Online Appendix for: Skewed Idiosyncratic Income Risk over the Business Cycle: Sources and Insurance

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A Data Appendix

This appendix briefly describes the variables used for each of the datasets and lists the numbers of observations after the sample selection steps.

A.1 PSID

Variables

Demographic and Socioeconomic

Head and Relationship to Head. We identify *current* heads and spouses as those individuals within the family unit with `Sequence Number` equal to 1 and 2, respectively. In the PSID, the man is labelled as the household head and the woman as his spouse. Only when the household is headed by a woman alone is she considered the head. If the family is a split-off family from a sampled family, then a new head is selected.

Age. The age variable recorded in the PSID survey does not necessarily increase by 1 from one year to the next. This may be perfectly correct, since the survey date changes every year. For example, an individual can report being 20 years old in 1990, 20 in 1991, and 22 in 1992. We thus create a consistent age variable by taking the age reported in the first year that the individual appears in the survey and add 1 to this variable in each subsequent year.

Education Level. In the PSID, the education variable is not reported every year and it is sometimes inconsistent. To deal with this problem, we use the highest education level that an individual ever reports as the education variable for each year. Since our sample contains only individuals that are at least 25 years old, this procedure does not affect our education variable in a major way.

Income

Individual Male Wages and Salaries. This is the variable used for individual income in the benchmark case. It is the answer to the question: *How much did (Head) earn altogether from wages or salaries in year t-1, that is, before anything was deducted for taxes or other things?* This is the most consistent earnings variable over time reported in the PSID, as it has not suffered any redefinitions or change in subcomponents.[1]

Individual Male Labor Earnings. `Annual Total Labor Income` includes all income from wages and salaries, commissions, bonuses, overtime and the labor part of self-employment (farm and business income). Self-employment in PSID is split into asset and labor parts using a 50-50 rule in most cases. Because this last component has been inconsistent over time,[2] we subtract the labor part of business and farm income before 1993.

Individual Female Labor Earnings. There is no corresponding `Wages and Salaries` variable for spouses. We use `Wife Total Labor Income` and follow a similar procedure as in the case of heads.

Annual Hours. For heads and wives, annual hours is defined as the sum of annual hours worked on main job, extra jobs, and overtime. It is computed using usual hours of work per week times the number of actual weeks worked in the last year.

Pre-Government Household Labor Earnings. Head and wife labor earnings.

[1] See Shin and Solon (2011) for a comparison of PSID male earnings variables in inequality analyses.

[2] In particular, total labor earnings included the labor parts of farm and business income up to the 1993 survey but not in subsequent waves.

Post-Government Household Labor Earnings. Pre-government household earnings *minus* taxes *plus* public transfers, as defined below.

Taxes. The PSID reports own estimates for total taxes until 1991. For the remaining years, we estimate taxes using TAXSIM.

Public Transfers. Transfers are considered at the family unit level whenever possible. We group social and welfare programs into three broad categories. Due to changes in the PSID design, the specific definition of each program is different every year. We give an overview below and leave the specific replication details for the online Data Appendix.

Transfers

See Table A.1 below for a description of the three groups of programs considered, as well as their subcomponents. In the PSID, obtaining an annual amount of each type of benefits is almost wave-specific. Every few survey years, the level of aggregation within the family unit and across welfare programs is different for at least one of our groups. To impose some common structure, we establish the following rules.

For survey years 1970–1993[3] and 2005–2011, the total annual amount of each program is reported for the head, spouse, and others in the family unit. Occasionally, the amount appears combined for several or all members.[4] Because in those cases it is impossible to identify separate recipiency of each member, we consider the benefit amount of the whole family. That is, we add up all available information for all family members, whether combined or separately reported.

In survey years 1994–2003, most benefits (except Food Stamps and OASDI) are reported separately for the head and the spouse only. The way amounts are reported changes as well. First, the reported amount ($\$X$) received is asked. Second, the

[3]Our main sample refers to survey years 1977–2011, but complementary results are provided for the annual subsample of the PSID, that is, for 1970–1997. We drop the first two waves in all cases, since benefits such as OASDI, UI, and WC are only reported for the family head and benefits such as SSI are not reported at all.

[4]This is always the case for Food Stamps.

frequency of that amount ($\$X$ per year, per month, per week, etc.) is specified. We convert all amounts to a common frequency by constructing a monthly amount $\$x$ using these time values. Finally, the head and spouse are asked during which months the benefit was received. The final annual recipiency of transfers is then obtained by multiplying $\$x$ by the number of months this benefit was received. For Food Stamps and OASDI, we follow the rules described for the other waves.

Detailed Sample Selection

We start with an initial sample of 584,392 SRC individuals interviewed between 1976 and 2011. We then impose the next criteria every year. The number of individuals kept at each stage in the sample selection is listed in Table A.2. Previous to this selection process, we have cleaned the raw data and corrected duplicates and inconsistencies (for example, zero working hours with positive labor income). We also require that the individuals have non top-coded observations in income.

1. The individual must be from the original main PSID sample (not from the Survey of Economic Opportunities or Latino subsamples).

2. In the benchmark individual sample, we select male heads of family. In the reference household sample, we require at least two adult members in the unit and that individuals had no significant changes in family composition. More specifically, we require that they responded either no change or change in family

Table A.1: Components of Social Policy

	LINDA	SOEP	PSID
1. Labor market transfers:	Unemployment benefits; Labor market programs	Unemployment benefits	Unemployment benefits; Workers' compensation
2. Aid to low-income families:	Family support; Housing support; Cash transfers from the public; (no private transfers)	Subsistence allowance; Unemployment assistance (up to 2004); Unemployment benefits II (since 2005)	Supplemental Security Income; Aid to Families with Dependent Children (AFDC); Food Stamps; Other Welfare
3. Social security and pensions:	(Old Age) Pensions	Combined old-age, disability, civil service, and company pensions	Combined (Old Age) Social Security and Disability (OASI)

Note: The table lists the measures used in the three datasets to construct subcomponents of transfers.

members other than the head or wife to the question about family composition changes.

3. The household must not have missing variables for the head or wife labor income, or for education of the head. The individuals must not have missing income or education themselves.

4. The individual must not have income observations that are outliers. An outlier is defined as being in the top 1% of the corresponding year.

5. We require the income variable of analysis to be positive.

6. Household heads must be between 25 and 65 years old.

Table A.2: Number of Observations Kept in Each Step: PSID

	Male Heads	All Females	Households
Initial PSID 1976-2010	615,474	615,474	615,474
Keep SRC Sample	319,183	319,183	319,183
Composition*	90,080	109,128	75,188
Non-Missing income, hours, or educ.	83,052	96,855	69,536
Drop top 1%	82,224	95,889	68,841
Drop if Income$< .5*520*minwage$	65,137	57,089	56,336
Age Selection: [25,60]	55,607	48,033	49,250
Final #Obs for transitory changes	43,869	36,483	37,478
Final #Obs for persistent changes	36,053	29,683	30,360

Note: Table lists number of person-year, or household-year, observations in the three panels for the sample from PSID. *Composition: (1) Keep Males heads, (2) Keep females heads and spouses, (3) Keep households with 2+ adults and no major changes.

A.2 LINDA

Variables

Demographic and Socioeconomic

Head and Relationship to Head. LINDA is compiled from the Income Register based on filed tax reports and other registers. Statistics Sweden samples individuals and then adds information for all family members, where family is defined for tax purposes. This implies that there is no information about head of households. We therefore define the head of a household as the sampled male.

Age. As defined by Statistics Sweden.

Education Level. LINDA contains information about education from 1991 and onward. An individual is assigned college education if he/she has at least three years of university education.

Private/Public employment An individual is defined as as working in the public sector, if he/she works in public administration, health care or education. LINDA contains consistent comparable information for the years 1991 and onward. For the years 1991–1992, we use SNI90 codes 72000–72003, 90000–93999, and ≥96000 to define public sector employment. For 1993–2006, we use SNI92 codes 64110–64202, 73000–74110, 75000–92000, 92500–92530, and ≥96000. For 2007–10, we use SNI2007 codes 64110–64202, 73000–74110, 75000–92000, 92500–92530, and ≥96000.

Income

For the years 1985–2010, we use the measures suggested by Statistics Sweden to be comparable between years in LINDA. We construct comparable measures for the years 1979–84.

Individual Labor Earnings. Labor earnings consist of wages and salaries, the part of business income reported as labor income, and taxable compensation for sick leave and parental leave.

Pre-Government Household Labor Earnings. Defined as the sum of individual labor income within the family.

Post-Government Household Labor Earnings. Post-government earnings is calculated as pre-government earnings *minus* taxes *plus* public transfers.

Taxes. LINDA provides observations of total taxes paid by the individual. Since taxes paid on capital income constitute a small part of total tax payments, and since we cannot separate taxes on capital income from those on labor income, we assume that all taxes are labor income taxes.

Public Transfers. LINDA provides observations of total public transfers at the individual level (Statistics Sweden has individualized transfers given to families) and at the household level. We also consider three subcategories of transfer as listed below.

Transfers

Transfers in subcategories 1 and 3 are individual-level transfers. Transfers in subcategory 2 are family level transfers but have been individualized by Statistics Sweden. For each subcategory, we take all transfers received by all members of the households.

- *HH-level transfers subcategory 1 (labor market transfers)*: sum of unemployment benefits received by all members of household.
- *HH-level transfers subcategory 2 (family aid)*: sum of transfers to support families received by all members of household.
- *HH-level transfers subcategory 3 (pensions)*: sum of old-age pensions received by all members of household.

Detailed Sample Selection

To be included in the individual sample, the individual has to be sampled and between 25 and 60 years old. A family is included in the household sample if the sampled individual is a man between 25 and 60 years old and there are at least two members ages 25–60 in the family.

A.3 LISA

The LISA database covers all individuals between 16 and 64 years of age for the period 1990–95 and all individuals above age 16 thereafter. Like in LINDA, all income data is based on tax records. Using the same definitions for all variables and the same sample selection procedure as in LINDA results in a sample with around 1.6 million one-year income changes per year. It contains annual information on employers of individuals, as well as on the establishment. We use this additional information in order to identify workers that stay at the same main establishment for a given t to t+1 change. We restrict this sample of stayers to individuals whose main establishment in both t and t+1 is the same, and who in addition received income from this establishment in both t-1 and t+2.

A.4 SIAB

We use the scientific use file SIAB-R7510 provided by the Institute for Employment Research (IAB). The SIAB data from which the scientific use file is constructed are a 2% random sample of all individuals covered by a dataset called IEB. This dataset is from four different sources, which can be identified in the data. For construction of our sample, we use earnings data stemming from BeH (employee history) and transfer data from LeH (benefit recipient history). Records in BeH are based on mandatory social security notifications from employers and hence cover individuals working in employment subject to social security, which excludes civil servants, students, and self-employed individuals. A new spell starts whenever there is a new notification, which happens when a new employment relationship changes, an ongoing contract is changed, or a new calendar year starts. BeH covers all workers subject to social security contributions, which excludes civil servants, self-employed individuals and students. For details on the dataset, see vom Berge, Burghardt and Trenkle (2013).

Variables

Demographic and Socioeconomic

Head and Relationship to Head. SIAB does not contain information on households. We use only individual-level data.

Age. Birth year is reported consistently in SIAB data.

Education Level. Each individual spell in SIAB contains information on the highest degree of formal education as reported by the employer. In order to construct a consistent measure of education we apply imputation rules proposed by Fitzenberger, Osikominu and Völter (2006).

Private/Public Employment. An individual is defined as working in the public sector, if he/she works in public administration, health care or education. SIAB contains consistent comparable information for all years of the sample. We use the classification WZ93 as provided in the data, which aggregates 3-digit codes of the original WZ93 classification into 14 categories. The industry of an employer is registered

once a year and assigned to the worker spells of that year. This implies that for some individual spells, there is no information on the industry. For each year, a worker is assigned the industry from the longest spell in that year. We classify as public employment those in sectors 13 (3-digit WZ93 801–804, 851–853: Education, social, and health-care facilities) and 14 (751–753, 990: public administration, social security).

Income

Individual Labor Earnings. We calculate annual earnings as the sum of total earnings from all valid spells for each individual. As marginal employment spells were not reported before 1999, we drop marginal employment in the years where they are reported in order to obtain a time consistent measure. For the same reason, we drop spells with a reported average daily wage rate below the highest marginal employment threshold in the sample period, which is 14.15 euros (in 2003 euros). The available data have two drawbacks: the structural break of the wage measure in 1984 and top-coding.

Structural Break in Wage Measure. Since 1984 the reported average daily wage rate from an employment spell includes one-time payments. We correct for this structural break following a procedure based on Dustmann, Ludsteck and Schönberg (2009): we rank individuals from 1976 to 1983 into 50 quintiles of the annual full-time wage distributions. Then we fit locally weighted regressions of the wage growth rate from 1982 to 1983 on the quintiles in 1983 and the same for 1983 to 1984. We then define as the correction factor the difference between the quintile-specific smoothed value of wage growth between 1984 and 1983. The underlying assumption is that wage growth should be higher from 1983 to 1984 because the wage measure includes one-time payments. In order to control for overall wage growth differences, we subtract the average of the correction factor of the second to 20th quintiles. The resulting percentile-specific correction factor is then applied to wages in 1976–1983.

Imputation of Top-Coded Wages. Before aggregating earnings from all spells, we correct full-time wage spells for the top-coding. We therefore follow Daly, Hryshko and Manovskii (2014) and fit a Pareto tail to the cross-sectional wage distribution. The Pareto distribution is estimated separately for each year by age group and sex. We define seven age groups: 25–29, 30–34,...,55–60. As a starting point for the Pareto distribution, we choose the 60th percentile of the subgroup-specific distribution. As

in Daly, Hryshko and Manovskii (2014), we draw one random number by individual, which we then apply to the annual specific distributions when assigning a wage to the top-coded workers. We apply the imputation method to the annual distribution of average full-time wages, and hence an individual can be below the cutoff limit if, for example, from two full-time spells in a year only one is top-coded. We therefore define as the top-coding limit the annual specific limit minus 3DM (1995DM) as in Dustmann, Ludsteck and Schönberg (2009).

Transfers

In SIAB we observe consistently over time unemployment benefits at the individual level.

Detailed Sample Selection

To be included in the sample, the individual has to be between 25 and 60 years old and earn a gross income above 520*0.5*minimum wage. We drop all workers that have at least one spell reported in East Germany.

A.5 SOEP

Variables

Demographic and Socioeconomic

Head and Relationship to Head. For each individual in the sample, SOEP reports the relationship to the head of household in any given wave. Whenever there is a non-couple household, (that is no spouse is reported), the reported head is classified as head. Whenever we observe a couple household and the reported head is a male, we keep this; when the reported head is a female and the reported spouse is a male, we reclassify the male to be head and the female to be spouse.

Age. The age is measured by subtracting the year of birth from the current year.

Education Level. The education variable used categorizes the obtained maximum education level by ISCED 1997. An individual with category 6 is assigned college education; an individual with categories 1-5 is assigned non-college. Category 6 includes a degree obtained from a university, from technical college, from a university abroad, and a PhD. An individual still in school (category 0) is assigned a missing value. For a small number of individuals, the described procedure yields inconsistencies in the sense that for some year t, the assignment is college and some later year $t+s$ the assignment is non-college; in these cases, we assign college to the later year.

Income and Hours

Individual Labor Income. Labor earnings are calculated from individual labor income components and include income from first job, secondary job, 13th and 14th salary, Christmas bonus, holiday bonus, and profit sharing. For consistency with the PSID measure, we assign 50% of income from self-employment to labor income.

Household-Level Labor Income. Defined as the sum of individual labor income of head and spouse.

Annual Hours. SOEP measures the average actual weekly hours worked and the numbers of months an individual worked. From these measures SOEP, provides a constructed measure of annual hours worked of an individual.

Pre-Government Household Labor Earnings. Head and spouse labor earnings.

Post-Government Household Labor Earnings. Pre-government household earnings *minus* taxes *plus* public transfers, as defined below.

Taxes. SOEP provides estimates of total taxes at the household level.

Public Transfers. Transfers are considered at the family unit level and at the individual level. We group social and welfare programs into three broad categories as listed below.

Transfers

Transfers are partly observed at the individual level and partly at the household level. For each subcategory, we take all transfers received by all members of the households.

- *HH-level transfers*: we use transfers received by all individual household members in order to calculate measures that are consistent over time. For each individual, total transfers are the sum of the following components: old-age pensions, widow's pensions, maternity benefit, student grants, unemployment benefits, subsistence allowance, unemployment assistance (up to 2004); at the hh-level we measure received child allowances and the total unemployment benefits II received by all household members (since 2005 replacing unemployment assistance).
- *HH-level transfers subcategory 1 (labor market transfers)*: sum of unemployment benefits received by all members of household.
- *HH-level transfers subcategory 2 (family aid)*: sum of subsistence allowance of all members, + sum of unemployment assistance received by all members (up to 2004), + hh-level measure of unemployment benefits II (since 2005).
- *HH-level transfers subcategory 3 (pensions)*: sum of old-age pensions received by all members of household.

Sample Selection

In order to be in the initial sample for a year, the individual or household head must be between ages 25 and 60 and live in West Germany. In order to have a consistent sample, we drop the immigrant subsample and the high-income subsample. This gives initial sample sizes of 87,582 individual-year observations for the male sample, 76,249 individual-year observations for the female sample, and 76,051 household-year observations for the household sample (see Table A.3). The sample selection then follows the steps listed below for each sample. All cross-sectional statistics are calculated using appropriate cross-sectional individual or household weights, respectively.

1. drop if no info on education or if no degree obtained yet
2. drop if currently working in military
3. drop if no info on income
4. drop if no info on hours worked
5. keep if income > 0 and hours ≥ 520
6. drop if in highest percentile (sample outliers)
7. drop if below $520 \times 0.5 \times$ *minimum wage*, where *minimum wage* is set to be 6€ in year 2000 euros
8. for transitory change measure: keep if in sample in t and t-1
9. for permanent change measure: keep if in sample in t and t-5

A.6 DADS

The DADS (*Déclaration Annuelle des Données Sociales*) panel is extracted from exhaustive administrative records of annual employer-employee information with compulsory completion by all firms and establishments within firms. These administrative records are used for taxation and social security purposes. All private sector firms,

Table A.3: Number of Observations Kept in Each Step: SOEP

selection step	Male Heads	Households	All Females
initial	87,582	95,982	95,716
drop if no coll. info	86,737	95,008	94,456
drop if in military	86,712	94,990	94,454
drop if no obs on ymin	86,009	94,990	93,960
drop if no obs on hours	86,009	94,990	93,960
keep if $\geq$520 hours and ymin>0	77,501	87,332	57,979
drop top 1% of ymin per year	76,641	86,379	57,475
drop if ymin<0.5×520×min wage	76,460	85,429	56,803
Final #Obs for transitory changes	64,824	71,287	44,805
Final #Obs for persistent changes	38,555	41,048	24,968

Note: Table lists number of person-year, or household-year, observations in the three panels for the sample from SOEP.

regardless of the number of employees, are included. Regarding the public sector, it includes dependent workers from semi-public firms. To constitute the panel, a 4% sample of workers was extracted from the records since 1976 and until 2001. These consist of all workers born in October of an even calendar year. Since 2002, workers born in October of all years have been included. This results in samples of approximately 8%. We use data on earnings, number of days paid, start and end date of the spell, and, importantly, number of hours worked, which is recorded since 1993. Due to data processing changes between 1993 and 1994, those years are dropped in the analysis, and thus we end up with usable data from 1995–2015. Given the similar nature of the dataset, we follow the same basic steps of sample selection as for the SIAB.

B Cyclicality of Individual Earnings by Groups

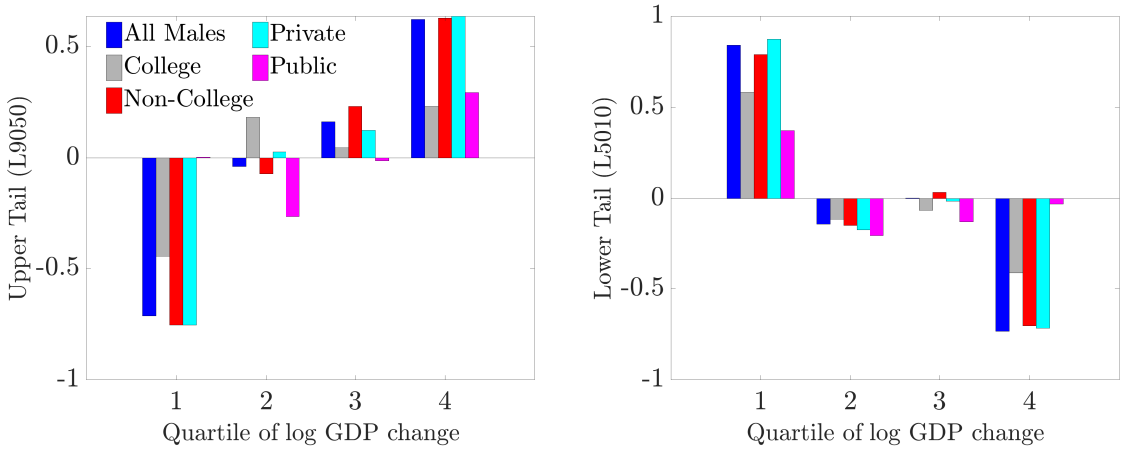
B.1 Education and Sector of Employment

Figure B.1 complements Figure 6 in the text and reports L9050 and L5010 for males in the same format. The next figure (B.2) reports the counterparts of these two figures for females.

Furthermore, we show results of the individual level earnings regressions discussed in Section III by subgroups. For each group and country, we estimated our baseline regression (equation 3). The estimated coefficients are displayed in Figure B.3, followed by Tables B.1 to B.5 showing the specific estimates, as well as the corresponding t-statistics. Each panel in the figure shows, starting from the left, the regression coefficients along with 95% confidence intervals for males (solid) in Sweden (red, triangles), Germany (green, squares), and the US (blue, bullets), followed by the equivalent regression coefficients for females (dotted). Within each country-gender grouping, the coefficients are (ordered from the left) those from the full sample, college graduates, non-college graduates, private employment, and public employment, respectively.

Figure B.3 confirms the picture that emerged in Figures 6 and B.2: higher-order earnings risk is similar across groups. However, we see some noteworthy differences.

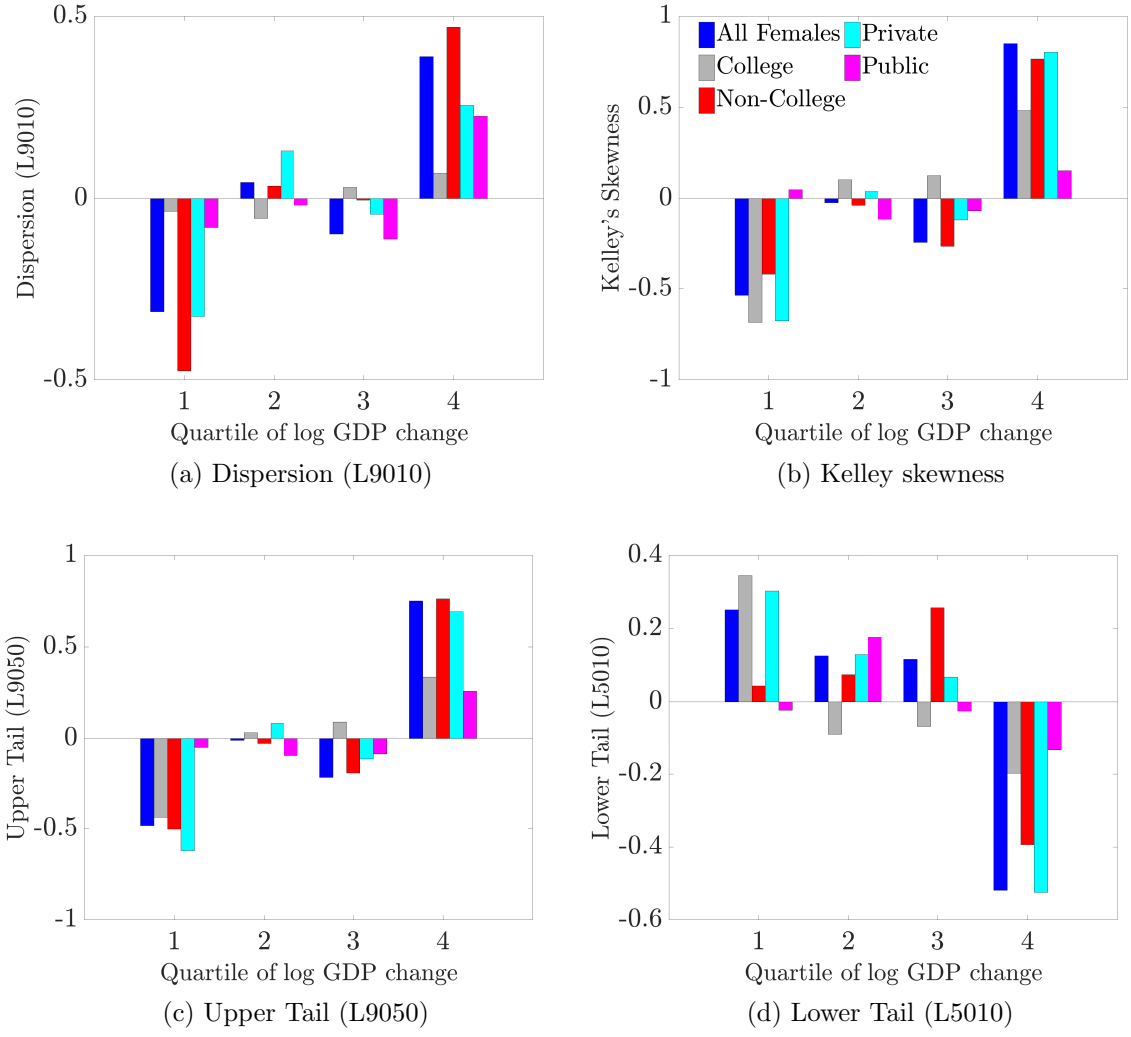
Figure B.1: L9050 and L5010 by Quartiles of Log GDP Change: Males



(a) Upper Tail (L9050) (b) Lower Tail (L5010)

Note: For different samples, each bar shows the average moment across years and countries by quartiles of log GDP change. Both log GDP changes and moments are standardized by country.

Figure B.2: Higher-Order Moments by Quartiles of Log GDP Change: Females



(a) Dispersion (L9010)

(b) Kelley skewness

(c) Upper Tail (L9050)

(d) Lower Tail (L5010)

Note: For different samples, each bar shows the average moment across years and countries by quartiles of log GDP change. Both log GDP changes and moments are standardized by country.

The magnitude of cyclicality is stronger for non-college graduates as compared to college graduates. The difference is particularly large for males in the US and Sweden, where the regression coefficient for Kelley skewness is about two to three times larger for non-college graduates (insignificant 0.97 vs. 2.37 for the US and 1.80 vs. 4.03 for Sweden). Moreover, the magnitude of cyclicality for public sector workers is weaker in all countries—and insignificant in the cases of Germany and the US.

In Sweden, the procyclicality of Kelley's measure of earnings is lower for the public sector (2.10 for males and 1.10 for females) compared with the private sector (3.83 for

males and 1.99 for females). For males, this is due to differences in the top tail; it compresses strongly for private sector employees, whereas it is acyclical in the public sector. The L5010 gap, on the other hand, fluctuates by comparable magnitudes for both groups. For women, the reduced cyclicality is due to both tails fluctuating slightly less.

Overall, it is somewhat surprising that for workers in the public sector in a country like Sweden with a reputation for high levels of public insurance, there is robust evidence of higher downside risk in recessions—compression of the top and expansion of the bottom of the distribution of income changes—even if the magnitudes are somewhat smaller than in the private sector.[5] This finding further strengthens the conclusion in Section III that increasing downside (individual) earnings risk appears to be a robust feature of business cycles in developed countries.

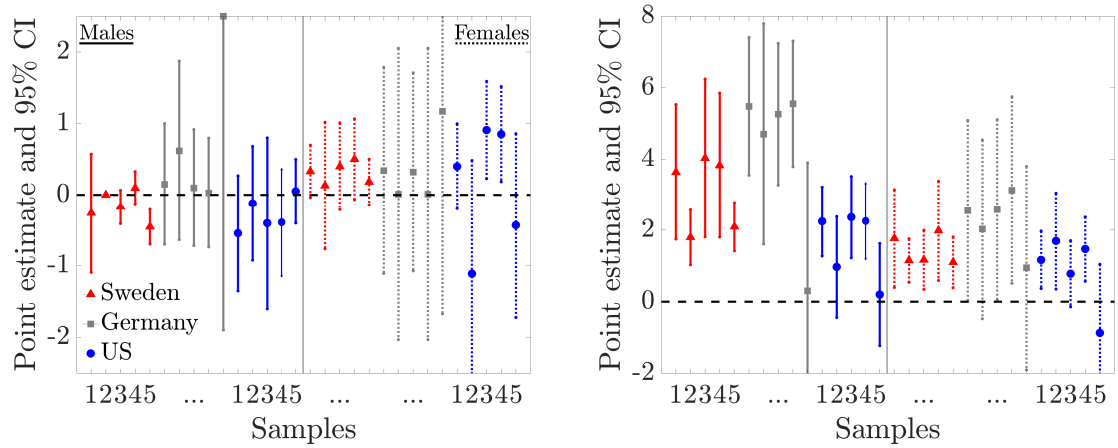
Table B.1: Cyclicality of Male Earnings, by Education Groups

	L9010	Kelley	L9050	L5010
	United States			
College Graduates	–0.12	0.97	0.36	–0.48
	(–0.31)	(1.42)	(1.39)	(–1.15)
Non-College	–0.40	2.37	0.83	–1.23
	(–0.69)	(4.29)	(2.04)	(–3.88)
	Sweden			
College Graduates	–0.00	1.80	0.42	–0.42
	(–0.01)	(4.93)	(1.58)	(–5.72)
Non-College	–0.17	4.03	0.99	–1.15
	(–1.52)	(3.86)	(3.39)	(–3.53)
	Germany (SIAB)			
College Graduates	0.62	4.70	1.24	–0.61
	(1.01)	(3.10)	(2.17)	(–2.29)
Non-College	0.10	5.26	0.89	–0.79
	(0.25)	(5.41)	(3.07)	(–3.78)

Note: Each cell reports the coefficient on log GDP change of a regression of a moment of the distribution of changes in an income measure on log GDP change, a constant, and a linear time trend. Newey-West t-statistics are included in parentheses (maximum lag length considered: 3 for SIAB and LINDA, 2 for PSID).

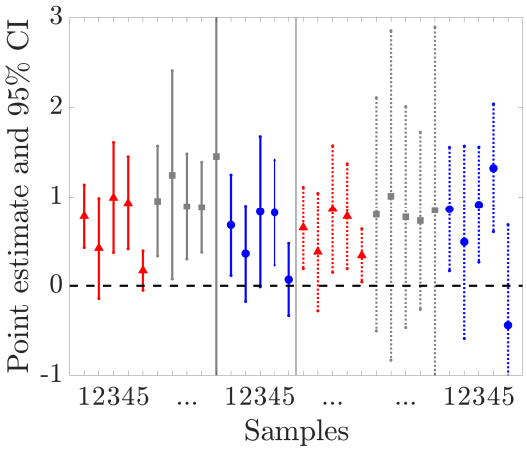
[5]One explanation (suggested by a referee) could be in employment protection that creates concentration of earnings changes. If most workers' earnings cannot fall by statute or contract, then the measured declines of earnings are likely to be concentrated among the set of people who work at firms that are sufficiently hard hit, which would then generate an expansion of the left tail of earnings changes.

Figure B.3: Cyclicality of Earnings for Subgroups (Sweden, Germany (SIAB), and the United States)

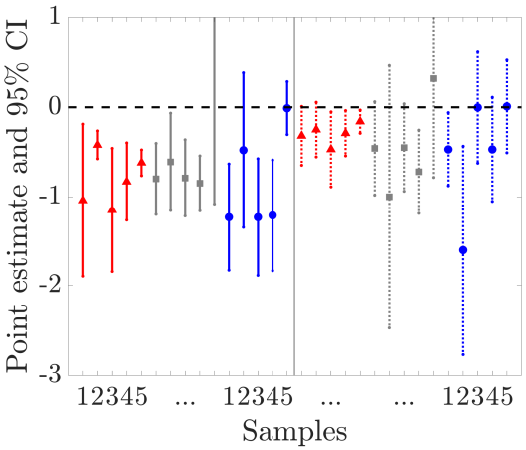


(a) Dispersion (L9010)

(b) Kelley skewness



(c) Upper Tail (L9050)



(d) Lower Tail (L5010)

Note: Separate regressions for different samples. Each marker reports the coefficient on log GDP change of a regression of a moment of the distribution of changes in an income measure on log GDP change, a constant, and a linear time trend. The confidence bands are based on Newey-West standard errors (maximum lag length considered: 3). The samples are (1) earnings: full sample , (2) earnings: college graduates, (3) earnings: non-college graduates, (4) earnings: private sector, (5) earnings: public sector. Sweden is marked by red triangles, Germany by green squares, and US by blue circles. In each figure, the left (right) half shows the results for males (females). For details of samples, see text. See tables B.1 to B.5 for specific values and t-statistics.

B.2 Occupations

This section reports additional results to complement the analysis of skewness fluctuations by occupation in Section IV.A. Figure B.4 shows the cyclicality coefficients for

Table B.2: Cyclicality of Female Earnings, by Education Groups

	L9010	Kelley	L9050	L5010
	United States			
College graduates	–1.11	1.70	0.49	–1.60
	(–1.44)	(2.61)	(0.94)	(–2.84)
Non-college	0.91	0.78	0.91	–0.00
	(2.77)	(1.75)	(2.91)	(–0.01)
	Sweden			
College graduates	0.13	1.15	0.38	–0.25
	(0.31)	(4.03)	(1.22)	(–1.74)
Non-college	0.50	1.81	0.75	–0.25
	(1.96)	(3.40)	(2.78)	(–2.71)
	Germany (SIAB)			
College graduates	0.01	2.03	1.01	–1.00
	(0.01)	(1.65)	(1.12)	(–1.39)
Non-college	0.32	2.58	0.77	–0.45
	(0.47)	(2.08)	(1.27)	(–1.88)

Note: Each cell reports the coefficient on log GDP change of a regression of a moment of the distribution of changes in an income measure on log GDP change, a constant, and a linear time trend. Newey-West t-statistics are included in parentheses (maximum lag length considered: 3 for SIAB and LINDA, 2 for PSID).

L5010 and L9050 to complement the L9010 and Kelley skewness shown in Figure 7. Table B.5 reports the cyclicality regressions for five broader occupational categories instead of the 30 detailed categories in Figure 7). Figures B.5 and B.6 are the analogues of Figures 7 and B.6 for females.

Table B.3: Cyclicality of Individual Earnings, Public vs. Private Sector Employment, Males

	L9010	Kelley	L9050	L5010
		United States		
Private	–0.39	2.26	0.82	–1.21
	(–1.08)	(4.43)	(2.88)	(–4.03)
Public	0.05	0.20	0.07	–0.01
	(0.23)	(0.29)	(0.36)	(–0.07)
		Sweden		
Private	0.10	3.83	0.93	–0.83
	(0.93)	(4.02)	(3.81)	(–4.08)
Public	–0.45	2.10	0.17	–0.62
	(–3.93)	(6.55)	(1.64)	(–9.11)
		Germany		
Private	0.03	5.55	0.88	–0.85
	(0.08)	(6.44)	(3.55)	(–5.64)
Public	2.50	0.30	1.45	1.06
	(1.16)	(0.17)	(1.08)	(1.01)

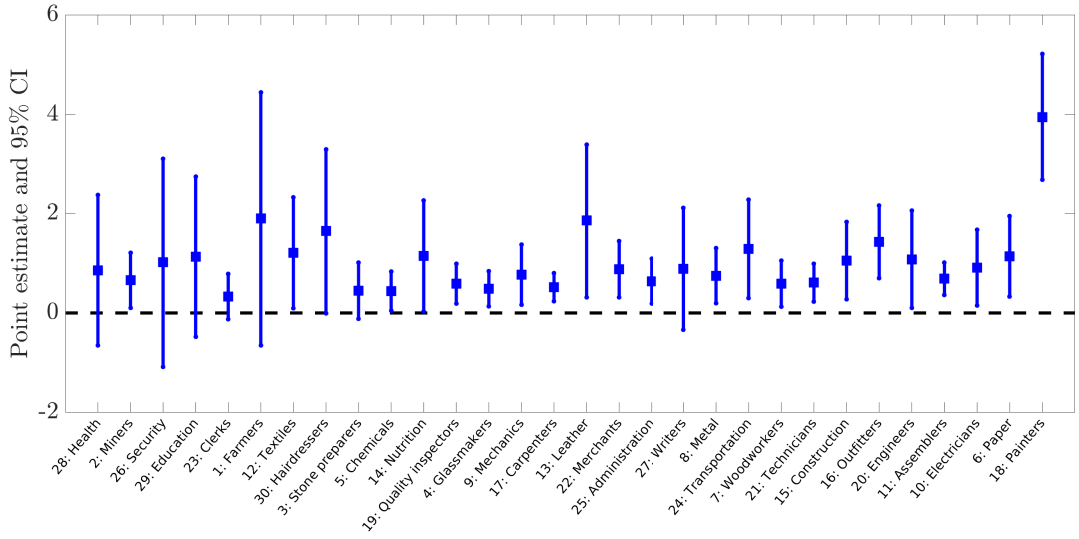
Note: Each cell reports the coefficient on log GDP change of a regression of a moment of the distribution of changes in an income measure on log GDP change, a constant, and a linear time trend. Newey-West t-statistics are included in parentheses (maximum lag length considered: 3 for SIAB and LINDA, 2 for PSID).

Table B.4: Cyclicality of Individual Earnings, by Sector of Employment, Females

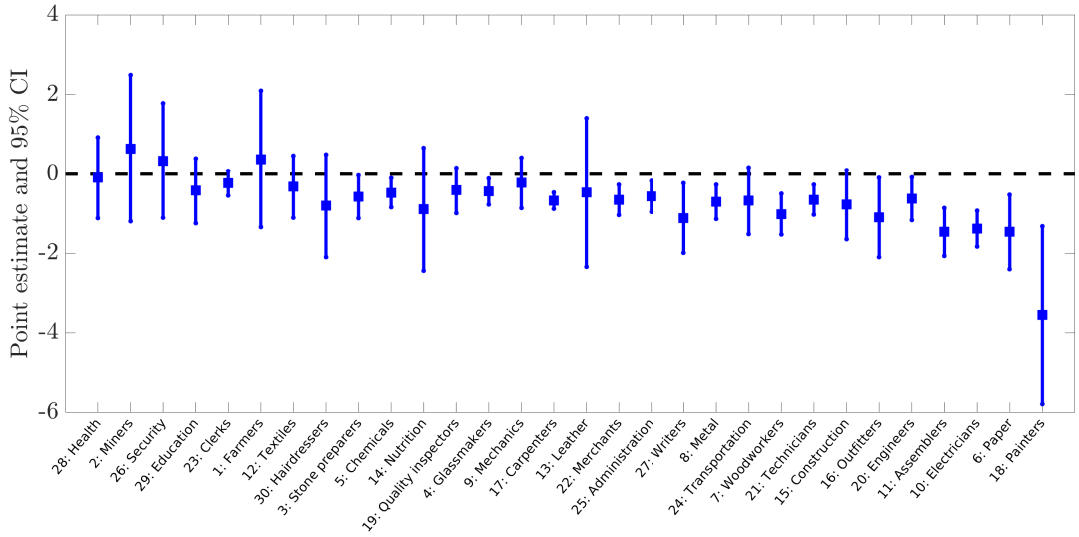
	L9010	Kelley	L9050	L5010
	United States			
Private	0.85	1.47	1.32	–0.47
	(2.64)	(3.38)	(3.82)	(–1.67)
Public	–0.43	–0.87	–0.44	0.01
	(–0.69)	(–0.94)	(–0.81)	(0.04)
	Sweden			
Private	0.50	1.99	0.78	–0.29
	(1.87)	(3.02)	(2.81)	(–2.43)
Public	0.18	1.10	0.34	–0.16
	(1.19)	(3.29)	(2.43)	(–2.61)
	Germany			
Private	0.01	3.13	0.73	–0.72
	(0.01)	(2.44)	(1.50)	(–3.15)
Public	1.17	0.95	0.85	0.32
	(0.84)	(0.68)	(0.85)	(0.59)

Note: Each cell reports the coefficient on log GDP change of a regression of a moment of the distribution of changes in an income measure on log GDP change, a constant, and a linear time trend. Newey-West t-statistics are included in parentheses (maximum lag length considered: 3 for SIAB and LINDA, 2 for PSID).

Figure B.4: Tails of Short-Run Income Growth by Occupation: Males (Germany (SIAB))



(a) Upper Tail (L9050)



(b) Lower Tail (L5010)

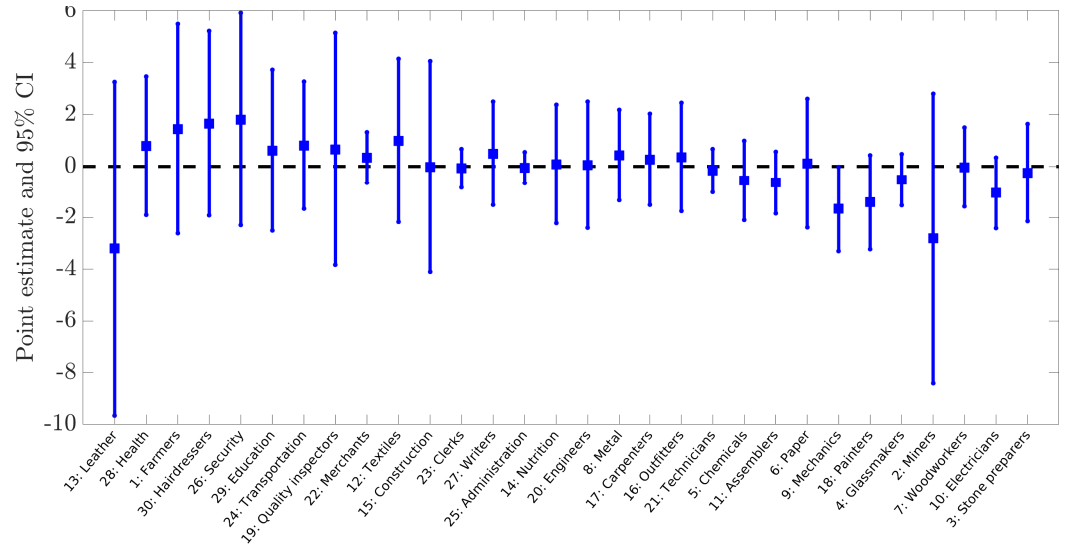
Note: Separate regressions for each of 30 occupation segments. Each marker reports the coefficient on log GDP change of a regression of a moment of the distribution of changes in an income measure on log GDP change, a constant, and a linear time trend. The confidence bands are based on Newey-West standard errors (maximum lag length considered: 3)

Table B.5: Cyclicality of Earnings by Occupational Area: Germany (SIAB)

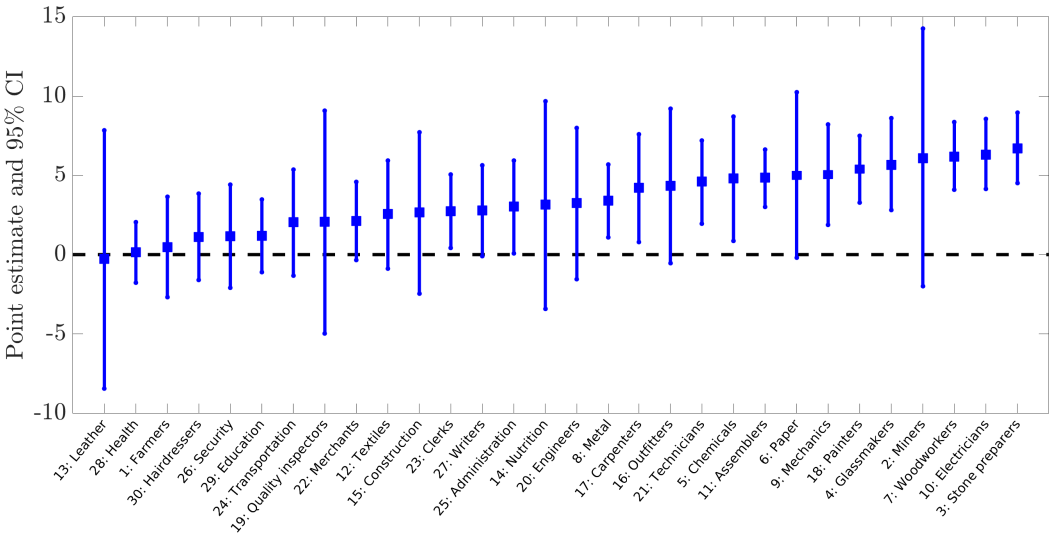
	L9010	Kelley	L9050	L5010
	Males			
Farming and related	2.28	2.82	1.90	0.38
	(1.23)	(1.51)	(1.52)	(0.45)
Mining, Mineral Extraction	1.31	1.62	0.66	0.65
	(1.25)	(1.39)	(2.43)	(0.72)
Manufacturing, Fabrication	0.09	5.70	1.00	–0.91
	(0.20)	(5.53)	(3.21)	(–3.99)
Technical Occupations	0.07	6.18	0.76	–0.69
	(0.19)	(4.04)	(2.72)	(–3.64)
Service Occupations	0.30	4.45	0.88	–0.59
	(0.68)	(3.92)	(2.41)	(-3.09)
	Females			
Farming and related	1.45	0.48	1.03	0.42
	(0.73)	(0.31)	(0.71)	(0.61)
Mining, Mineral Extraction	–2.80	6.13	0.80	–3.60
	(–1.02)	(1.54)	(0.34)	(–2.59)
Manufacturing, Fabrication	–0.36	5.30	1.24	–1.60
	(–0.48)	(4.95)	(2.00)	(–6.01)
Technical Occupations	–0.38	4.22	0.71	–1.08
	(–0.83)	(2.70)	(1.56)	(–2.82)
Service Occupations	0.43	2.05	0.73	–0.30
	(0.59)	(1.63)	(1.13)	(–1.15)

Note: Each cell reports the coefficient on log GDP change of a regression of a moment of the distribution of changes in an income measure on log GDP change, a constant, and a linear time trend. Newey-West t-statistics are included in parentheses (maximum lag length considered: 3).

Figure B.5: Dispersion and Skewness of Short-Run Income Growth by Occupation: Females (Germany (SIAB))



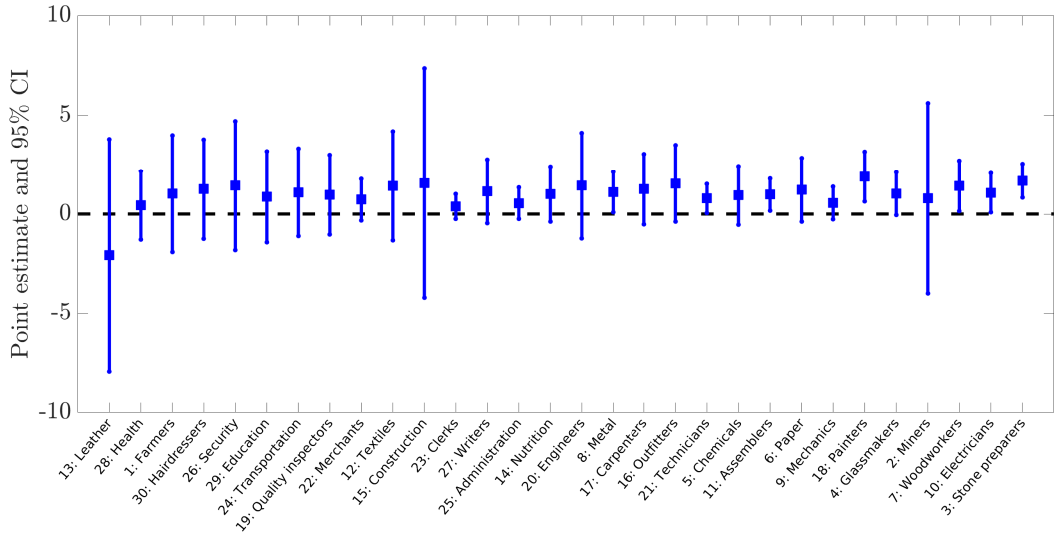
(a) Dispersion (L9010)



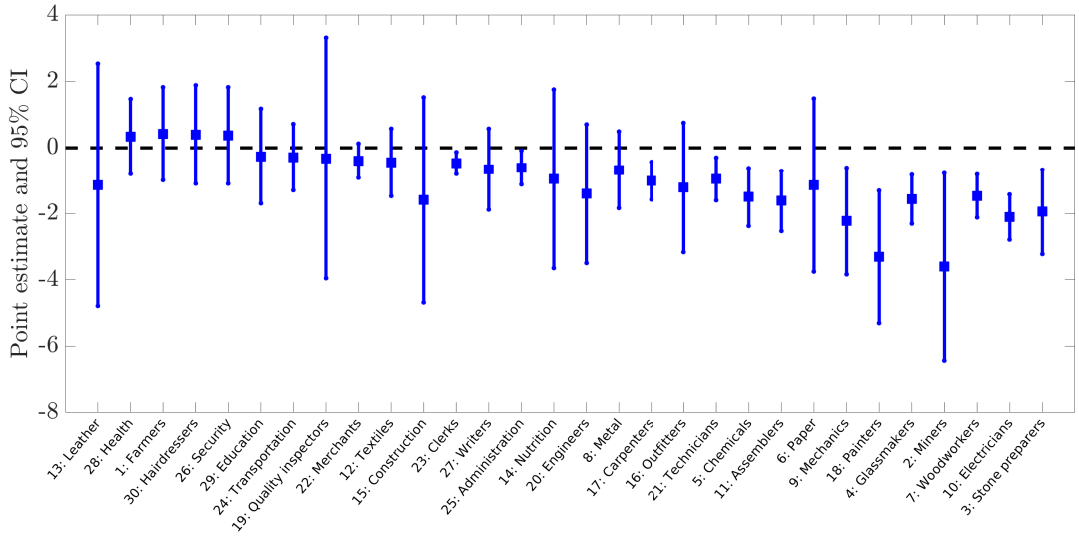
(b) Kelley skewness

Note: Separate regressions for each of 30 occupation segments. Each marker reports the coefficient on log GDP change of a regression of a moment of the distribution of changes in an income measure on log GDP change, a constant, and a linear time trend. The confidence bands are based on Newey-West standard errors (maximum lag length considered: 3).

Figure B.6: Tails of Short-Run Income Growth by Occupation: Females (Germany (SIAB))



(a) Upper Tail (L9050)



(b) Lower Tail (L5010)

Note: Separate regressions for each of 30 occupation segments. Each marker reports the coefficient on log GDP change of a regression of a moment of the distribution of changes in an income measure on log GDP change, a constant, and a linear time trend. The confidence bands are based on Newey-West standard errors (maximum lag length considered: 3).

C Alternative Specifications

C.1 Including Zeros

In this section, we first run an alternative version of the benchmark cyclicality regression: we eliminate the lower threshold in sample selection and calculate earnings changes using the *arc-percent* formula instead of log changes. This allows the inclusion of zero incomes. We then use moments of the distribution of arc-percent changes as the dependent variable in our regression. The main results hold.

C.2 Using a Binary Classification of Years

We now consider an alternative specification to test for the cyclicality of different moments of the distribution of earnings changes, for different types of earnings. Instead of using log GDP change as a measure of the aggregate state of the economy, one can classify years as expansions and contractions, which is what, e.g., Storesletten,

Table C.1: Cyclicality of Income Growth Moments: Arc Percent Changes

	L9010	Kelley	L9050	L5010
	United States			
Males	–2.21	3.27	1.45	–3.66
	(–1.61)	(5.43)	(3.77)	(–2.78)
Females	–2.22	1.99	1.44	–3.66
	(–1.42)	(3.55)	(2.14)	(–2.80)
	Sweden			
Males	0.02	4.86	1.78	–1.76
	(0.02)	(3.85)	(4.10)	(–1.95)
Females	1.16	2.67	1.57	–0.41
	(2.50)	(2.85)	(3.22)	(–1.42)
	Germany (SIAB)			
Males	-0.22	6.93	1.36	–1.58
	(-0.37)	(4.50)	(3.13)	(–3.09)
Females	0.11	3.49	1.36	–1.25
	(0.11)	(2.10)	(1.42)	(–1.98)

Note: Each cell reports the coefficient on log GDP growth of a regression of each moment of the distribution of income changes as measured by the arc-percent change ($\frac{x_t - x_{t-1}}{(x_t + x_{t-1})/2}$) on log GDP growth, a constant, and a linear time trend. Newey-West t-statistics are included in parentheses (maximum lag length considered: 3 for SIAB and LINDA, 2 for PSID).

Telmer and Yaron (2004) do. We initiate our classification of years with the NBER dates (as described in the main text). We extend the measure by considering the average growth of male earnings (as done in Huggett and Kaplan, 2016).[6] Our preferred specification remains the continuous measure in the main text, because it is more flexible and simplifies the cross-country comparison. Furthermore, it does not come with the difficulty of exactly timing recessions at the yearly level

Still, there are advantages of resorting to a binary characterization. To begin with, it makes our results more easily comparable to previous work (Storesletten, Telmer and Yaron, 2004; Pruitt and Turner, 2020; Guvenen, Ozkan and Song, 2014). More importantly, it tests the robustness of our results in the case we thought of cyclicality as a regime switching rather than a linear relationship between the aggregate state and the distribution of earnings.[7]

The following tables show regression results for an alternative specification where we regress on a dummy that takes the value 1 in expansions instead of regressing on log GDP growth. The results are virtually unchanged, i.e., they tell exactly the same story as our benchmark specification: entering an expansion is associated with a significant increase in skewness and a non-significant change in dispersion. We document the four main types of earnings, but there are no significant changes from any of the results in the main text. We focus on the case of the US since the main issue is comparability with previous work—which is focused on the US—and specification robustness. All in all, we can conclude that, if the cyclical relationship is more a regime-switching model with reasonable noise and realistic dynamics, our regression picks up the relationship.

[6]This results in contraction years 1970, 1974, 1980, 1981, 1982, 1983, 1990, 1991, 2001, 2002, 2008, 2009, 2010, and 2012.

[7]We thank one of the referees for suggesting this extension and the thoughtful interpretation.

Table C.2: Cyclicality of Individual Earnings using binary Measure of Business Cycles: United States

	L9010	Kelley	L9050	L5010
Males (GOS)	0.00	0.15	0.07	–0.07
	(–0.06)	(6.66)	(6.14)	(–4.06)
Males	-0.02	0.15	0.05	-0.08
	(-0.91)	(4.17)	(3.54)	(-3.13)
Females	0.04	0.06	0.06	-0.01
	(2.10)	(2.07)	(2.43)	(-0.85)
HH Earnings	0.01	0.12	0.06	-0.04
	(0.63)	(5.10)	(7.68)	(-2.42)
HH Post-Gov	0.03	0.08	0.04	-0.01
	(2.05)	(4.36)	(4.70)	(-1.23)

Note: Each cell reports the coefficient on a dummy—1 in expansions and 0 in recessions—of a regression of each moment of the distribution of income changes on such dummy, a constant, and a linear time trend. Newey-West t-statistics are included in parentheses (maximum lag length considered: 2). Males (GOS) uses the moments of Guvenen, Ozkan and Song (2014).

D Hours versus Wages: Females

Table D.1 shows the regressions of full time workers and stayers for German and Swedish females. The results for females mirror the findings for males in the main text. The systematic variation of skewness of earnings changes over the business cycle cannot be entirely explained by the extensive margin of employment changes. Instead, also the incomes of workers who are continuously full-time employed over the cycle display an increase of left-skewness in aggregate downswings.

Table D.1: Cyclicality of Individual Earnings vs. Daily Wages; Germany (SIAB) and Sweden (LISA): Females

	L9010	Kelley	L9050	L5010
	Germany			
Earnings (Full population)	0.34	2.55	0.80	–0.46
	(0.48)	(2.05)	(1.25)	(–1.80)
Full-Time Daily Wages	0.03	2.12	0.17	–0.14
	(0.18)	(5.11)	(2.61)	(–1.58)
Full-Time Daily Wages	0.02	2.28	0.16	–0.14
(Establishment Stayers)	(0.13)	(4.84)	(3.17)	(–1.61)
	Sweden			
Earnings (Full population)	0.38	1.64	0.64	–0.26
	(1.85)	(3.69)	(2.97)	(–3.24)
Establishment Stayers	–0.08	0.69	0.05	–0.13
	(–1.55)	(2.55)	(1.23)	(–2.62)

Note: Each cell reports the coefficient on log GDP change of a regression of a moment of the distribution of changes in an income measure on log GDP change, a constant, and a linear time trend. Newey-West t-statistics are included in parentheses (maximum lag length considered: 3). Full-Time are those that work full time for at least 50 weeks in both years for which the change is calculated.

E Survey versus Administrative Data

As noted earlier, it is not possible to link individual data from the SIAB dataset to obtain household-level information. This is why we use survey data (PSID for the US and SOEP for Germany) to answer questions regarding insurance provided within households and by the government. These datasets, however, suffer from having fairly few observations, which may imply that higher moments are imprecisely estimated.

Specifically, we have rerun the regression in equation (3) using moments from the SSA data (reported in Guvenen, Ozkan and Song (2014)), and from SOEP data. The resulting coefficients for US males using SSA data for each of the four moments are –0.07, 2.31, 1.02, and –1.09, respectively. These estimates are strikingly similar to those in the first row of the top panel in Table 1. The equivalent estimates using SOEP data are –1.27, 1.55, –0.23, and –1.04. While these numbers differ somewhat from those in the first row of the bottom panel in Table 1, they tell the same story. In particular, male earnings changes in both SOEP and SIAB are characterized by asymmetric movements of the tails rather than uniform expansions and contractions of both tails.[8] The main difference is that, in the SOEP, there is evidence of countercyclical dispersion, which was not observed in the SIAB.

However, this is best understood by looking directly at the tails. The lower tail is countercyclical in both datasets, whereas the upper tail is procyclical in SIAB but acyclical in SOEP. As a result, the L9010 is acyclical in SIAB and countercyclical in SOEP. This is yet another example in which limiting the analysis to the overall measure of dispersion gives an incomplete picture: the L9010 is countercyclical, but due to an expansion of the lower tail in contractions while the upper tail is unchanged, not to a symmetric expansion of both tails. This evidence of asymmetric risk is reflected in procyclical skewness.

[8] We have also run regression 3 using the standard deviation of earnings changes as our measure for overall dispersion instead, and the coefficients are small (0.07 (SIAB), –0.09 (SOEP)) and insignificant (t-stat of 0.42 (SIAB), –0.38 (SOEP)) in both datasets.

F Robustness of the Empirical Results in SIAB Data

We perform a number of robustness checks for the analyses based on SIAB data, which deal with (i) top-coding of incomes and (ii) a structural break in the income measure in 1984. In addition to Kelley skewness, we consider two alternatives: two versions of Hinkley's measure of skewness, referred to in the tables as HS 1 and HS 2. Instead of L9050 and L5010, these measures relate L8550 and L5015 or L8050 and L5020, respectively.

The first four rows of table F.1 show the results of the regressions for male and female earnings wages, respectively. The results are the ones from the main text and serve as a comparison to the robustness analyses. Columns 7-12 show the results for the two versions of Hinkley's skewness measures and the corresponding tails. Compared to Kelley skewness and L9050 and L5010, the estimates show that the substantive conclusion is also robust for these smaller log percentile differentials. Rows 5 and 6 show the results for the wage regressions when applying a less strict criterion of working full-time for only 45 weeks in two consecutive years. Again, the results are very similar to those reported for 50 weeks.

In order to ensure that top-coding does not drive our results, we redo the analysis using reduced samples in which an individual is considered in the distribution of income changes from t to $t+1$ only if income is below the top-coding thresholds in both t and $t+1$. About 11% and 2% of all observations are top-coded in the male and female base samples, respectively. Table F.2 shows the results of the respective regressions for earnings, wages, and wages of firm stayers for both males and females. Second, we rerun the regressions completely ignoring top-coding, that is, all individuals from the base sample are in the sample, but with their reported incomes again for earnings, wages, and wages of stayers. Results are in Table F.3.

A rerun of the regression analysis using only observations after 1983, thereby dropping all years for which the reported income measure does not include one-time payments such as bonuses, does not change the results (see the lower panel of Table F.3).

Table F.1: Sensitivity of Regression Results - SIAB I

	Std Dev	L9010	Skew	Kelley	L9050	L5010	HS 1	HS 2	L8550	L8050	L5015	L5020
Male Earnings	0.07	0.15	14.42	5.48	0.95	-0.80	5.84	5.85	0.51	0.32	-0.54	-0.36
	(0.42)	(0.36)	(4.28)	(5.80)	(3.14)	(-4.11)	(9.85)	(7.51)	(4.10)	(3.57)	(-4.77)	(-3.43)
Female Earnings	0.10	0.34	4.34	2.55	0.80	-0.46	2.75	2.71	0.43	0.25	-0.24	-0.14
	(0.47)	(0.48)	(1.77)	(2.05)	(1.25)	(-1.80)	(2.62)	(3.85)	(1.40)	(1.65)	(-2.56)	(-1.87)
Male Wages	0.01	-0.09	14.55	4.73	0.30	-0.39	4.94	4.88	0.22	0.18	-0.28	-0.20
	(0.23)	(-0.54)	(4.58)	(6.31)	(3.77)	(-3.20)	(4.35)	(3.37)	(2.59)	(2.66)	(-2.55)	(-2.07)
Female Wages	0.04	0.03	8.98	2.12	0.17	-0.14	2.20	2.09	0.14	0.11	-0.09	-0.04
	(0.66)	(0.18)	(2.02)	(5.11)	(2.61)	(-1.58)	(4.79)	(4.67)	(2.68)	(2.65)	(-1.24)	(-0.83)
Male Wages	0.01	-0.08	13.20	4.65	0.31	-0.39	4.88	4.85	0.23	0.18	-0.29	-0.20
(45 weeks)	(0.27)	(-0.54)	(4.55)	(6.60)	(3.90)	(-3.30)	(4.50)	(3.48)	(2.70)	(2.78)	(-2.61)	(-2.09)
Female Wages	0.04	0.04	8.80	2.07	0.17	-0.14	2.20	2.10	0.14	0.12	-0.09	-0.05
(45 weeks)	(0.72)	(0.25)	(2.02)	(5.21)	(2.72)	(-1.57)	(4.85)	(4.72)	(2.73)	(2.66)	(-1.23)	(-0.84)

Note: Each cell reports the coefficient on log GDP change of a regression of a moment of the distribution of changes in an income measure on log GDP change, a constant, and a linear time trend. Newey-West t-statistics are included in parentheses (maximum lag length considered: 3)

Table F.2: Sensitivity of Regression Results - SIAB II

	Std Dev	L9010	Skew	Kelley	L9050	L5010	HS 1	HS 2	L8550	L8050	L5015	L5020
	Not top-coded workers only:											
Male Earnings	0.08	0.26	14.49	4.98	0.96	-0.70	4.83	4.65	0.48	0.31	-0.44	-0.28
	(0.41)	(0.53)	(4.26)	(4.28)	(2.53)	(-3.07)	(6.66)	(8.86)	(3.13)	(3.40)	(-4.06)	(-3.08)
Male Wages	-0.01	-0.05	8.76	3.39	0.23	-0.28	3.49	3.36	0.19	0.14	-0.20	-0.14
	(-0.14)	(-0.29)	(6.07)	(10.76)	(3.52)	(-2.91)	(8.43)	(8.09)	(3.74)	(3.49)	(-2.34)	(-2.00)
Male Wages	-0.03	-0.08	11.41	3.66	0.22	-0.30	3.67	3.48	0.17	0.13	-0.21	-0.14
(stayers)	(-0.75)	(-0.52)	(5.77)	(9.09)	(4.12)	(-2.96)	(7.52)	(7.65)	(4.14)	(3.63)	(-2.42)	(-2.10)
Female Earnings	0.09	0.33	4.67	2.54	0.80	-0.46	2.72	2.67	0.43	0.25	-0.23	-0.13
	(0.45)	(0.47)	(1.90)	(2.03)	(1.24)	(-1.83)	(2.57)	(3.76)	(1.40)	(1.67)	(-2.46)	(-1.71)
Female Wages	0.04	0.05	2.04	2.05	0.17	-0.12	2.11	2.12	0.13	0.11	-0.08	-0.05
	(0.71)	(0.31)	(0.66)	(4.42)	(2.64)	(-1.34)	(4.10)	(4.56)	(2.77)	(2.74)	(-1.08)	(-0.92)
Female Wages	0.02	0.03	3.87	2.17	0.16	-0.12	2.25	2.18	0.13	0.10	-0.08	-0.05
(stayers)	(0.56)	(0.25)	(0.78)	(4.11)	(3.16)	(-1.38)	(4.04)	(4.46)	(3.24)	(2.99)	(-1.15)	(-0.98)

Note: Each cell reports the coefficient on log GDP change of a regression of a moment of the distribution of changes in an income measure on log GDP change, a constant, and a linear time trend. Newey-West t-statistics are included in parentheses (maximum lag length considered: 3)

Table F.3: Sensitivity of Regression Results - SIAB III

	Std Dev	L9010	Skew	Kelley	L9050	L5010	HS 1	HS 2	L8550	L8050	L5015	L5020
						Ignore Top-Coding:						
Male Earnings	0.07	0.15	14.72	5.68	0.91	-0.76	5.97	6.17	0.48	0.30	-0.52	-0.37
	(0.40)	(0.40)	(4.30)	(5.70)	(3.14)	(-4.68)	(10.66)	(8.02)	(4.27)	(3.46)	(-5.60)	(-4.51)
Male Wages	-0.01	-0.09	13.36	4.93	0.29	-0.38	5.40	5.38	0.21	0.15	-0.30	-0.22
	(-0.27)	(-0.69)	(4.24)	(7.59)	(4.59)	(-3.86)	(5.11)	(3.76)	(2.57)	(1.95)	(-3.59)	(-3.22)
Male Wages	-0.04	-0.13	16.06	5.19	0.27	-0.39	5.55	5.36	0.19	0.14	-0.31	-0.22
(stayers)	(-1.15)	(-1.06)	(3.47)	(6.67)	(4.03)	(-3.85)	(4.63)	(3.51)	(2.11)	(1.85)	(-3.58)	(-3.17)
Female Earnings	0.10	0.34	4.36	2.51	0.79	-0.45	2.70	2.63	0.41	0.24	-0.23	-0.13
	(0.48)	(0.48)	(1.76)	(2.02)	(1.24)	(-1.78)	(2.61)	(3.98)	(1.39)	(1.65)	(-2.55)	(-1.84)
Female Wages	0.03	0.02	1.91	2.03	0.15	-0.13	2.16	2.17	0.13	0.11	-0.09	-0.05
	(0.65)	(0.16)	(0.60)	(4.79)	(2.64)	(-1.51)	(4.68)	(5.10)	(2.74)	(2.68)	(-1.29)	(-1.11)
Female Wages	0.02	0.01	3.52	2.20	0.14	-0.13	2.35	2.27	0.12	0.10	-0.09	-0.05
(stayers)	(0.48)	(0.09)	(0.75)	(4.45)	(3.31)	(-1.58)	(4.70)	(4.90)	(3.30)	(3.01)	(-1.40)	(-1.18)
						1984-2010:						
Male Earnings	-0.04	-0.07	13.25	5.10	0.81	-0.88	5.82	6.22	0.46	0.31	-0.61	-0.42
	(-0.26)	(-0.18)	(3.84)	(5.85)	(2.96)	(-3.99)	(11.04)	(9.21)	(3.83)	(3.12)	(-5.48)	(-4.33)
Female Earnings	0.04	0.30	3.86	2.46	0.75	-0.46	2.79	2.88	0.42	0.26	-0.26	-0.16
	(0.21)	(0.39)	(1.51)	(1.84)	(1.10)	(-1.65)	(2.46)	(3.65)	(1.24)	(1.49)	(-2.29)	(-1.87)

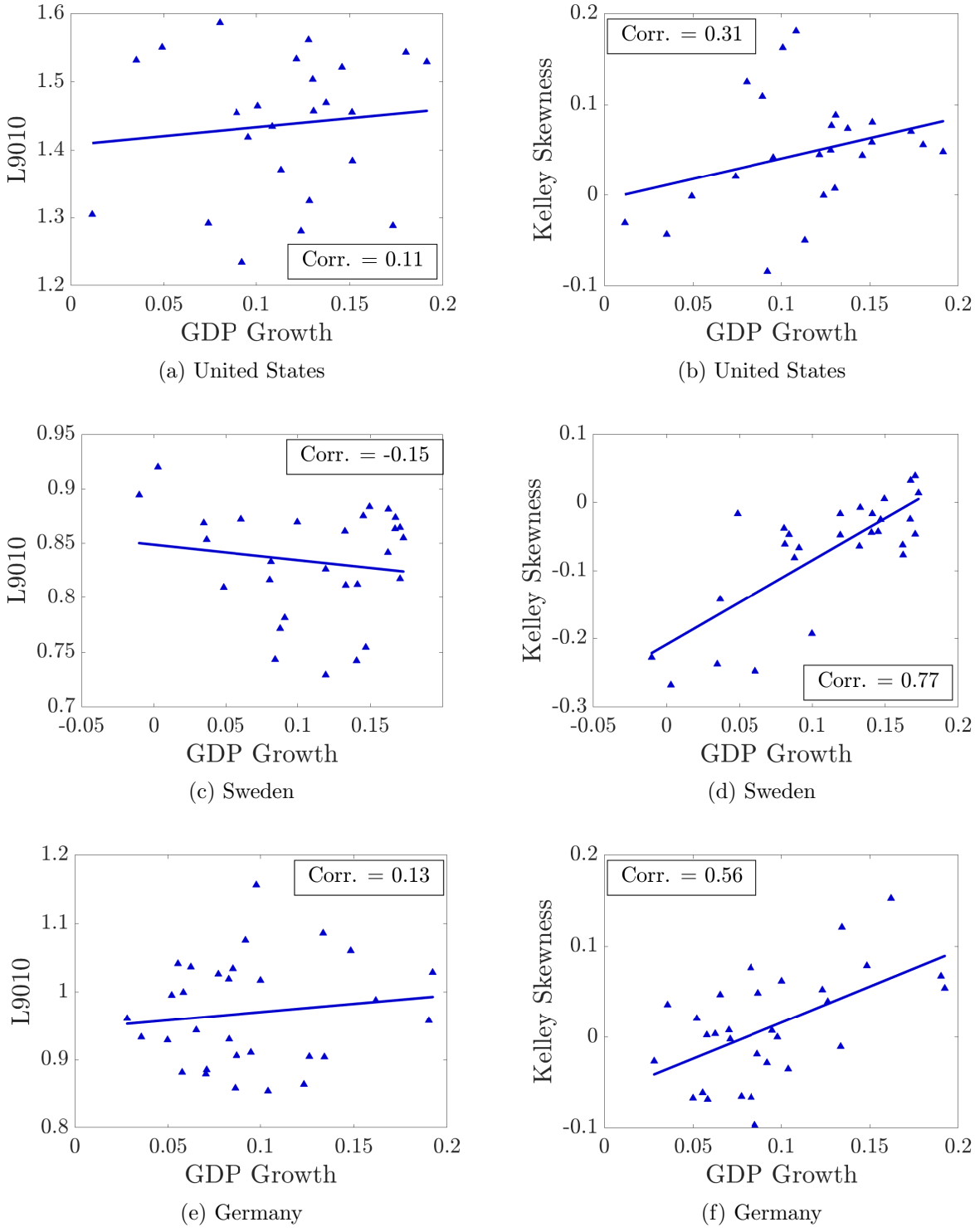
Note: Each cell reports the coefficient on log GDP change of a regression of a moment of the distribution of changes in an income measure on log GDP change, a constant, and a linear time trend. Newey-West t-statistics are included in parentheses (maximum lag length considered: 3)

G Long-Run Earnings Growth

Figure G.1 shows L9010 and Kelley's skewness of long-run earnings growth, that is, five-year changes for Germany and Sweden, and four-year changes for the United States against log GDP growth for females.

Table G.1 shows the correlation of L9010 and Kelley's skewness of five-year earnings changes with log GDP growth for workers by occupational segment. A worker contributes to the occupation-specific moment if in year t-5 he or she is in that occupation. Figure G.2 shows the relationship between occupation-specific average earnings growth and moments of the distribution for females.

Figure G.1: Cyclicality of Five-Year Income Growth; United States, Sweden, and Germany (SIAB): Females



(a) United States (b) United States

(c) Sweden (d) Sweden

(e) Germany (f) Germany

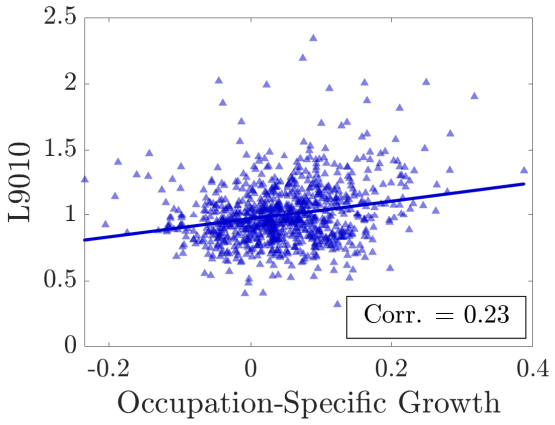
Note: Scatterplot of moment of five-year earnings change against log GDP change over the same horizon. Five-year income changes for Germany and Sweden, four-year income changes for the United States.

Table G.1: Correlation of Moments of Five-Year Income Growth with GDP growth: Germany (SIAB)

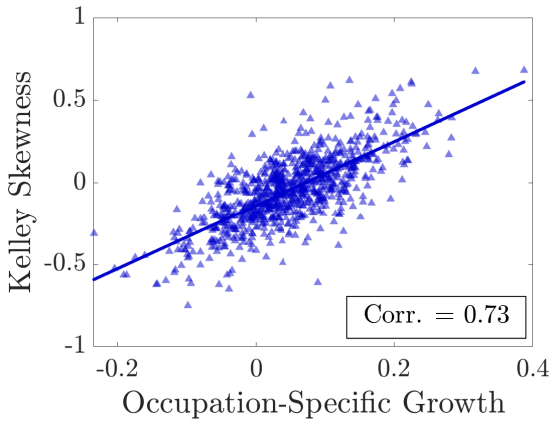
	Males		Females	
Occupation	L9010	Kelley	L9010	Kelley
1	0.41	0.53	0.15	0.29
2	0.32	0.46	0.10	–0.07
3	–0.12	0.53	–0.11	0.36
4	0.24	0.56	0.07	0.46
5	–0.51	0.83	–0.08	0.54
6	–0.29	0.72	0.01	–0.15
7	0.32	0.37	–0.02	–0.02
8	0.09	0.67	0.12	0.29
9	0.20	0.54	–0.17	0.52
10	0.22	0.61	0.43	0.34
11	–0.24	0.75	0.24	0.45
12	–0.11	0.71	0.36	0.52
13	–0.01	0.66	–0.22	0.06
14	–0.19	0.64	0.12	0.29
15	–0.27	0.63	–0.01	–0.14
16	–0.31	0.71	–0.02	0.21
17	–0.16	0.51	0.20	0.45
18	–0.34	0.35	–0.44	–0.30
19	–0.08	0.68	–0.02	0.17
20	–0.12	0.60	0.20	0.58
21	–0.26	0.63	–0.25	0.57
22	–0.35	0.68	–0.09	0.66
23	–0.32	0.65	–0.11	0.08
24	–0.10	0.69	0.00	0.55
25	–0.33	0.60	–0.26	0.64
26	0.12	0.55	–0.19	0.45
27	–0.45	0.65	–0.09	0.35
28	0.20	0.52	0.45	–0.39
29	0.43	0.58	0.62	0.18
30	–0.08	0.63	0.20	0.37

Note: Each entry is the correlation of occupation-specific moments of the distribution of income growth with log GDP changes over a five-year horizon.

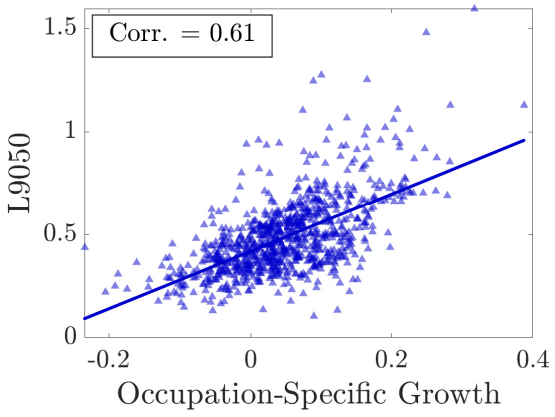
Figure G.2: Distribution of Five-Year Income Growth; Occupation-Specific Cycles (SIAB): Females



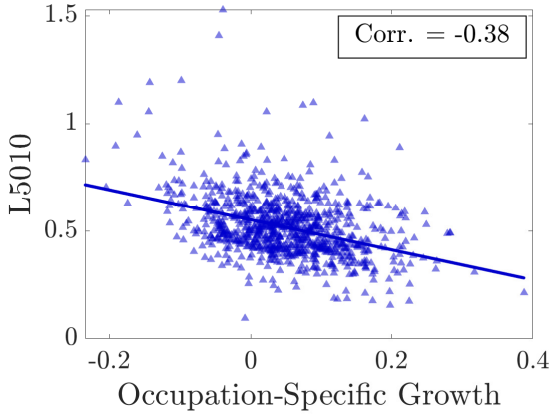
(a) Females, L9010



(b) Females, Kelley's skewness



(c) Females, L9050



(d) Females,L5010

Note: Scatterplot of moment of five-year earnings change against occupation-specific average growth over the same horizon.

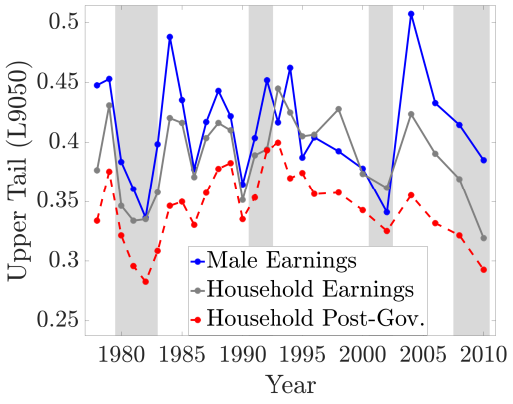
H Insurance

H.1 Household Insurance

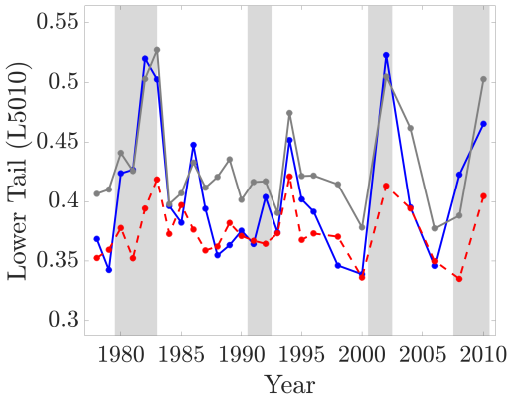
For the ranking we first remove year and household head age fixed effects from household earnings. Then, for each year t, we calculate pre-episode earnings as average earnings over the last five years ($t-5$ to $t-1$). We only include households where both the head and the spouse separately satisfy the minimum income criteria. We then group households into 3 income groups based on their pre-episode earnings belonging to the 1st - 20th, 21st - 80th, 81st - 100th percentile of the earnings distribution. This ranking is done separately by age (3 groups; <35, 36-45, 46-59) and region (7 regions; capital, south, west, east, central, mid-north and north).

Figure H.3 shows percentiles of the conditional distribution of household log earnings growth for several quantiles of head log earnings growth separately for expansion (blue) and contraction (red) years. The 45°-degree line is the reference point for perfectly correlated incomes of head and spouse. Notice that the larger the income losses (gains) of the head, the more the distribution of household income changes tends to lie above (below) the 45°-degree line, implying that there is insurance at the household level. To the extent that spousal income changes are uncorrelated this insurance is rather passive in the sense that it is explained by having two as opposed to one income, which implies that changes of one of the two incomes less that proportionately translate into changes of the overall income.

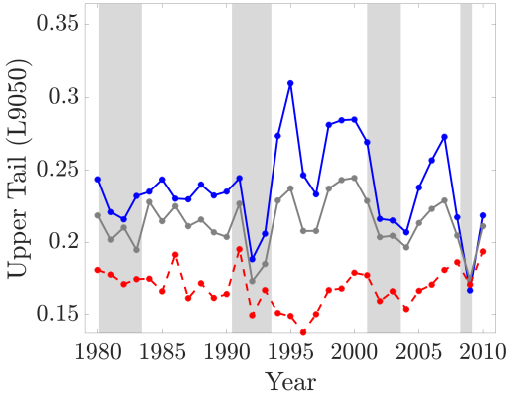
Figure H.1: Tails of Short-Run Earnings Growth: United States, Germany (SOEP), and Sweden



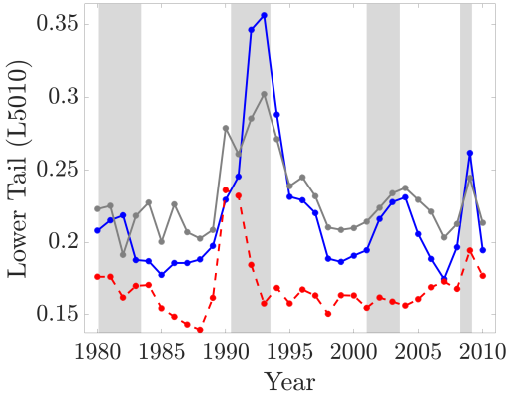
(a) United States, Upper Tail (L9050)



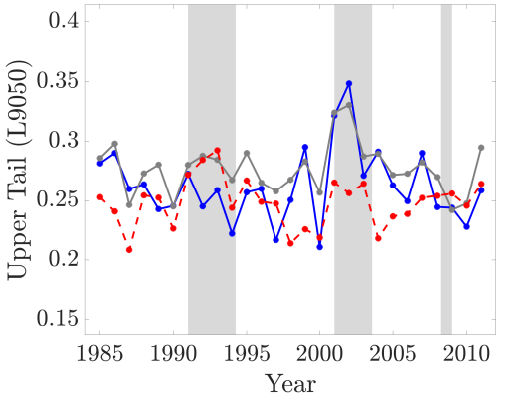
(b) United States, Lower Tail (L5010)



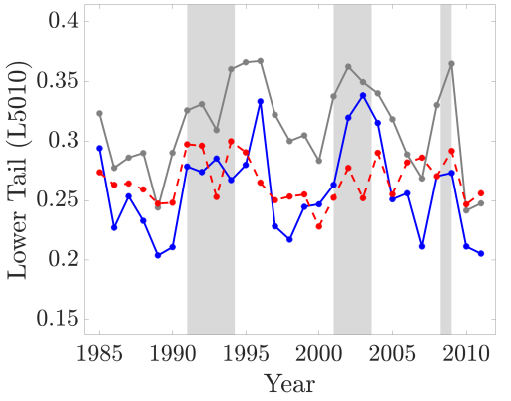
(c) Sweden, Upper Tail (L9050)



(d) Sweden, Lower Tail (L5010)



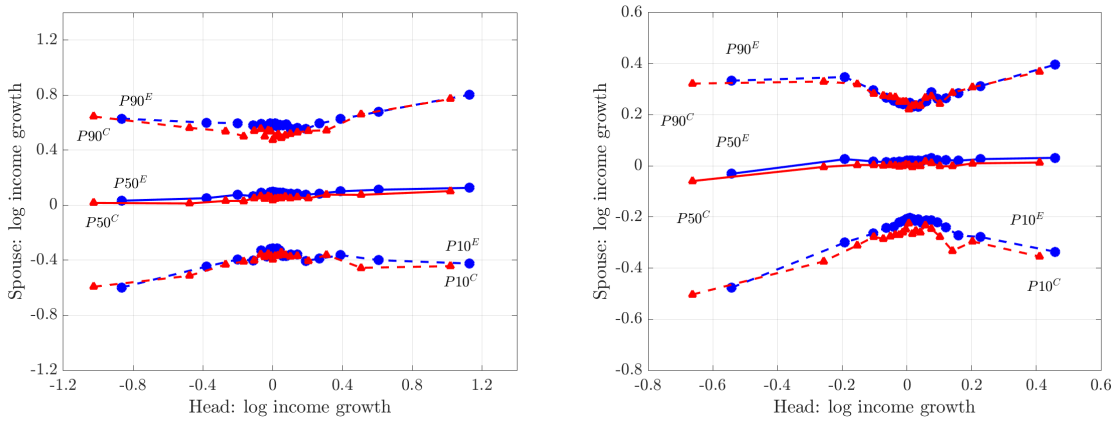
(e) Germany, Upper Tail (L9050)



(f) Germany, Lower Tail (L5010)

Note: Linear trend removed, centered at sample average. Shaded areas indicate recessionary periods (see footnote 12). Horizontal gray line in the right axis of the left panel indicates zero (symmetry) reference line. Year denotes ending year in the growth rate calculations.

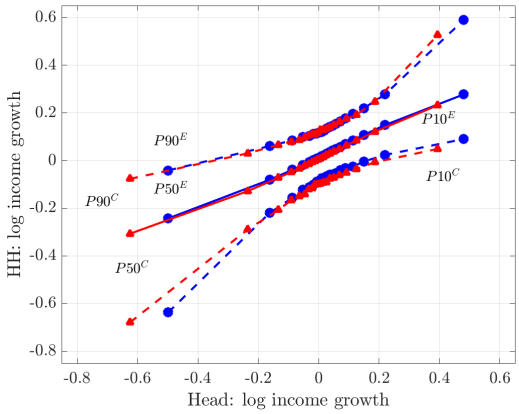
Figure H.2: Spousal Response to Head's Income Change, Bottom and Top Quintiles: Sweden



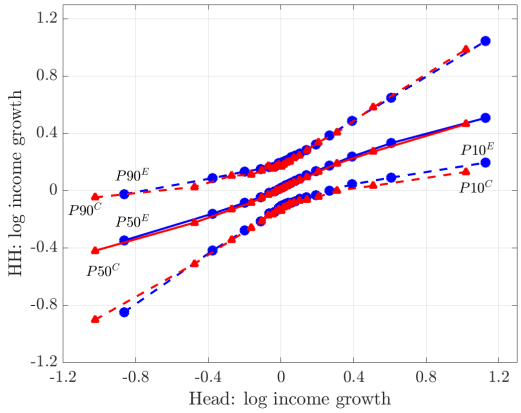
(a) Bottom Quintile (b) Top Quintile

Note: Panels a and b show spouse's log earnings growth against household head log earnings growth for households in the bottom and top quintiles of the distribution of five-year average earnings, respectively. For each marker, the x-axis shows the median earnings growth of heads in that five-percentile-wide bin and the y-axis shows the 90th, 50th, or 10th percentile of spouse log earnings growth. Red and blue markers correspond to recession and expansion years, respectively. For details see text.

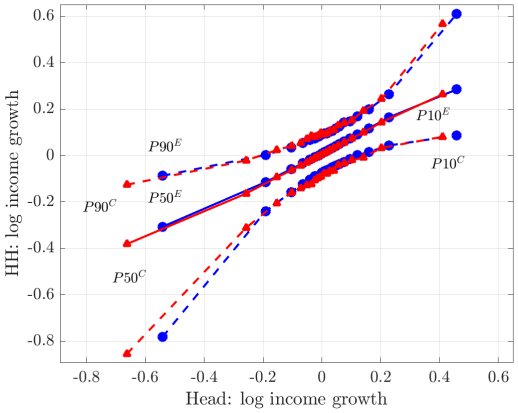
Figure H.3: Household Income Change against Head's Income Change: Contractions vs. Expansions; Sweden



(a) Middle 3 Quintiles



(b) Bottom Quintile



(c) Top Quintile

Note: Figure shows percentiles of household log earnings growth against household head log earnings growth. The three panels group households based on average household earnings over the last 5 years. For each marker, the x-axis shows the median earnings growth of heads in that five-percentile-wide bin, and the y-axis shows the 90th, 50th, or 10th percentile of household earnings growth. Red and blue markers correspond to recession and boom years, respectively. The dashed line is the 45°-line. For details see text.

H.2 Tax and Transfer Policies: Additional Results from SIAB

Table H.1 shows additional results for income measures including unemployment benefits from the SIAB.

Table H.1: Cyclicality of Individual Earnings Including Unemployment Benefits in Germany (SIAB)

	L9010	Kelley	L9050	L5010
Male earnings	0.11	5.71	0.97	–0.86
	(0.26)	(5.32)	(2.93)	(–4.40)
+Unempl. benefits	0.15	5.12	0.84	–0.70
	(0.34)	(5.24)	(2.61)	(–4.01)
Female earnings	0.46	2.69	0.89	–0.44
	(0.60)	(1.92)	(1.26)	(–1.74)
+ Unempl. benefits	0.50	2.43	0.82	–0.32
	(0.67)	(1.82)	(1.22)	(–1.43)

Note: Each cell reports the coefficient on log GDP change of a regression of a moment of the distribution of changes in an income measure on log GDP change, a constant, and a linear time trend. Newey-West t-statistics are included in parentheses (maximum lag length considered: 3 for SIAB and LINDA, 2 for PSID). The income measures are individual earnings, and individual earnings + unemployment benefits. Differences for gross earnings to the estimates in Table 1 are due to regressions starting in 1981 instead of 1976.

I Classification of Occupations

The SIAB records 120 occupation groups, which we aggregate to 30 occupational segments according to the KldB88 classification, listed in Table I.1.

Table I.1: Classification of Occupations

Segment	Description
1	Farmers, fishers, gardeners
2	Miners, mineral winners
3	Stone preparers, manufacturers of building materials
4	Potters, glassmakers
5	Chemical workers, plastics processors
6	Paper manufacturers, processors, printers
7	Woodworkers and related
8	Metal producers
9	Mechanics and associated professions
10	Electricians
11	Assemblers and related
12	Textile workers
13	Leather manufacturers, leather and fur processors
14	Nutrition professionals
15	Construction workers
16	Outfitters, decorators, upholsterers
17	Carpenters, modelers
18	Painters and related
19	Quality inspectors and related
20	Engineers, chemists, physicists, mathematicians
21	Technicians, special technical professionals
22	Merchants
23	Clerks, insurance agents, related
24	Traffic and transportation
25	Administration
26	Security
27	Writers, artists
28	Health
29	Social sector, education and related
30	Hairdressers, cleaners, hoteliers

Note: The thirty occupation segments used in the analysis. Segments are based on KldB88 classification of occupations.

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