. To do this, I estimate the model at two points in time and jointly target three key groups of moments for workers and entrepreneurs. More specifically, one group of moments use the hours of workers and entrepreneurs to capture the initial level difference and the decline in the hours of entrepreneurs. The second group of moments makes use of the share of entrepreneurs and the share of individuals working many hours, making sure that the underlying mechanism is consistent with the occupational choice. Finally, the last group of key defining moments is the relative income of workers and entrepreneurs and their respective dispersion, which are important for restricting the strength of the income effect going through the level of earnings.

The estimation suggests that the returns to working an additional hour at the top of the hours distribution fell substantially for entrepreneurs, while it stayed largely unchanged for workers. In the model, this mechanism is captured by a change in the curvature of the non-linear earnings function. In line with the previous literature, this function is found to be convex, but I show that it has become more linear over time. This change alone can explain 44% of the observed decline in average hours, 73% of the decline in the share of entrepreneurs working more than 45 hours and 43% of the fall in the share of entrepreneurs in the labor force over this period. No other source of change in the model moves hours and the share of entrepreneurs in the same direction. Therefore, to the extent that these two features of the data are related, the analysis suggests a change that maps to the convexity of the earnings function must be the source.

The remaining question is what could have changed the return to working many hours. One plausible explanation how the curvature of the earnings function could have changed is through the tax progressivity. Several observations speak against this as a likely cause, however. First, the fact that the same decline is visible in Germany implies that Germany would have needed to make the same changes in the tax code as the U.S., which appears unlikely. Second, I estimate a decrease in the tax progressivity for both workers and entrepreneurs, which is in line with evidence by e.g. Borella et al. (2023). Finally, many entrepreneurs are unincorporated or choose a pass-through corporation, which implies that they are being taxed in the same way as workers. Thus, if anything this increased the returns to working long hours.

A more promising explanation for a decrease in the returns to working many hours is a change in the market structure for the output provided by the entrepreneur. I show that a change in the curvature of the entrepreneurial earnings function can be connected to the demand elasticity that entrepreneurs face for their goods or services. Starting from a reduced-form demand function, I link the curvature of the entrepreneurial

earnings function with the consumer's price elasticity of demand for the entrepreneurial output good. In this framework, a decrease in the price elasticity decreases the returns to working many hours. I find that the estimated earnings elasticity is quantitatively in line with changes in the demand elasticity coming from markup estimations in e.g. De Loecker et al. (2020). Thus, the change in the nature of competition that has been discussed extensively elsewhere now also appears as a likely explanation for the declining hours worked of entrepreneurs.

Contribution to the literature. This paper contributes to several strands of the literature. First, the paper speaks to the literature on the slowing business dynamism. Among one of the first papers to document a decline in firm entry and exit rates was Haltiwanger et al. (2011). This was further documented in Decker et al. (2014) and Decker et al. (2016). Since then, a series of attempts have been made to find a cause for the slowing business dynamism. Examples of related papers are Karahan et al. (2019) and Hopenhayn et al. (2022), who propose a theory that links the slowing business dynamism with the aging of the population. Neira and Singhania (2022) investigate how much the reduction of effective corporate tax rates contributed to the fall in the startup rate and conclude that this can explain at most one fifth of the decline. Kozeniauskas (2022) and Salgado (2020) and Jiang and Sohail (2023) propose theories that skill-biased technical change can account for this. The paper by Akcigit and Ates (2023) combines the observation on rising market concentration with the slowing business dynamism in a unified framework and related to this Deb (2023) also establishes a link between the rise in markups and the fall in the share of entrepreneurs. This paper contributes another, yet unexplored, observation on the slowing business dynamism by documenting a decline in the hours worked among entrepreneurs. It also connects the hours with the share of entrepreneurs in a model of occupational choice and points to the rise in market power as a likely explanation. Thus, supporting the argument by Akcigit and Ates (2023) and Deb (2023).

Second, the empirical analysis of the paper also contributes to papers documenting a general decline in market hours in developed countries. In particular, I add to the observations of, for example, Aguiar and Hurst (2007, 2016), Ramey and Francis (2009) and Boppart and Krusell (2020) by documenting that the decline in aggregate market hours per employed person is to a large extent driven by entrepreneurs. More closely related are Yurdagul (2017) and Wellschmied and Yurdagul (2021), who document the level of hours of entrepreneurs but do not document the evolution over time. To the best of my knowledge, this paper is the first to document a decline in the hours among entrepreneurs. Moreover, I also show that this decline in hours of entrepreneurs is also visible in Germany. Thus, I believe that this paper provides valuable insights into the labor supply of entrepreneurs over time, that can inform macroeconomic models on entrepreneurship with an intensive margin choice. For example, the models used in Yurdagul (2017), Allub and Erosa (2019) and Wellschmied and Yurdagul (2021).

Third, this paper identifies a mechanism that crucially relies on a non-linear relationship between earnings and hours to explain the decline in hours and the drop in the share of entrepreneurs at the same time. The literature on non-linear earnings and its effects on labor supply has a long history and examples of early papers on this topic are Rosen (1976) and Moffitt (1984). More recently this topic received further attention by French (2005), Prescott et al. (2009), Rogerson (2011), Goldin (2014) and Bick et al. (2022).

I contribute to this long strand of literature by providing further evidence for non-linear earnings functions for both workers and entrepreneurs. In addition, I also provide estimates of these earnings elasticities and how they have changed over time.

Fourth and finally, the quantitative model used in the estimation is closely related to a recent series of papers that use an occupational choice model in the spirit of Roy (1951) with an intensive margin of labor supply. In particular, the papers Erosa et al. (2022a,b) and Erosa et al. (2023) estimate a similar occupational choice model with a focus on workers only. The main innovation in this paper is that I am the first to estimate such models over time and apply them to the context of entrepreneurship.

The paper proceeds as follows. Section 2 describes the data used and Section 3 documents the empirical facts about the declining hours, the fall in the share of entrepreneurs and the income development of entrepreneurs and workers over time. Section 4 introduces a simple static model of labor supply, derives some predictions for different potential causes and develops a quantitative model with an occupational choice that is then estimated and interpreted. Section 5 concludes.

2 Data

The main data source used in this paper is the Current Population Survey (CPS). This survey is administered by the U.S. Census Bureau and also used to compute the official unemployment statistics of the U.S. The design of the survey is the following. Each sampled household is interviewed for four consecutive months and after a break of eight months again for the same four months of the following calendar year. There is a set of questions in the basic monthly interview that is asked every month and that includes the question on hours worked. In the fourth interview of each block, a sub-sample of households is asked more questions about their wage and income. This survey is called the outgoing rotation group (ORG). Unfortunately, the sub-sample of households is chosen based on the class of worker and this results in the fact that the entrepreneurs in my definition are not included in the ORG. However, in March every year, the survey contains additional questions on several topics, including income in the previous year, which is called the Annual Social and Economic Supplement (ASEC). The questions in this supplement were also asked of entrepreneurs and data on income for both entrepreneurs and workers in this paper is taken from there. All data from the CPS is extracted using IPUMS-CPS (see Flood et al., 2022).

To classify respondents as workers or entrepreneurs, I use the question on the class of worker (CLASSWKR). This question is contained in the basic monthly interview and thereby available each month, including the March supplement. I classify respondents as entrepreneurs if they report "working for self". That includes unincorporated as well as incorporated self-employed individuals.[2] This classification is the same as applied in Jiang and Sohail (2023), who also use the CPS. However, the distinction between

[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.

incorporated and unincorporated self-employed individuals can only be made after 1983.

The hours worked are measured using the question on actual hours worked on all jobs including overtime in the week before the interview (AHRSWORKT). There are also other questions on usual hours worked and hours worked on other jobs than the main job. These questions are contained in the basic monthly interview from 1989 onward. The March supplement already contained questions on actual hours worked, usual hours worked and weeks worked since 1968. However, up until 1983, the incorporated self-employed individuals were included in the class of workers.

Data on income is taken from the March supplement (ASEC). As mentioned above, self-employed respondents are not included in the earner-study of the ORG (interview month four and eight), which is usually the preferred way to measure wages (see Bick et al., 2022). In order to measure income consistently for workers and entrepreneurs I take data on income exclusively from the ASEC. More specifically, I use data on total personal income (INCTOT) that includes income from all sources including capital income. I define earned income as income coming from wages (INCWAGE), business (INCBUS) or farm income (INCFARM). I use this to calculate unearned income by simply deducting earned income from total personal income. All nominal variables are deflated using the CPI to obtain real 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.

I apply standard sample restrictions and only include individuals in the labor force who are between 22 and 60 years old. I further exclude unpaid family members who might be working for the family business or farm. The final sample consists of around 700,000 observations per year, of which 80,000 observations are on entrepreneurs. This large sample allows me to analyze differences in hours worked among many detailed sub-groups, which cannot be done in any other survey containing data on hours worked. This is particularly valuable since there are large differences in the level of hours worked between sub-groups of the population (e.g. gender and occupation). I apply some additional sample restrictions for data from the CPS ASEC to obtain a less noisy measure of income. In particular, I restrict the sample to individuals with at least 350 annual hours of work and who have an hourly earned income that is above half the CPI-adjusted federal minimum wage. Since the March supplement is only asked in March every year, the resulting sample size of the ASEC sample is around 50,000 observations with about 5,000 of them on entrepreneurs. In all analyses of the basic monthly interview I use the final CPS sample weights (WTFINL) and in all analyses of the ASEC, I use the ASEC sample weights (ASECWT).

Table 1 shows summary statistics of workers and entrepreneurs and how they differ between two sub-periods, which are chosen to reflect the two periods of focus in the quantitative analysis of the second half of the paper. We can see that workers and entrepreneurs differ in a few characteristics. First, We can see a much higher share of women among workers than among entrepreneurs. Second, entrepreneurs are on average four years older and this difference has changed relatively little over time. Further, they have very similar education but tend to cohabit slightly more and have slightly more children. The last line highlights a significant change in the share of entrepreneurs in the labor force between the two periods and reflects the slowing business dynamism.

Table 1: Summary statistics of basic characteristics for workers and entrepreneurs over two periods of time.

Period	**1989-1993**		**2015-2019**	
Worker / **E**ntrepreneur	**W**	**E**	**W**	**E**
Share female (in %)	46.9	30.3	47.9	36.1
Age	37.5	41.7	40.2	44.6
Years of education	13.2	13.6	14.1	14.0
Share living with partner (in %)	67.3	77.8	67.7	74.5
Number of children	1.00	1.16	0.93	1.10
Share of the labor force (in %)	88.9	11.0	90.9	9.1

Notes: Data from the CPS basic monthly interview.

As a robustness analysis, I also use data from other U.S. surveys that ask about hours worked: the Survey of Consumer Finances (SCF) and the Panel Study of Income Dynamics (PSID). The declining trend can clearly be seen in both of these surveys as well. 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. In all of these surveys, I attempt to keep the definition of entrepreneurs and the sample restrictions as close as possible to the procedure described above for the CPS.

3 Empirical Facts

This section documents three main facts about entrepreneurs. The first fact is the decline in hours worked. I document that hours worked for entrepreneurs started from a much higher level, but then steadily declined until it reached a similar level as for workers. I measure the decline in hours relative to workers in a regression framework that allows me to keep the composition fixed over time and conclude that compositional changes cannot account for the decline in hours. I then decompose the average decline into components from different sub-groups along the following dimensions: gender, age, education, number of children, occupation, industry and status of incorporation. This exercise shows that the decline is broad-based and, except for a few small occupation and industry groups, visible in all sub-groups. The second fact I document is a fall in the share of entrepreneurs in the labor force during the same time period. I corroborate results from other papers (e.g. Decker et al., 2016) and additionally show that the decline in the share of entrepreneurs is primarily associated with the top of the hours distribution. The third fact I document is that the difference in the hourly income of entrepreneurs to workers was stable in this period. However, I also show that there was a significant fall in the total annual income of entrepreneurs, coming from the fact that entrepreneurs reduced their weekly hours worked.

3.1 Hours

First, I use actual weekly hours worked on all jobs including overtime from the basic monthly interview to document the evolution of working hours for entrepreneurs and workers. In all analyses, I compute average hours conditional on observing positive working hours. This takes out extensive margin variation in hours worked due to e.g. unemployment spells, vacation or sick leave that are not the focus of this analysis.

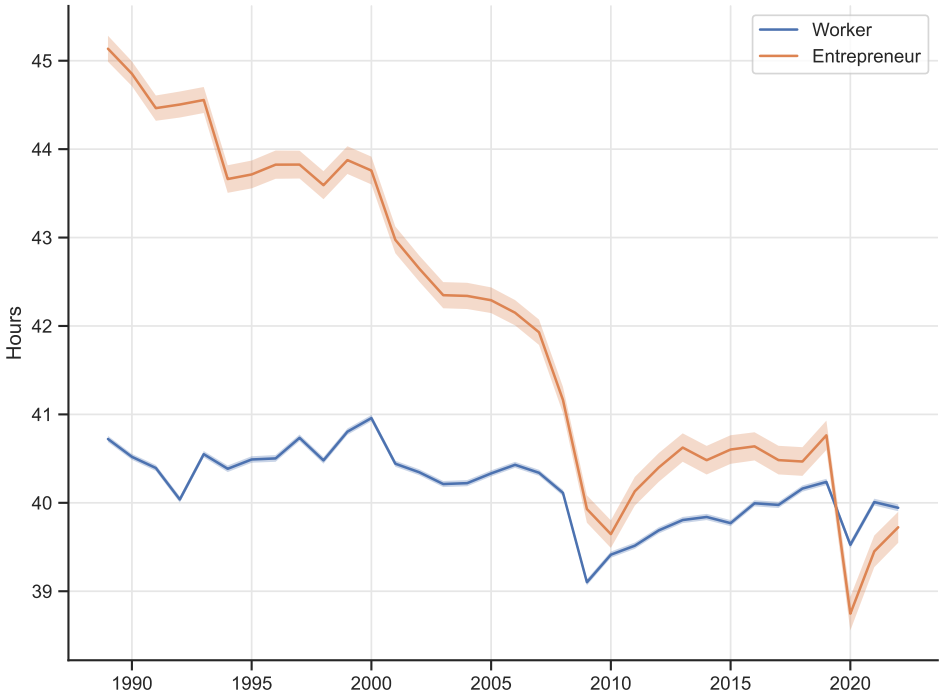


Figure 1: Average weekly hours worked of workers and entrepreneurs.

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

Figure 1 shows the hours worked by workers and entrepreneurs and highlights the strong decline in working hours of entrepreneurs over the last 35 years. In 1989, entrepreneurs worked on average about 45 hours and this number decreased to under 40 in 2022. The hours of workers have remained relatively stable during this period and only exhibit a small decline of less than one hour between 1989 and 2022. Figure 16 in Appendix A shows that the same trend can also be observed in the SOEP for Germany. Apart from some minor level differences between the two surveys, the slope of the difference is very similar. In both cases, the hours of entrepreneurs decreased by around five hours.

The March supplement allows us to go slightly further back in time but does not allow us to separate the incorporated self-employed from the workers. Figure 2 shows that this declining trend has already started in the late 1960s for at least the unincorporated self-employed males. Note that the generally higher level of hours comes from the fact that these series focus on males only. The observation that the decline started already so early, makes it unlikely that the decline was caused by the adoption of information and communication technology. Furthermore, the fact that this trend is strongly visible among males only, indicates that the decline is not driven by a higher share of female

entrepreneurs, who work a few hours less on average.

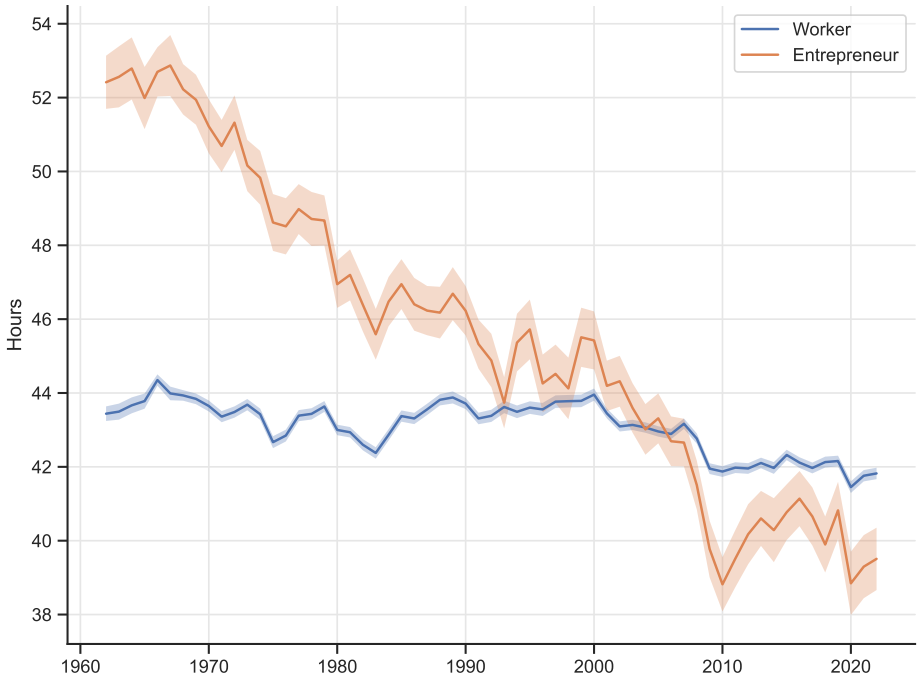


Figure 2: Average weekly hours worked of male workers (including incorporated self-employed) and unincorporated self-employed men.

Notes: Data from the March supplement (CPS ASEC). The average hours are conditional on working positive hours. Weighted by the CPS sample weights. Shaded areas indicate 95% confidence intervals.

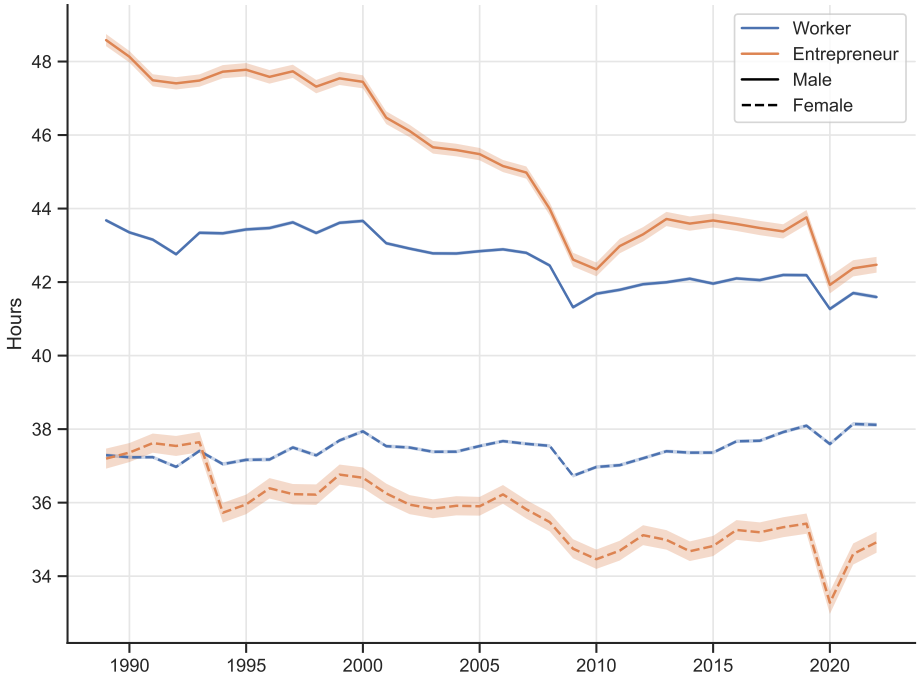


Figure 3: Average weekly hours worked by gender.

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

Table 2: Average annual decline in hours worked.

Dependent Variable:	Weekly Hours				
Model:	(1)	(2)	(3)	(4)	(5)
Entr	4.370***	2.880***	2.179***		
	(0.0501)	(0.0484)	(0.0485)		
t × Entr	-0.1477***	-0.1279***	-0.1097***	-0.1009***	-0.1112***
	(0.0027)	(0.0026)	(0.0026)	(0.0026)	(0.0026)
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-Occupation			Yes	Yes	Yes
Year-Industry			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
Observations	19,305,283	19,305,283	19,305,283	19,305,283	19,305,283
R^2	0.006	0.071	0.102	0.105	0.113

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

Notes: Data from the CPS basic monthly interview. "Entr" denotes an entrepreneur-dummy. Age codes 3-year age bins. Education codes 5 different educational attainment groups ranging from "less than high-school" to "more than Bachelor". Children codes 4 groups for the number of children. Occupation codes 25 occupation groups and industry codes 9 industry groups. Incorporated is a dummy for an entrepreneur being incorporated. "t" is coded as years since 1989.

Figure 3 confirms that the decline is even visible among women. Although female entrepreneurs worked very similar hours compared to female workers in 1989, they too reduced their working hours. However, part of the increase in the difference among females is coming from a slight increase in the hours of female workers.

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 common to both entrepreneurs and workers. This is what columns 1 to 3 of Table 2 report. The exact regression equation for these three columns is the following:

$$h_{iy} = \beta_1 \cdot Entr_{iy} + \beta_2 \cdot t \cdot Entr_{iy} + \sum_{j=1989}^{2023} \boldsymbol{\theta}'_j \cdot \mathbb{1}_{j=y} \cdot \mathbf{X}_{iy} + \varepsilon_{iy} \tag{1}$$

where h_{it} are the weekly hours of individual i in year y, $Entr_{it}$ is an indicator if individual i was an entrepreneur in year y, t is years since 1989, $\mathbb{1}_{j=y}$ is simply a year dummy and $\mathbf{X}_{iy}$ captures a vector of dummy variables for gender, three-year age-bins, five education groups, four groups for the number of children, 25 occupation groups and 12 industry groups.

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 respective sub-groups. Formally, I run the following regression:

$$h_{iy} = \beta_2 \cdot t \cdot Entr_{iy} + \sum_{j=1989}^{2023} \boldsymbol{\theta}'_j \cdot \mathbb{1}_{j=y} \cdot \mathbf{X}_{iy} + \boldsymbol{\delta}' \cdot Entr_{iy} \cdot \mathbf{Y}_{iy} + \varepsilon_{iy} \tag{2}$$

where $\beta_1 \cdot Entr_{iy}$ is now fully absorbed by the entrepreneur-specific intercepts in the last term before the error and $\mathbf{Y}_{iy}$ are the same dummy variables in $\mathbf{X}_{iy}$ plus a dummy for the status of incorporation of an entrepreneur. The regression coefficient β_2 then captures the average decline *within* each sub-group. The last column of Table 2 reports that weekly hours worked within each sub-group have declined by around 0.1112 hours. We can now decompose this coefficient and report the decline separately by the different sub-groups. I do this by interacting the first term with dummies for each possible value of the demographic characteristic D. For example, for gender I interact it with a male and female dummy. Formally, I run the following regression:

$$h_{iy} = \sum_{d \in \mathcal{D}} \beta_{2d} \cdot t \cdot Entr_{iy} \cdot \mathbb{1}_{D=d} + \sum_{j=1989}^{2023} \boldsymbol{\theta}'_j \cdot \mathbb{1}_{j=y} \cdot \mathbf{X}_{iy} + \boldsymbol{\delta}' \cdot Entr_{iy} \cdot \mathbf{Y}_{iy} + \varepsilon_{iy} \tag{3}$$

where $\mathcal{D}$ is the set of possible values for the demographic characteristic D considered below. I then repeat this regression for each characteristic separately. The coefficient β_{2d} captures the average slope for all individuals with characteristic $D = d$.

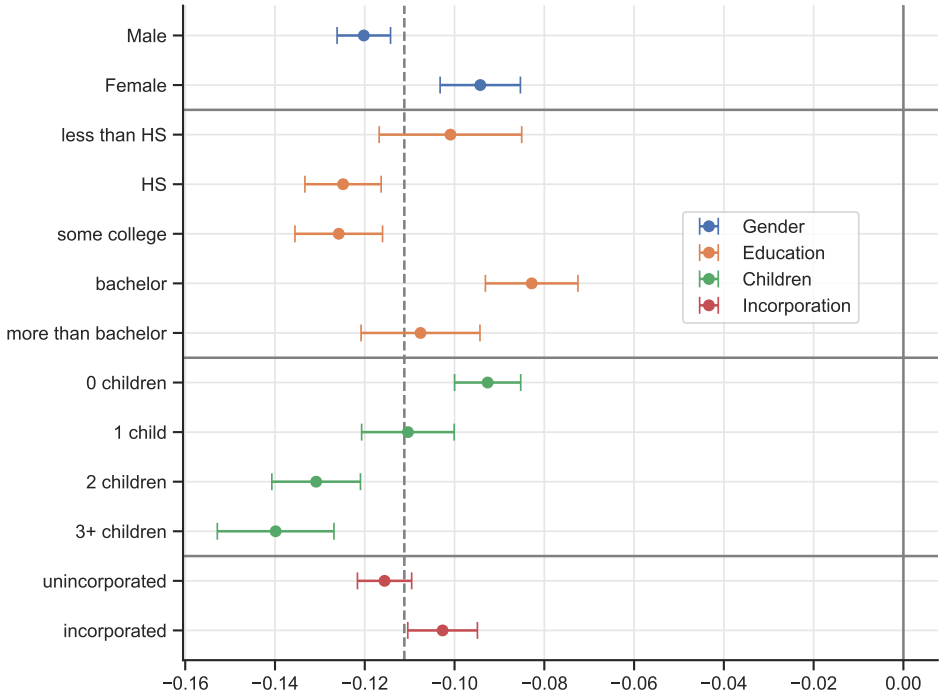


Figure 4: Decomposition of the decline in average weekly hours worked of entrepreneurs relative to workers by basic characteristics.

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

Let us first start with a decomposition by basic characteristics. Figure 4 shows how the slope coefficient varies along different dimensions (e.g. gender or education). The average decline estimated in Table 2 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 20), occupation groups (Figure 21) and industry groups (Figure 23). 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). It further contains the raw difference in weekly hours between entrepreneurs and workers by occupation group (Figure 22) and by industry group (Figure 24), highlighting the broad-based decline once more.

In the hope of capturing likely "true" entrepreneurs, I also estimate the slope coefficient for a particular subgroup of men. Those that are between 40–55 years old, with at least some college education and reporting to be in the management occupation. The slope coefficient for this particular subgroup is -0.101*** (0.006), with standard errors in parentheses. This shows one more time, that the decline is not driven by particular subgroups and is also visible among likely "true" entrepreneurs often referred to in combination with the slowing business dynamism.

To see where in the hours distribution the decline of the weekly hours comes from, we can look at the changes in the composition of weekly hours by nine hours bins in Figure 5. 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 at the beginning of the sample. Looking at the shifts in the composition of the hours distribution reveals that the decline in the average weekly hours primarily comes 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 25 in Appendix A shows the distribution of hours for men only. Apart from a level shift of all hour bins, the main conclusion that the drop in hours comes from the top of the distribution is unchanged.

The SOEP in Germany contains a question about how many hours respondents would like to work taking into account a corresponding decrease in their income. Interestingly, Figure 26 in the appendix, shows that both workers and entrepreneurs would prefer to work fewer hours, but entrepreneurs would prefer to reduce their hours to a greater extent. The gap between actual and desired hours of work has been very stable for workers but decreased with the actual hours of work for entrepreneurs. Hence, it appears that entrepreneurs managed to get closer to their desired hours of work.

One remaining question is how the decline in weekly hours transmits to annual hours, which consequentially also affects annual income measures reported below. I will answer this by decomposing annual hours worked into weeks worked and usual hours per week. Unfortunately, the basic monthly interview does not provide us with data on weeks

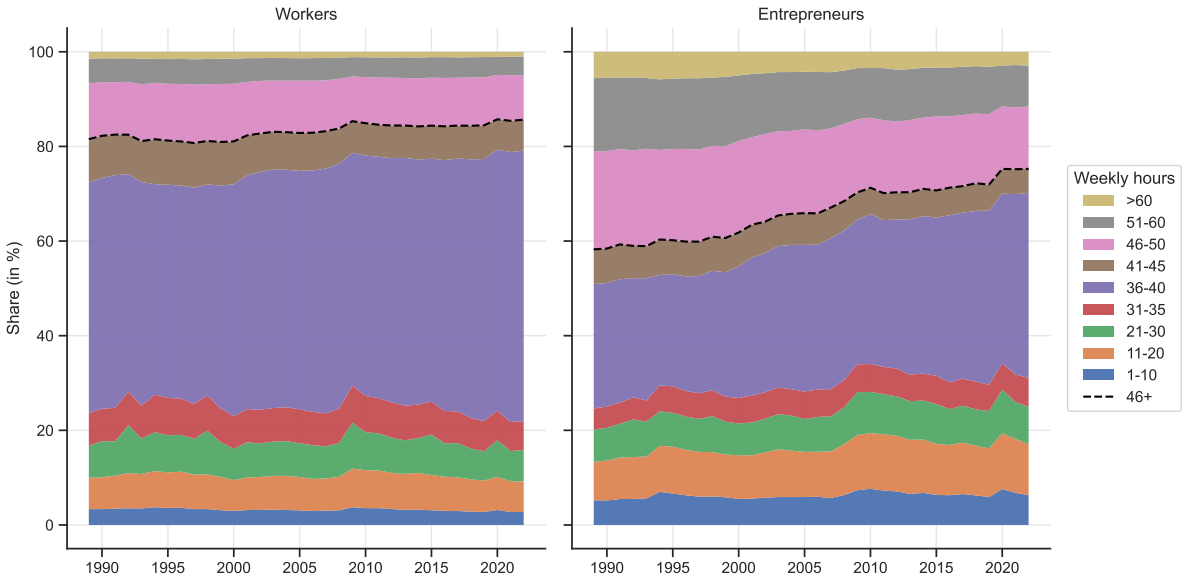


Figure 5: The distribution of hours over time for workers and entrepreneurs.

Notes: Data from the CPS basic monthly interview.

worked in the previous year. This variable is only available in the March supplement. Therefore, I will resort to the CPS ASEC for this decomposition exercise.

Figure 6 shows the difference of the log of annual hours, the log of weeks worked and the log of usual hours worked since 1988.[3] First, focussing on the series for annual hours worked, we can see a slight increase for workers and a substantial decrease for entrepreneurs. Since annual hours are the product of weeks worked and usual hours per week, we can straightforwardly decompose the log of annual hours into the sum of the log of weeks worked and the log of usual hours. The green line corresponds to the usual hours worked and is the closest equivalent to the analysis using actual hours worked from above. Again, we see a similar picture as described above. Usual hours of workers are relatively flat, while there is a visible downward trend for entrepreneurs. Furthermore, we see that the series for weeks worked depicted by the orange line, is fairly stable for entrepreneurs and exhibits a slight upward trend for workers. The sum of the series for weeks worked and usual hours worked add up to the series for annual hours worked shown in blue. While the annual hours of workers follow weeks worked more closely, the annual hours of entrepreneurs follow usual hours more closely. Thus, we conclude that the decline in weekly hours also translates into a decline in annual hours for entrepreneurs.

Furthermore, Appendix A contains several robustness analyses. First, it shows that the decline in hours of entrepreneurs is also visible in other surveys in the U.S. (see Figure 17 for the SCF and Figure 18 for the PSID). The panel dimension of the PSID also allows us to control for individual fixed effects and Figure 19 confirms that the decline holds regardless of that. Then, it shows that the decline is not driven by individuals holding other jobs, as Figure 28 and Figure 29 illustrate. Another concern could be a shift of hours within the household. However, Figure 30 plots the total hours of couples and

[3]Figure 27 plots the annual hours of workers and entrepreneurs in levels and shows a very similar picture as for weekly hours in Figure 1.

Figure 6: Decomposition of the annual hours into the weeks worked and usual hours per week.

Notes: Data from the CPS ASEC. All lines measure the difference of the respective series from 1988 in logs.

shows the same declining trend. Figure 31 provides additional analyses in this direction, by plotting the hours of singles and cohabitating individuals by gender. The March supplement introduced a question about the firm size in 1992, which can be used to plot the weekly hours for entrepreneurs with more or less than ten employees. Surprisingly, apart from a level difference, we do not find a difference in the slope of the decline. Finally, the PSID and the SOEP contain data on business net-wealth and household net-wealth, respectively. Figure 33 shows weekly hours by the wealth quartiles. Although the estimates are less precise, the declining trend can be seen in all quartiles.

3.2 Share of Entrepreneurs

Next, I document a fall in the share of entrepreneurs within the labor force alongside the decline in hours. For that, I use data from the CPS basic monthly interview again. This paper is not the first to document this fact and several papers have pointed at a slowing business dynamism, e.g. Decker et al. (2014, 2016), Salgado (2020) and Jiang and Sohail (2023), that had a decline in the share of entrepreneurs as a consequence. I corroborate these findings and show that this also holds for the sample in the CPS and the specific definition of entrepreneur adopted in this paper. Given that the decline in the share of entrepreneurs is already a well-documented fact, the analysis in this section focuses on the fall in the share of entrepreneurs by the level of hours worked.

First, Figure 7 shows that the share of entrepreneurs in the labor force was 11% in 1989 and declined to 9% in 2022. A number close to what other papers found as well (e.g. Jiang and Sohail (2023)). The figure also shows the decline in the share of entrepreneurs for entrepreneurs working up to 45 hours and more than 45 hours. It highlights that the decrease in the share of entrepreneurs comes entirely from entrepreneurs working more

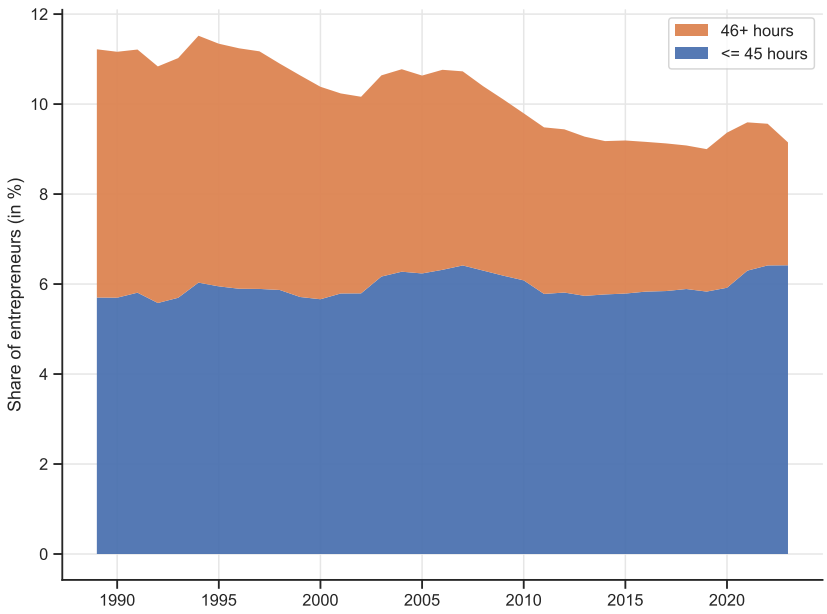


Figure 7: The share of entrepreneurs split by the number of hours.

Notes: Data from the CPS basic monthly interview.

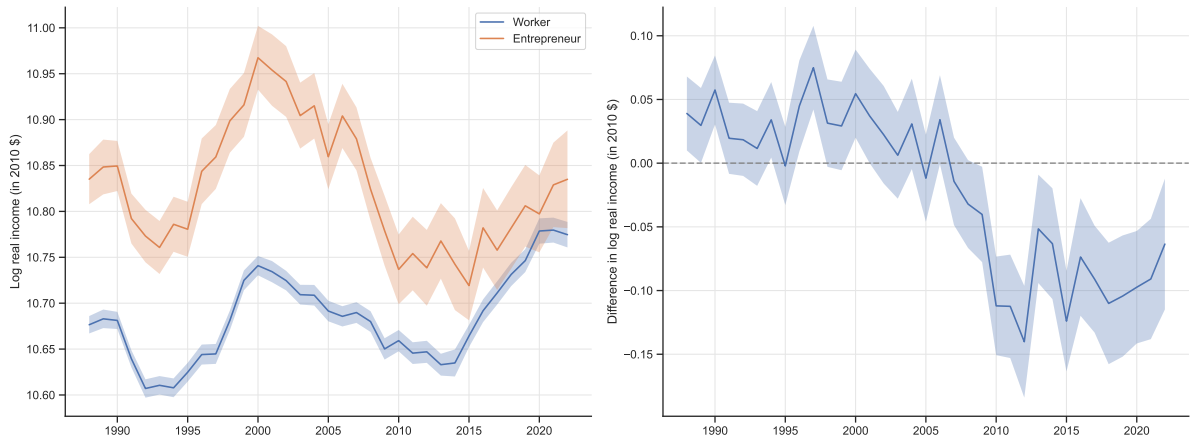
than 45 hours.

Appendix A contains further plots on the share of entrepreneurs with more detailed information and other splits of the data. Figure 34 shows the evolution of the share of entrepreneurs by gender over the same period and highlights that the decline is mainly driven by men. Furthermore, Figure 35 shows the occupational mix of entrepreneurs over time. Unsurprisingly, about a quarter of entrepreneurs have an occupation within management in business, science and arts. Figure 36 shows the industry composition and that the biggest industries these entrepreneurs operate in is construction, retail trade, business and repair services as well as professional and related services.

3.3 Income

In standard models of labor supply, the decision of how many hours of work to supply is tightly linked to the wage or other sources of income. A substantial increase in the income of entrepreneurs could potentially explain why hours have trended down. This motivates a closer look at 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 who reported to have worked at least 350 hours (about 2 months of full-time employment) in the previous year. I then calculate the wage as total earned income (income from wages, business or farm) divided by total annual hours and exclude everyone that has a wage of half the CPI-adjusted federal minimum wage.



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

Figure 8: Development of log real income for workers and entrepreneurs and the difference in income from a regression with fixed effects.

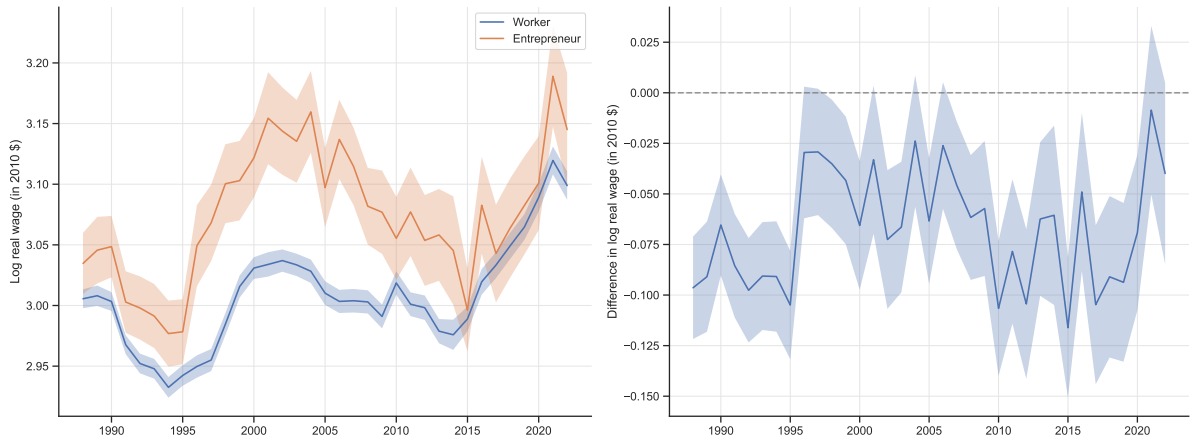
Notes: Data from the CPS ASEC. Sample includes only men. Shaded areas indicate 95% confidence intervals. Fixed effects in (b) include: year x (age, education, number of children, 25 occupation group, 12 industry groups, state).

Figure 8 shows that entrepreneurs have about 20 log points higher income than workers at the beginning of the sample. However, this gap has disappeared almost entirely by 2020. Panel (b) of Figure 8 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 this suggests that there was actually a gap *opening* up in the income between entrepreneurs and workers. Figure 37 shows the income for workers and entrepreneurs working more or less than 45 hours separately and highlights two facts. First, the income for both workers and entrepreneurs working more than 45 hours is significantly higher than for those working up to 45 hours, suggesting a strong positive correlation between income and hours. Second, it also highlights that the income of entrepreneurs and workers working more than 45 hours has been evolving very similarly. Thus, the decline in the average income of entrepreneurs comes from a higher share of entrepreneurs working up to 45 hours.

Figure 39 in the appendix also shows a time series for the estimated after-tax disposable income. To obtain after-tax income, I deduct federal and state tax estimates provided by IPUMS-CPS (Flood et al., 2022) from total personal income. The overall conclusions in the difference between workers and entrepreneurs are unchanged, but both saw a larger increase in real income over time. This is likely due to a fall in the tax progressivity that I estimate in Section 4.5.

Turning our attention to the development of hourly income, Figure 9 shows that wages of entrepreneurs and workers have evolved fairly similarly.[4] Again, the difference between entrepreneurs and workers becomes negative, when controlling for fixed effects. This corroborates findings from previous research (see e.g. Hamilton, 2000 and Moskowitz

[4]The fairly big jump in the difference of the wage in 1996 in panel (b) of Figure 9 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 some caution.



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

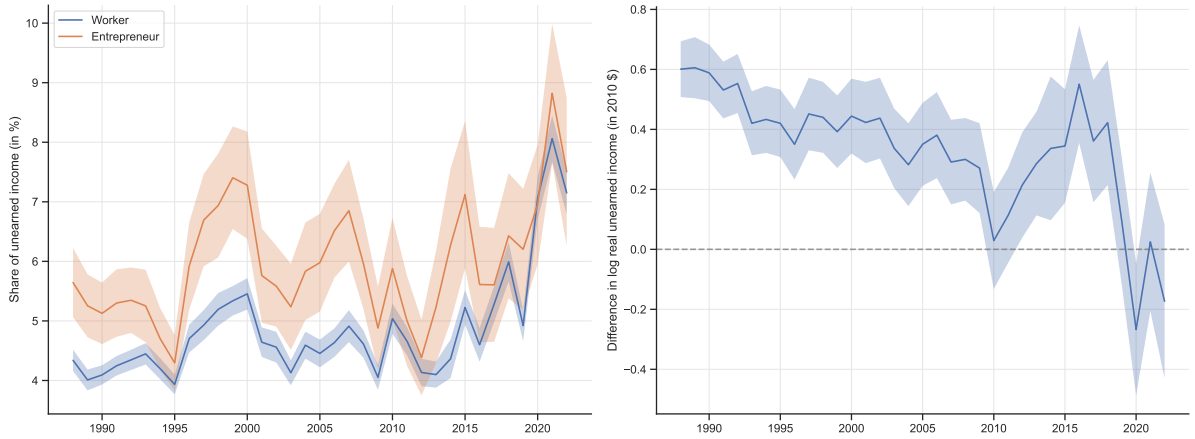
Figure 9: Development of log real wages for workers and entrepreneurs and the difference in wage from a regression with fixed effects.

Notes: Data from the CPS ASEC. Sample includes only men. Shaded areas indicate 95% confidence intervals. Fixed effects in (b) include: year x (age, education, number of children, 25 occupation group, 12 industry groups, state).

and Vissing-Jørgensen, 2002), which found that entrepreneurs seem to be motivated by more than just financial returns since the wage rate of comparable individuals in paid employment is slightly higher. Figure 38 in Appendix A shows the log real wage for everyone working more and less than 45 hours. In contrast to income, the real wage is much less positively correlated. Interestingly, the wage for workers seems to be higher if they work more than 45 hours, but the opposite is true for entrepreneurs.

One might be concerned that there was a substantial change in higher moments of the income or wage distribution. The top-coding of income in the CPS data is not ideal to accurately compute higher moments. However, looking at the standard deviation of log income and log wages might still be informative. Figure 40 and 41 in Appendix A show the standard deviation of log income and log wages respectively. Two facts stand out: first, the standard deviation is slightly higher for entrepreneurs and second, there is an increasing trend for both workers and entrepreneurs which is consistent with findings of e.g. Moffitt and Zhang (2018) using PSID data. Importantly, however, there is no evidence that the standard deviation of log income or log wages for entrepreneurs has evolved substantially differently for male entrepreneurs considered in this sample.

As the simple model in the next section shows, an increase in unearned income will unambiguously decrease the optimal hours choice through a pure income effect. Thus, if a bigger share of entrepreneurs' total income comes from unearned income like capital income or rent income, this could potentially explain the decline in hours worked. Therefore, I now take a closer look at the role of unearned income and how its share has changed for workers and entrepreneurs during the period in question. Figure 10 shows that unearned income is only a small fraction and accounts for about 5-6% of total personal income. Most importantly however, the share of unearned income of entrepreneurs relative to workers has declined over the period in question and was mainly driven by an increase in the share of unearned income of workers. Thus, a simple model of labor supply would predict that the hours of workers should have declined by more than the



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

Figure 10: 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.

hours of entrepreneurs. The opposite of what we observe in the data.

To summarise, we can note that at the same time as the hours of entrepreneurs declined, their income declined as well. This is mainly driven by a reduction in hours as the hourly income of entrepreneurs relative to workers was relatively stable over this period. We can also note that unearned income is only a small fraction of total income and only shows an increasing trend for workers and less so for entrepreneurs. This already hints at the fact that an income effect might not be the cause of the decline in hours for entrepreneurs. The next section develops a model to investigate the cause of this decline further.

4 Model

This section first introduces a simple model of labor supply to highlight that several forces can lead to a decrease in hours and then develops this model further into a quantitative model with an occupational choice. Importantly, I do not restrict the earnings function to be linear in hours. The simple model shows that the increase in the hourly income that is required to cause a decline in hours similar to the decline in the data, by far exceeds the observed increase in the wage of entrepreneurs relative to workers. It further shows that a change in the curvature of the earnings function can potentially be quite powerful in affecting the optimal hours choice.

I then develop a quantitative model of occupational choice in the spirit of Roy (1951) adapted to workers and entrepreneurs. The two occupations are allowed to differ in the profile of their earnings function, similar to Erosa et al. (2023). I estimate the model at two points in time and let the model suggest, which parameters must have changed in order to be consistent with the empirical observations on the hours of the two occupations, the share of entrepreneurs and their hourly income relative to workers. I find that the single most powerful parameter that can explain the decline in hours of

entrepreneurs and the fall in the share of entrepreneurs is the curvature of the earnings function.

4.1 A Simple Model of Labor Supply

In what follows I describe a simple static model that purposefully abstracts from dynamic considerations. The reason for this is the fact that the decline in hours among entrepreneurs is happening relatively steadily over a longer period of time. This suggests that short-run fluctuations are less informative in identifying the cause of this long-run trend. In addition, the simple model also highlights the basic mechanisms that could lead to a decline in hours.

The model features an agent that has utility over consumption and dis-utility from labor. More specifically, I will assume MaCurdy (1981) preferences with the functional form:

$$u(c,h) = \frac{c^{1-\sigma}-1}{1-\sigma} - \varphi \frac{h^{1+\frac{1}{\theta}}}{1+\frac{1}{\theta}}. \tag{4}$$

Hours can be chosen freely, but they potentially differ in the shape of their earnings function. In particular, I will assume that both workers and entrepreneurs have an earnings function of the following form:

$$E(z,h) = zh^{\eta}. \tag{5}$$

For workers that are being paid an hourly wage, this earnings function is typically assumed to be linear in hours, i.e. the earnings elasticity is one ($\eta = 1$) and the productivity z is given by the wage rate. For entrepreneurs or also for salaried workers, it is less obvious, whether this earnings function is linear in hours. Erosa et al. (2023), for example, highlights that there might be substantial differences in hours worked between occupations of workers, that stem from differences in the earnings elasticity of the particular occupation.

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

$$\max_{c,h} \; u(c,h) \quad \text{s.t.:} \; \begin{aligned} c &= E(z,h) + y \\ h &\geq 0, c \geq 0 \end{aligned} \tag{6}$$

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:

$$h = \left(\frac{[E(z,h)+y]^{-\sigma}}{\varphi} \frac{\partial E(z,h)}{\partial h} \right)^{\theta} = \left(\frac{[zh^{\eta}+y]^{-\sigma}}{\varphi} \eta \frac{zh^{\eta}}{h} \right)^{\theta}. \tag{7}$$

Assuming no unearned income, i.e. $y = 0$, we get a closed form expression for hours:

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

and average hourly income is then given by:

$$\bar{w} = z \left(\frac{\eta z^{1-\sigma}}{\varphi} \right)^{\frac{\theta(\eta-1)}{1+\theta-\eta(1-\sigma)\theta}} . \tag{9}$$

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. If an increase in productivity or z, was the cause of the decline in hours, we would need to observe an increase in the general hourly income of entrepreneurs. This is in contrast to the data, where we see a rather flat development or even a decrease of around 5% in hourly income.

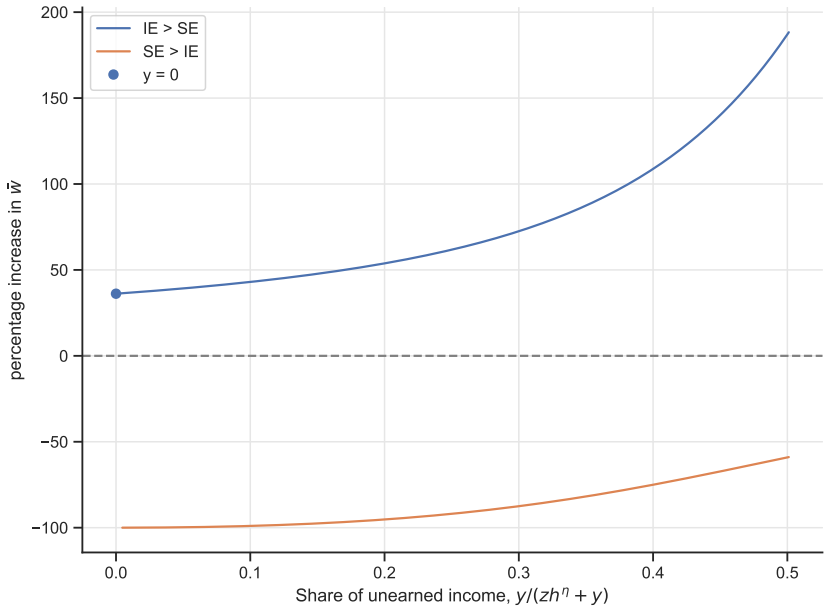


Figure 11: Changes in $\bar{w}$ necessary to generate a 7.7% drop in hours by different levels of unearned income.

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

How much does the hourly income have to increase in order to generate a drop in hours of around 7.7% relative to workers as seen in the data?[5] 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 11 illustrates the change in $\bar{w}$ necessary to generate a drop in hours h of 7.7%. 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 36% can generate a drop in hours of 7.7%. To see this, note that we can divide the hours of the latter period h' with the hours of the first period h using equation 8 to get an expression that defines the change in z necessary for a drop in hours of 7.7%. We

[5]The decrease of 7.7% is measured for men between the two periods used later in the quantitative model as well: 1989–1993 and 2015–2019.

can use this to calculate the necessary drop in $\bar{w}$:

$$1 - 0.076 = \frac{h'}{h} = \left(\frac{z'}{z}\right)^{\frac{\theta(1-\sigma)}{1+\theta-\eta(1-\sigma)\theta}} \iff \frac{z'}{z} = \left(\frac{h'}{h}\right)^{\frac{1+\theta-\eta(1-\sigma)\theta}{\theta(1-\sigma)}} \tag{10}$$

$$\frac{\bar{w}'}{\bar{w}} = \frac{z'}{z}\left(\frac{h'}{h}\right)^{\eta-1} = \left(\frac{h'}{h}\right)^{\frac{1+\sigma\theta}{\theta(1-\sigma)}} = 1.362 \tag{11}$$

Note that this increase in $\bar{w}$ is independent of the parameter η as it drops out of the calculations. This is certainly a sizable increase and far away from what we see in the survey data.[6] Second, if there is some unearned income $y > 0$, then the increase in hourly income has to be even larger.

Inspecting the labor supply condition in closed form in equations (8) and (9) reveals 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 much either η or $1/\varphi$ has to be in order to generate a drop of 7.7% in hours for entrepreneurs. Figure 12 shows the change in percent of either only changing η or only changing $1/\varphi$. The initial values of both η and φ are fixed to 1.5.[7] The percentage change of the respective parameter is on the horizontal axis and percentage changes in hours (left panel) or percentage changes in hourly income (right panel) are on the vertical axis. We can see that a decrease of η (while keeping φ fixed) by about 27% decreases hours by exactly 7.7% as observed in the data. Turning to a change in φ only, we see that also a decrease of $1/\varphi$ by about 29% can generate the same decline in hours.

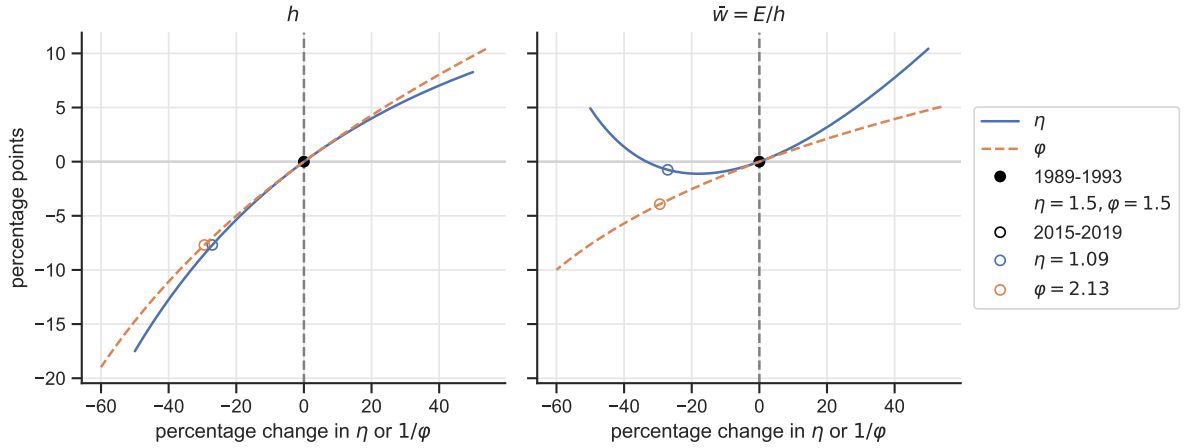


Figure 12: Changes in η necessary to generate a 7.7% drop in hours for two different values of σ.

Notes: Value for other parameters: $\sigma = 2, \theta = 0.54, z = 1, y = 0$.

However and importantly, the implications for the hourly wage is different, which helps us distinguish a change from η from a change in φ. While a change of η only decreases hourly

[6] This corresponds to about a 1 p.p. higher growth rate of productivity for entrepreneurs relative to workers. 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 value.

[7] If η was fixed to an initial level that is below one, then a decrease in η would lead to a decrease in hours, but to an increase in the hourly wage. This is contrary to what we observe in the data and therefore I focus on the case where $\eta > 1$.

income by 0.8%, a decrease in φ has a much stronger decline of 3.9% as a consequence. The estimation of the quantitative model in the next section will use this insight and use the hourly income to distinguish the drop in hours from a change in η and a change in φ.

4.2 A Quantitative Model of Occupational Choice

The simple model above highlighted that a change in the curvature of the earnings function holds promise in explaining the decline in hours without a substantial change in the hourly income. However, another salient feature of the data is the drop in the share of entrepreneurs. This is information that we can use to identify the mechanism behind the decline in hours of entrepreneurs. The simple model cannot make predictions for the share of entrepreneurs, since it does not allow individuals to make an occupational choice. This section advances the simple model and introduces an occupational choice between being a worker and an entrepreneur.

The quantitative model is set in a static environment without any inter-temporal choices made by the agents, but I estimate the model at two points in time. Again, the assumption of a static environment seems to be reasonable against the background of the long-run steady decline in the working hours of entrepreneurs. The estimation of the model targets three key moments. First, the level of average working hours for workers and entrepreneurs. Second, the share of entrepreneurs and third, the average difference in wages between workers and entrepreneurs. These key moments will then identify which parameters in the model need to be adjusted to match the change over time. A more detailed description of the model follows.

The economy is populated by a unit mass of agents indexed by i who maximize utility. Each agent chooses to be either a worker or an entrepreneur. The two occupations are indexed by $j \in \{w, e\}$ and differ in the shape of their earnings function. Agents differ in their productivity as worker z_{iw}, in their productivity as entrepreneur z_{ie}, in their taste for work φ_i and in the non-pecuniary benefits ε_i that they receive as an entrepreneur. The inclusion of non-pecuniary benefits is motivated by the fact that many entrepreneurs seem to have a lower real wage than comparable workers as shown in Section 3.3. Additionally, each agent also chooses how many hours to work. Since this is a static model, agents directly consume all their earnings and do not face a consumption-savings choice. Since there was little change in unearned income between workers and entrepreneurs as shown in Figure 10 of Section 3.3, I also abstract from unearned income. The inclusion of unearned income only complicates the computation of the optimal hours decision without adding any substantial benefits. The maximization problem can be formulated in two stages.

In the first stage, agents draw a vector of their four states $(z_{iw}, z_{ie}, \varphi_i, \varepsilon_i)$ and choose how many hours to work, conditional on the choice of the occupation. More specifically, they solve the following utility-maximization problem:

$$V_{ij} = \max_{c_{ij}, h_{ij}} \; u_i(c_{ij}, h_{ij}) + \varepsilon_i \mathbb{1}_{[j=e]} \quad \text{s.t.:} \; \begin{array}{l} c_{ij} = e_{ij} \\ h_{ij} \geq 0, c_{ij} \geq 0. \end{array} \tag{12}$$

The utility function $u_i(c_{ij}, h_{ij}) = \frac{c_{ij}^{1-\sigma}-1}{1-\sigma} - \varphi_i \frac{h_{ij}^{1+\frac{1}{\theta}}}{1+\frac{1}{\theta}}$ is individual-specific since the taste for work φ_i is allowed to be different for individuals, but otherwise is the same as in the simple model. Consumption is directly given by earnings, reflecting the assumption of no unearned income and no consumption-savings decision. Importantly, the earnings function is given by:

$$e_{ij} \equiv E_j(z_{ij}, h_{ij}) = z_{ij} h_{ij}^{\eta_j}. \tag{13}$$

Note that the earnings function differs between the two occupations only in the curvature with respect to hours η_j. As shown by Heckman and Honoré (1990), without any parametric assumptions on the distributions, from which individuals draw their idiosyncratic states, Roy models of this form can match any cross-sectional distribution of hours and wages. Therefore, I will make specific parametric assumptions about the distributions from which all the idiosyncratic states are drawn. The productivity states for the two occupations are drawn from two independent log-normal distributions and z_{ij} has a mean of μ_z^j and standard deviation of σ_z^j. Further, the taste for work, which is assumed to be the same for the two occupations, is also drawn from a log-normal distribution and the resulting mean and standard deviation of φ_i is given by μ_φ and σ_φ, respectively. Finally, the value for the non-pecuniary benefits as an entrepreneur ε_i is drawn from a normal distribution with mean $\mu_\varepsilon = 0$ and standard deviation σ_ε.

In the second stage, agents compare the value of each occupation and choose the one with the higher value. That is, agent i chooses to become an entrepreneur if the following holds:

$$V_{ie} > V_{iw}. \tag{14}$$

I abstract from the measure zero individuals who are indifferent between the two occupations. What matters most, which occupations agents choose depends first and foremost on their relative productivity between the two occupations z_{ie}/z_{iw}. If an agent has a comparative advantage as an entrepreneur, the likelihood of this agent choosing to be an entrepreneur is higher. The decision is also influenced by the other two idiosyncratic states. The taste for work φ_i also plays an important role as the optimal hours for each occupation potentially differ. This follows from the fact that the earnings functions and in particular their curvature η_j are different for the two occupations. Although, the non-pecuniary benefits from entrepreneurship ε_i influence the occupational choice, it does in fact not enter the decision problem of how many hours to work, conditional on the choice of the occupation. However, non-pecuniary benefits can still affect average hours and average hourly income through effects on selection into the occupation. If an agent with a very low z_{ie} chooses to be an entrepreneur because of the high non-pecuniary benefits, this agent then chooses to work many hours at a relatively low hourly income rate.

4.3 Estimation Strategy

This section outlines the estimation strategy to estimate the quantitative model of occupational choice described in the previous section. The estimation is performed on an early period (1989–1993) and a later period (2015–2019). It describes which parameters

are fixed and which parameters are estimated and are allowed to vary between the two estimation periods 1989–1993 and 2015–2019. Further, it explains which moments are targeted, how they are measured in the data and how they map to the model. Conceptually, the strategy is to normalize the model to the first period (1989–1993) and measure the respective moments in the data relative to that period by using weights that adjust the composition in the second period to the composition in the first period. Thus all data moments should be interpreted as moments with the 1989–1993 composition of workers and entrepreneurs.

First, I fix some parameters to standard values. The coefficient of relative risk aversion of the utility function with respect to consumption is fixed to $\sigma = 2$. The fact that I set $\sigma = 2$ allows an income effect to be active, unlike in models with log-utility in which income and substitution effects cancel. The parameter that controls the Frisch elasticity of labor supply in dynamic models, θ, is taken from Chetty et al. (2011) and fixed to 0.54. The mean of the productivity distribution for workers μ_z^w is normalized to be one in the first period but is allowed to vary in the second period. Alternatively, the mean of the taste for work μ_φ could have also been chosen as a normalization.

This leaves us with eight parameters to be estimated in the first period and nine parameters to be estimated in the second period. The two parameters of the highest interest are η_e and η_w, the two curvature parameters of the earnings function for each occupation. Then, there are two parameters for the taste of work, the mean μ_φ and standard deviation σ_φ of the distribution of φ_i. Further, we have the parameters associated with the distributions of the idiosyncratic productivity for each occupation. The two means μ_z^j and the two standard deviations σ_z^j. However, since we have used $\mu_z^w = 1$ as a normalization in the first period, we only have three parameters associated with the productivity distributions to be estimated in the first period. Finally, the last parameter to be estimated is the standard deviation of the non-pecuniary benefits σ_ε.

These eight parameters are estimated by matching eight model moments for each period and one moment that ensures a consistent normalization between the two periods. The eight model moments for each period are the following. First and foremost, the log of mean hours for entrepreneurs and workers. Then, the share of entrepreneurs and the mean difference in log wages between entrepreneurs and workers. I further use the share of entrepreneurs and workers working more than 45 hours and eventually the log standard deviation of wages for entrepreneurs and workers. The one moment that links the two periods is the mean of log income for workers. This moment is needed as the level of income in the first period is endogenous and the result of the chosen normalization and the estimated parameters. Therefore, I perform the estimation of the two periods jointly together.

When computing these moments in the data, I average over a five-year period to smooth year-specific variation. In order to deal with compositional changes, I first produce composition adjustment weights for the second period (2015–2019) such that observations are weighted to correspond to the composition in the first period (1989–1993). This reweighting is performed for the usual dimensions of age, education, number of children, occupation and industry used in Section 3. In order to estimate the model, I use a simulated method of moments approach. For each period, I simulate three million agents (corresponding to the number of observations in the data), solve their labor supply and

Table 3: Estimated parameters

Parameter	Value		Description
	1989-1993	2015-2019	
η_e	1.477 [1.379, 1.575]	1.239 [1.153, 1.330]	Earnings elasticity of entrepreneurs
η_w	1.138 [1.064, 1.214]	1.208 [1.125, 1.296]	Earnings elasticity of workers
μ_φ	0.949 [0.887, 1.009]	1.017 [0.948, 1.088]	Mean, disutility of labor, φ_i
σ_φ	0.092 [0.075, 0.110]	0.103 [0.080, 0.124]	Std., disutility of labor, φ_i
μ_z^e	0.384 [0.375, 0.392]	0.391 [0.375, 0.404]	Mean, entrepreneurial productivity distribution
μ_z^w	1.0	1.199 [1.194, 1.203]	Mean, worker productivity distribution
$\sigma_{log(z)}^e$	1.228 [1.204, 1.252]	1.401 [1.367, 1.435]	Std., entrepreneurial productivity distribution
$\sigma_{log(z)}^w$	0.487 [0.477, 0.497]	0.582 [0.570, 0.595]	Std., worker productivity distribution
σ_ε	0.807 [0.779, 0.832]	0.952 [0.923, 0.978]	Std., non-pecuniary benefits

Notes: Values in brackets report 95 % confidence intervals obtained by 300 bootstrap iterations.

occupational choice decisions and compute the model moments. I then search for the parameters that minimize the sum of squared residuals of the model moments to the data moments. To obtain confidence intervals, I repeat this procedure 300 times with different random draws.

4.4 Estimation Results

Table 3 reports the point estimates along with the confidence intervals of the parameters for both periods. The first two rows of the table show the earnings elasticity of entrepreneurs and workers. We can see a substantial drop in the elasticity for entrepreneurs η_e, while the elasticity for workers η_w stays almost unchanged. This already indicates that η_e seems to be important to match the data moments, which the decomposition exercise further down confirms. The next two rows show the parameters for the distribution of φ_i. Both parameters show little change over time. Turning to the mean of the productivity distributions from which agents draw their productivity values, we first note that μ_z^e is substantially lower than μ_z^w. However, the reader should note that this is the mean of the underlying theoretical distributions from which agents draw their productivity value. It does not tell us anything about the ex-post realized value of productivity of entrepreneurs after selection. Comparing these values between the two periods, we can see hardly any change for μ_z^e, but a substantial increase in μ_z^w. Even though μ_z^w is fairly unchanged over time, the standard deviation of the entrepreneurial and worker productivity distributions have both increased. Eventually, we also see a slight increase in the standard deviation of the non-pecuniary benefits.

Table 4: Targeted moments

Moment	I) 1989-1993 Data	I) 1989-1993 Model	II) 2015-2019 Data	II) 2015-2019 Model
Mean hours of entrepreneurs	47.81	45.92	42.80	42.38
Mean hours of workers	43.26	43.08	41.95	41.70
Share of entrepreneurs with 46+ hours (in %)	48.22	49.80	32.98	33.26
Share of workers with 46+ hours (in %)	27.33	27.53	22.14	22.43
Share of entrepreneurs (in %)	14.07	14.05	12.09	11.90
$mean(\log(e_{ie}/h_{ie})) - mean(\log(e_{iw}/h_{iw}))$	0.04	0.04	0.00	0.00
$std(\log(e_{ie}/h_{ie}))$	0.66	0.66	0.77	0.77
$std(\log(e_{iw}/h_{iw}))$	0.46	0.46	0.54	0.54
Difference of $mean(log(e_{iw}))$ to first period	–	–	0.13	0.13

Notes: The moments on the mean hours of entrepreneurs and workers were converted from the logarithm of mean hours to mean weekly hours for readability. The actual targeted moments enter in logarithms into the objective function of the estimation to ensure a fair weighting with the other moments that are either expressed in percentage points or logarithms as well.

Next, we turn to the fit of the model with the data. Table 4 shows the targeted moments for the data and the corresponding values from the estimated model in both periods. Overall, the model does a fairly good job of matching all targeted moments. Looking at the first two rows, we see the mean weekly hours of entrepreneurs and workers. The model cannot perfectly match the hours of entrepreneurs in the first period, but otherwise compares well with the data. However, almost equally important is the share of entrepreneurs and workers working more than 45 hours. There, we can see that the model does a good job for both entrepreneurs and workers in the two periods. Given our parametric assumptions on the distributions, it is not surprising that the model cannot perfectly match all moments as the reported hours worked in the data tend to bunch at "round" numbers like 40 or 45 and not reflect a log-normal distribution. The remaining moments are matched almost perfectly.

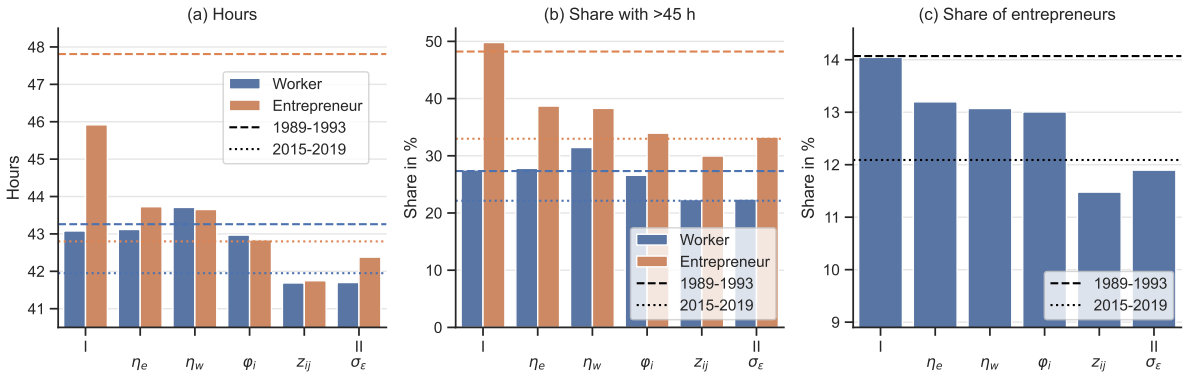


Figure 13: Decomposition of parameter changes.

To see the effect of each parameter, we can perform a decomposition of the parameter changes shown in Figure 13. To do this, I start from the estimated model in the first period (period I). I then change the parameters one after the other and report the

mean hours together with the share working more than 45 hours for both workers and entrepreneurs and the share of entrepreneurs along the horizontal axis. Eventually, the last bars on the right side of each panel show the estimated model in period II.

Figure 13 shows the result of this decomposition exercise. The first (leftmost) two bars of panel (a) for hours labeled with "I" show the hours from the estimated model in the first period. The dashed and the dotted lines show the data moments for the first and second period. The first two bars of panel (b) show the same but for the share of individuals working more than 45 hours and panel (c) shows the equivalent for the share of entrepreneurs from the estimated model in period I. This illustrates the fit of the model for these three moments and we can see that both the share of entrepreneurs and the share of individuals working more than 45 hours fit the data moments very closely. However, the average hours of entrepreneurs are slightly too low.

The next group of bars labeled with η_e in panel (a) shows the hours of entrepreneurs and workers when only changing η_e to the value estimated in period II. As we can see, a change in only this parameter can reduce the mean hours of entrepreneurs substantially and brings it already very close to the target for period II. In fact, a change in η_e reduces the hours of entrepreneurs by 2.2 hours, which is 44% of the total decline in average hours observed in the data. However, this single parameter change is even more successful in explaining the reduction at the top of the hours distribution. It can explain 73% of the share of entrepreneurs working more than 45 hours. Turning to the share of entrepreneurs, we can see that a change in η_e has also a substantial drop in the share of entrepreneurs as a consequence. It can explain about 43% of the overall fall in the share of entrepreneurs in the data.

As we now move to the next group of bars labeled with η_w, we not only change η_e to the value of the estimated model in period II, but we additionally change η_w. Since this parameter changes very little between the two periods, the effect on hours and the share of entrepreneurs is negligible. Next, we change the two parameters that are associated with the distribution of φ, the mean μ_φ and the standard deviation σ_φ. Also, these parameters change little between the two periods and reduce the hours of both workers and entrepreneurs only marginally. Changes in the four parameters that describe the two productivity distributions, labeled with z_{ij}, have a substantially larger effect. Like η_e, it reduces the hours and the share of entrepreneurs. However, an important distinction is that it also lowers the hours of workers. Finally, the standard deviation of the distribution of non-pecuniary benefits increases the hours and the share of entrepreneurs.

Instead of cumulatively changing parameters, we can also evaluate the isolated effect of these parameters. Figure 14 again departs from the model estimated in period I, but then changes one parameter (or group of parameters for the case of φ_i and z_{ij}) at a time. The reader should note that the dashed line now shows the model moments from the first period, which corresponds to the height of the bars labeled with I. The result from this exercise corroborates the findings from the decomposition of the parameter changes. The parameter η_e is very powerful in decreasing both the hours of entrepreneurs and their share. While changes in the parameter associated with the productivity distributions are also powerful in moving the share of entrepreneurs, they move the hours of entrepreneurs by far less. Thus, we can conclude that η_e is the single most powerful parameter that can both cause a decline in the hours of entrepreneurs, especially at the top of the hours

distribution, and a fall in the share of entrepreneurs in the labor force.

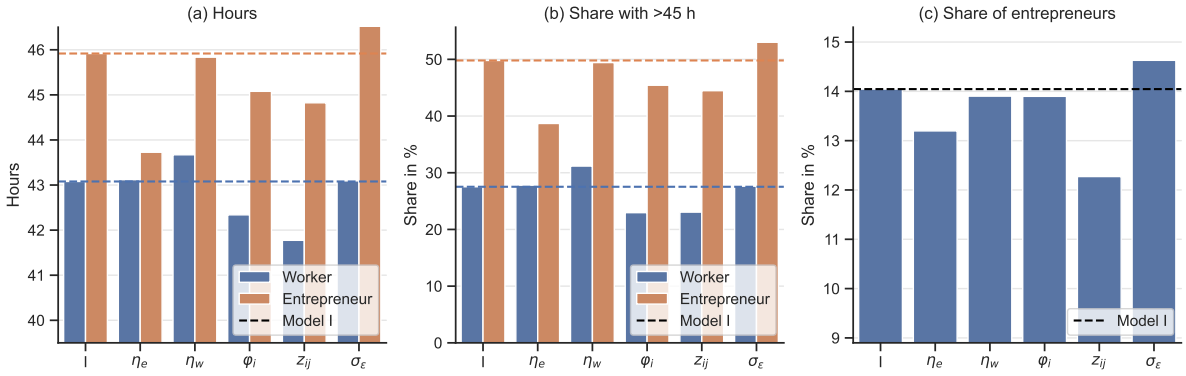


Figure 14: Isolated effect of each parameter or group of parameters.

Since the effects of certain parameters that change very little from one period to the other, mechanically show up as having a small effect, we can also look at the elasticities of these parameters. Figure 42 in Appendix A shows the elasticities of hours and the share of entrepreneurs with respect to a one percent increase in every single parameter. It confirms the conclusion that η_e is the single most important parameter that can move the hours and the share of entrepreneurs. Further, despite the little difference in μ_φ between the two estimated periods, it shows that also this parameter is powerful in moving the hours. However, it moves the hours of workers and entrepreneurs by a similar magnitude and only reduces the share of entrepreneurs marginally.

4.5 Interpreting a Drop in η

One remaining question is how this drop in the earnings elasticity of entrepreneurs can be interpreted. This section investigates two possible explanations. The first is a change in the demand elasticity faced by entrepreneurs. It shows that a decrease in competition is compatible with a fall in the curvature of the earnings function. The second possible interpretation is a change in the tax progressivity, which is less promising as I estimate a fall in the tax progressivity that is similar among entrepreneurs and workers. If anything, this would increase the returns to working long hours instead.

A change in the demand elasticity. To see what role the demand elasticity plays for the hours' choice, I set up a very simple example, in which an entrepreneur faces a downward-sloping demand curve, and I argue that a change in the demand elasticity can produce a situation that makes a decrease in the demand elasticity observably identical to a drop in the earnings elasticity η_e.

Consider an entrepreneur i, who faces an inelastic demand for her goods or services. In particular, let us assume that the downward-sloping demand function is given by the following functional form:

$$q(p_i) = \left(\frac{p_i}{P}\right)^{-\epsilon} Q \qquad \text{or by} \qquad p(q_i) = \left(\frac{q_i}{Q}\right)^{-\frac{1}{\epsilon}} P. \tag{15}$$

Here $-\epsilon$ is the price elasticity of her quantities with respect to an increase in her price p_i. The terms P and Q are aggregate terms, which are fixed in this partial equilibrium analysis.[8] Then, it directly follows that the entrepreneur's total revenues are given by:

$$p(q_i)q_i = Q^{-\frac{1}{\epsilon}} P q_i^{\frac{\epsilon-1}{\epsilon}}. \tag{16}$$

Further, let us also assume that the entrepreneur can produce one unit of output, by working ζ_i hours. Thus, her production function is given by: $q_i(h_i) = \zeta_i h_i$ and we can express her earnings as:

$$e_{ie} = Q^{-\frac{1}{\epsilon}} P \left(\zeta_i h_i\right)^{\frac{\epsilon-1}{\epsilon}} = z_{ie} h_i^{\eta_e}, \tag{17}$$

where some terms are collected in $z_{ie} = Q^{-\frac{1}{\epsilon}} P \zeta_i^{\frac{\epsilon-1}{\epsilon}}$ and in $\eta_e = \frac{\epsilon-1}{\epsilon}$. This is exactly the assumed functional form of the earnings function of workers and entrepreneurs. A decrease in the elasticity of demand (a decrease in ϵ) could then cause a decline in her earnings elasticity η_e.

This simple example shows that a decrease in the demand elasticity would be able to generate a change in the earnings elasticity η_e measured in the quantitative model. In turn, the interpretation of a decrease in ϵ is that her customers are now less price sensitive. This allows her to raise her markup, i.e. raise her price, and lower quantities. Furthermore, it also changes the curvature of the revenue function in exactly the way the estimation suggested. One scenario, in which the demand elasticity could change is a change in the market structure. For example, a decrease in competition or an increase in monopoly power could lead to a lower price elasticity.

A change in the tax progressivity. The curvature of the earnings function for both workers and entrepreneurs is also affected by the tax system. More progressive taxation reduces the after-tax income for the high earners. Since the empirical analysis showed a positive relationship between hours and income, a more progressive taxation would also change the curvature of the earnings function with respect to hours. This motivates a closer look at changes in the tax progressivity of the U.S. tax system.

Following Heathcote et al. (2017) and Borella et al. (2023), I model the U.S. tax system with the following effective tax function:

$$T(Y) = Y - (1-\alpha)Y^{1-\tau}, \tag{18}$$

where τ is the strength of the tax-progressivity and α is the average tax rate when $Y = 1$. Thus, the after-tax disposable income is given by:

$$\hat{Y} = (1-\alpha)Y^{1-\tau}. \tag{19}$$

Writing this in logs, we can estimate the following equation in the CPS ASEC to obtain estimates for the tax-progressivity parameter τ_t over time:

$$\log(\hat{Y}_{it}) = \log(1-\alpha_t) + (1-\tau_t)\log(Y_{it}). \tag{20}$$

The after-tax disposable income is computed by taking the total personal income and subtracting federal and state tax estimates provided by IPUMS-CPS (Flood et al., 2022).

[8] The demand function can be micro-founded assuming consumers have a CES utility function over entrepreneur i's and her competitors' goods.

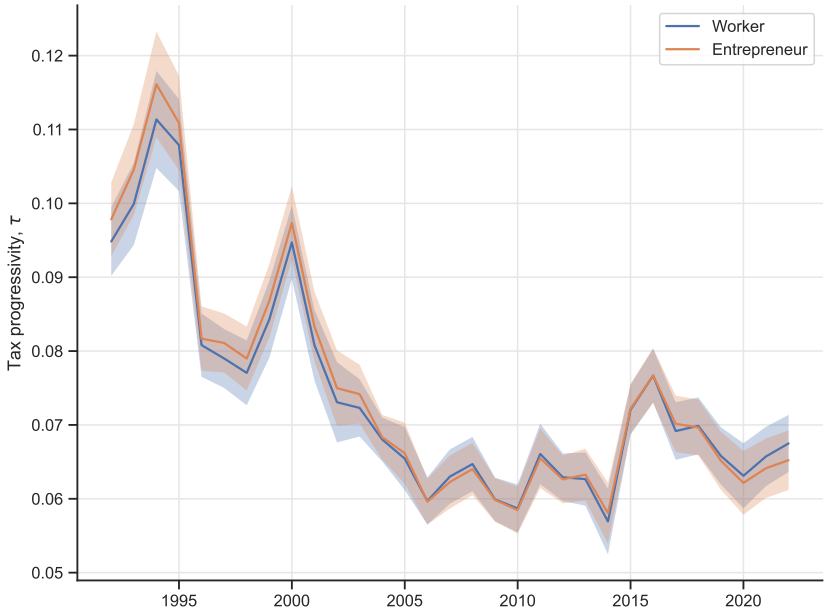


Figure 15: Estimated tax progressivity parameter τ_t for males workers and entrepreneurs over time.

Notes: Data from the CPS ASEC. Sample includes only males. The lines show the estimated tax progressivity τ_t from equation 20 and shaded areas indicate 95% confidence intervals.

As we can see in Figure 15, the tax progressivity for both workers and entrepreneurs decreased substantially since the 1990s. However, there are no noticeable differences in the tax progressivity between workers and entrepreneurs. This decrease in the tax progressivity would increase the convexity of the earnings function. Therefore, this could partly explain the estimated increase in the convexity for workers, but it cannot explain the decrease in the convexity for entrepreneurs.

5 Conclusion

This paper documents a new fact about the working hours of entrepreneurs in the U.S. It shows a substantial decline of 5.2 weekly hours relative to workers over the last 35 years. At the same time, the weekly hours of workers decreased by less than one hour. After adjusting for compositional changes in terms of gender, age, education, 25 occupation groups, 12 industry groups and the number of children, the downward trend reduces slightly to 3.8 weekly hours over the last 35 years. The decline is broad-based and visible in almost all sub-groups, except two small occupation groups. Further robustness analyses show, that the same trend can also be observed in Germany. Inspection of the distribution of hours reveals that the decline in working hours originates from the top of the hours distribution and that the share of entrepreneurs working more than 45 hours has dropped by around 20 percentage points.

The paper also documents two other facts that are important to identify the cause of this decline. The second fact shows that the decline in the share of entrepreneurs comes from entrepreneurs working more than 45 hours and the share of entrepreneurs

working up to 45 hours was stable over time. This fact adds to the recent literature on the slowing business dynamism and connects it with the decline in working hours of entrepreneurs. The third fact shows that the hourly income of workers and entrepreneurs during the last 35 years has evolved very similarly and that the income of entrepreneurs fell proportionally with their hours.

Using a simple static labor supply model, I explore several possible mechanisms that could have caused the decline in hours. First, a pure income effect coming from an increase in the productivity of entrepreneurs relative to workers can explain a reduction in the hours of entrepreneurs. However, the simple model shows that under reasonable parameter calibrations, this would imply an increase in the hourly income of about 35%. A number far away from the empirically observed development of stable hourly income for entrepreneurs relative to workers. The simple model further reveals that a change in the curvature of the earnings function of entrepreneurs holds promise in explaining the decline.

With the insights from the simple model, I develop a quantitative model of occupational choice in which agents are allowed to choose between being a worker or an entrepreneur. This delivers a prediction for the share of entrepreneurs and the relative income between workers and entrepreneurs that can be used in combination with the data to identify the mechanism behind the decline in hours of entrepreneurs. The estimation of the model in 1989–1993 and in 2015–2019 shows that the curvature of the non-linear earnings function of entrepreneurs is a key parameter that changed substantially over time. The change in this parameter alone can explain 44% of the decline in hours, 73% of the decline in the share of entrepreneurs working more than 45 hours and 43% of the fall in the share of entrepreneurs in the labor force. Further sensitivity analysis shows that this parameter is the single most important parameter that can explain a drop in the hours and the share of entrepreneurs at the same time.

I propose a possible interpretation for the curvature of the entrepreneurial earnings function and connect it with the price elasticity of demand in a partial equilibrium setup with inelastic demand. This simple example shows that a decrease in the price elasticity maps to a decrease in the curvature of the entrepreneurial earnings function. Thus, a change in the market structure of entrepreneurs that led to a decreased price elasticity was identified to be a possible candidate for the decline of hours worked among entrepreneurs. Therefore, it seems promising for future research to investigate this link further.

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A Additional Figures

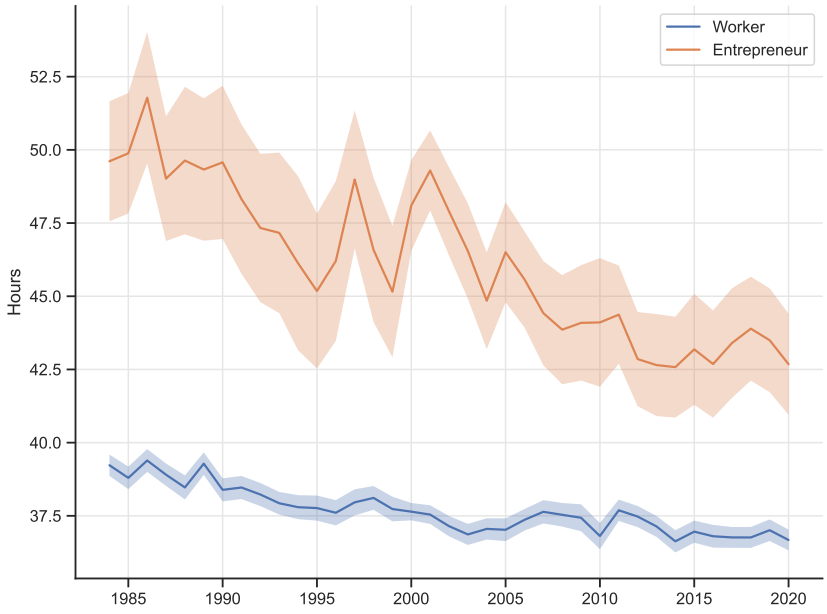


Figure 16: Average weekly hours worked in Germany.

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.

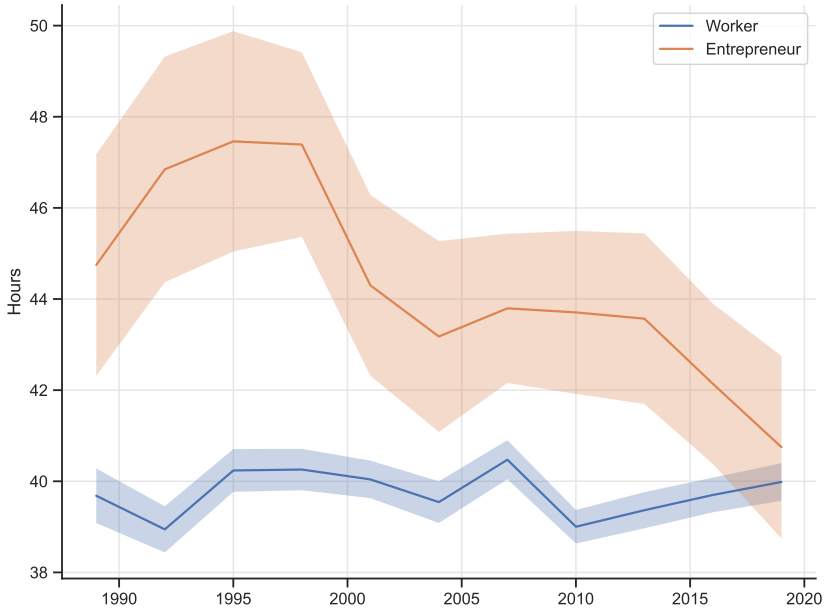


Figure 17: Average weekly hours worked in the U.S. with data from the SCF.

Notes: Data source is the Survey of Consumer Finances (SCF). The hours are conditional on working positive hours. Weighted by the sample weights. Shaded areas indicate 95% confidence intervals.

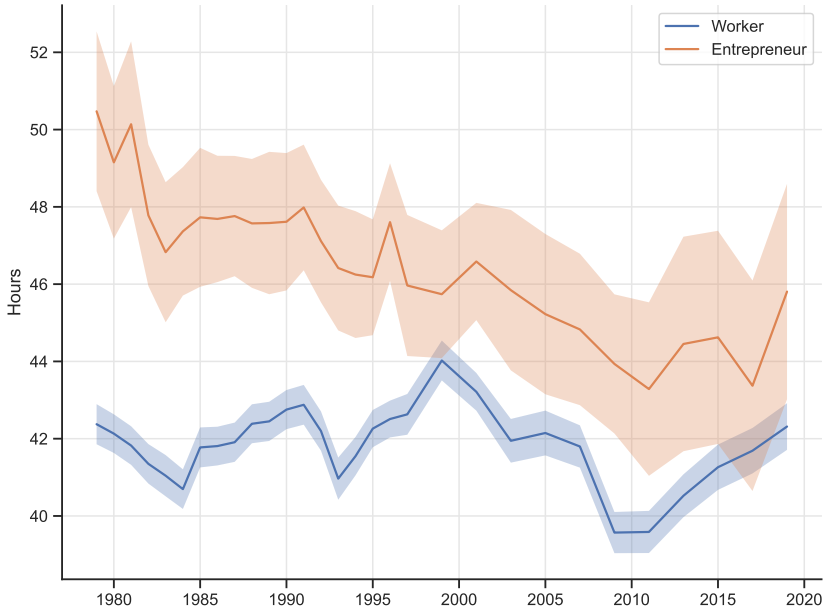


Figure 18: Average weekly hours worked in the U.S. with data from the PSID.

Notes: Data source is the Panel Study of Income Dynamics (PSID). The hours are conditional on working positive hours. Weighted by the PSID sample weights. Shaded areas indicate 95% confidence intervals.

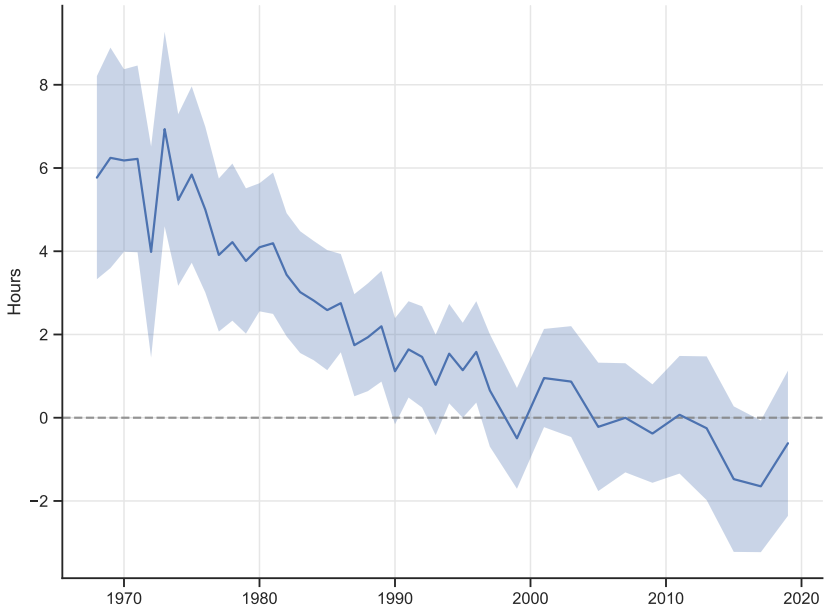


Figure 19: Difference in weekly hours worked between entrepreneurs and workers in the PSID from a regression framework with individual fixed effects.

Notes: Data source is the Panel Study of Income Dynamics (PSID). The hours are conditional on working positive hours. Coefficients are taken from a regression of weekly hours on the interaction of year-dummies with an entrepreneur dummy while absorbing individual and year FEs. Weighted by the PSID sample weights. Shaded areas indicate 95% confidence intervals.

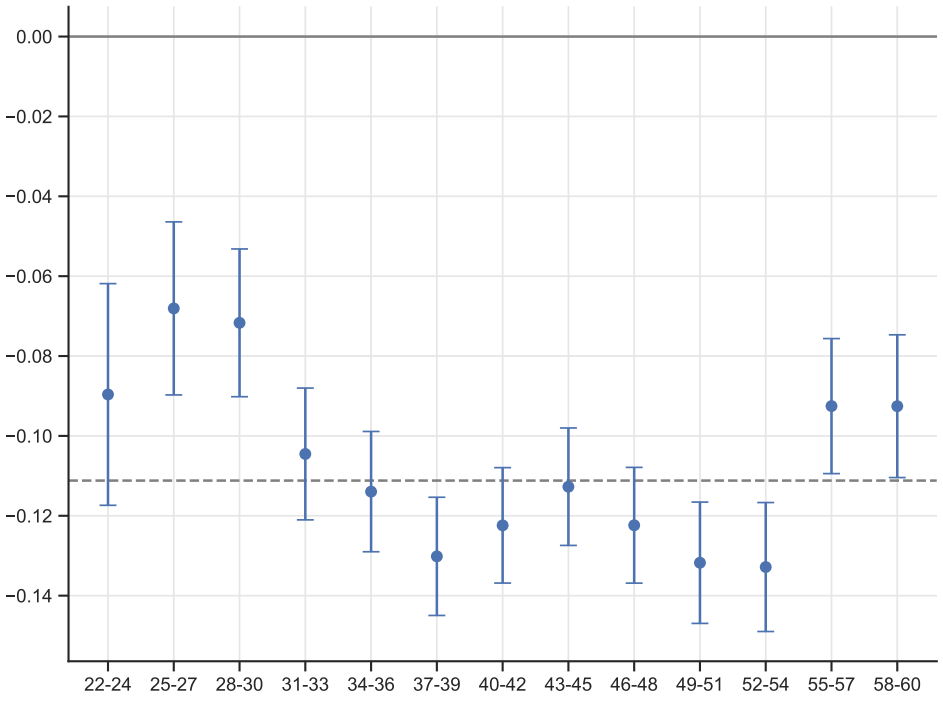


Figure 20: Decomposition of the decline in average weekly hours worked of entrepreneurs relative to workers by age bins.

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

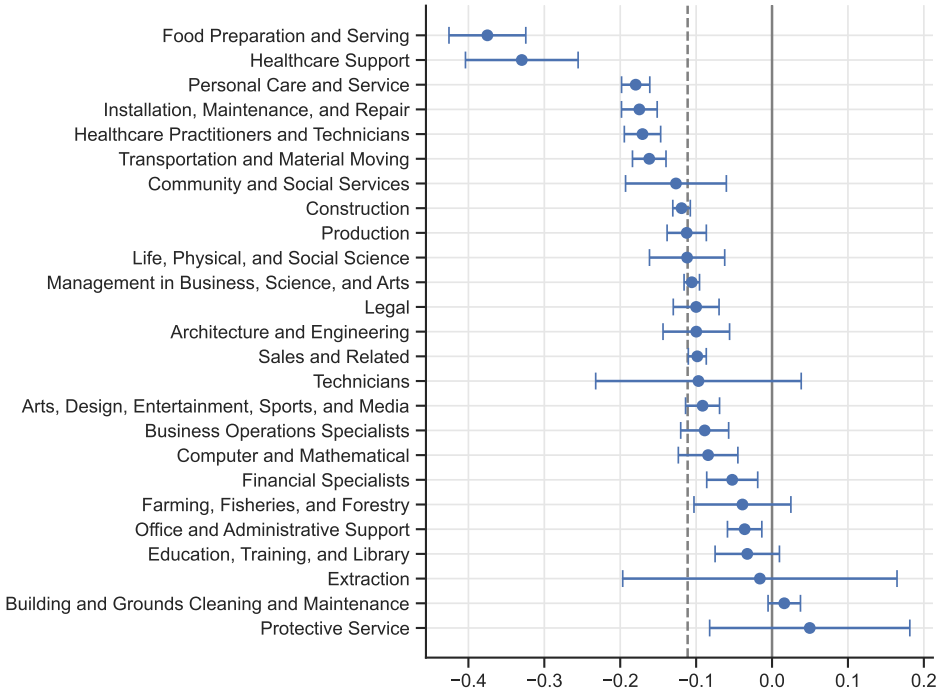


Figure 21: Decomposition of the decline in average weekly hours worked of entrepreneurs relative to workers by occupation groups.

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

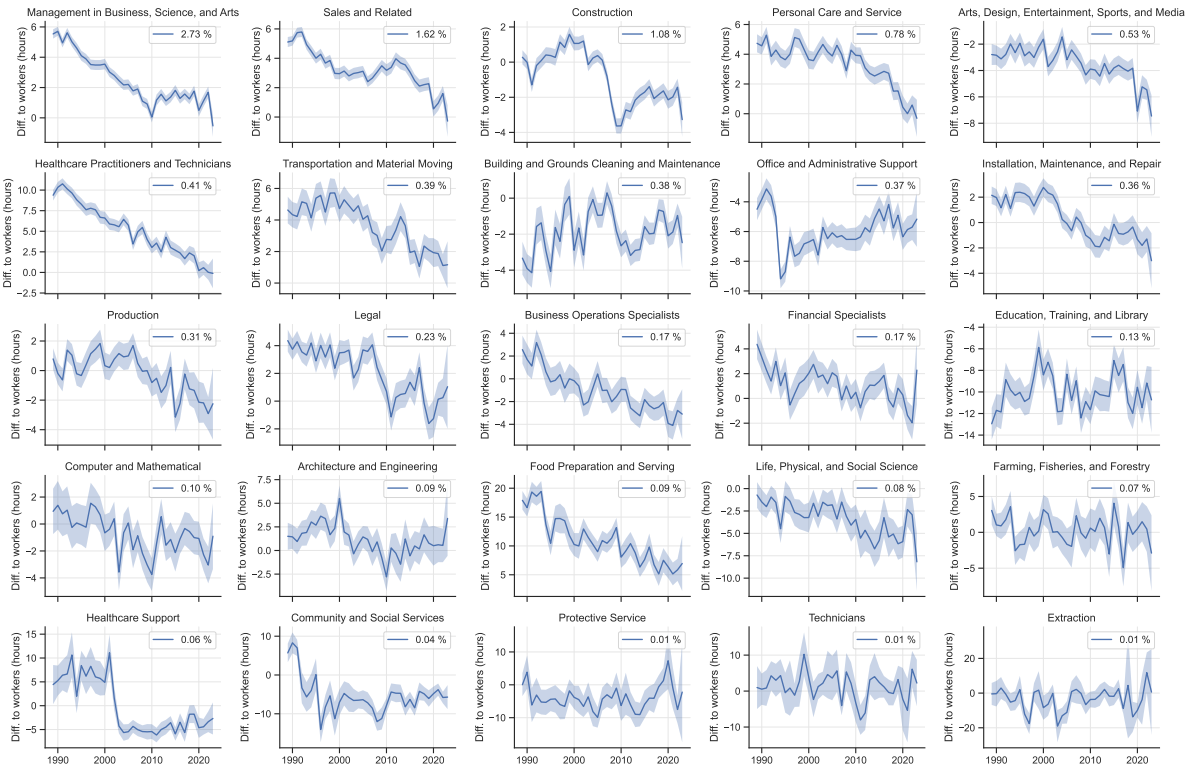


Figure 22: Difference in weekly hours worked between entrepreneurs and workers within each occupation group.

Notes: Data from the CPS basic monthly interview. Whiskers indicate 95% confidence intervals. The legend shows the average share of entrepreneurs in the labor force for the respective occupation group. The occupation groups are ordered by the average share of entrepreneurs.

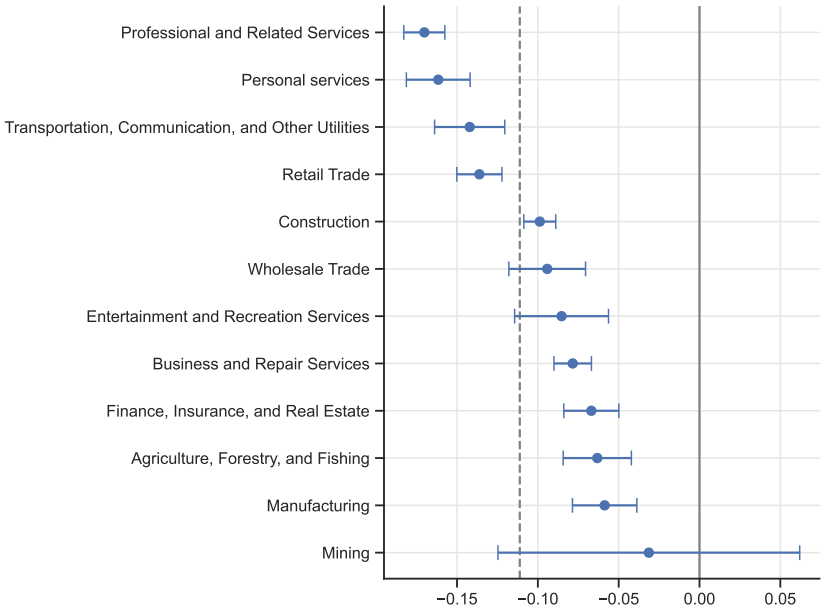


Figure 23: Decomposition of the decline in average weekly hours worked of entrepreneurs relative to workers by industry groups.

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

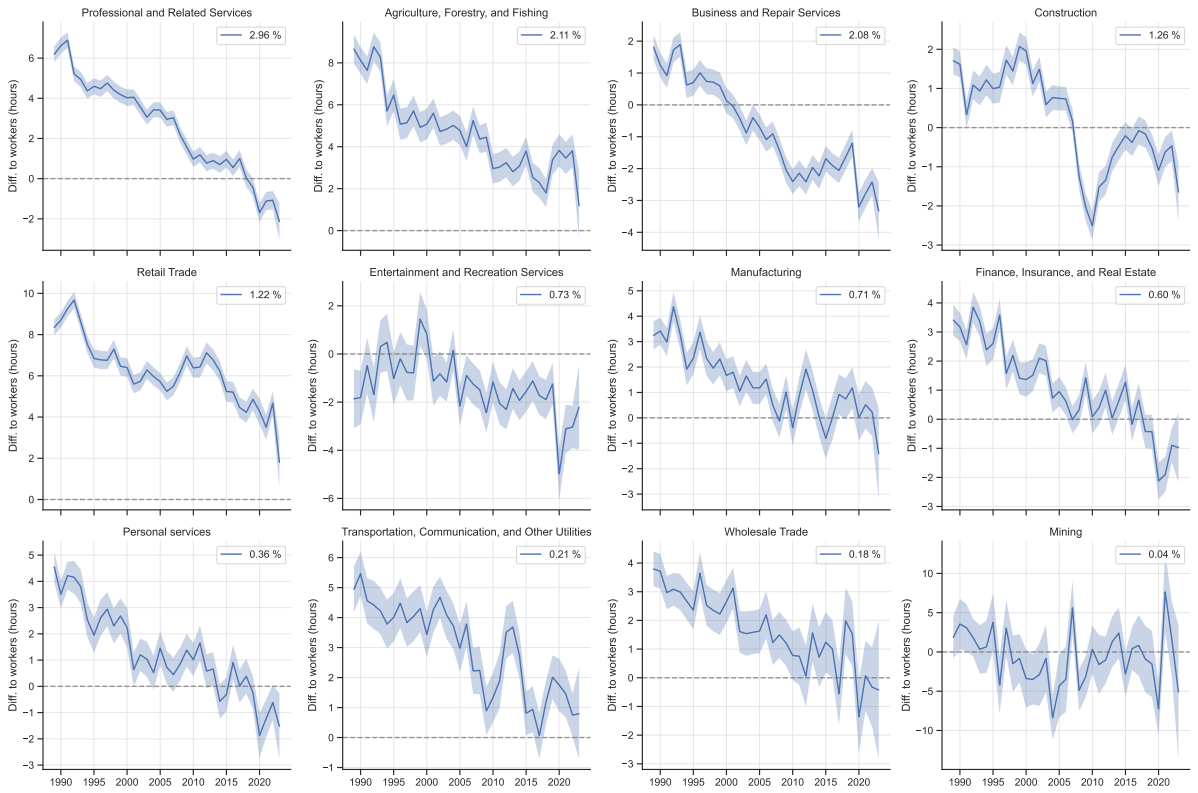


Figure 24: Difference in weekly hours worked between entrepreneurs and workers within each industry group.

Notes: Data from the CPS basic monthly interview. Whiskers indicate 95% confidence intervals. The legend shows the average share of entrepreneurs in the labor force for the respective industry group. The industry groups are ordered by the average share of entrepreneurs.

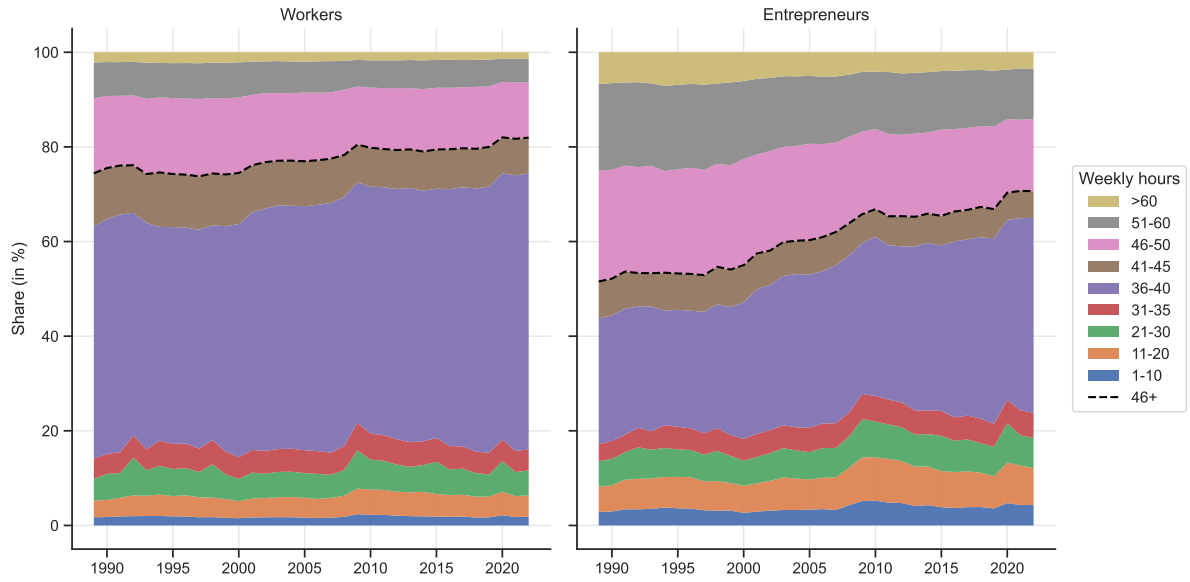
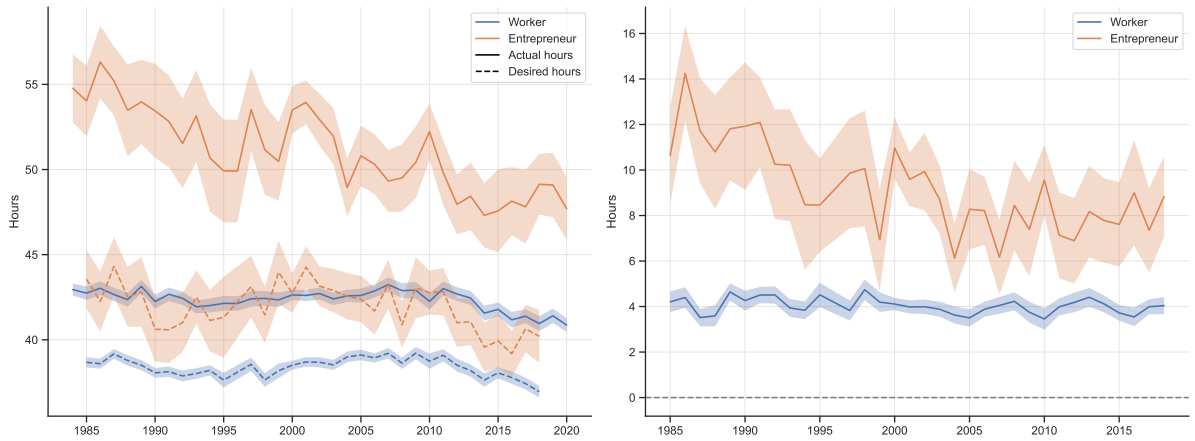


Figure 25: The distribution of hours over time for male workers and entrepreneurs only.

Notes: Data from the CPS basic monthly interview.



(a) Actual and desired weekly hours.

(b) Difference between actual and desired hours.

Figure 26: Actual and desired weekly hours of work for men in Germany.

Notes: Data from the SOEP in Germany. Weighted by sample weights. Shaded areas indicate 95% confidence intervals.

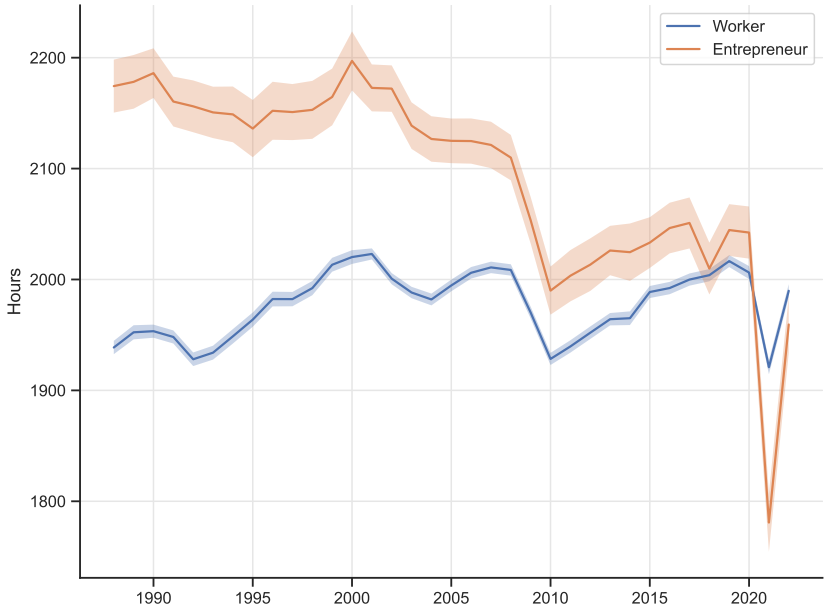
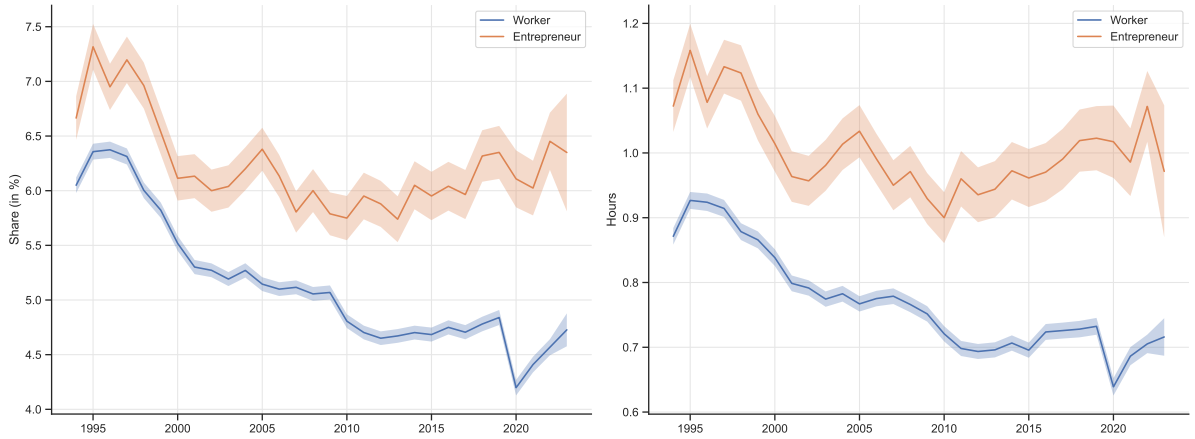


Figure 27: Annual hours worked for workers and entrepreneurs.

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.



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

Figure 28: Share of individuals having more than one job and the total average hours worked on other jobs.

Notes: Data from the CPS basic monthly interview. Weighted by the CPS sample weights. Shaded areas indicate 95% confidence intervals.

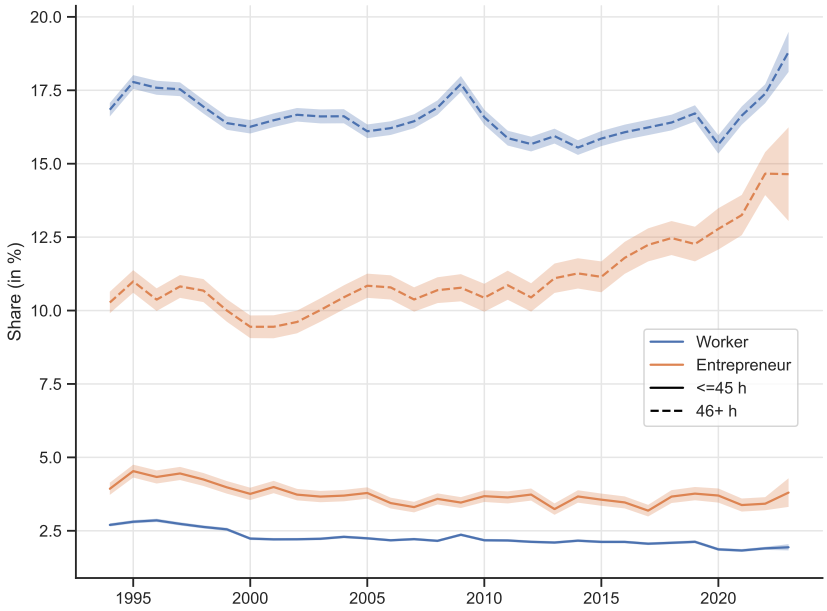
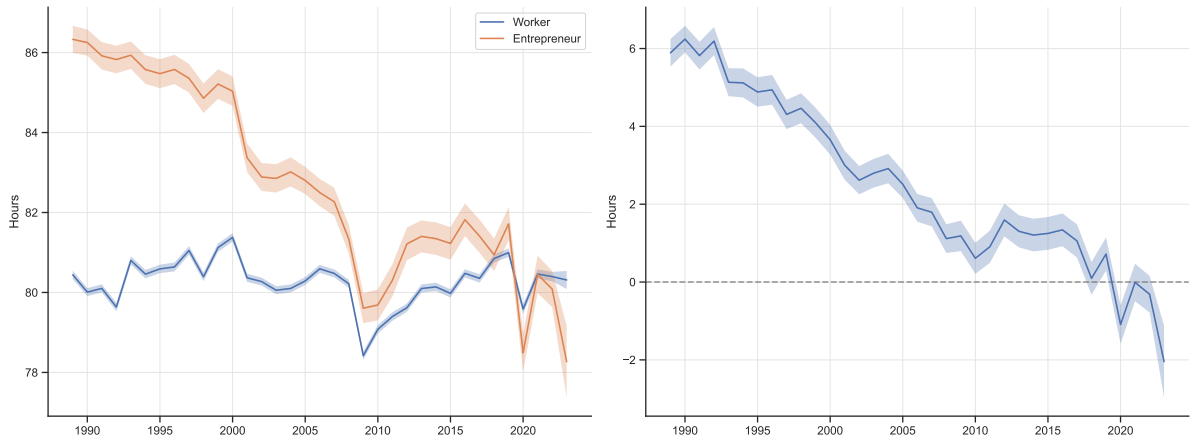


Figure 29: Share of individuals having more than one job split by working more or less than 45 hours.

Notes: Data from the CPS basic monthly interview. Weighted by the CPS sample weights. Shaded areas indicate 95% confidence intervals.



(a) Weekly couple hours (b) Difference in weekly couple hours

Figure 30: Weekly hours worked by the couple together.

Notes: Data from the CPS basic monthly interview. The sample only contains couples. Weighted by the CPS sample weights. Shaded areas indicate 95% confidence intervals.

(a) Male (b) Female

Figure 31: Weekly hours worked by gender and cohabitation status.

Notes: Data from the CPS basic monthly interview. Weighted by the CPS sample weights. Shaded areas indicate 95% confidence intervals.

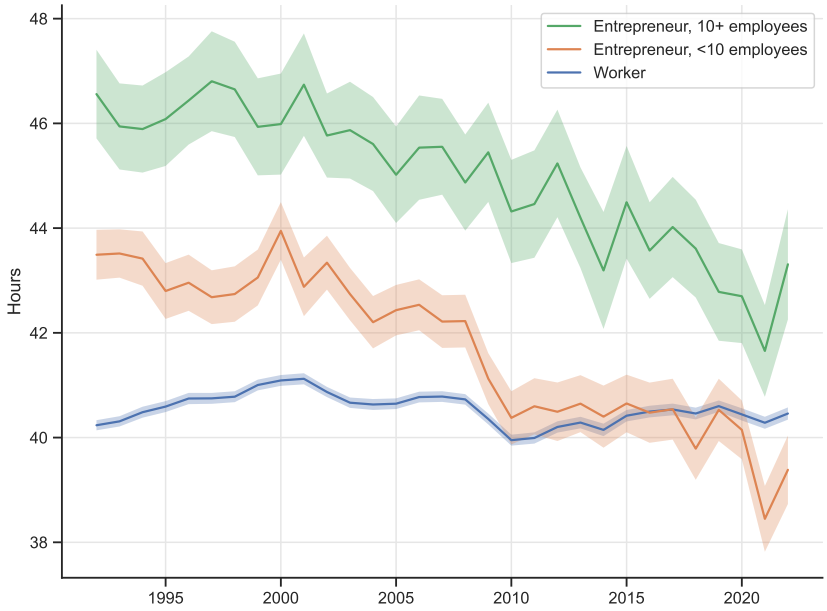
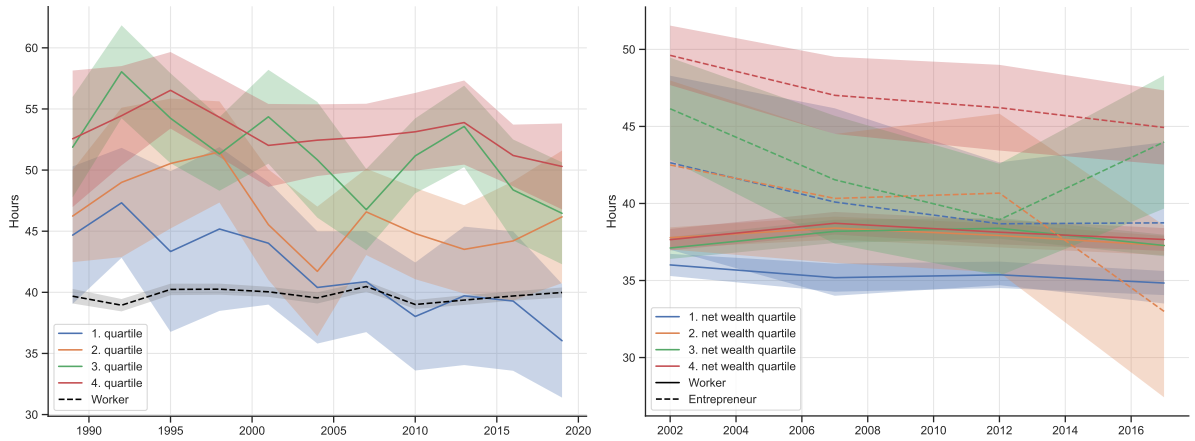


Figure 32: Weekly hours worked by firm size.

Notes: Data from the CPS March supplement (ASEC). Weighted by the CPS sample weights. Shaded areas indicate 95% confidence intervals.



(a) Business net-wealth (SCF) **(b)** Household net-wealth (SOEP)

Figure 33: Weekly hours by net-wealth: business net-wealth (SCF) or household net-wealth (SOEP).

Notes: Data for Panel (a) is from the Survey of Consumer Finances (SCF) and data for Panel (b) from the German Socio-Economic Panel (SOEP). Weighted by the CPS sample weights. Shaded areas indicate 95% confidence intervals.

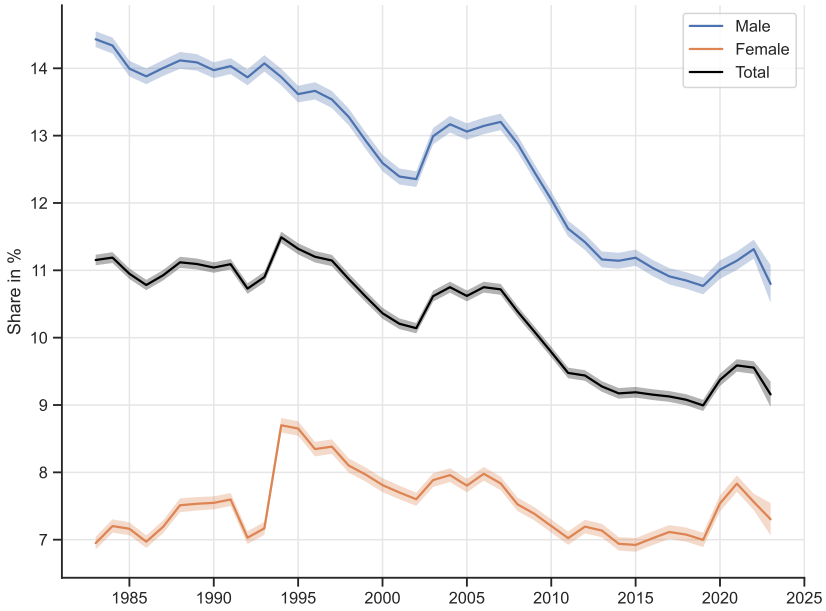


Figure 34: The share of entrepreneurs in the labor force by gender.

Notes: Data from the CPS basic monthly interview. Shaded areas indicate 95% confidence intervals.

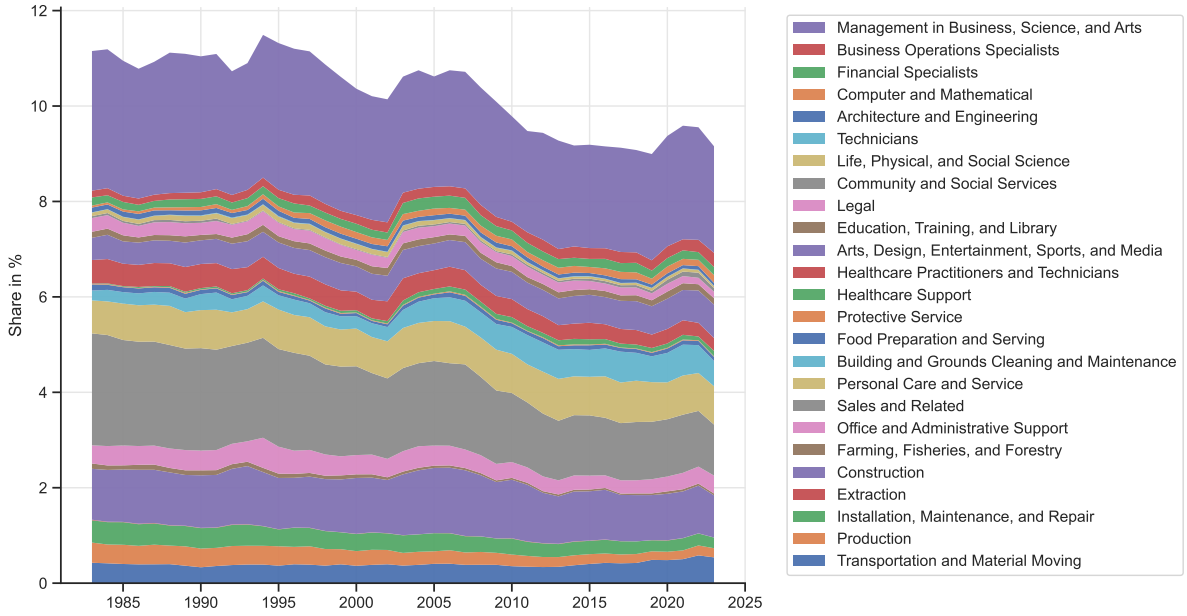


Figure 35: The occupational composition of entrepreneurs.

Notes: Data from the CPS basic monthly interview.

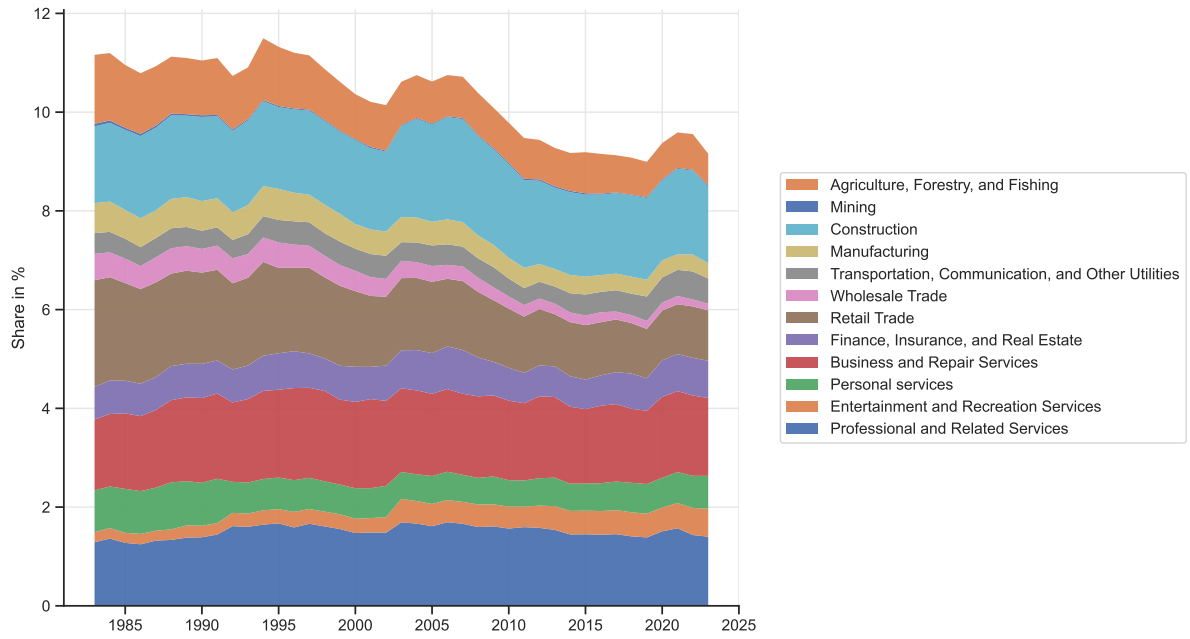
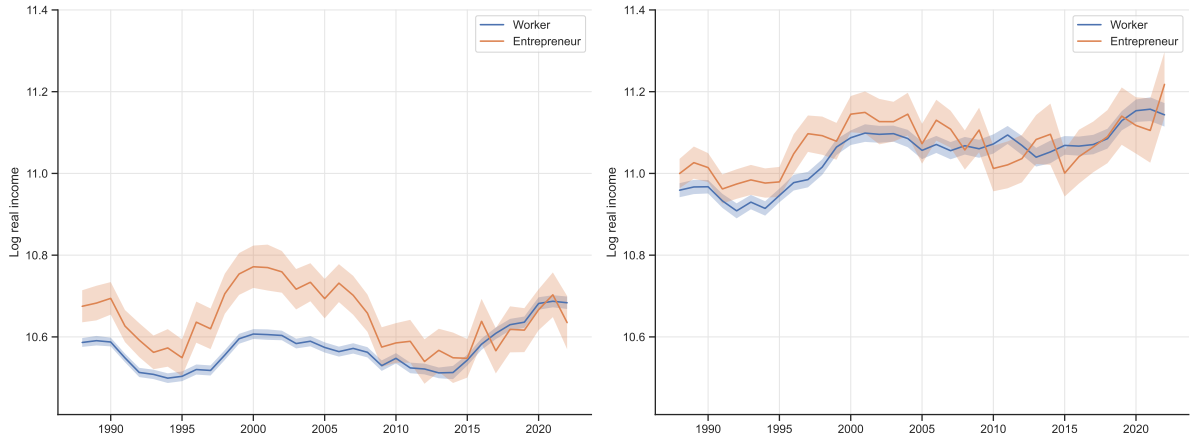


Figure 36: The industry composition of entrepreneurs.

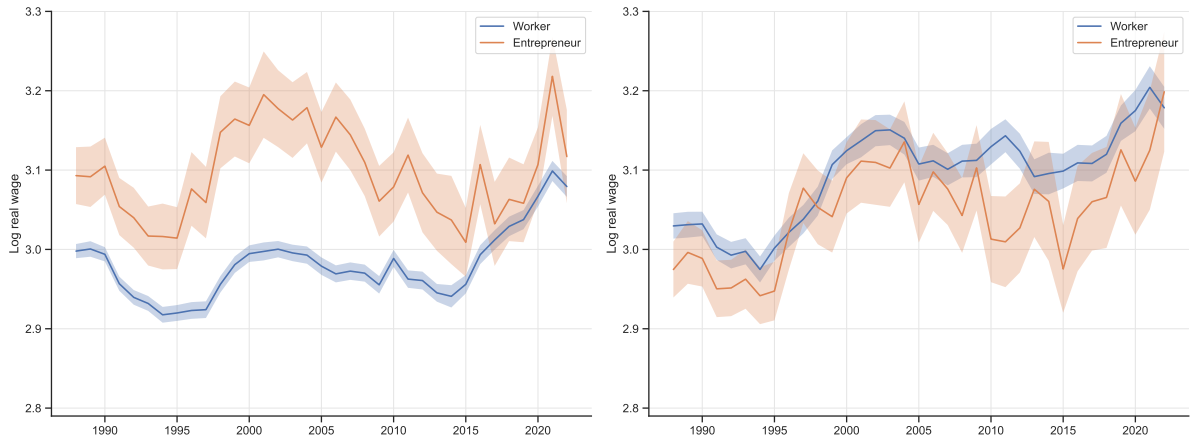
Notes: Data from the CPS basic monthly interview.



(a) up to 45 hours (b) 46+ hours

Figure 37: Log real income for workers and entrepreneurs split by working more or less than 45 hours.

Notes: Data from the CPS ASEC. Sample includes only men. Shaded areas indicate 95% confidence intervals.



(a) up to 45 hours (b) 46+ hours

Figure 38: Log real wage for workers and entrepreneurs split by working more or less than 45 hours.

Notes: Data from the CPS ASEC. Sample includes only men. Shaded areas indicate 95% confidence intervals.

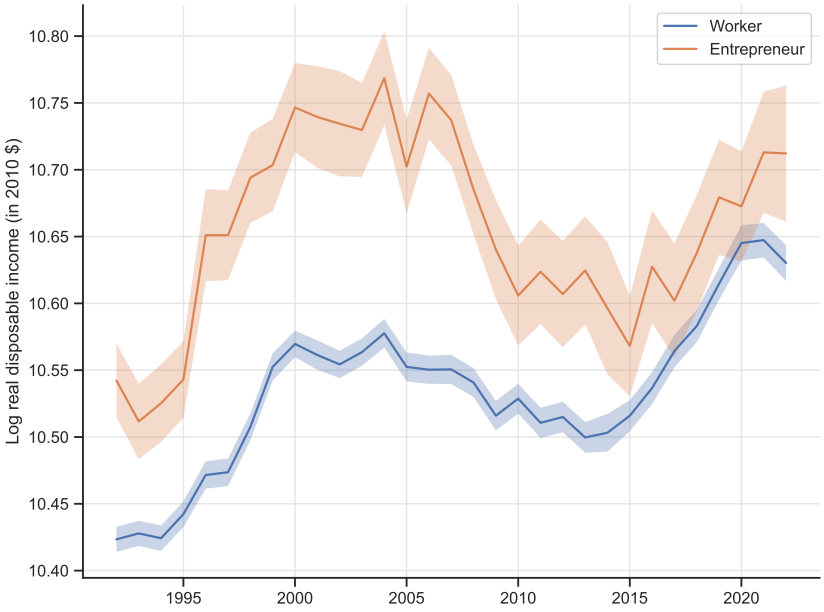
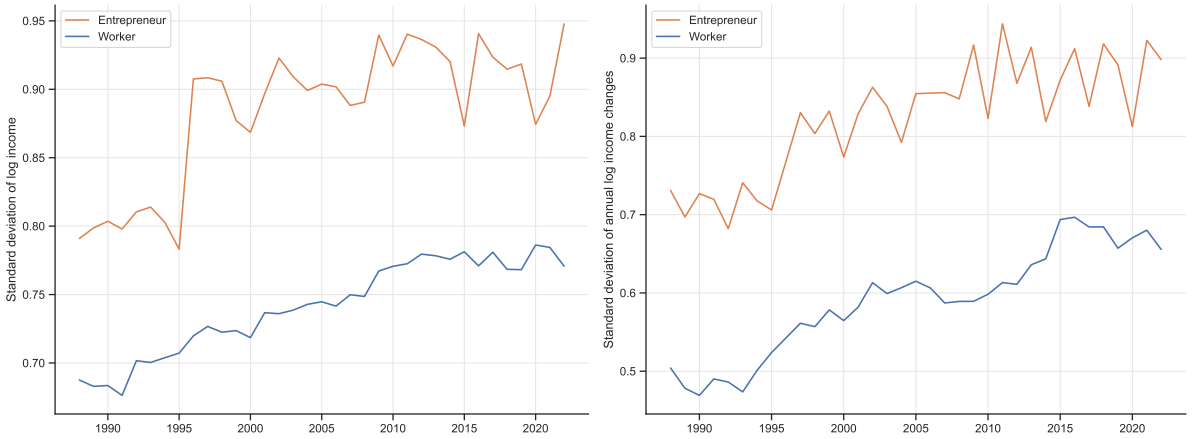


Figure 39: Log real after-tax disposable income for male workers and entrepreneurs.

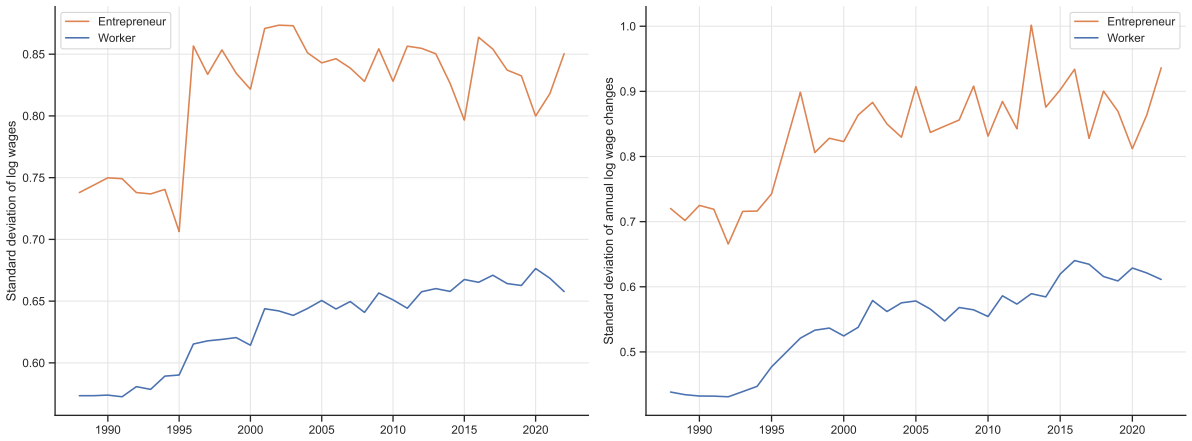
Notes: Data from the CPS ASEC. Shaded areas indicate 95% confidence intervals. After-tax disposable income is computed by subtracting estimates for the federal and state taxes provided by IPUMS-CPS (Flood et al., 2022) from total personal income.



(a) Std. of log income (b) Std. of annual log income changes

Figure 40: Standard deviation of log income and annual log income changes.

Notes: Data from the CPS ASEC. Sample includes only men. Panel (a) shows the cross-sectional standard deviation of log real income and panel (b) shows the standard deviation of individual changes in log real income from year $t-1$ to year t.



(a) Std. of log wages (b) Std. of annual log wage changes

Figure 41: Standard deviation of log wages and annual log wage changes.

Notes: Data from the CPS ASEC. Sample includes only men. Panel (a) shows the cross-sectional standard deviation of log real wages (hourly income) and panel (b) shows the standard deviation of individual changes in log real wages from year $t-1$ to year t.

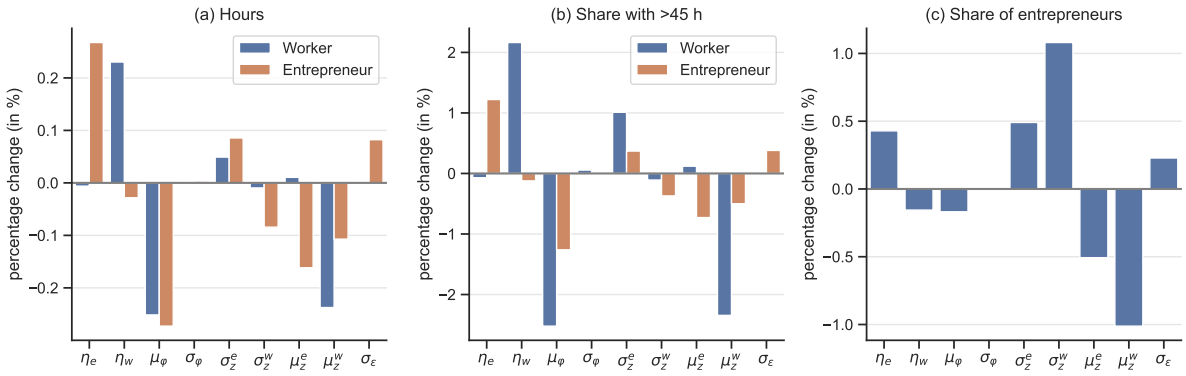


Figure 42: Elasticities of some selected model moments for each estimated model parameter.

Notes: Elasticities are obtained by setting all model parameters to the parameters estimated in period I except for the parameter in question, which is increased by one percent compared to period I. The bars show the effect of this one percent change in the parameter on hours of workers and entrepreneurs (left panel) and the share of entrepreneurs (right panel).