

# Boom, Bust, Rebound: Two Decades of Earnings Inequality, Risk and Mobility in Ireland

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# Main Findings

## Using new data on administrative social security records for Ireland over 2002-2022:

- Generate harmonized, micro statistics on earnings inequality, dynamics, and mobility for Ireland
  - >> Global Repository of Income Dynamics (GRID) - IE + 13 countries
- Document how inequality evolved through Ireland's boom, bust, and recovery
  - Boom in the early 2000s lifted all parts of the distribution
  - Recession disproportionately reduced earnings at the bottom
  - Recovery brought strong catch-up at lower percentiles but left persistent gaps at the top

## On earnings dynamics:

- Sharp rise in top earnings shares
- Moderate income risk
- Relatively high economic mobility compared with other advanced economies

## Novel findings:

- Importance of accounting for price dynamics in income inequality
- Selection (including migration) can distort standard inequality measures
  - >> weekly earnings provide a useful complementary perspective on living standards

# Data

## **Dataset: Welfare and Work Longitudinal Database**

- Based on social security records from Department for Social Protection
- Time frame: 1970s to present; reliable coverage from 1990s
- Sample used: 2002-2022 (due to changes in taxable earnings definitions)

## **Earnings: Annual individual earnings before tax**

- Including (taxable) bonuses and benefits-in-kind, excluding pensions and severance payments

## **Sample: 10% sample of population of employees (excludes self-employment)**

- Approx. 125k-183k per year
- Includes earnings from all employments

## **GRID Covariates: Gender, Age Group**

- Do not have nationality, education or firm identifiers

# Trends in Inequality, Risk and Mobility

## Concept of inequality is multifaceted:

- Differences in income at a given point in time
- Differences in the amount of risk faced over time
- Differences in how persistent income is over long periods

## We measure inequality across three dimensions:

- Cross sectional: measured by the distribution of earnings
- Income dynamics: measured by (residual) changes in earnings
- Income mobility: measured by how persistent permanent income is over time

## Large administrative dataset >> examined by gender, age and permanent income

## Beyond GRID, demonstrate:

- Importance of price changes in (real) income dynamics
- How to account for income dynamics and inequality in presence of large-scale selection into the labour market (migration & weeks worked)

# Literature

## First estimates of income inequality, risk and mobility for Ireland using admin data

- Existing work uses survey data (Roantree and co-authors, 2023, 2024) and aggregate tax data (Nolan 2007; Doorley and co-authors 2020)

## Contribute to literature comparing income inequality across countries

- Krueger, Perri, Pistaferri and Violante, 2010; Guvenen, Pistaferri and Violante, 2022b
- >> income dynamics in great recession (9th worst labour market contraction in recent history)
- >> how to meet challenge of higher level of selection (migration, large unemployment swings)
- >> weeks worked - rare feature - and important vis selection (Hoffmann and Malacrino, 2019; Broer et al, 2023)

## Contribute to the literature on responsiveness of earnings risk to aggregate output and inflation

- Guvenen et. Al 2017
- >> earnings growth of men and lower earners especially sensitive to output
- >> decompose this into weekly earnings and weeks worked – weeks worked accounts for sizeable share of earnings risk
- >> price pass through from inflation to earnings is (almost) complete – in aggregate. For low permanent income earners, price pass through is *more* than complete (Blanco et al 2025, Afrouzi, Blanco et al, 2026)

# Sample Selection & Measurement

## Sample restrictions:

- Age 25-55
- Drop obs. for those with low labour market attachment (earnings < 260 hours at minimum wage)
- Employees only

## Samples

- Cross section: cross section inequality measures
- Longitudinal sample: distribution of earnings changes (CS with 1 and 5 year forward earnings changes)
- Variation across demographic groups: age, gender, permanent income (pool across years)

## Variable definitions:

- Raw real (deflated to 2018 using CSO's CPI) earnings in levels and logs
- Residualised log earnings: residual from regression of log real earnings on age dummies, by gender and year
- Permanent earnings: average earnings over past 3 years
- 1 year (forward) change in residualised log earnings
- 5 year (forward) change in residualised log earnings
- Weekly earnings: annual earnings divided by weeks worked (in all employments, capped at 52 weeks) and multiplied by 52

# Economic Context

1. Boom (2002-2007)
2. Bust (2008-2012)
3. Robust recovery (2013-2022)
4. Brief pandemic interruption (2020)

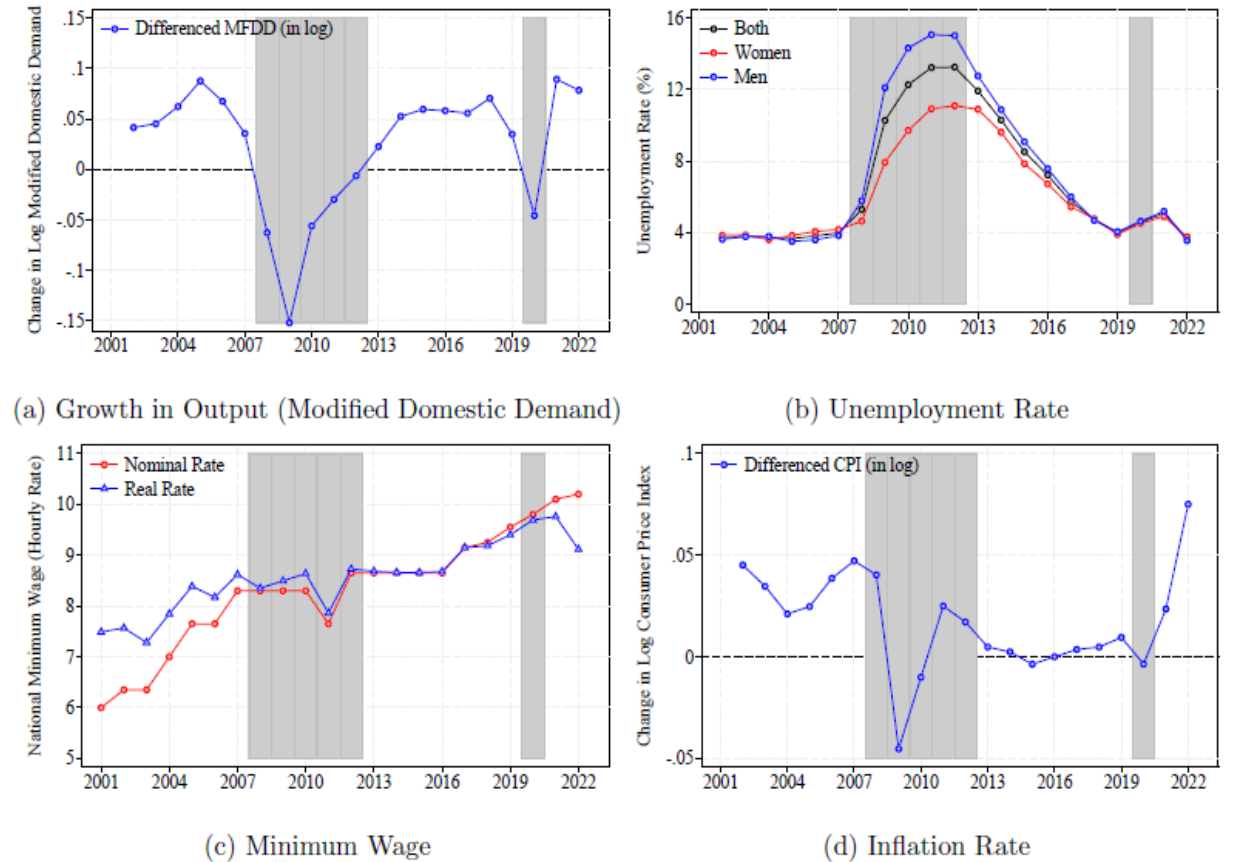


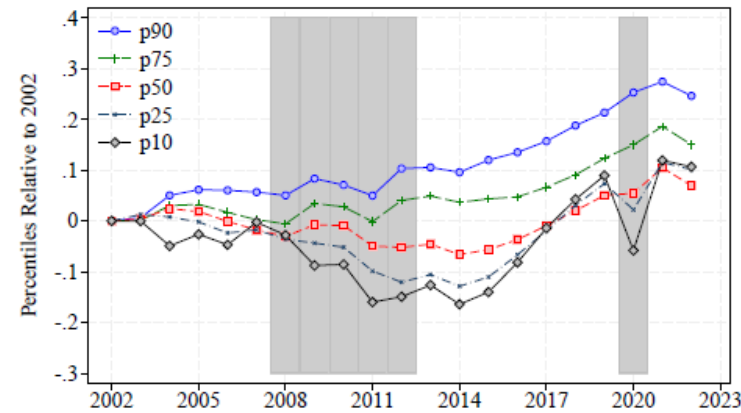
Figure 2: Trends in the Irish economy

**Notes.** Figure shows aggregate trends in the Irish economy and labor market since 2000. Panel (a) shows Modified Domestic Demand, a preferred measure of national income that removes the influence of multinational companies that distort Irish GDP and GNI. Panel (b) shows the unemployment rate. Panel (c) shows the minimum wage. Panel (d) shows the inflation rate. All data are the official series provided by the Central Statistics Office (CSO).

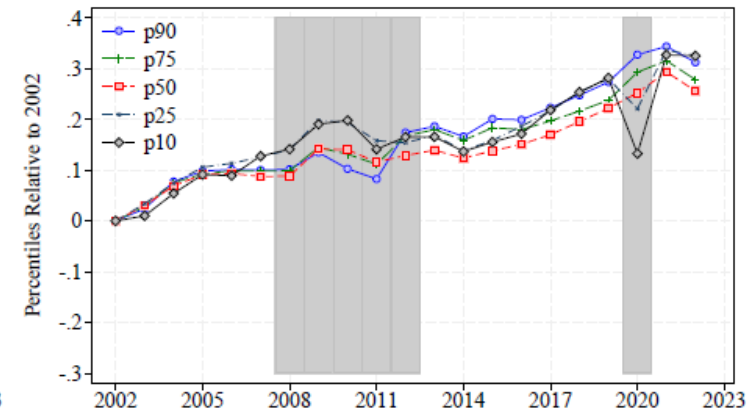
# Trends in Inequality, Risk and Mobility

## Earnings in levels - Evidence of business cycle dynamics:

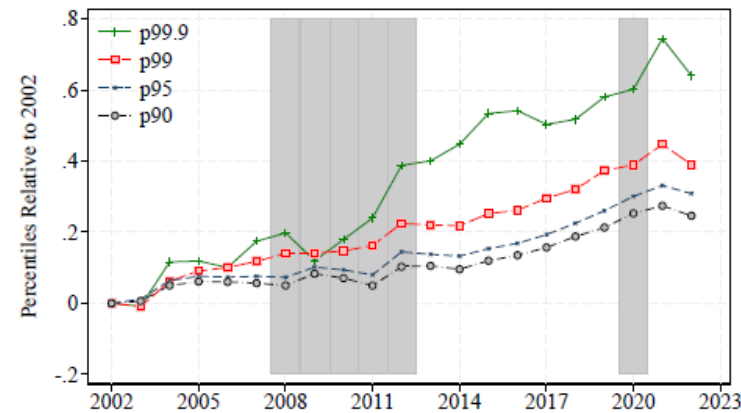
- Earnings growth doesn't track expansion OR unemployment trends 1:1
  - >> median income fell from 2005
  - >> earnings at the bottom fall throughout the boom
  - >> earnings for top 50% apparently rise during worst years of recession



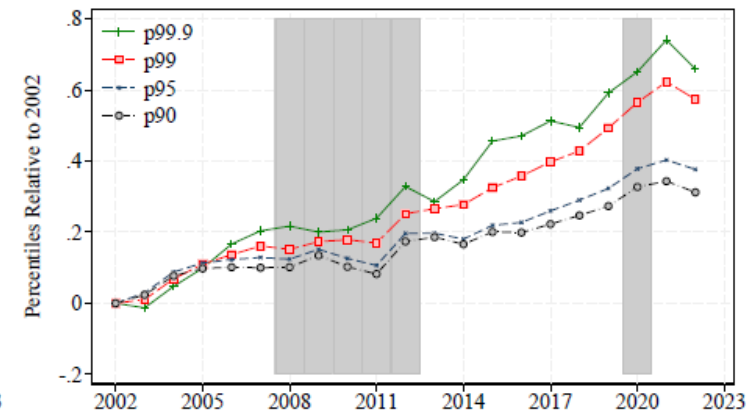
(a) Men



(b) Women



(c) Men



(d) Women

## Inequality has risen throughout, but for different reasons:

- Fanning out (men) during recession, followed by 10th centile catching up with median
- All: "fanning out" of the top 10% is stark
- Differences between men and women: Women's real wages did not fall below 2002 level
- Covid: bottom earnings fell, top flat/growing

# Trends in Inequality, Risk and Mobility

Residualise earnings - Remove predictable changes in earnings due to life-cycle, gender, (average) business cycle effects

- Remaining variation is due to shocks related to the individual (idiosyncratic, sector, education, etc)

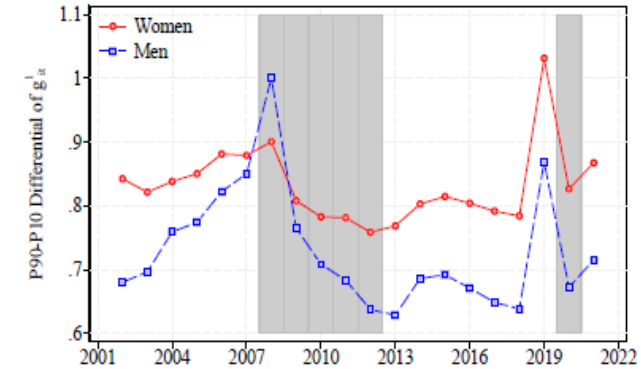
As in other countries, income risk does not resemble a normal distribution: more skewness and fatter tails (more kurtosis)

IE has low/modest earnings risk - increases during recessions

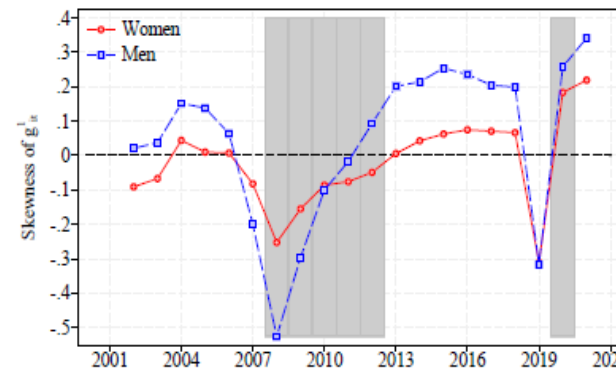
- Higher for women likely due to higher variation in hours worked over working life

Skewness counter-cyclical - good shocks more likely in good times, bad shocks much more likely in bad times (esp. for men)

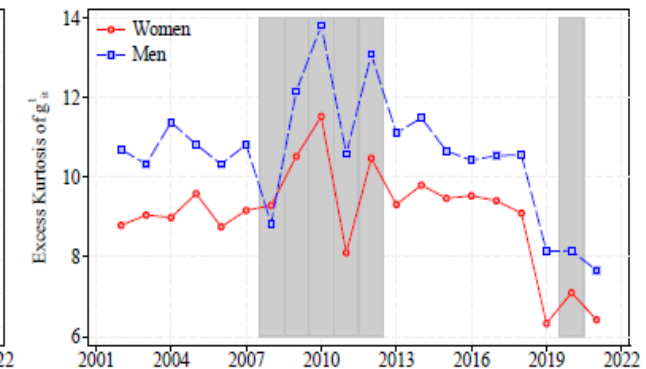
Kurtosis (likelihood of very large changes in income) pro-cyclical - modest in IE compared to other GRID countries



(a) Volatility



(b) Skewness



(c) Kurtosis

Figure 5: Trends in Volatility, Skewness and Kurtosis of Earnings Growth

Note: Volatility is the P90-10 of earnings growth, skewness is Kelley skewness of earnings growth, and kurtosis is the 4th moment of the earnings growth distribution. Shaded areas indicate recession years, based on declines in Modified Domestic Demand.

# Trends in Inequality, Risk and Mobility

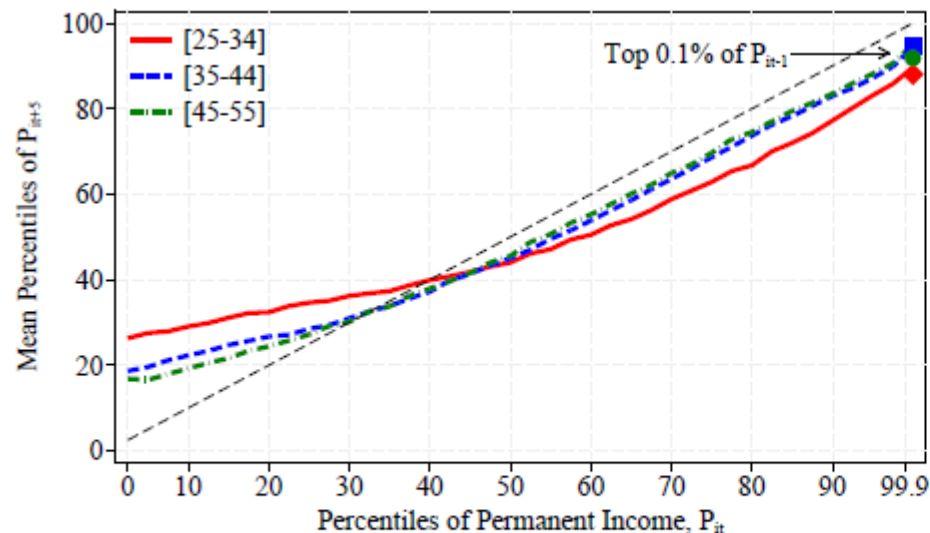
Persistence of earnings: earnings today compared to earnings 5 years ago

- >> do past earnings predict current earnings?

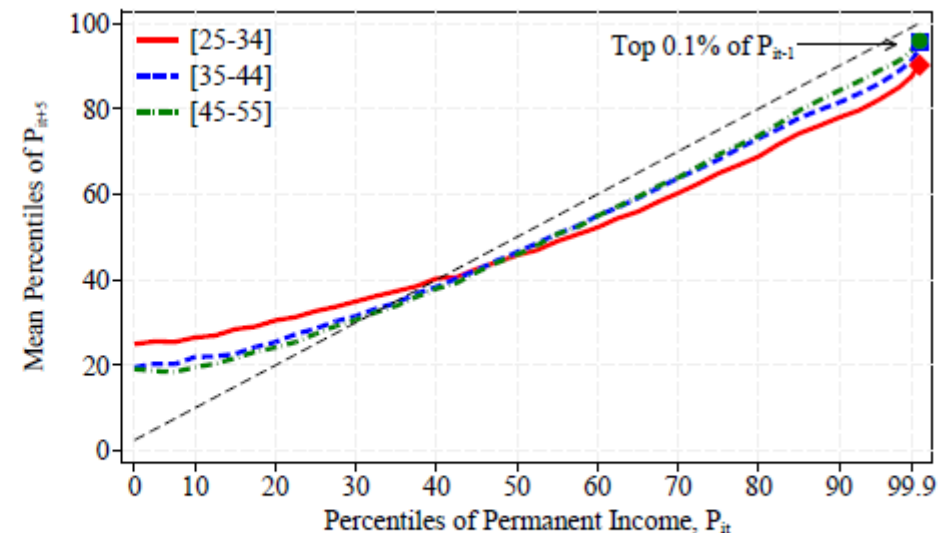
More mobility when younger compared with older workers

Mean reversion:

- Lowest earners are likely to rise to at or above 20th centiles
- Higher earners likely to fall a bit (less likely at the very top)



(a) Men



(b) Women

# Comparing Ireland with Other Countries

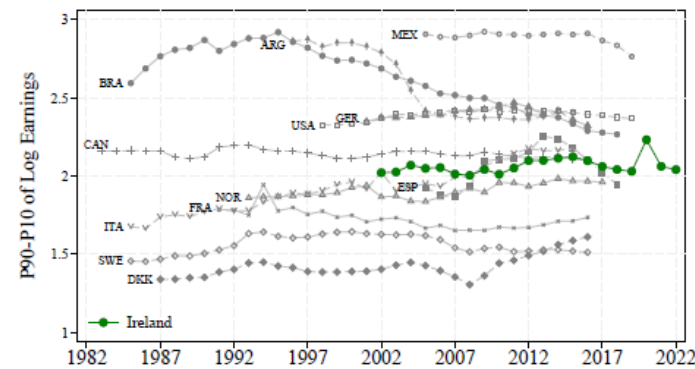
## Earnings inequality is high but stable

- Of advanced economies in GRID only DE and US are consistently higher

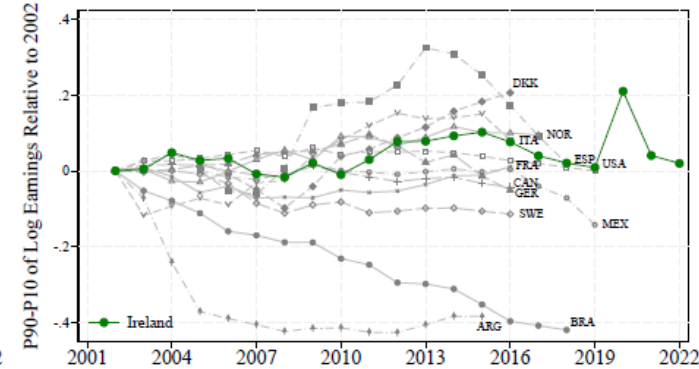
## Top earnings inequality was low but has grown rapidly over the sample

## Earnings risk is middle of the pack, but rose substantially in lead up to financial crisis

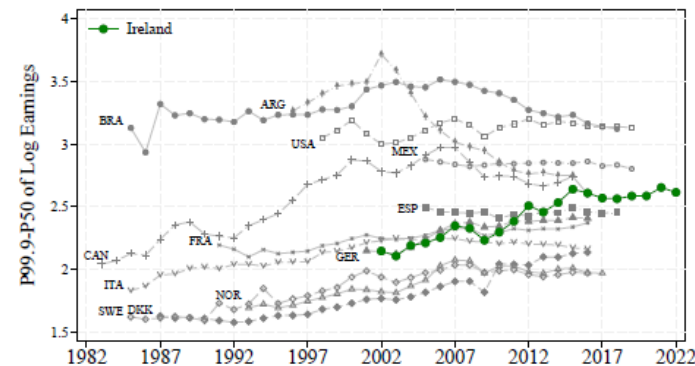
- From as early as 2003
- Show later that this increase in earnings risk likely related to selection (migration & weeks worked)



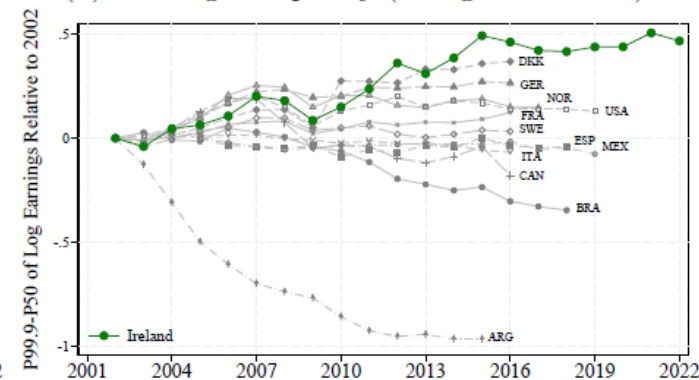
(a) Earnings Inequality (Level)



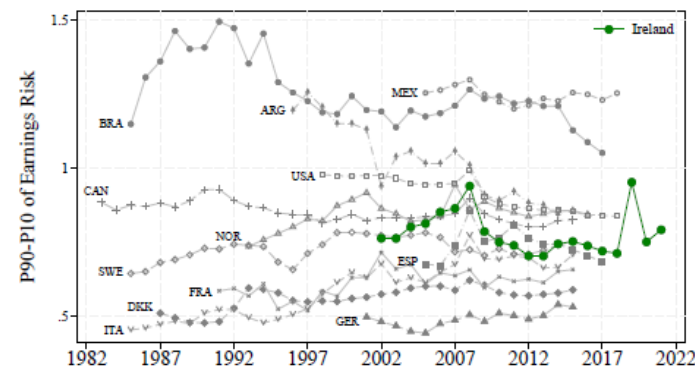
(b) Earnings Inequality (change since 2002)



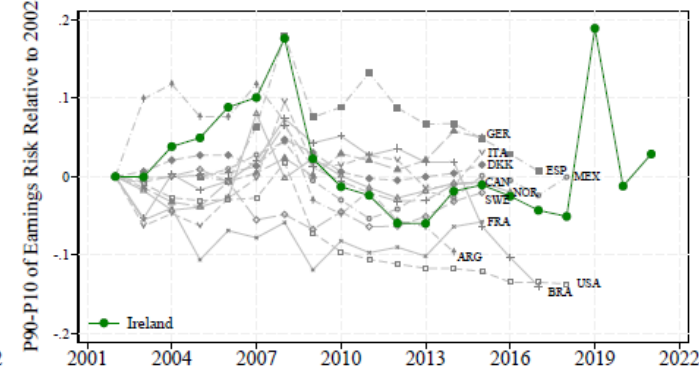
(c) Top Earnings Inequality (Level)



(d) Top Earnings Inequality (change since 2002)



(e) Earnings Risk (Level)



(f) Earnings Risk (Change since 2002)

# Responsiveness of earnings: output & inflation

Recall puzzling patterns in earnings profile for some parts of the distribution, esp. over 2003-2007

- E.g. Real earnings falling for men up to P75 during 2005-2007
  - >> striking boom-bust pattern in output not so evident in real earnings
- >> decompose responsiveness to weekly earnings vs. weeks worked

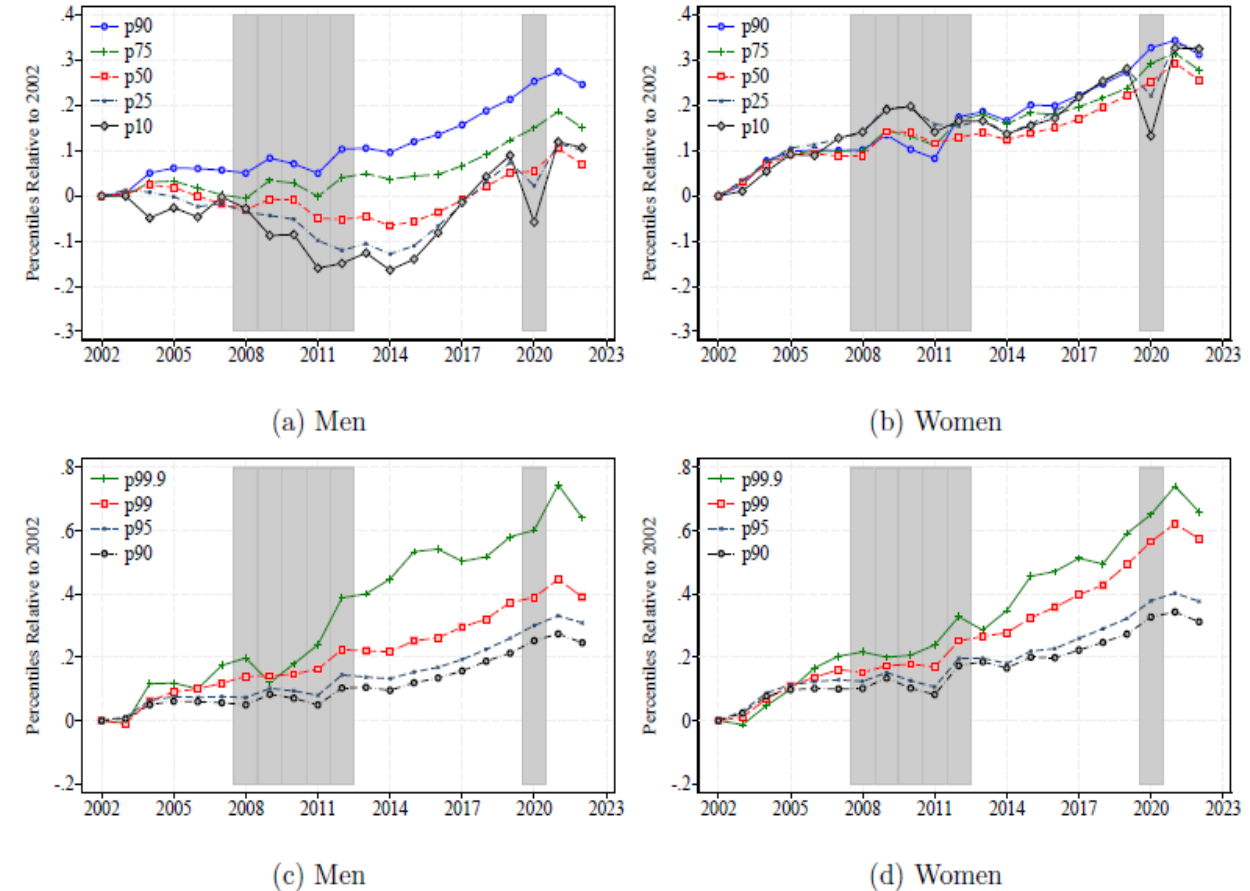


Figure 3: Changes in the percentiles of the log real earnings distributions

*Note:* Log income is normalised to 0 in the base year 2002. Top panels (A) and (B) show P10, P25, P50, P75, P90; Bottom panels (C) and (D) show P90, P95, P99, P99.9. Shaded areas indicate recession years, based on declines in Modified Domestic Demand.

# Estimation & Decomposition

Framework (Guvenen et al 2017 – “Worker Betas”)

$$\Delta y_{it} = \alpha^g + \beta^g \Delta Y_t + \varepsilon_{it}$$

- Worker  $i$  at time  $t$  from group  $g$  (gender\*age\*permanent income)
- Sensitivity of individual income to aggregate variables (output or inflation)
- >> Change in log income is available for weekly earnings and weeks worked – log difference allows the decomposition of interest:

And:

$$\Delta y_{it}^w = \Delta y_{it}^w + \Delta w_{it}$$

$$\beta_y = \beta_{y^w} + \beta_w$$

- >> when inflation on RHS can interpret as inflation pass through to real wages:  $\beta_y = 0$  == full pass through
- Distribution: quantile regression – hetero effects of agg. variables on distribution of earnings growth

# Earnings & Output

## Responsiveness of average earnings growth to agg output

- Exposure to MDD is significantly higher for low permanent income workers
- Moderately higher for men and younger workers

## Weeks worked accounts for substantial share of exposure for many earners – non-monotonic

- Responsiveness of men: high on average with high responsiveness to weeks worked
- For p10 workers: average is high, weeks worked accounts for 17% of this
- Older workers have lower average responsiveness, with nearly 40% accounted for by weeks worked

Table 2: Decomposition of Average Responsiveness to Output

| Group                | Mean $\beta_y$ | Weeks share, $\beta_w/\beta_y$ |
|----------------------|----------------|--------------------------------|
| Panel A: Gender      |                |                                |
| Men                  | 0.827          | 0.293                          |
| Women                | 0.405          | 0.114                          |
| Panel B: Percentiles |                |                                |
| p10                  | 1.250          | 0.168                          |
| p50                  | 0.494          | 0.441                          |
| p90                  | 0.152          | 0.612                          |
| p99.9                | 0.463          | 0.050                          |
| Panel C: Age Groups  |                |                                |
| Age 25–34            | 0.867          | 0.156                          |
| Age 35–44            | 0.513          | 0.245                          |
| Age 45–55            | 0.467          | 0.369                          |

# Earnings & Inflation

## Responsiveness of average earnings growth to price changes

- On average, pass through is complete for men
- Moderate for women >> inflation associated with higher real earnings (even conditional on MDD growth)

## Weeks worked accounts for substantial share of exposure for some earners – non-monotonic

- Responsiveness of p10 workers: average is +ve, weeks worked is -ve and large, indicating that weekly earnings rise by even more

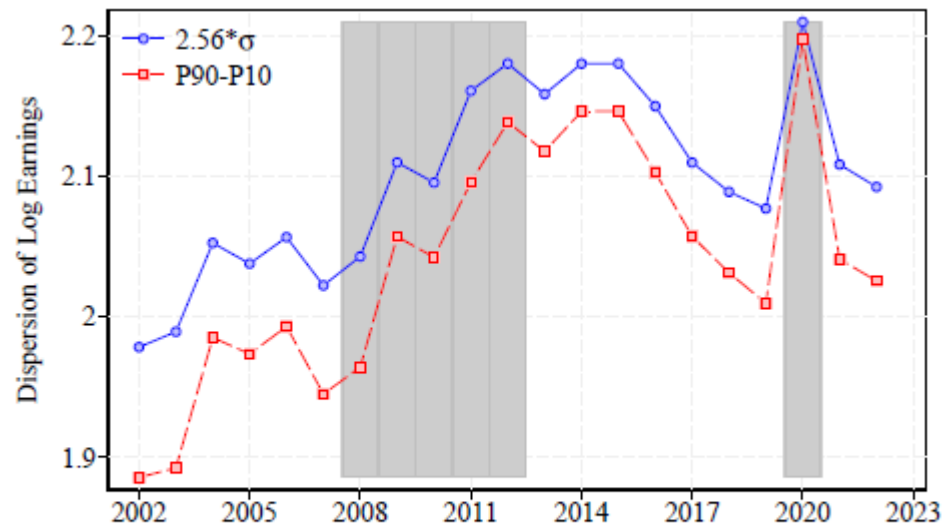
Table 4: Decomposition of Average Responsiveness to Inflation

| Group                | Mean $\beta_y^\pi$ | Weeks share, $\beta_w^\pi / \beta_y^\pi$ |
|----------------------|--------------------|------------------------------------------|
| Panel A: Gender      |                    |                                          |
| Men                  | 0.003              | -17.138                                  |
| Women                | 0.148              | -0.703                                   |
| Panel B: Percentiles |                    |                                          |
| p10                  | 0.808              | -0.547                                   |
| p50                  | -0.105             | -0.311                                   |
| p90                  | -0.224             | 0.001                                    |
| Panel C: Age Groups  |                    |                                          |
| Age 25–34            | 0.240              | -0.943                                   |
| Age 35–44            | -0.038             | 0.947                                    |
| Age 45–55            | 0.024              | 1.423                                    |

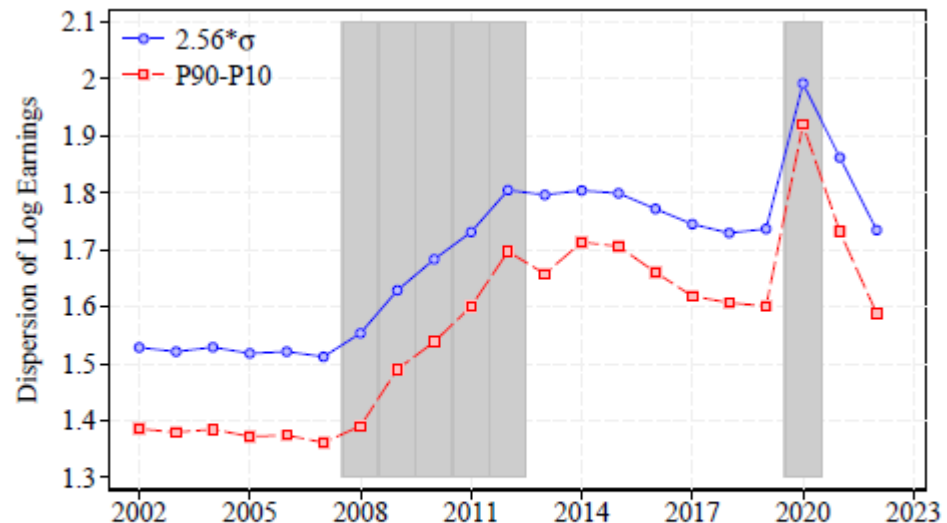
# Annual Earnings, Weekly Earnings, Weeks Worked

Recall puzzle in earnings levels and changes patterns: boom-bust pattern in output less evident in earnings – bottom male earnings fell during boom...

- Weekly earnings (annual earnings/weeks worked\*52) – removes earnings changes driven by weeks worked
- >> sharper relationship between inequality and the business cycle
- Compared to annual earnings measures: 1/3 inequality increase over 2002-2022 occurred during boom
- Differences much smaller for women



(a) Men - annual

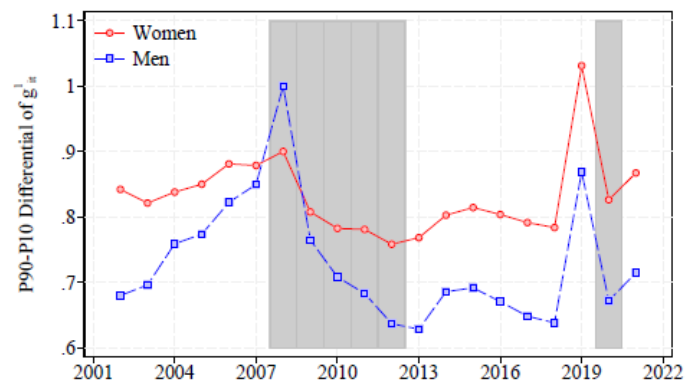


(b) Men - weekly

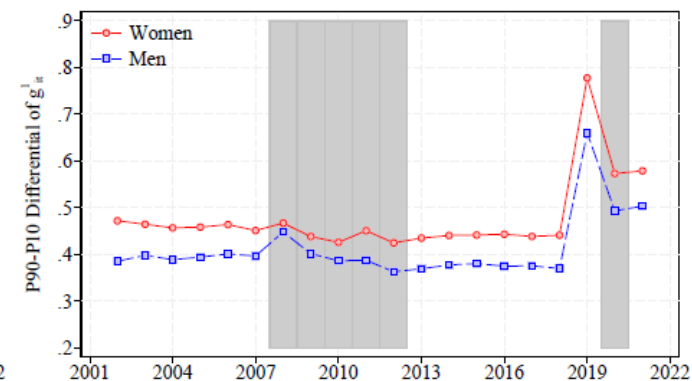
# Weeks Worked - Source of Income Risk

Changes in weeks worked explains a large portion of earnings risk across all 3 measures

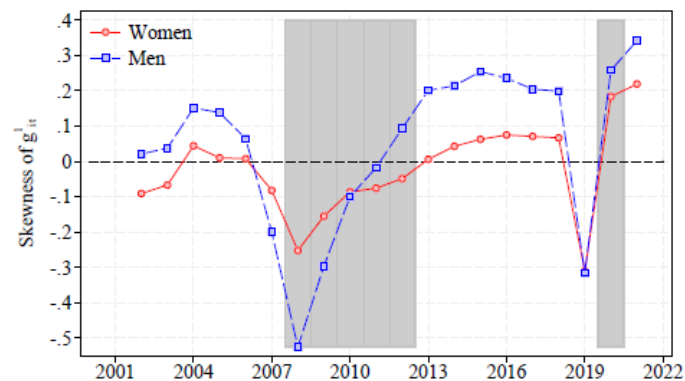
- Volatility & kurtosis fall by close to half
- Skewness also falls but remains both procyclical and stronger in downturns than expansions
- Weeks worked particularly important for great recession (compared to Covid)



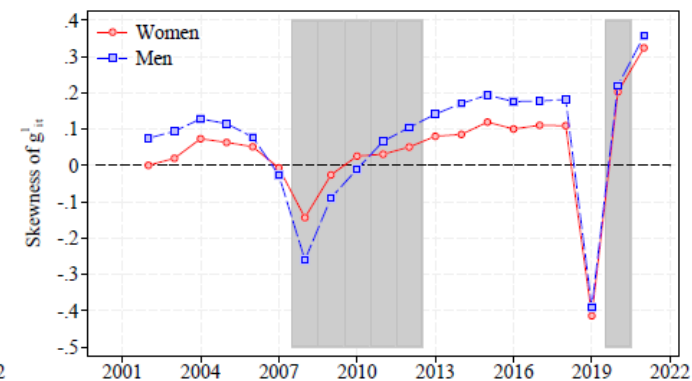
(a) Volatility - Annual



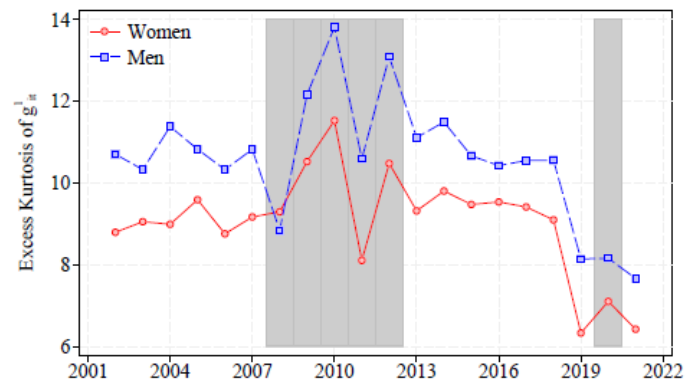
(b) Volatility- Weekly



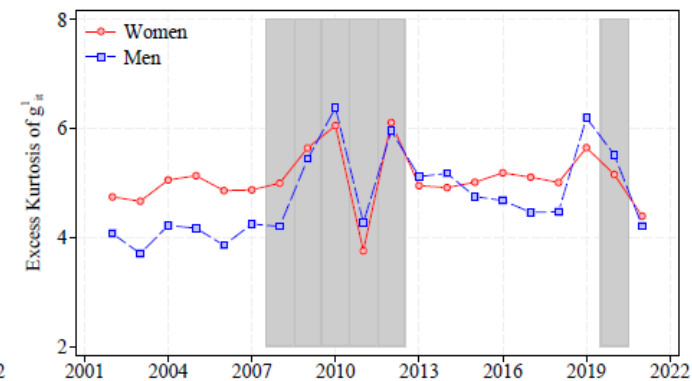
(c) Skewness - Annual



(d) Skewness - Weekly



(e) Kurtosis - Annual



(f) Kurtosis - weekly

# Conclusions

## Paper:

- Comprehensive, harmonized evidence on evolution of income inequality, dynamics and mobility in over two decades in Ireland

## Distinctive patterns

- Rising inequality - driven by gains at the top
- Recovery in the lower half of the distribution following the Great Recession
- Coexistence of relatively high inequality with moderate economic mobility

**Using the amplified boom-bust in Ireland over 2002-2014 we explore how macro changes (output and prices) interact with micro-level earnings dynamics**

- Heterogeneity of responsiveness to output – by gender, age, income level
  - Role of weeks worked non-monotonic
- At the average, inflation passthrough is complete – but positive for those at low incomes
  - Even accounting for role of weeks worked

**Selection (weeks worked, migration) explain significant share of income risk**

**More research needed with the new data!** <https://www.grid-database.org/>

# Thank You

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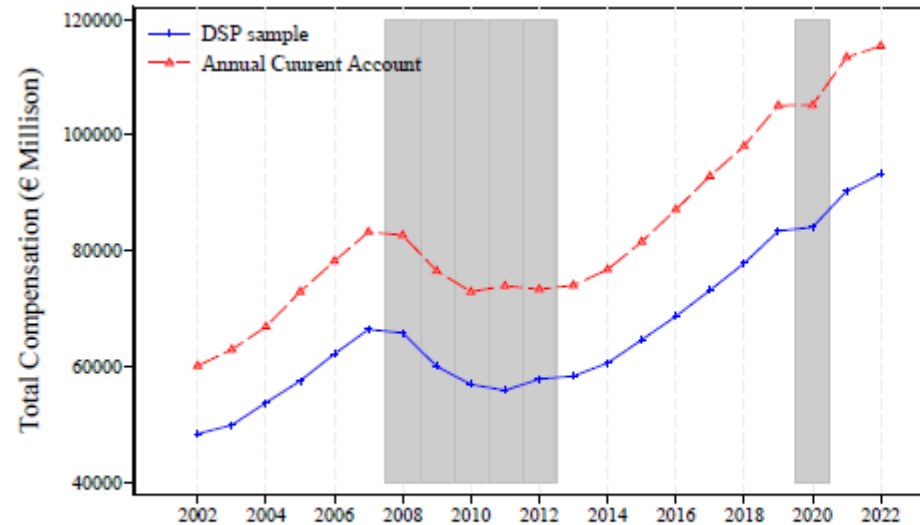
# Additional Material

# Data Quality

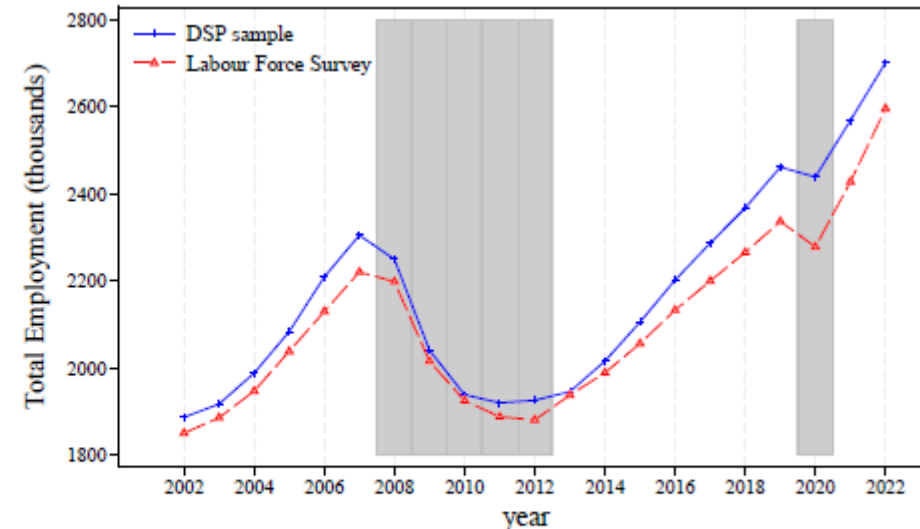
Good coverage of number of employees

Reasonable coverage of income concept

- NB: national accounts definition of income is much broader than in WWLD



(a) Total Earnings

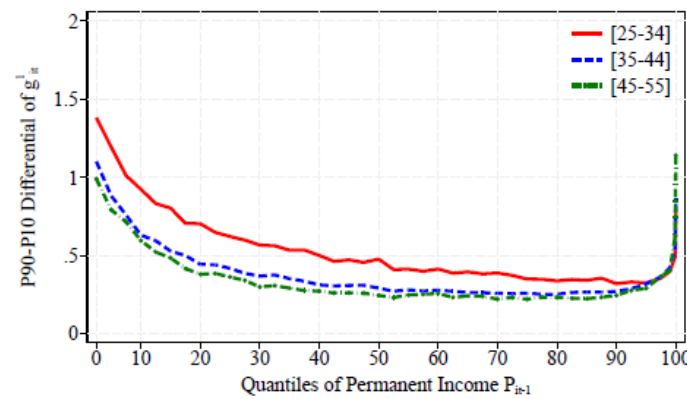


(b) Total Employment

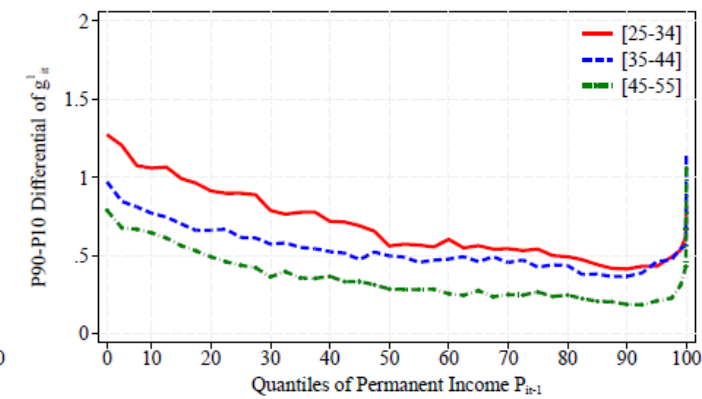
# Permanent Income & 1-Year Income Risk

Permanent income: earnings averaged over 3 years

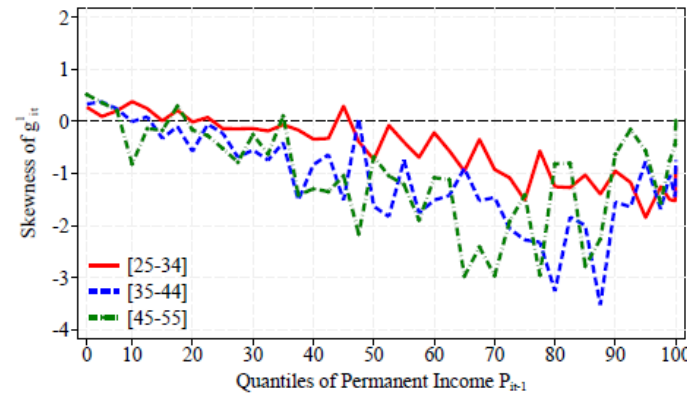
- (a) & (b) Volatility: highest for younger earners and those at the bottom and very top of the permanent income distribution
- (c) - (f) Skewness & kurtosis: higher earners and older workers exhibit more skewness and kurtosis
  - Inverse for very top



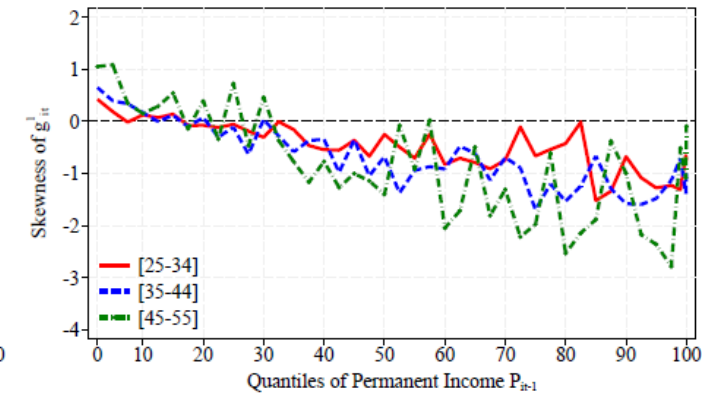
(a) Men



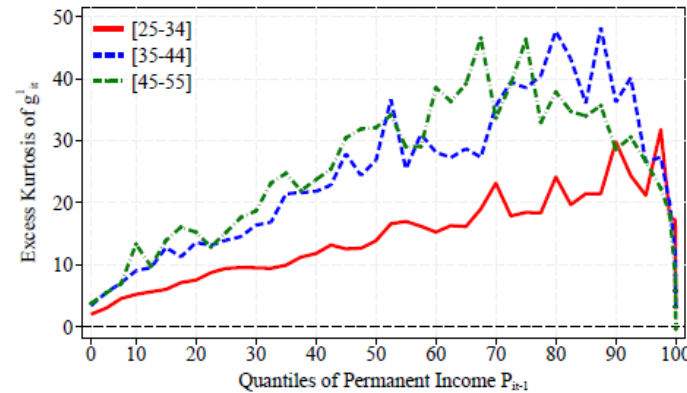
(b) Women



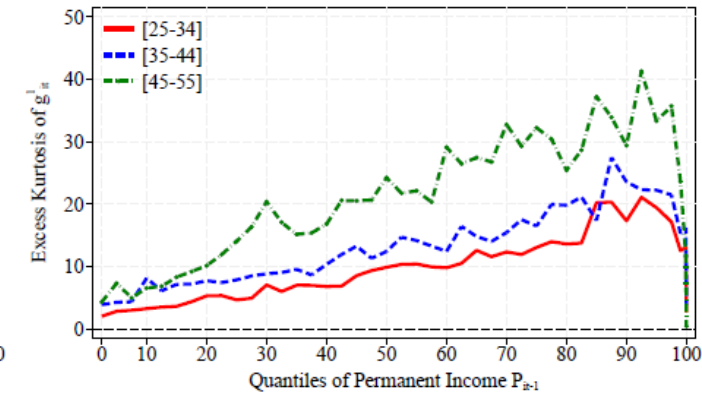
(c) Men



(d) Women



(e) Men



(f) Women

# Relationship Between Inequality, Risk and Mobility

Mobility is measured as the slope of a rank-rank regression on earnings

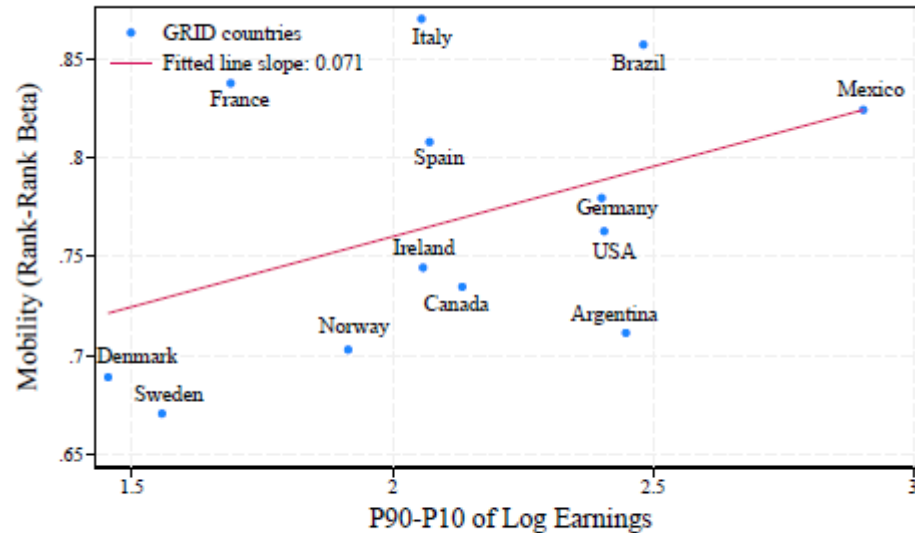
- Higher rank-rank slope means higher persistence in earnings, i.e. less mobility

**+ve relationship between rank-rank slope (mobility) and inequality (P90-P10 log earnings)**

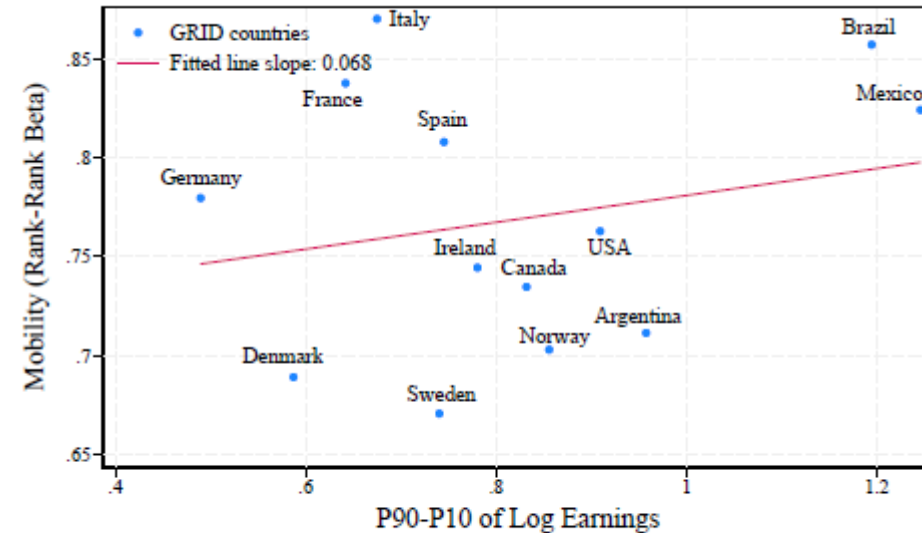
- (to lesser extent) risk (residual earnings growth)
- >> countries with higher inequality are less mobile

**Ireland looks more like Canada than the US or developing countries**

- Higher than expected mobility given inequality



(a) Inequality and Mobility

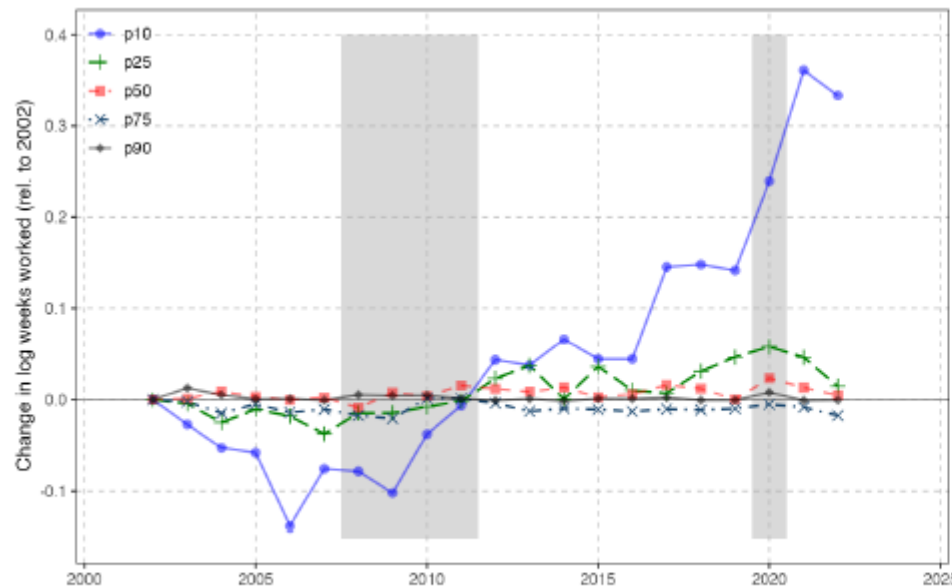


(b) Risk and Mobility

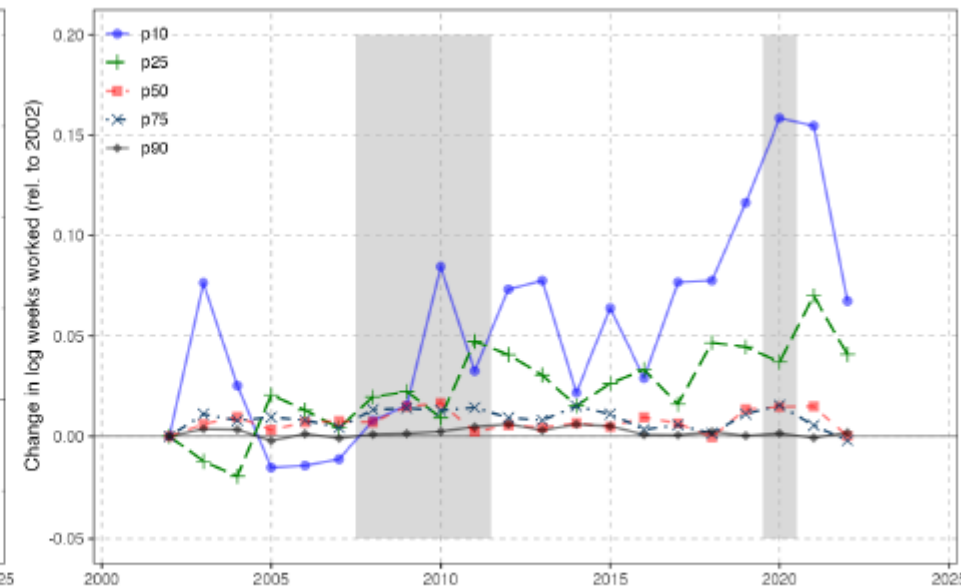
# ...Weeks Worked

Average weeks worked fell at 10th and 25th centiles for men during boom

- Fall for men large: 10% for P10
- >> Annual earnings fell, despite rising weekly earnings
- Steady for women
- NB - Rankings may change between annual and weekly earnings



(a) Men



(b) Women

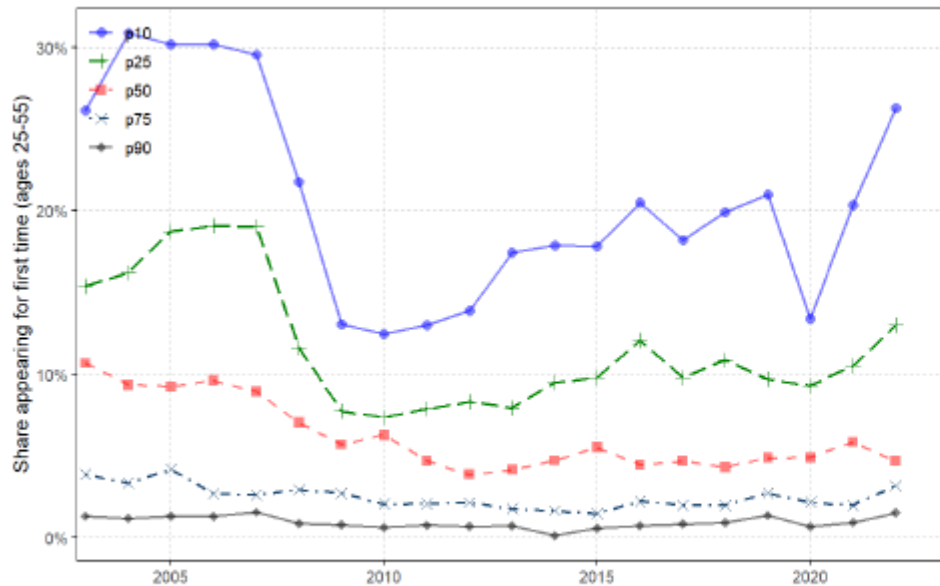
# ...Weeks Worked + Migration...

New entrants to labour market arrive throughout the year....

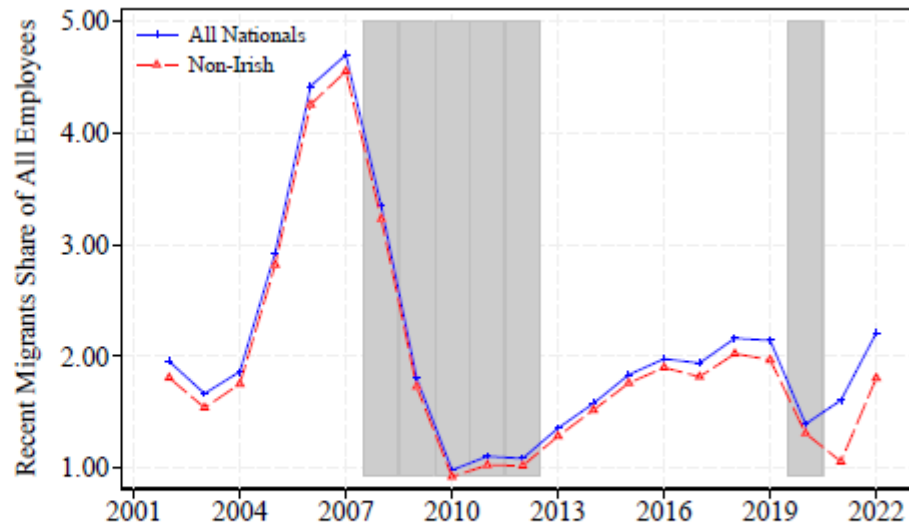
- New entrants from domestic supply of working age population: driven by domestic demographics – change slowly over time
- New entrants from foreign labour supply: driven largely by push and pull factors – likely to be pro-cyclical

>> migrants - may explain fall in average weeks worked

- Especially in boom/peak migration
- >> New entrants to WWLD peak for 10th and 25th centiles during boom, and again after Covid



(a) New Entrants to WWLD Data

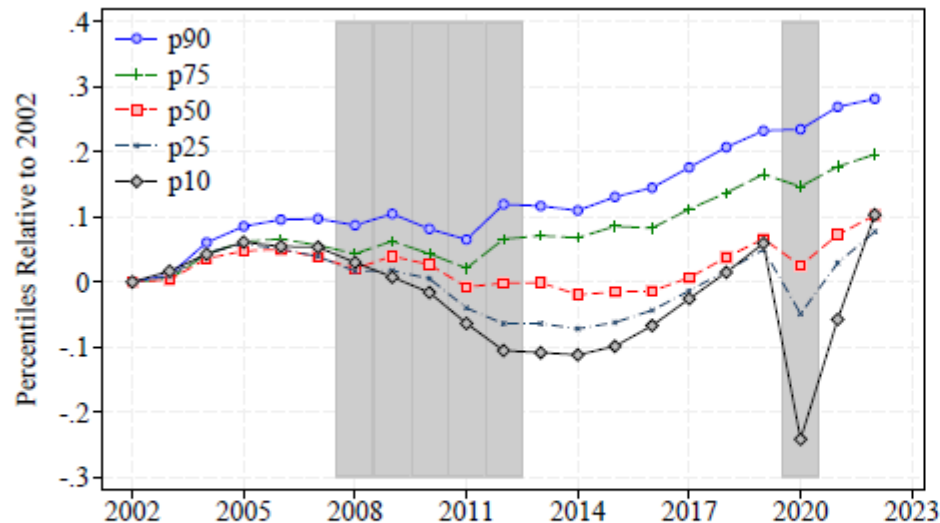


(b) Aggregate Migration Patterns in LFS Data

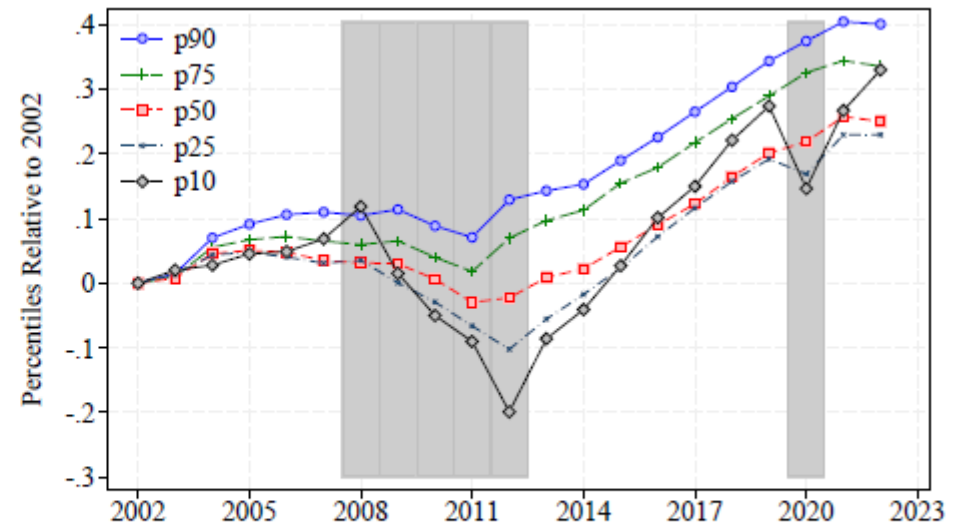
# ...Weeks Worked + Selection...

Restricted samples show patterns closer to weekly earnings than annual earnings

- Full year workers (includes migrants)
- Survivors (sample present from 2007-2012) - removes impact of unemployment



(a) Men - full year workers



(b) Men - survivors employed 2007-12