SVERIGES RIKSBANK
WORKING PAPER SERIES
459

Outsider Unemployment, Insider Wages, and the Disappearance of the Swedish Wage Curve

Mikael Carlsson, Iida Häkkinen Skans and Oskar Nordström Skans

January 2026

WORKING PAPERS ARE OBTAINABLE FROM

www.riksbank.se/en/research
Sveriges Riksbank • SE-103 37 Stockholm
Fax international: +46 8 21 05 31
Telephone international: +46 8 787 00 00

The Working Paper series presents reports on matters in
the sphere of activities of the Riksbank that are considered
to be of interest to a wider public.
The papers are to be regarded as reports on ongoing studies
and the authors will be pleased to receive comments.

Outsider Unemployment, Insider Wages, and the Disappearance of the Swedish Wage Curve*

Mikael Carlsson[a] **Iida Häkkinen Skans**[b] and **Oskar Nordström Skans**[c]

Sveriges Riksbank Working Paper Series No. 459

January 2026

Abstract

We document a substantial reduction in the wage responsiveness to regional unemployment (the *wage curve*) in Sweden during the past 25 years. The period is characterized by large changes in the composition of the labor force arising from refugee migration and active labor supply policies targeting marginal workers. During the period, the relationship between regional unemployment and industry demand shocks weakened as the share of immigrants among the unemployed increased from 25 to 60 percent. Simultaneously, a previously stable wage curve disappeared, even though regional wages continued to respond to regional industry demand shocks. The results suggest that wages respond more strongly to unemployment fluctuations that arise from the demand side than the supply side, and that the unemployment rate has become a less informative indicator of resource utilization and inflationary pressure.

JEL-codes: J11, E24, J21, J31, R23

Keywords: Wages, Unemployment, Composition

*This is a substantially updated version of an article circulated as "Wage Flexibility in a Unionized Economy with Stable Wage Dispersion" (IZA DP 12093). We are grateful for comments from Alex Bryson, Olof Åslund, Karl Walentin and participants in various seminars. ON Skans acknowledges financial support from the Swedish Research Council (2018-04581) and Carlsson from Handelsbankens Forskningsstiftelser (P21-0094). The opinions expressed in this paper are the sole responsibility of the authors and should not be interpreted as reflecting the views of Sveriges Riksbank.

[a]Uppsala University and Sveriges Riksbank. E-mail: mikael.carlsson@nek.uu.se.

[b]Sveriges Riksbank. E-mail: iida.hakkinenskans@riksbank.se.

[c]Uppsala University, IZA, and RFBerlin. E-mail: oskar.nordstrom_skans@nek.uu.se.

1 Introduction

Understanding wage responses to labor market shocks is a central theme in both macroeconomics and labor economics. The elasticity of wages with respect to local unemployment, the *wage curve*, quantifies the adjustment of the labor market by capturing how much wages respond to the excess labor supply (Blanchflower and Oswald, 1995). The elasticity has long been recognized as a useful statistic for whether regional disturbances are absorbed through employment adjustments or through wage moderation, which affect the risk of persistent regional unemployment disparities (see e.g. Layard et al., 2005). However, regional wage responses are also of key interest from a macroeconomic perspective – see, for example, Beraja et al. (2019), which uses regional wage curve elasticities to discipline a New Keynesian model in order to understand the drivers of aggregate business cycles. Furthermore, the wage elasticity is important in practical monetary policy work where unemployment rates are used as indicators of labor market slack, see e.g. the discussion in Stock and Watson (2020). A related research strand, see e.g. Hazell et al. (2022), Fitzgerald et al. (2024) and McLeay and Tenreyro (2019), estimate the elasticity of *prices* to regional unemployment – i.e. "the price curve" – to understand the flattening of the Phillips curve.[1]

The central theme in these research strands is that regional unemployment serves as a measure of available resources that should be negatively correlated with regional wage pressure. But the effect need not be constant, and recent research has explored how it changes with institutional and structural features. Cross-country evidence highlights the role of wage-bargaining systems in mediating the sensitivity of wages to regional labor demand (Boeri et al., 2021), while other studies have shown that changes over time in labor-market attachment among non-employed workers have muted the relationship between wages and regional unemployment rates in the US (Blanchflower et al., 2024).

In this paper, we emphasize a complementary process arising from compositional changes

[1]This strategy exploits the fact that national monetary policy is common and thus does not differentially respond to regional shocks. It is used to identify the slope of the aggregate price (Phillips) curve — which, in aggregate-data estimates, appears to have flattened considerably over time; see, e.g., Del Negro et al. (2020) for a discussion.

within the labor force. One of the most salient recent developments in many European labor markets is an increased share of marginally attached workers among the unemployed (see, e.g., Foged and Peri, 2016; Fasani et al., 2022). Leaning on insider–outsider models of wage determination originally proposed by Lindbeck and Snower (1988), we argue that an unemployment pool consisting of "outsiders" may have a relatively weak disciplining effect on the wages of employed "insiders". As a consequence, an increased fraction of outsiders among the unemployed may weaken the disciplining effect of unemployment, thereby attenuating the wage responsiveness to regional unemployment, which leaves room for persistent regional labor market imbalances while reducing the usefulness of unemployment rates as a measure of inflationary pressure.[2] As emphasized by Alogoskoufis (2018), Blanchard (2018), and Galí (2022), non-responsiveness of insider wage setters to outside unemployment generates unemployment persistence with important implications for macro-economic stabilization policy.

Our empirical analysis leverages Swedish data for the period 1998 to 2023, a period with stable wage-setting institutions, growing real wages, and a stable aggregate wage distribution. This apparent aggregate stability masks substantial compositional changes within the pool of unemployed workers. The changes plausibly arose because of two reinforcing processes: (i) a very large inflow of low-skilled refugee migrants who – in contrast to labor migrants – arrive without prior labor market connections and whose skills are often misaligned with labor market needs, and (ii) policy reforms aimed at further increasing labor force participation from already very high levels. The mix of supply policies includes tax incentives, reduced benefit rates, and increased labor market activation measures – often explicitly targeting marginally attached workers such as refugee migrants, people with disabilities, and older unemployed workers. An increased labor supply of marginal workers should push up the share of low-skilled workers among the unemployed, employment-to-population rates (as some of the added workers find jobs), and unemployment rates (due to

[2]For recent quasi-experimental evidence on insider-outsider forces in relation to immigration shocks, see Dustmann et al. (2017). For a more general discussion of how inside and outside forces affect workers' wages see Jäger et al. (2020).

a shift in composition). Along these lines, the migrant share within the pool of unemployed increased from 25 to 60 percent during this period, even though the *employment* integration profiles of refugees improved. Simultaneously, the unemployed became increasingly negatively selected in terms of years-of-schooling, both among natives and immigrants.

Our study uses detailed register data to estimate how the empirical relationship between regional wages and regional unemployment changed during this period. We use a rolling time-window to estimate how the wage curve moves across time. Our approach begins from individual-level data that we adjust for individual-level composition effects. This is potentially important as the composition of the employed individuals changes.[3] To isolate the relative wage adjustments that we are interested in, we control for time-invariant region-specific factors through region fixed effects and for aggregate time-varying factors through year fixed effects.

We complement our analysis of regional unemployment rates by an analysis of regional exposure to industry-level demand shocks in the spirit of Bartik (1991, 2002). We show that the impact of these industry demand shocks on regional *unemployment* disappears over time, becoming insignificant towards the later part of our study period. This pattern suggests that the variability in local unemployment rates increasingly depends on sources unrelated to industry-level demand shocks. Instead, we show that the regional associations between unemployment rates and migrant inflow rates become increasingly strong.

During the period when regional unemployment remained closely linked to our measured demand shocks, we find a robust and statistically significant wage curve capturing the relationship between regional unemployment and composition-adjusted wages.[4] Our preferred estimates for this period yield short-run elasticities of approximately -0.02 and long-run elasticities around -0.04, both statistically significant and robust across specifications.

[3] In addition to trends, the composition tends to vary over the business cycle (Bils, 1985; Solon et al., 1994; Card, 1995; Gertler et al., 2020).

[4] An earlier version of this work was circulated under the title *Wage Flexibility in a Unionized Economy with Stable Wage Dispersion* (IZA DP 12093), where we used data up to 2013 and found evidence of a stable wage curve.

However, this relationship changes markedly in the latter part of our sample, with the shift beginning prior to the COVID-19 pandemic. As the composition of the unemployment pool evolves, the pass-through from unemployment to wages disappears. In the later years, we estimate a zero wage–unemployment elasticity – a finding that is highly robust across a wide range of specifications with alternative models, samples, and regional definitions.

In contrast, the relationship between our industry demand shifter and regional wages remains more stable and, if anything, becomes *stronger* in the final years of our data. This pattern suggests that regional labor demand continues to affect the wages of employed workers, but not via the unemployment channel, as the composition of the unemployed shifts over time.

The results thus suggest that the relationship between wages and regional unemployment has weakened over time as the competitiveness of unemployed job-seekers has deteriorated. In principle, this could arise through two channels: Either because wages are consistently less responsive in market segments where these marginal workers compete (and due to compositional changes, these markets get a higher weight), or because wages within any given market segment become less responsive to unemployment when the composition changes. We use our rich micro data to derive a prediction for the job-loss risk of all our employed workers and estimate time-varying wage curves across the distribution of unemployment risk. The results suggest that both forces are at play. The results for insiders suggest that insider wages are decoupled from regional unemployment (but not from demand shocks) in the later years. The results for marginal employees instead highlight that wages of these workers consistently have lower responses to variations in regional unemployment, consistent with more binding institutional wage rigidities for this group of workers.

The paper is structured as follows: In Section (2) we outline a stylized model to highlight how the wage curve relationship may change when unemployment starts to vary due to supply inflow forces instead of variations in labor demand. In Section (3) we describe labor

market institutions, labor supply reforms, and the data we use for our empirical analysis. Section (4) shows basic time trends. Section (5) describes the empirical strategy and shows the identifying variation. Section (6) shows the main results and Section (7) concludes.

2 A Stylized Model

To make the intuition behind our analysis more precise, we set up a highly stylized wage-setting model. We rely on a standard set-up used in the rent-sharing literature where wages depend on firm-specific factors and outside options, see e.g. Card et al. (2018) and Jäger et al. (2020). We add two components. First, although we do not close the model explicitly, we let unemployment be a function of two underlying forces: average firm productivity and inflow into unemployment in the region, and we allow the composition of the inflow to alter the disciplining effects of unemployment on wages. Second, following Carlsson et al. (2016), we let firm-level revenue productivity (with a positive impact on labor demand) have a sectoral and a purely idiosyncratic component, which builds up towards a region-level Bartik-style labor demand shifter.[5] To keep the model stylized, we do not incorporate micro-foundations beyond these assumptions.

2.1 Model set-up

Consider a wage-setting framework where the wage w_{ij} in firm i in region j depends on firm performance and workers' outside options:

$$w_{ij} = \beta a_i + (1-\beta)\left[p_j\,\bar{w}_j + (1-p_j)\,\Omega\right], \tag{1}$$

where a_i is firm-specific performance (e.g. revenue productivity), p_j is the probability that an incumbent worker (insider) in region j finds a new job if displaced, $\bar{w}_j$ is the average

[5] See Carlsson et al. (2016) for Swedish evidence on wage adjustments to idiosyncratic and sectoral shocks.

wage in the region, and Ω is non-work income.

We assume that firm performance has a shared sectoral (V_s) component and an orthogonal mean-zero idiosyncratic component (v_i), i.e. $a_i = V_s + v_i$. Averaging (1) over firms in region j (using $\mathbb{E}[v_i] = 0$) yields:

$$\bar{w}_j = \frac{\beta D_j + (1-\beta)(1-p_j)\,\Omega}{1 - p_j + \beta p_j}, \tag{2}$$

where $D_j = \sum_s \omega_{sj} V_s$ and ω_{sj} denotes each sector's region-specific industry weight. Regional labor demand D_j thus has a Bartik shift-share structure that we will rely on in our empirical work.[6]

The reemployment probability p_j depends negatively on the regional unemployment rate u_j, but the degree of dependence ϕ_j varies with the composition. In line with our empirical case, we let $p_j = \alpha - \phi_j(I_j)u_j$, where I_j is the share of recent entrants among the unemployed and where we assume that $\phi_j'(I_j) < 0$, reflecting that entering outsiders are weaker substitutes for insiders.

The unemployment rate is determined by regional labor demand affecting hiring rates[7] and unemployment inflow, $u_j = I_j - bD_j$, where $b > 0$ implies that stronger demand lowers unemployment, while I_j (e.g. migration inflows or supply-side reforms) increases unemployment for a given level of labor demand and is scaled to have an impact of unity to reduce notation. Thus,

$$p_j = \alpha - \phi_j(I_j)\,(I_j - bD_j). \tag{3}$$

Jointly, equations (2) and (3) determine regional wages as a function of industry demand and inflow supply.

[6] In the empirical representation of equation (6) below, the weights are approximated by employment shares and sectoral shocks are represented by national employment trends in each sector.

[7] See Carlsson et al. (2021) for evidence on how shocks to revenue productivity affect hiring in the Swedish context.

(i) When unemployment varies with industry-level labor demand

To derive the wage curve when unemployment changes due to shifts in labor demand (D_j), we use that $\left.\frac{\partial \bar{w}_j}{\partial u_j}\right|_{\text{via } D_j} = \frac{\partial \bar{w}_j / \partial D_j}{\partial u_j / \partial D_j} = -\frac{1}{b}\frac{\partial \bar{w}_j}{\partial D_j}$. Thus:

$$\left.\frac{\partial \bar{w}_j}{\partial u_j}\right|_{\text{via } D_j} = -\frac{1}{(1-p_j+\beta p_j)^2}\left[\underbrace{\beta(1-\beta)\,\phi_j(I_j)\,(D_j-\Omega)}_{\text{unemployment disciplining effect}} + \underbrace{\frac{\beta}{b}\,(1-p_j+\beta p_j)}_{\text{rent-sharing effect}}\right] < 0.$$

The disciplining effect operates in the expected direction (higher unemployment lowers wages) whenever insiders' wages exceed their fallback income, which is ensured when $D_j > \Omega$. This effect is smaller when unemployment has a less competitive composition (i.e. when $\phi_j(I_j)$ is small). The expression highlights that when unemployment varies due to demand, rent-sharing reinforces unemployment discipline.

(ii) When unemployment varies due to inflow of outsiders

When unemployment instead changes due to inflows of new job-seekers (I_j), both the unemployment rate u_j and the composition parameter $\phi_j(I_j)$ change simultaneously. Symmetrically to case *(i)*, we use that $\left.\frac{\partial \bar{w}_j}{\partial u_j}\right|_{\text{via } I_j} = \frac{\partial \bar{w}_j / \partial I_j}{\partial u_j / \partial I_j} = \frac{\partial \bar{w}_j}{\partial I_j}$. Since $\partial u_j / \partial I_j = 1$, we get:

$$\left.\frac{\partial \bar{w}_j}{\partial u_j}\right|_{\text{via } I_j} = -\frac{1}{(1-p_j+\beta p_j)^2}\left[\underbrace{\beta(1-\beta)\phi_j(I_j)\Big(D_j-\Omega\Big)}_{\text{unemployment disciplining effect}} + \underbrace{\beta(1-\beta)\phi_j'(I_j)u_j\Big(D_j-\Omega\Big)}_{\text{composition effect}}\right].$$

The first term mirrors the unemployment-disciplining mechanism from (i): higher unemployment weakens insiders' outside options and lowers wages. The second term is a composition effect. Since $\phi_j'(I_j) < 0$, inflows of marginal outsiders make the unemployed less effective as a wage-disciplining threat. This attenuates the wage response to unemployment when unemployment is driven by inflows rather than by weak demand.

Comparison: To compare the two mechanisms, note that both expressions share a common

unemployment disciplining component:

$$\mathcal{C}_j = \frac{1}{(1 - p_j + \beta p_j)^2}\, \beta(1-\beta)\, \phi_j(I_j)\, \big(D_j - \Omega\big),$$

which captures how higher unemployment weakens insiders' outside options and thereby exerts downward pressure on wages.

Using this notation, we can rewrite the two wage–unemployment slopes as:

$$\left.\frac{\partial \bar{w}_j}{\partial u_j}\right|_{\text{via } D_j} = -\Bigg[\mathcal{C}_j \; + \underbrace{\frac{\beta}{b}\,\frac{1}{1 - p_j + \beta p_j}}_{\text{rent-sharing term (reinforcing)}}\Bigg],$$

$$\left.\frac{\partial \bar{w}_j}{\partial u_j}\right|_{\text{via } I_j} = -\Bigg[\mathcal{C}_j \; + \underbrace{\frac{\phi_j'(I_j)}{\phi_j(I_j)}\, u_j\, \mathcal{C}_j}_{\text{composition term (flattening)}}\Bigg].$$

The first term, $\mathcal{C}_j$, is common across both cases: it is the wage pressure that comes from the unemployment disciplining insiders' wage demands. The second terms differ.

- **Demand-driven unemployment variations.** The additional "rent-sharing term" reflects that when local labor demand D_j weakens, firms' profitability falls. This reduces the rents available to be shared with workers and, therefore, pulls wages down even further. This channel is only present when unemployment is driven by weak demand.

- **Inflow-driven unemployment variations.** The additional term $\frac{\phi_j'(I_j)\, u_j}{\phi_j(I_j)}\, \mathcal{C}_j$ reflects the changing composition of the unemployed. Since $\phi_j'(I_j) < 0$, inflows of marginal outsiders make the unemployed less effective as substitutes for insiders. This weakens the disciplining force of unemployment and offsets (part of) $\mathcal{C}_j$.

When unemployment is high because local demand is weak, wages fall for two reinforcing reasons: weaker outside options and weaker rents. When unemployment is high because

many new outsiders enter job search, wages respond much less: there is no rent-sharing force, and the outsider-heavy unemployment pool is a weaker bargaining threat. The wage curve therefore flattens when unemployment is driven by inflows rather than by demand and empirically we should expect a flatter wage curve during periods when the composition is "weak" and/or when fluctuations in unemployment is due to inflow variations rather than labor demand variations.

3 Institutions and Data

3.1 Wage-setting institutions

Wage setting in Sweden is entirely governed by the social partners; there is no statutory minimum wage.[8] A stable 81–85 percent of private-sector employees are covered by collective agreements since mid-1990's, while union membership rates have been declining slightly, from 75 to 64 percent (Kjellberg, 2023; Medlingsinstitutet, 2024). As in most European countries, once an employer signs a collective agreement, it applies to all employees at the workplace regardless of union membership, see OECD (2025).

Since 1997, wage setting has followed a coordinated structure known as pattern bargaining, organized under the *Industrial Agreement* (IA) regime. Under this model, unions and employer associations in the manufacturing and mining sectors negotiate first as these sectors are considered to be most heavily exposed to international competition. Their coordinated agreements jointly establish a percent *wage cost increase* known as the "benchmark" (*märket*), which serves as a reference for all subsequent negotiations in other sectors. The National Mediation Office (Medlingsinstitutet), which oversees wage bargaining in the remaining sectors (resulting in around 650 agreements in total), is instructed to facilitate settlements consistent with this benchmark. The benchmark thus provides a common ref-

[8]This subsection draws heavily on Olsson and Nordström Skans (2025), which contains further details and references.

erence point in terms of wage costs that is followed by all sector-level agreements although the *structure* of these agreements varies widely.

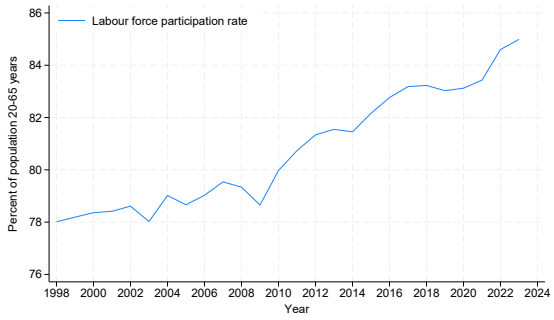
Sector-level bargaining is, in almost all cases, followed by local firm-level negotiations, often resulting in "wage drift" defined as wage increases above what is specified in the industry-level agreement (Hibbs and Locking, 1996). Local negotiations take place under conditions determined in the sector-level agreements. According to the National Mediation Office (Medlingsinstitutet, 2016), about 10 percent of private-sector employees are covered by agreements that leave wage setting entirely to local negotiations, while roughly 15 percent are covered by fully centralized agreements without local variation. For the remaining 75 percent of private-sector workers, local bargaining is constrained by some guaranteed minimum wage increase (in SEK and/or percent) at the group or individual level.

Three points are crucial for the analysis of this paper. *First*, the basic principles of wage setting have remained constant across the time period we are analyzing. Thus, any changes in responsiveness are endogenous to the market conditions and not due to institutional changes in the wage-setting process. *Second*, the sector-level agreements do not contain any explicit provisions for regional wage differences. Although the agreements may contain elements of varying relevance for different regions (e.g. minimum wages by type of occupation), it is reasonable to assume that most regional wage variations emerge during local negotiations. *Third*, all agreements allow the employers to pay wages above the minimum wages and to overshoot guaranteed minimum wage increases. This implies that wages always can respond to market forces if the firms find the need to do so, see e.g. Carlsson et al. (2016) for evidence of wage adjustments relative to idiosyncratic shocks.[9]

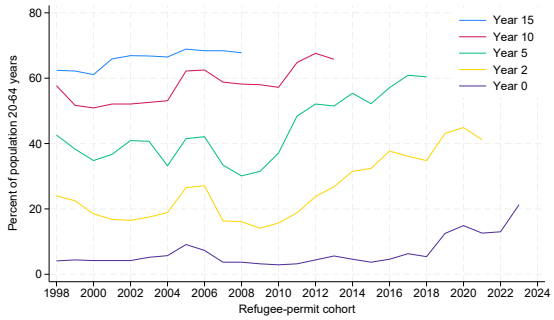
[9]There is also fair degree of (formal) flexibility regarding starting wages at the beginning of new contracts as minimum (contractual) wages only tend to be binding for a small set of workers. Instead, wage contracts are mostly focused on the rate of wage increases.

3.2 Supply reforms

The period 1998 – 2023 has seen dramatic changes in the incentive structures and institutional environment that marginal workers face. Some of the most salient changes include gradually eroding *de facto* replacement rates, reduced access to early retirement schemes for labor market reasons, a transfer of long-term unemployed from the sickness insurance to the Swedish Public Employment Service (PES), a transfer of recent immigrants from education oriented introduction programs to PES-run programs with a clear employment focus, a sequence of earned income tax credit reforms generating much stronger incentives to work, and a trend growth of activation programs for unemployed welfare benefit recipients. Although it is difficult to assess the relevance and impact of each of these measures, the aggregate time trends suggest that the joint impact on labor force participation – and employment – among marginal (native and immigrant) workers have been positive. See e.g. Forslund (2019) for an overview of labor market outcomes and policies in Sweden in recent decades.



(a) Labor force participation rate



(b) Employment rates by refugee arrival cohort and time since arrival

Note: Figure 1b shows the employment rates for refugees and their family members by arrival cohort and time since arrival. The arrival year is defined as the year when they received their residence permit as refugees. Employment rates for 2023 (last observations) refer to age group 20-65 years. Source: Statistics Sweden.

Figure 1: Increased labor force participation and refugee employment

The labor supply policies should be understood in a context where employment-to-population rates already at the start of the period were among the highest in the EU (Finansdepartementet, 2011). This implies that any increase in labor force participation

is likely to include workers with low employment prospects. Furthermore, it may be unusually difficult for low-skilled workers to compete on this market as most jobs are skill intensive – in 2023 Sweden had the lowest share of elementary occupations among all 27 EU countries according to Eurostat data (4 percent, whereas the EU average is 8.4 percent).

Across the period, labor force participation rates in core ages rose from 78 to 85 percent, see Figure 1a. Since the employment rate among core groups was very high already at the start, this increase was primarily driven by increased participation among marginal workers. Aggregate trends indicate a positive overall employment impact of these policies. An illustration of employment changes among marginal workers is provided by Figure 1b, which depicts the trend increase in the rate at which new refugee migrants find employment. The employment rate two years after arrival doubled from 20 to 40 percent. The employment rate 5 years after arrival also nearly doubled from $30-40$ percent in the beginning of the period to around 60 percent for the last arrival cohort we can study. Even 15 years after arrival, employment rate was about 5 percentage points higher for the last arrival cohort that we can follow for this long, compared to the first one.

3.3 Data

We use data from the LISA database and the Wage Structure Statistics, both provided by Statistics Sweden. Data are fully linked at the individual level and across time. We focus on employees aged $20-65$ years in the private sector. Our period covers years $1998-2023$.

LISA includes standard information on individual characteristics for the entire Swedish population. We use information on gender, age, region of origin, level and type of education, marital status, number and ages of children, municipality of residence, employment, and industry of employment. The data also contain unemployment records (a registration indicator in November, and number of registered days during the year) from the Public Employment Service (PES). Unfortunately, it is *not* possible to identify collective agreements in the Swedish registers.

We use wage data from the Wage Structure Statistics since LISA only contains information on annual labor earnings, but not working hours or hourly wages.[10] We use "full-time equivalent" monthly wages, a term which refers to hourly wages multiplied with monthly full-time working hours. Our measure includes basic wages as well as stable supplementary payments such as compensation for inconvenient working hours (e.g. night shifts) and compensations for managerial duties. The measure does not include overtime supplements or bonuses. The wage data are reported directly by the employers through automated routines and should be highly accurate. These data are collected each year in September from all employers with at least 500 employees and from a size-stratified sample of smaller employers. In total, the wage data cover from almost 900,000 individuals in 1998 to almost 1,3 million individuals in 2023, which is around 45 percent of the target population.

We perform our empirical analysis at the regional level. To approximate local labor markets, we use a strategy to divide Sweden's 21 counties into centers and peripheries. Sweden has a few large metropolitan centers and a set of dispersed rural municipalities in counties that often have one regional center. To capture this regional heterogeneity, we construct 59 regions by splitting Sweden's 21 counties by municipality types as defined by Swedish Association of Local Authorities and Regions.[11] This means that we divide each county in one to four subdivisions, mostly covering a distinction between center and periphery. We do this because many counties are geographically large, but with low population density. For the typical non-metropolitan county, the definition captures a regional center and a cluster of small urban municipalities that we aggregate together. In the empirical section, we show that results are robust if we instead use the raw 21 counties as the units of observation.

All regional variables except wages are constructed from the LISA database. Regional unemployment rates are computed as the number of individuals registered as unemployed in November as percentage of the regional labor force (registered unemployed + the num-

[10] As annual earnings is highly dependent on the number of hours worked during the year, which is highly correlated with economic conditions, it is not a suitable outcome for our purposes.

[11] These municipality types are big cities, commuting municipalities near big cities, large towns and municipalities near them, smaller towns and municipalities near them, and rural municipalities.

ber of employed). Other regional variables include the population shares of women, immigrants, and shares for each level of education. Each industry's fraction of the total employment in the county is calculated based on the two-digit industry classification.

4 Aggregate Time Trends

In this section, we set the stage by showing how aggregate labor market conditions have evolved during our study-period. We start by illustrating the stability of the wage distribution, and then turn to the changing composition of the unemployment pool.

4.1 Wages

The period, leading up to the post-COVID inflation shock was characterized by steady real wage growth across the wage distribution as shown in Figure 2a. Because of the tight bargaining regime, wages did not adjust to the changing inflation rates, causing a substantial drop in real wages when inflation increased in 2022. A second thing to note its that the Swedish wage distribution is very compressed by international standards. As shown in Figure 2b, workers at the 90th percentile earn between 2 and 2.3 times as much as those at the 10th percentile across the full period. The figure also depicts a very stable distribution with very small changes, in particular between 2002 and 2018. Figure 2c shows a similar stability for the wage growth of "stayers", defined as workers with subsequent employment in the private sector across adjacent years (thus, not necessarily in the same job). As a final exhibit, we illustrate the rate of nominal wage increases in the Industrial Agreements alongside nominal wage increases among stayers within the private sector (Figure 2d). The gap between the two series is the "wage drift" that provides the scope for regional adjustments. As can be noted, the wage drift was particularly small during the initial year of the financial crisis (2009) and the COVID-19 pandemic (2020), but otherwise remained reasonably stable across time.

(a) Real wages

(b) Percentile ratios

(c) Wage increases for stayers

(d) Actual wage growth vs. benchmark

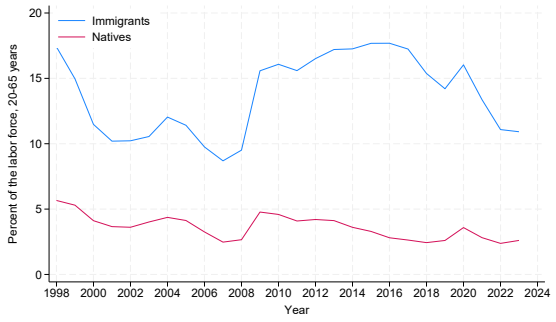
Note: Wages are deflated with CPI in Figure 2a. Stayers in Figure 2c are defined as workers with subsequent employment in the private sector across adjacent years. Negotiated wage increases in Figure 2d according to National Mediation Office.

Figure 2: The stable wage distribution

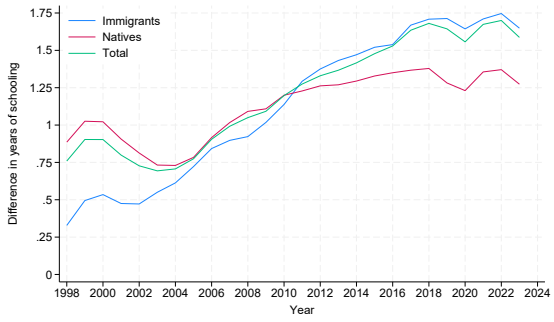
4.2 Compositional changes

The period is characterized by increased labor force participation and refugee employment as we highlighted above. These trends also bring substantial changes to the composition of the total labor force, in particular among the unemployed. In Figure 3a we show how the unemployment rates of immigrants and natives evolve over time, using our own definitions as described in the data section. As is evident, the unemployment rate among immigrants increased during the period, despite of the improved employment assimilation we documented above. In parallel, the education gap between the employed and the unemployed doubled from three quarters of a year to 1.5 years as shown in Figure 3b. Although parts of this change can be attributed to immigrants, the figure clearly illustrates a coinciding negative compositional trend among unemployed *natives*.

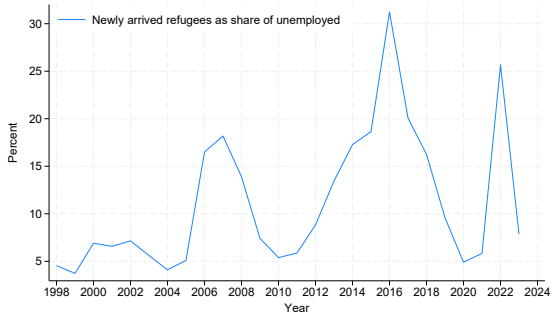
The period was also characterized by a large, but time-varying, inflow of refugee migrants. For our purposes, it is illustrative to relate the size of this inflow to the stock of unemployed. As shown in Figure 3c, the yearly inflows has varied between 5 and 30 percent of the number of unemployed, with a peak during the refugee crisis of 2015. The most striking change is, however, perhaps the one illustrated in Figure 3d, where we show that the share of immigrants among unemployed job seekers grew from 25 to 60 percent in roughly a decade.



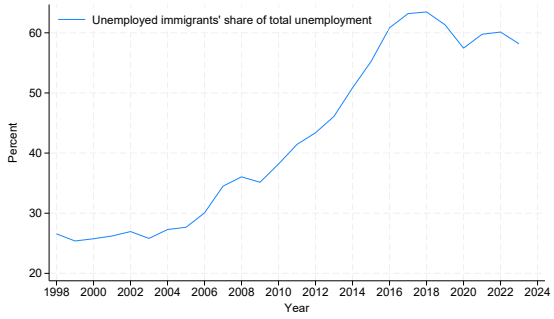
(a) Unemployment rates



(b) Employed/unemployed education gap



(c) Refugee inflow



(d) The immigrant share in unemployment

Note: Refugee inflow is the number of residence permits to refugees and their family members each year according to statistics from the Swedish Migration Agency.

Figure 3: The changing composition of unemployment

5 Empirical Strategy and Identifying Variation

Our empirical work aims to estimate how the responsiveness of wages to regional shocks has changed over time. To this end, we estimate a set of empirical models where we gradually change the data window across time. Below we explain the methods we employ for each sample period, but, for the most part, suppress the notation indicating the sample-vintage.

The analysis proceeds in two steps. In the first stage, we remove any time-invariant individual heterogeneity since it is well known (at least) since Bils (1985) and Solon et al. (1994) that systematic changes in the composition of employees across the business cycle can have a substantial impact on measured wage cyclicality. To address this issue, we follow Card (1995), Bell et al. (2002) and others by adjusting our regional wage data for individual composition effects. Thus, in a first stage we estimate:

$$w_{ijt} = \alpha_i + \alpha_{jt} + X_{ijt}\beta + \varepsilon_{ijt}, \tag{4}$$

where w_{ijt} is the natural logarithm of the monthly wage for individual i observed in region j and year t, α_i is an individual fixed effect, and α_{jt} is a region-specific year effect (i.e. region $\times$ year dummies). The vector X_{ijt} contains time-varying individual characteristics, including age, age squared and cube, marital status, presence of children aged $0-6$ years, and three education levels. The model of equation (4) is estimated for each sample vintage using individual-level data for private sector workers during that period. The estimated region-specific year effects, $\widehat{\alpha}_{jt}$, are then used as composition-corrected measures of regional wages.

In the second stage of our analysis, we let the unit of observation be the region–year cell. Following Blanchflower and Oswald (1994), Bell et al. (2002), and Gregg et al. (2014) among others, we use our regional panel to estimate:

$$\widehat{\alpha}_{jt} = \omega_j + \omega_t + \gamma\widehat{\alpha}_{j,t-1} + \delta u_{jt} + Z_{jt}\varphi + \nu_{jt}, \tag{5}$$

where ω_j and ω_t denote region and year fixed effects, respectively, and u_{jt} is the natural logarithm of the regional unemployment rate (in percent). The vector Z_{jk} includes time-varying regional characteristics capturing population shares (among working-aged residents) by education levels (3 groups), gender, and country of birth (Sweden vs. abroad). The year effects ω_t capture all aggregate shocks related to policy or other shared macroeconomic conditions. The parameter δ represents the short-run elasticity of wages with respect to unemployment, which is our main parameter of interest. As noted above, we estimate the model on moving sample windows, and thus report time-varying estimates $\hat{\delta^{\tau}}$ where τ represents the vintage of the data.

Following standard practices in this literature, the model includes a lagged dependent variable to capture dynamic wage adjustment. The long-run elasticity of wages with respect to unemployment is given by $\delta/(1-\gamma)$, where γ is the coefficient on the lagged dependent variable. A possible concern is that the coefficient of the lagged dependent variable is subject to Nickell (1981) bias of order $1/T$. In our case, $T = 10$ in most cases, implying that the bias should be relatively minor. We also estimate versions of equation (5) excluding the dynamic term, and our conclusions remain robust. For all reported estimates, standard errors are clustered at the regional level (59 clusters).

5.1 Industry labor demand

For parts of our analysis, we are interested in identifying variations in labor market conditions that arise from the labor demand side. For our purposes, it is important to have a demand-shifter with a relatively stable relationship to the economy across time. As a consequence, we cannot rely on specific events occurring at particular points in time, such as changes in international trade patterns due to entry of new trading partners. Therefore,

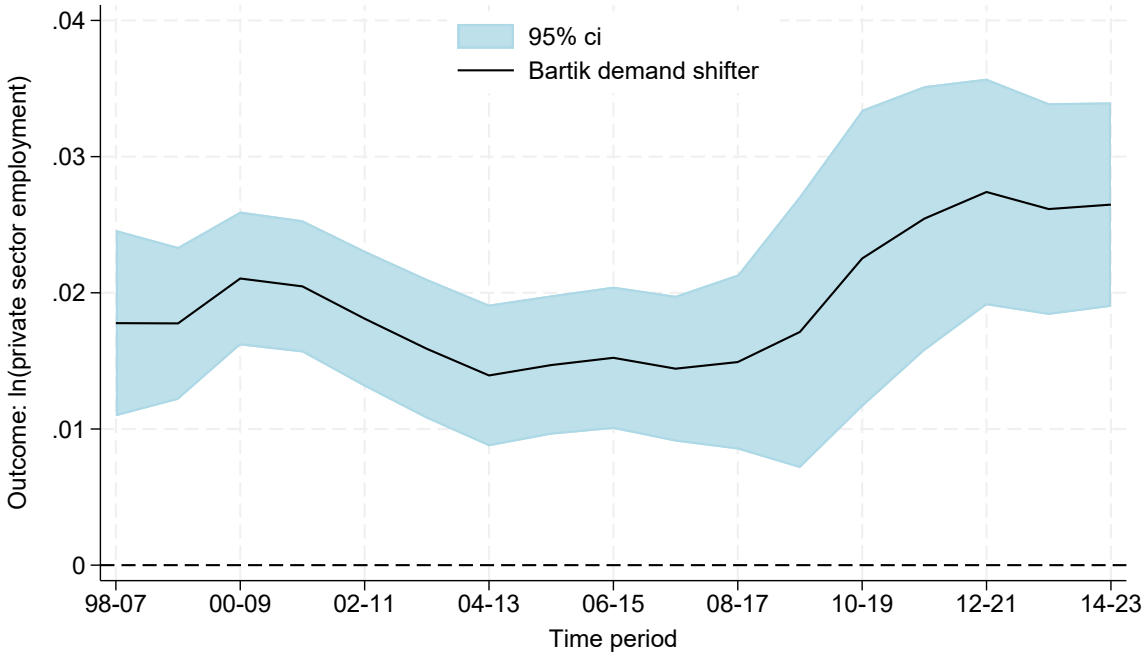
we employ a brute-force approach in the spirit of Bartik (1991, 2002) and proxy regional labor demand through the interaction between the initial industry mix of each region and the national employment growth of each industry across time. We interpret this score as a demand shifter under the assumption that national employment growth in an industry reflects aggregate demand for labor in that industry, and that it is not directly influenced by regional labor supply factors. In our stylized theory model outlined in Section 2 above, we motivate the formulation from the assumption that firm-level labor demand has a sectoral component and an idiosyncratic factor as in Carlsson et al. (2016).

Formally, the predicted labor demand for region j in year t is constructed by allocating each two-digit industry's national employment growth to regions according to their initial industry composition in the first year. We define the regional industry demand shifter as:

$$\widehat{D}_{jt}^{\tau} = \sum_{s} \left(\frac{E_{s,j,\tau}}{E_{j,\tau}} \right) E_{s,t}^{\text{National}}. \tag{6}$$

Here, $E_{s,j,\tau}$ denotes employment in industry s in region j in the start year of each estimation cohort τ and $E_{j,\tau}$ is total employment in region j in the start year. As we estimate the model in levels – with time and unit fixed effects – rather than in 1st differences, we define the shift-variable $E_{s,t}^{\text{National}}$ as the national employment in industry s in year t. In the appendix, we show a set of robustness exercises using different functional forms for shift variable and the patterns are very stable. The demand shifter $\widehat{D}_{jt}^{\tau}$ captures the employment changes that each region would experience if its industries grew at the national industry rates, conditional on its initial industrial structure.[12] Figure 4 shows a sequence of estimates for each 10-year rolling time-window, illustrating that the demand shifter has a consistent positive relationship to regional private sector employment.

[12] A recent very active literature, see e.g. Jaeger et al. (2018), Goldsmith-Pinkham et al. (2020) and Borusyak et al. (2022), discusses the identification challenges of Bartik IVs. In this setting, our weights sum to one which helps with identification, and, as in the original work of Bartik (1991), we do not assume that shares are exogenous. Instead, motivated by our theory, we let the industry employment growth reflect industry-level productivity shocks that affect the regions with different intensities depending on their initial industry weights.



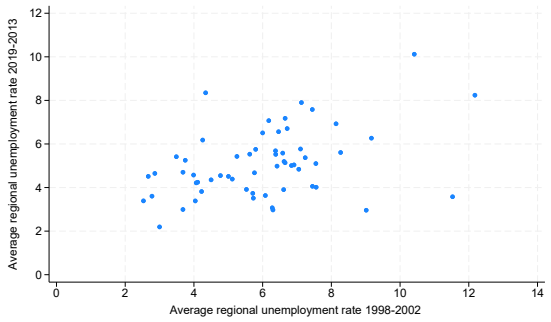
Note: The figure shows estimates of the pass-through of the demand shifter defined in equation (6) on log total private sector employment in the region-year. Estimates for 59 regions using rolling 10-year windows. The specification includes time-varying regional controls (the population shares of women, immigrants and individuals with compulsory and post-secondary education), and fixed year and region effects. Standard errors are clustered at the region level.

Figure 4: Regional Industry Demand and Regional log Employment

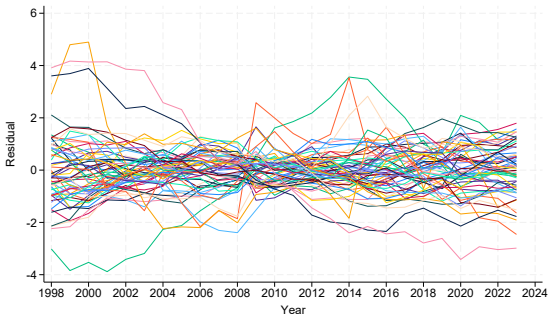
5.2 The identifying variation

In Figure 5a we show the long difference of regional unemployment rate across our 59 regions, using an average of the first and last 5 years across the full sample period. As the figure shows, there is substantial variation in the intersection of space and time that we can exploit in our empirical analysis. In Figure 5b we show the residualized identifying variation, again using the full time-period. The figure thus shows the unemployment rate net of region and time fixed effects. This implies that the data sums to zero within each year, and across all years within each region. As is evident, there is substantial remaining variation in the data. The most notable series are for the mining regions in the north that experienced substantial relative (and absolute) improvements of labor market conditions due to increased prices of raw materials in the wake of China's entry into the WTO. The most significant increase in unemployment is for Södertälje, an immigrant dense town in the Stockholm metropolitan area. In the empirical analysis, we will mostly study data in rolling time-windows of 10 years each. This implies that the region fixed effects will harmonize the levels to be zero for each region within the relevant 10-year window.

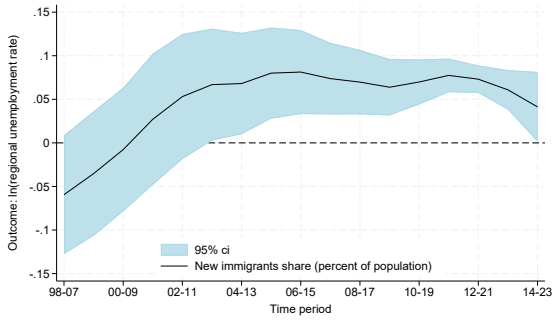
Figure 5c uses our empirical model, with unemployment as the outcome, and the inflow of new immigrants as the explanatory variable. The figure shows estimates for rolling 10-year window displaying the changing association between immigrant inflows and regional unemployment. In the earliest periods, immigrant inflow was larger when unemployment was low, consistent with strategic settlement patterns. But, around the same time as the share if immigrants among the unemployed started to rise towards levels where their numbers may affect the aggregate statistics (see Figure 3d above), the association changes sign. From the period 2004-13 onwards, the inflow of new immigrants has a positive and significant association to the unemployment rate, which is consistent with supply composition driving variations in regional unemployment. The pattens are particularly clear in the periods covering the aftermath of the refugee crisis of 2015.



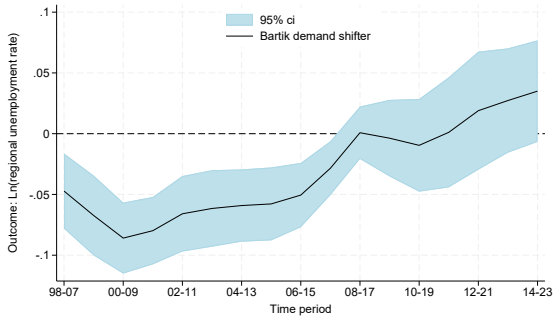
(a) Long difference



(b) Residualized variation



(c) Supply: Immigrant inflow and regional unemployment



(d) Demand: Industry Bartik and regional unemployment

Note: Figure 5a shows the long difference of regional unemployment rate across the 59 regions, using an average of the first and last 5 years across the full sample period. Figure 5b shows residual unemployment rates from regressions on year and region fixed effects. Figures 5c and 5d show estimates for 59 regions using rolling 10-year windows with fixed year and region effects. Figure 5d also includes time-varying regional controls (the population shares of women, immigrants and individuals with compulsory and post-secondary education). Standard errors are clustered at the region level. In Figure 5c new immigrants are those who have arrived within last 5 years and the figure shows estimates of new migrants population share on log regional unemployment rate. The Figure 5d shows estimates of the demand shifter defined in equation (6) on log regional unemployment rate.

Figure 5: The identifying variation

Figure 5d instead illustrates the declining association between labor demand and regional unemployment. The figure relates rolling demand measures, defined as the interaction between the initial regional industry share and changes in the national industry employment structure, to the regional unemployment levels. The association clearly dissipates across time, and from the 2008-17 period onwards, the association seizes to be statistically significant. To the extent that one would be willing to use the Bartik measure as an instrument for regional unemployment, the first stage turns insignificant in the later part of the period.[13]

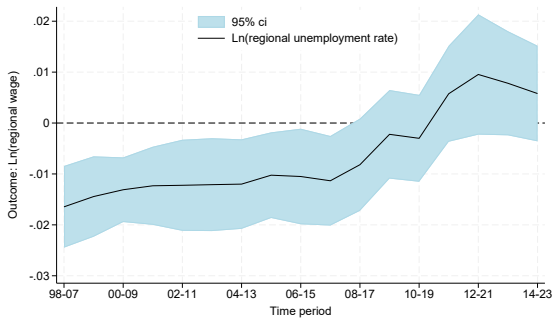
Our interpretation of these results is that regional unemployment over time has become more closely associated with regional labor supply shocks than with regional labor demand shocks.

6 Results

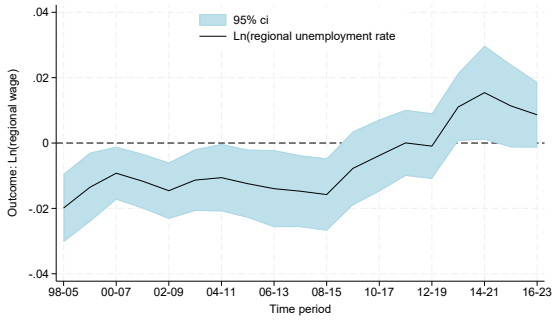
6.1 The disappearance of the wage curve

Our main results are displayed in Figure 6a. The results show a stable short-run wage curve estimate across the initial part of the data period. In the last periods, the relationship disappears altogether. Two things are worth noting, the first is that initial wage curve period includes two fully non-overlapping 10-year periods. The second is that the change in patterns occurred just before the COVID-19 pandemic. To make these points even clearer, the figure also shows results for rolling 8-year periods on the right-hand side of the figure. In the lower panel, we show the ensuing long-run estimates which use the dynamic set-up to trace out the long-run impact.

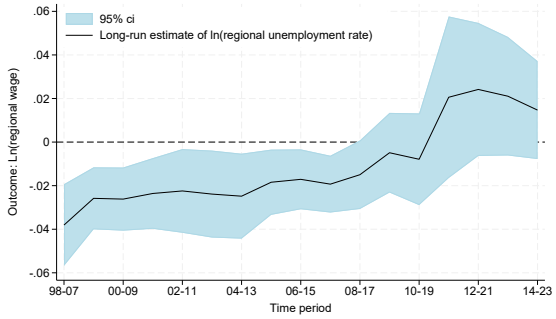
[13] In the first version of this paper using data until 2013, circulated as "Wage Flexibility in a Unionized Economy with a Stable Wage Distribution", we did use the industry-Bartiks as instruments to identify the wage curve.



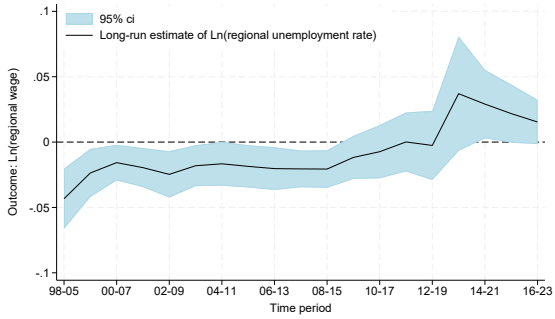
(a) Wage Curve Estimates: 10-year rolling windows



(b) Wage Curve Estimates: 8-year rolling windows



(c) Long-Run Wage Curves: 10-year rolling windows



(d) Long-Run Wage Curves: 8-year rolling windows

Note: The figures in the upper panel show the short-run estimates of log regional unemployment rate from equation (5) on log regional wage for 59 regions using 10- or 8-year rolling windows. The lower panel shows the corresponding long-run estimates. The models include time-varying regional controls (the population shares of women, immigrants and individuals with compulsory and post-secondary education), and fixed year and region effects. Standard errors are clustered at the region level.

Figure 6: The Disappearance of the Wage Curve

The results thus imply that a previously stable wage curve relationship disappeared during the later period when regional unemployment started to vary because of supply inflow instead of demand shocks. For completeness, Table 1 shows short-run and long-run estimates for the full period, as well as for the first and last 10-year periods.

Table 1: Wage responsiveness to regional unemployment

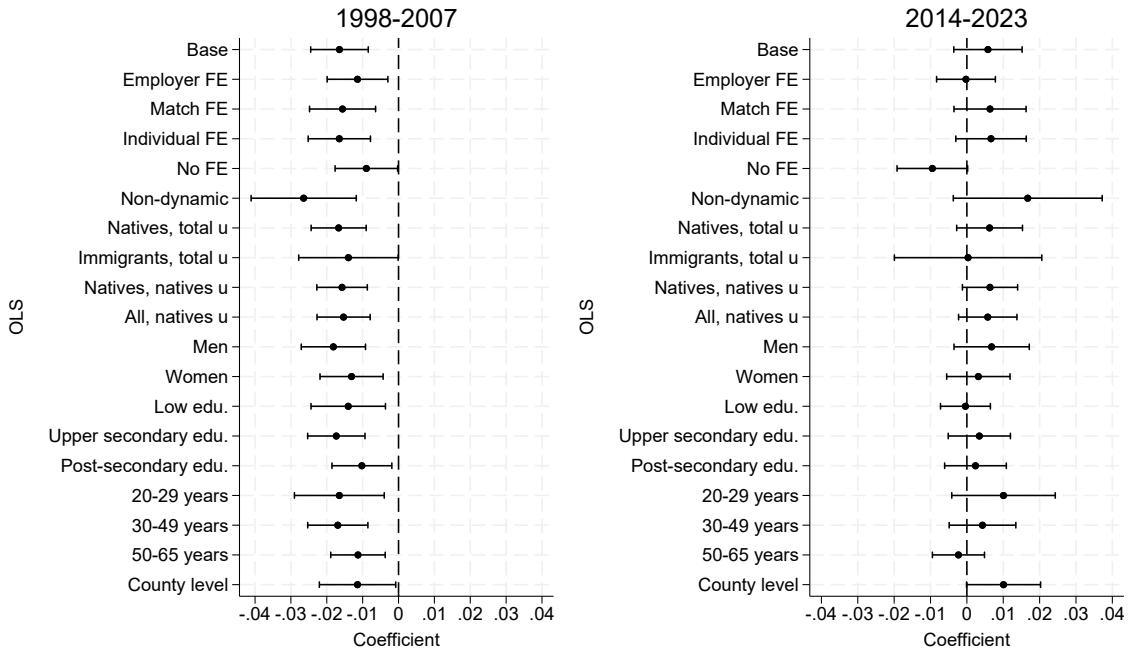
	(1) Full Period 1998–2023	(2) First 10 years 1998–2007	(3) Last 10 years 2014–2023
Ln(regional unemployment rate)	-0.006**	-0.016**	0.006
	(0.002)	(0.004)	(0.005)
Ln(regional wage$_{t-1}$)	0.767**	0.568**	0.606**
	(0.033)	(0.040)	(0.098)
Long-run elasticity	-0.027**	-0.038**	0.015
	(0.009)	(0.010)	(0.011)
Observations	1,475	531	531
Number of regions	59	59	59

Standard errors in parentheses are clustered at the region level. All models include time-varying regional controls (the population shares of women, immigrants and individuals with compulsory and post-secondary education), and fixed year and region effects. $^{**}p < 0.01$, $^{*}p < 0.05$, $^{+}p < 0.1$

6.1.1 Robustness

The conclusion that a previously stable wage-curve relationship has disappeared is not due to modelling or sampling choices. To illustrate the robustness, we provide results from a large set of variations in Figure 7. The figure presents estimates for the first and last 10-year time-windows during our analysis period. Overall, the results are very robust. Our main model uses wages that are residualized from individual fixed effects. We show that the overall conclusions does not change if we instead control for firm effects, or for interacted firm-worker (i.e. match) effects, a specification which also allows for an AKM-structure as defined by Abowd et al. (1999). The results are entirely consistent. An exception arises if we estimate the model without using any fixed effects. For completeness, we therefore

show estimates for the full period from this particular model in Figure A1 in the Appendix, and the overall time-pattern remains for most sample periods in this case as well.



Note: *Base* is our preferred specification shown in Figure 6a. *Employer, match, individual* and *no fixed effects* exclude persons with only one wage observation. *Non-dynamic* does not control for the regional wage the year before. *Natives* (*Immigrants*), total u is estimated on natives (immigrants) but using total unemployment. *Natives, natives u* is estimated on natives and using unemployment rate among natives. *All, natives u* is estimated on total population but using unemployment rate among natives. Models for gender and education and age groups are estimated for the sub-samples, but using total unemployment rate as in the baseline. *County level* is estimated using 21 counties instead of 59 regions.

Figure 7: Model variations: First and last 10-year period

We also present results from a model that does not include the lagged dependent variable, and the changes are even larger this case, although also with larger standard errors. This may be reassuring because our specification uses a lagged dependent variable with fixed effects in a relatively short panel, potentially exposing us to the Nickell (1981) bias.[14]

We also varied the sample according to various demographic definitions. We show that the change remains regardless of which group of employed workers we analyze (immigrants/natives, males/females, low/high education, different age groups). We also re-

[14]Note also that the pooled estimate across the full time period reported in Table 1 produces an estimate which is well in line with the average of estimates for the shorter 10-year panels. This would not be the case if the Nickell bias was affecting the 10-year panels.

place the overall unemployment rate with a measure that only uses the unemployment rate among natives, without much change in the results. Finally, we use Sweden's 21 counties as the unit of observation instead of the 59 regions we use in the main analysis, and the results remain robust.

The fact that the results remain robust regardless if we use unemployment rates for immigrants or natives may appear surprising. But this result should be understood in a context where the relative skills of unemployed *natives* also has deteriorated (see Section 2). This pattern instead highlights that the supply reforms discussed in Section 3 affect low-skilled workers regardless of origin.

The finding that the wage curve has flattened is very much in line with recent evidence from the US presented in Blanchflower et al. (2024). They show that US inactivity rates have become more useful than unemployment rates as a measure of regional labor market slack in recent years. Inspired by their set-up, we have re-estimated our models accounting for inactivity rates in our Swedish data as well, but our results do not suggest that inactivity rates play an important role in our setting, see Table A1 in the Appendix for details. As a consequence, we conclude that the underlying mechanism for the flattening of the wage curve is not the same in Sweden as in the US. A plausible explanation for why we do not see a similar pattern as in the US is the strong Swedish policy emphasis on increasing labor force participation among the non-employed.

Another possible explanation for the decline of the wage curve would be increased regional mobility among unemployed workers. To check for this possibility, we computed the share of non-employed workers finding jobs in other regions, separately for each year. The share is, however, very stable across time, as shown in Figure A7 in the Appendix.

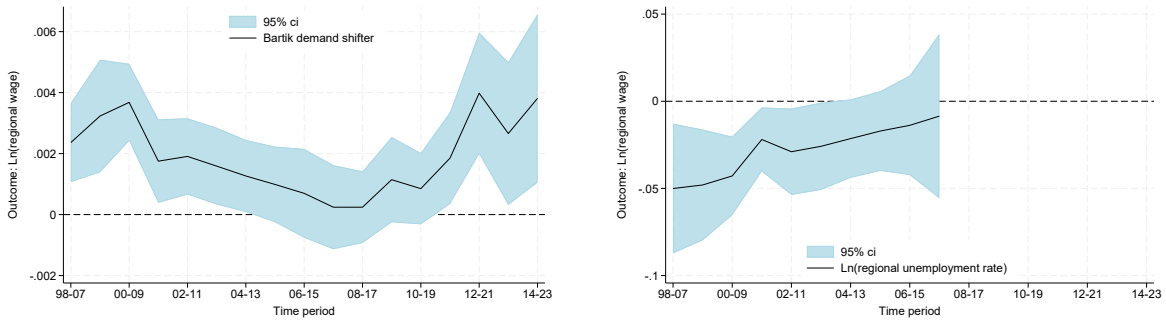
6.2 The pass-through of demand shocks

We interpret these results as robustly indicating a gradually attenuated relationship between regional unemployment and workers' wages. A possible interpretation is that it

reflects a general decoupling of wages from regional shocks altogether. An indication that this may not be the driving mechanism, is the apparent stability of the wage distribution and the wage change distribution during the period. However, to get a direct measure of the association between wages and economic shocks that does not rely on unemployment, we use the industry demand shifter described in Section 5. We relate the measure of regional industry demand to regional wages across time and present results in Figure 8a. These results show that the wage impact of the industry shocks remains positive, with a slightly larger impact on wages in the most recent periods. As shown in figure 5d above, this is indeed a period when the demand shock did not affect regional unemployment.

To complete the picture, we present IV-estimates where we instrument regional unemployment by the Bartik instrument during the periods when we have a first stage. As is evident, the IV presents a reasonably consistent picture during this period with results that are much larger than the OLS estimates during the same years. This is fully consistent with the stylized theoretical model where demand driven variations in unemployment also correlate with reinforcing rent-sharing effects, whereas other variations in unemployment instead may be affected by the flattening inflow-composition effects.

In Figure 9, we show that the stability of the (direct) relationship between the demand shifter and wages is as robust across variations as the disappearance of the wage curve. As before, we have a different result in one of the specifications – the results for low educated have a slightly different pattern in the end period. We therefore show more detailed results for this specific group in Figure A4 in the Appendix.

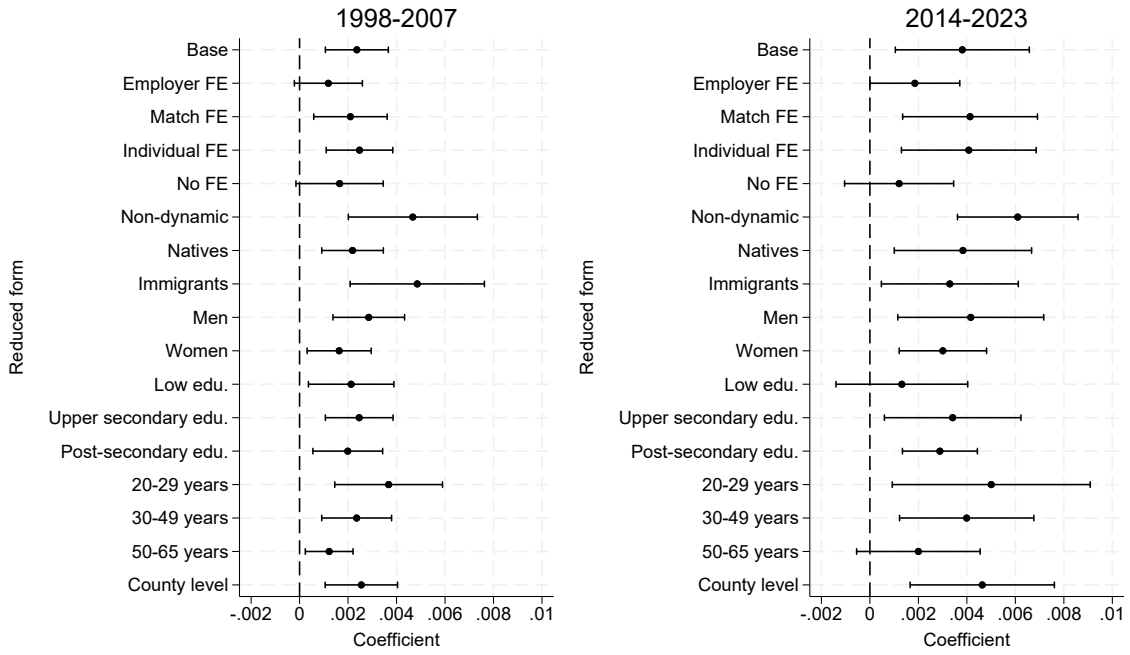


(a) Regional Industry Demand and Regional Wages

(b) Bartik IV Wage Curve, while there is a 1st stage

Note: The figure 8a shows estimates of the demand shifter defined in equation (6) on log regional wage. Figure 8b shows estimates of log regional unemployment rate on log regional wage using the demand shifter as an instrument for the regional unemployment rate. Both figures show estimates for 59 regions using rolling 10-year windows and include time-varying regional controls (the population shares of women, immigrants and individuals with compulsory and post-secondary education), and fixed year and region effects. Standard errors are clustered at the region level.

Figure 8: The Demand-Driven Wage Curve



Note: *Base* is our preferred specification shown in Figure 8a. *Employer, match, individual* and *no fixed effects* exclude persons with only one wage observation. *Non-dynamic* does not control for the regional wage the year before. *Natives* (*Immigrants*), total u is estimated on natives (immigrants) but using total unemployment. *Natives, natives u* is estimated on natives and using unemployment rate among natives. *All, natives u* is estimated on the total population but using unemployment rate among natives. Models for gender, education, and age groups are estimated for the sub-samples but use the total unemployment rate as in the baseline. *County level* is estimated using 21 counties instead of 59 regions.

Figure 9: Model variations, Regional industry demand: First and last 10-year period

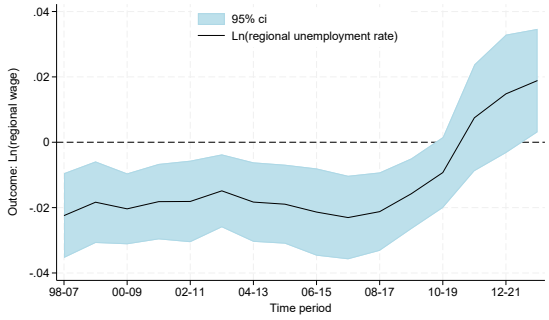
6.3 Insiders vs. high-risk employees

The patterns we document above could in principle be attributed to two closely related mechanisms. Either the inflow changes the composition of employed workers towards those with a lower responsiveness to unemployment and a higher direct responsiveness to demand shocks, *or* the effect arises because of changing responses within each given set of workers.

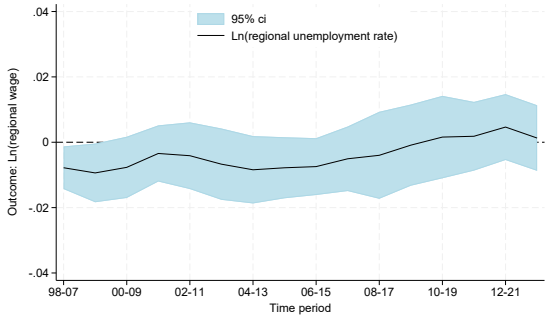
To make progress in explicitly separating between unemployment disciplining effects and demand effects among insiders and outsiders, we use a data-driven approach where

we classify employed workers into quartiles of predicted job-loss probabilities. We start by estimating a pooled (across our entire sample period) Poisson model, where we let the risk of unemployment (among employed workers) be the outcome. As explanatory variables we use gender, age with square and cube, immigrant status, 100 education groups (capturing field and level), industry indicators, region indicators, and year indicators. We then define insiders as workers in the lowest quartile of predicted risk of job loss *within each year*. Symmetrically, we define "high risk employees" as those within the highest quartile within the year. Note that these workers are still employed and may be very different from the low skilled workers in the unemployment pool.

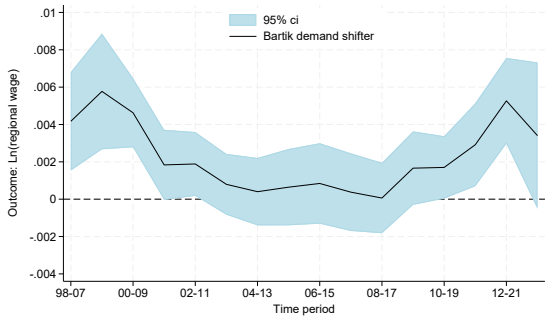
We then estimate how the wages of these groups of workers move with unemployment and with the demand shifter across time. The results presented in Figure 10 indicate that the main results are explained by a mixture of composition effects and endogenous responses. The pure insiders clearly have a rapidly declining wage curve relationship but a stable relationship to the demand shifter. This is fully consistent with the notion that variations in regional unemployment during the later years are less relevant for this group of workers, because unemployment fluctuations due to low-skilled inflow effects are not related to labor market slack on their specific sub-markets. For high-risk employees on the other hand, we find a weak relationship to both the unemployment rate and the demand shifter across the full period. This is plausibly explained by the fact that wage setting is more rigid in this group of workers, a market feature that is shared between Sweden and many other European countries.



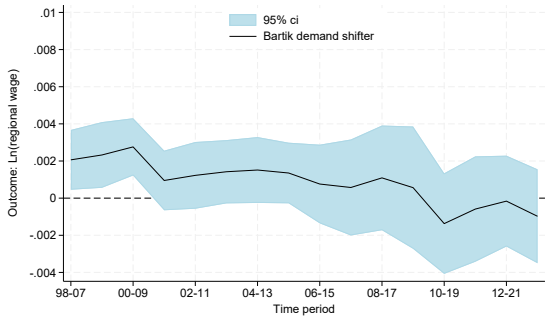
(a) Wage Curves: Insiders



(b) Wage Curves: High risk employees



(c) Demand Effects: Insiders



(d) Demand Effects: High risk employees

Note: The figures in the upper panel show estimates of log regional unemployment rate from equation (5) on log regional wage for insiders and high risk employees. The figures in the lower panel show estimates of the demand shifter defined in equation (6) on log regional wage for insiders and high risk employees. Insiders (high risk employees) are defined as workers in the lowest (highest) quartile of predicted risk of job loss each year. All figures show estimates for 59 regions using rolling 10-year windows and include time-varying regional controls (the population shares of women, immigrants and individuals with compulsory and post-secondary education), and fixed year and region effects. Standard errors are clustered at the region level.

Figure 10: Insiders and high risk employees

7 Conclusion

This paper analyzes how wages respond to changes in regional unemployment in Sweden over a 25-year period. We first document a dramatic rise in the share of marginally attached workers among the unemployed, coinciding with a weakening association between industry-driven labor demand shocks and regional unemployment. At the same time, a previously stable relationship between wages and regional unemployment dissipates even though wages continue to covary with the demand shifters. Taken together, the results suggest that unemployment predicts wage variation when it reflects regional labor demand conditions. However, once the unemployment pool becomes dominated by marginal workers, this predictive power diminishes. Additional findings indicate that these changes primarily reflect a shift in wage-setting behavior among insiders, who face minimal risk of unemployment.

Our results imply that wage adjustments may be less effective in mitigating the employment impacts of regional imbalances during periods of large inflows of low-skilled workers. When imbalances are driven by migration flows or active labor supply policies, rising unemployment may not be accompanied by downward pressure on regional wages — particularly among protected insiders. From a macroeconomic policy perspective, the findings suggest that the unemployment rate has become a less reliable indicator of resource utilization and inflationary pressure. In line with the emerging literature on insider–outsider dynamics in macroeconomics (see, e.g., Galí, 2022), unemployment appears to be a more informative indicator of wage pressure when driven by shifts in labor demand rather than by changes in the supply of "outsiders" with low employment prospects.

References

Abowd, J. M., Kramarz, F., and Margolis, D. N. (1999). High Wage Workers and High Wage Firms. *Econometrica*, 67(2):251–333.

Alogoskoufis, G. (2018). The Clash of Central Bankers with Labour Market Insiders, and the Persistence of Inflation and Unemployment. *Economica*, 85(337):152–176.

Bartik, T. J. (1991). *Who Benefits from State and Local Economic Development Policies?* W. E. Upjohn Institute.

Bartik, T. J. (2002). Instrumental Variable Estimates of the Labor Market Spillover Effects of Welfare Reform. Upjohn Institute Working Paper 02-78, W. E. Upjohn Institute.

Bell, B., Nickell, S., and Quintini, G. (2002). Wage Equations, Wage Curves and All That. *Labour Economics*, 9(3):341–360.

Beraja, M., Hurst, E., and Ospina, J. (2019). The Aggregate Implications of Regional Business Cycles. *Econometrica*, 87(6):1789–1833.

Bils, M. (1985). Real Wages over the Business Cycle: Evidence from Panel Data. *Journal of Political Economy*, 93(4):666–689.

Blanchard, O. (2018). Should We Reject the Natural Rate Hypothesis? *Journal of Economic Perspectives*, 32(1):97–120.

Blanchflower, D. G., Bryson, A., and Spurling, J. (2024). The wage curve after the Great Recession. *Economica*, 91(362):653–668.

Blanchflower, D. G. and Oswald, A. J. (1994). *The Wage Curve*. MIT Press, Cambridge, MA.

Blanchflower, D. G. and Oswald, A. J. (1995). An Introduction to the Wage Curve. *Journal of Economic Perspectives*, 9(3):153–167.

Boeri, T., Ichino, A., Moretti, E., and Posch, J. (2021). Wage Equalization and Regional Misallocation: Evidence from Italian and German Provinces. *Journal of the European Economic Association*, 19(6):3249–3292.

Borusyak, K., Hull, P., and Jaravel, X. (2022). Quasi-Experimental Shift-Share Research Designs. *The Review of Economic Studies*, 89(1):181–213.

Card, D. (1995). The Wage Curve: A Review. *Journal of Economic Literature*, 33(2):785–799.

Card, D., Cardoso, A. R., Heining, J., and Kline, P. (2018). Firms and Labor Market Inequality: Evidence and Some Theory. *Journal of Labor Economics*, 36(S1):S13–S70.

Carlsson, M., Messina, J., and Nordström Skans, O. (2016). Wage Adjustments and Productivity Shocks. *The Economic Journal*, 126(595):1739–1773.

Carlsson, M., Messina, J., and Nordström Skans, O. (2021). Firm-Level Shocks and Labour Flows. *The Economic Journal*, 131(634):598–623.

Del Negro, M., Lenza, M., Primiceri, G. E., and Tambalotti, A. (2020). What's Up with the Phillips Curve? *Brookings Papers on Economic Activity*, pages 301–357.

Dustmann, C., Schönberg, U., and Stuhler, J. (2017). Labor Supply Shocks, Native Wages, and the Adjustment of Local Employment. *The Quarterly Journal of Economics*, 132(1):435–483.

Fasani, F., Frattini, T., and Minale, L. (2022). (The Struggle for) Refugee Integration into the Labour Market: Evidence from Europe. *Journal of Economic Geography*, 22(2):351–393.

Finansdepartementet (2011). Långtidsutredningen 2011. SOU 2011:11, Swedish Ministry of Finance.

Fitzgerald, T. J., Jones, C., Kulish, M., and Nicolini, J. P. (2024). Is There a Stable Relationship between Unemployment and Future Inflation? *American Economic Journal: Macroeconomics*, 16(4):114–142.

Foged, M. and Peri, G. (2016). Immigrants' Effect on Native Workers: New Analysis on Longitudinal Data. *American Economic Journal: Applied Economics*, 8(2):1–34.

Forslund, A. (2019). Employment outcomes and policies in sweden during recent decades. IFAU Working paper 2019:15, IFAU.

Galí, J. (2022). Insider–Outsider Labor Markets, Hysteresis, and Monetary Policy. *Journal of Money, Credit and Banking*, 54(S1):53–88.

Gertler, M., Huckfeldt, C., and Trigari, A. (2020). Unemployment Fluctuations, Match Quality, and the Wage Cyclicality of New Hires. *The Review of Economic Studies*, 87(4):1876–1914.

Goldsmith-Pinkham, P., Sorkin, I., and Swift, H. (2020). Bartik Instruments: What, When, Why, and How. *American Economic Review*, 110(8):2586–2624.

Gregg, P., Machin, S., and Fernández-Salgado, M. (2014). Real Wages and Unemployment in the Big Squeeze. *The Economic Journal*, 124(576):408–432.

Hazell, J., Herreno, J., Nakamura, E., and Steinsson, J. (2022). The Slope of the Phillips Curve: Evidence from U.S. States. *The Quarterly Journal of Economics*, 137(3):1299–1344.

Hibbs, D. and Locking, H. (1996). Wage Compression, Wage Drift, and Wage Inflation in Sweden. *Labour Economics*, 3(2):109–141.

Jaeger, D. A., Ruist, J., and Stuhler, J. (2018). Shift-Share Instruments and the Impact of Immigration. Working Paper 24285, National Bureau of Economic Research.

Jäger, S., Schoefer, B., Young, S., and Zweimüller, J. (2020). Wages and the Value of Nonemployment. *The Quarterly Journal of Economics*, 135(4):1905–1963.

Kjellberg, A. (2023). Kollektivavtalens täckningsgrad och vita fläckar. Report, Arena Idé, Stockholm.

Layard, R., Nickell, S., and Jackman, R. (2005). *Unemployment: Macroeconomic Performance and the Labour Market*. Oxford University Press, Oxford, 2 edition.

Lindbeck, A. and Snower, D. J. (1988). *The Insider–Outsider Theory of Employment and Unemployment*. MIT Press, Cambridge, MA.

McLeay, M. and Tenreyro, S. (2019). Optimal inflation and the identification of the phillips curve. *NBER Macroeconomics Annual*, 34:199–255.

Medlingsinstitutet (2016). Årsrapport 2016: Avtalsrörelsen och lönebildningen. Report, Medlingsinstitutet, Stockholm.

Medlingsinstitutet (2024). Kollektivavtalstäckning och arbetsmarknadens organisationer. Report, Medlingsinstitutet, Stockholm.

Nickell, S. (1981). Biases in Dynamic Models with Fixed Effects. *Econometrica*, 49(6):1417–1426.

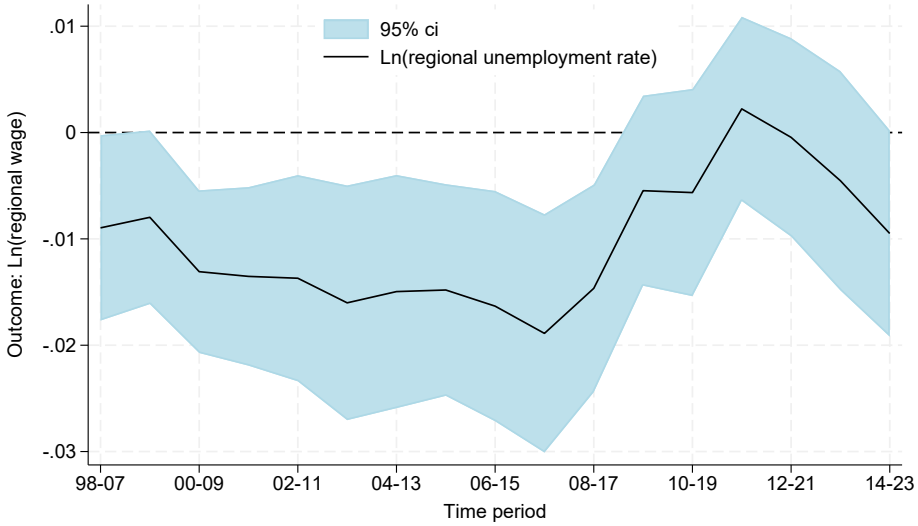
OECD (2025). Membership of Unions and Employers' Organisations, and Bargaining Coverage: Standing, but Losing Ground. Policy brief, OECD.

Olsson, M. and Nordström Skans, O. (2025). The Rules of the Game: Local Wage Bargaining and the Gender Pay Gap. RFBerlin Discussion Paper 128/25, RFBerlin.

Solon, G., Barsky, R., and Parker, J. A. (1994). Measuring the Cyclicality of Real Wages: How Important Is Composition Bias? *The Quarterly Journal of Economics*, 109(1):1–25.

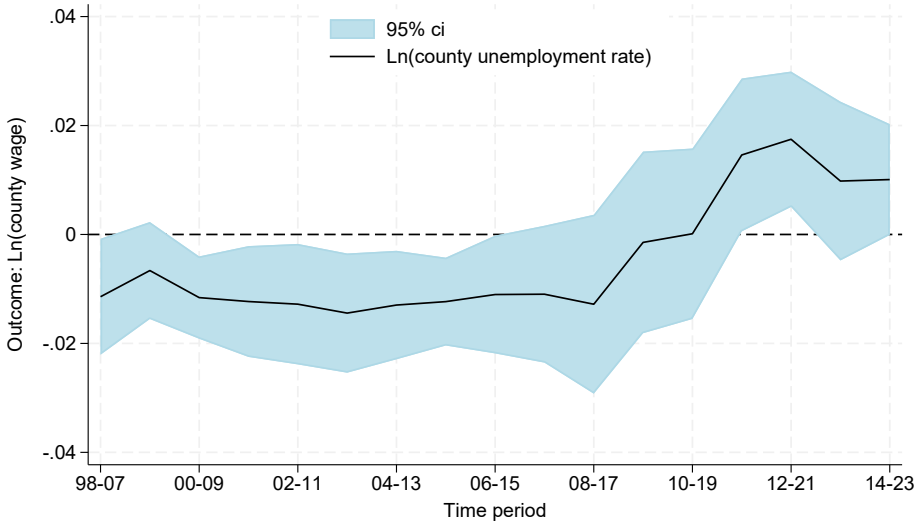
Stock, J. H. and Watson, M. W. (2020). Slack and Cyclically Sensitive Inflation. *Journal of Money, Credit and Banking*, 52(S2):393–428.

Appendix



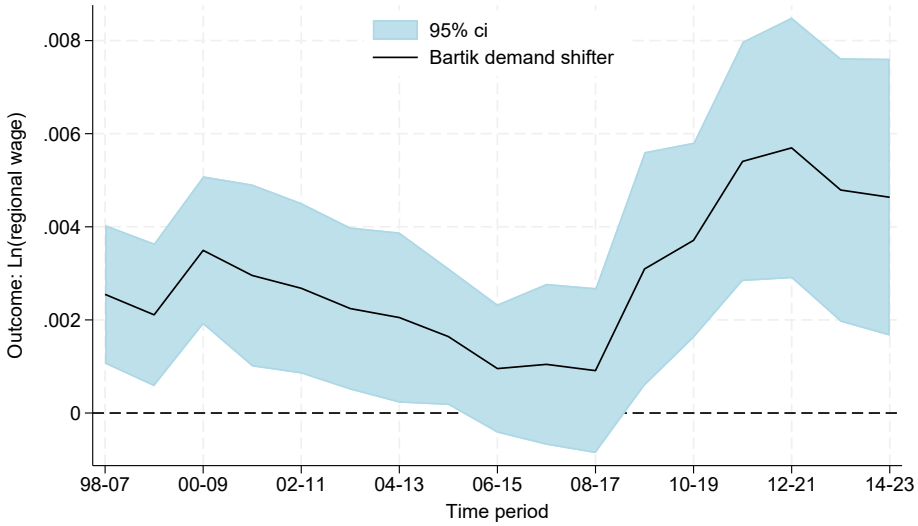
Note: The figure shows estimates of log regional unemployment rate from equation (5) on log regional wage without individual fixed effects in the first stage composition correction in equation (4) and excluding individuals with only one wage observation. Estimates are for 59 regions using rolling 10-year windows and including time-varying regional controls (the population shares of women, immigrants and individuals with compulsory and post-secondary education), and fixed year and region effects. Standard errors are clustered at the region level.

Figure A1: Wage Curve without individual fixed effects



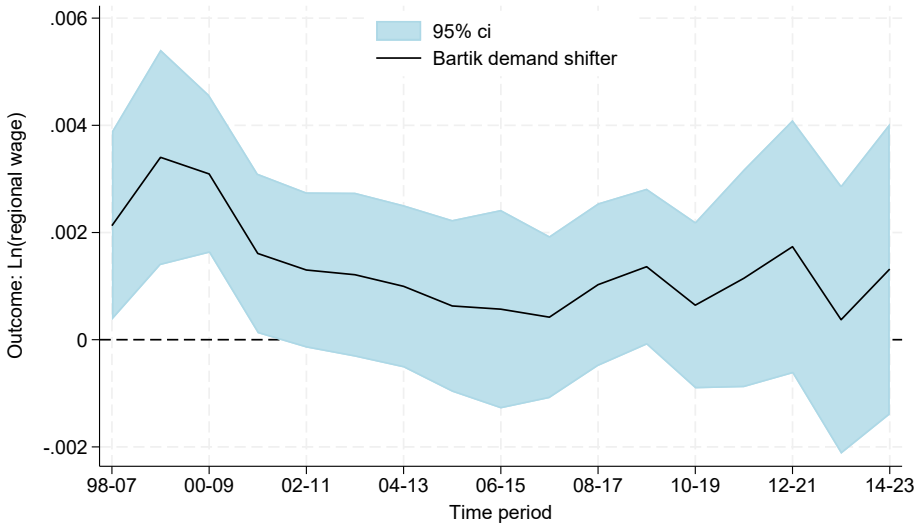
Note: The figure shows estimates of log regional unemployment rate on log regional wage as defined in equation (5). The estimates are for 21 counties using rolling 10-year windows and include time-varying regional controls (the population shares of women, immigrants and individuals with compulsory and post-secondary education), and fixed year and county effects. Standard errors are clustered at the county level.

Figure A2: Wage Curve: County-level estimates



Note: The figure shows estimates of the demand shifter defined in equation (6) on log regional wage for 21 counties using rolling 10-year windows. The specification includes time-varying regional controls (the population shares of women, immigrants and individuals with compulsory and post-secondary education), and fixed year and county effects. Standard errors are clustered at the county level.

Figure A3: County-level Industry Demand and Regional Wages



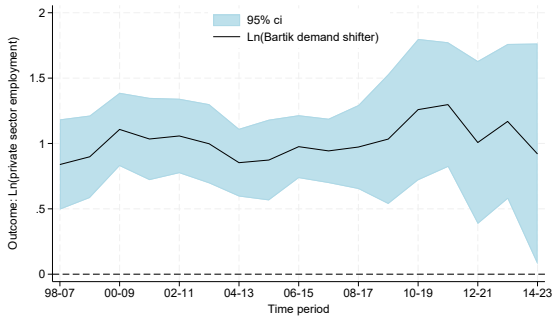
Note: The figure shows estimates of the demand shifter defined in equation (6) on log regional wage for persons with at most compulsory education (9 years). The estimates are for 59 regions using rolling 10-year windows and include time-varying regional controls (the population shares of women, immigrants and individuals with compulsory and post-secondary education), and fixed year and region effects. Standard errors are clustered at the region level.

Figure A4: Bartik demand estimates for low educated persons

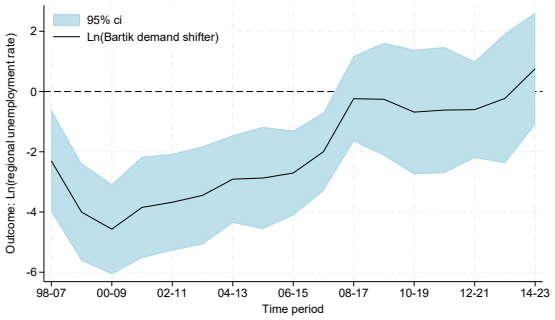
Table A1: Wage responsiveness to regional unemployment and inactivity rate

	(1) Full Period 1998–2023	(2) First 10 years 1998–2007	(3) Last 10 years 2014–2023
Ln(regional unemployment rate)	-0.006**	-0.016**	0.006
	(0.002)	(0.004)	(0.005)
Ln(regional inactivity rate$_{t-1}$)	-0.010	0.002	0.0010
	(0.007)	(0.021)	(0.014)
Ln(regional wage$_{t-1}$)	0.764**	0.568**	0.607**
	(0.032)	(0.039)	(0.098)
Long-run elasticity	-0.024**	-0.038**	0.015
	(0.008)	(0.010)	(0.011)
Observations	1,475	531	531
Number of regions	59	59	59

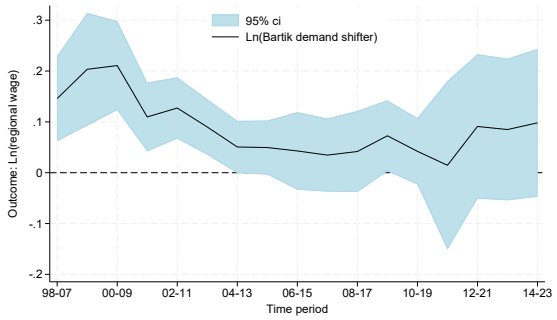
Standard errors in parentheses are clustered at the region level. All models include time-varying regional controls (the population shares of women, immigrants and individuals with compulsory and post-secondary education), and fixed year and region effects. $^{**}p < 0.01$, $^{*}p < 0.05$, $^{+}p < 0.1$



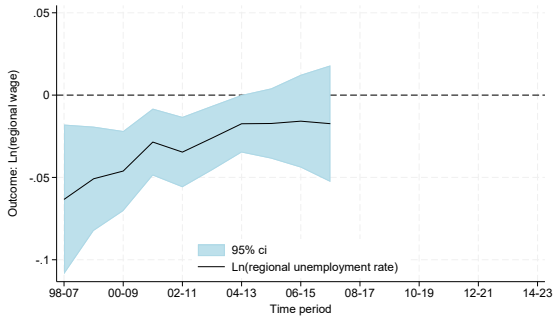
(a) Ln Bartik demand and regional employment



(b) Demand: Ln Bartik and regional unemployment



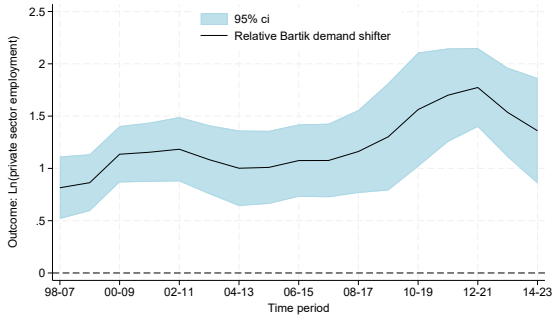
(c) Ln Bartik Demand and Regional Wages



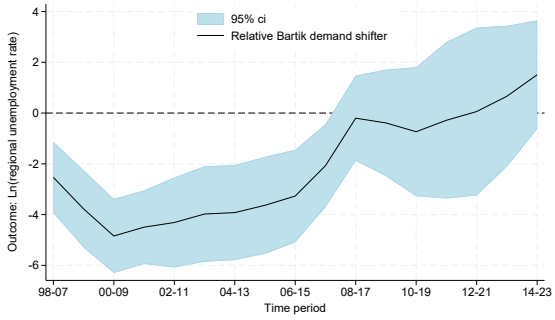
(d) Ln Bartik IV Wage Curve, while there is a 1st stage

Note: The figures show estimates of log demand shifter on log private sector employment (Figure A5a), on log regional unemployment (Figure A5b), and on log regional wage (Figure A5c), and estimates of log regional unemployment rate on log regional wage when using the log demand shifter as an instrument for the regional unemployment rate (Figure A5d). All figures show estimates for 59 regions using rolling 10-year windows and include time-varying regional controls (the population shares of women, immigrants and individuals with compulsory and post-secondary education), and fixed year and region effects. Standard errors are clustered at the region level.

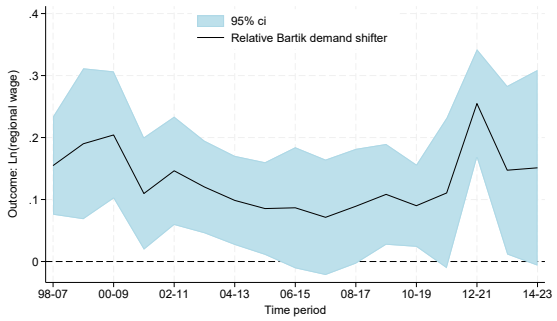
Figure A5: Ln Bartik instead of level Bartik



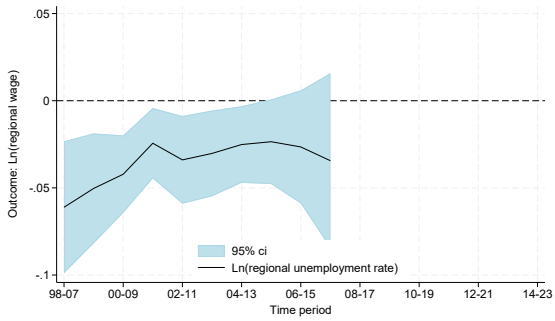
(a) Relative Bartik demand and regional employment



(b) Demand: Relative Bartik and regional unemployment



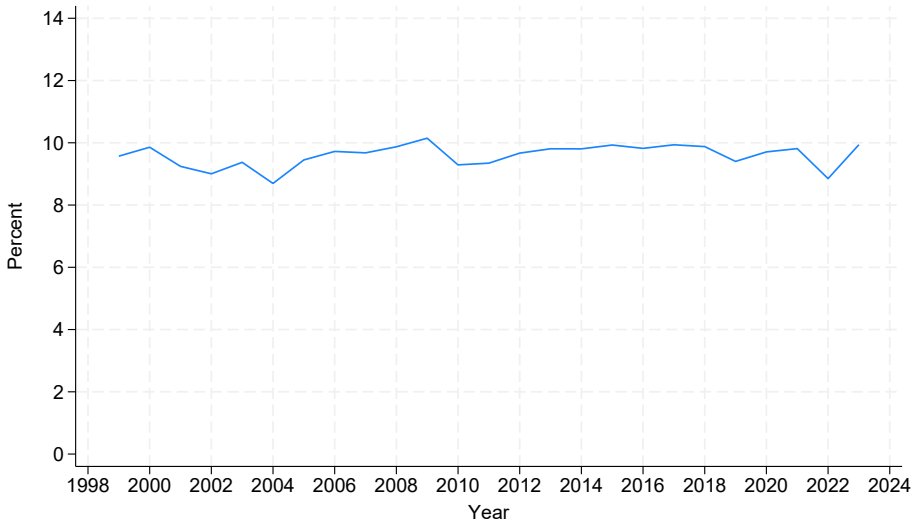
(c) Relative Bartik Demand and Regional Wages



(d) Relative Bartik IV Wage Curve, while there is a 1st stage

Note: The figures show estimates of relative demand shifter on log private sector employment (Figure A6a), on log regional unemployment (Figure A6b), and on log regional wage (Figure A6c), and estimates of log regional unemployment rate on log regional wage when using the relative demand shifter as an instrument for the regional unemployment rate (Figure A6d). The relative demand shifter is divided by the first periods employment and gets value 1 in the first period, otherwise it is defined as in equation (6). All figures show estimates for 59 regions using rolling 10-year windows and include time-varying regional controls (the population shares of women, immigrants and individuals with compulsory and post-secondary education), and fixed year and region effects. Standard errors are clustered at the region level.

Figure A6: Relative Bartik instead of level Bartik



Note: Non-employed persons in year before who have found a job and moved to a different region as percent of all private sector workers who were unemployed or out of the labor force the year before. 59 regions.

Figure A7: Share of workers coming from non-employment who have found a private sector job in other region

Recent Working Papers:

For a complete list of Working Papers published by Sveriges Riksbank, see www.riksbank.se

The Macroeconomic Effects of Trade Tariffs: Revisiting the Lerner Symmetry Result *by Jesper Lindé and Andrea Pescatori*	2019:363
Biased Forecasts to Affect Voting Decisions? The Brexit Case *by Davide Cipullo and André Reslow*	2019:364
The Interaction Between Fiscal and Monetary Policies: Evidence from Sweden *by Sebastian Ankargren and Hovick Shahnazarian*	2019:365
Designing a Simple Loss Function for Central Banks: Does a Dual Mandate Make Sense? *by Davide Debortoli, Jinill Kim and Jesper Lindé*	2019:366
Gains from Wage Flexibility and the Zero Lower Bound *by Roberto M. Billi and Jordi Galí*	2019:367
Fixed Wage Contracts and Monetary Non-Neutrality *by Maria Björklund, Mikael Carlsson and Oskar Nordström Skans*	2019:368
The Consequences of Uncertainty: Climate Sensitivity and Economic Sensitivity to the Climate *by John Hassler, Per Krusell and Conny Olovsson*	2019:369
Does Inflation Targeting Reduce the Dispersion of Price Setters' Inflation Expectations? *by Charlotte Paulie*	2019:370
Subsampling Sequential Monte Carlo for Static Bayesian Models *by David Gunawan, Khue-Dung Dang, Matias Quiroz, Robert Kohn and Minh-Ngoc Tran*	2019:371
Hamiltonian Monte Carlo with Energy Conserving Subsampling *by Khue-Dung Dang, Matias Quiroz, Robert Kohn, Minh-Ngoc Tran and Mattias Villani*	2019:372
Institutional Investors and Corporate Investment *by Cristina Cella*	2019:373
The Impact of Local Taxes and Public Services on Property Values *by Anna Grodecka and Isaiah Hull*	2019:374
Directed technical change as a response to natural-resource scarcity *by John Hassler, Per Krusell and Conny Olovsson*	2019:375
A Tale of Two Countries: Cash Demand in Canada and Sweden *by Walter Engert, Ben Fung and Björn Segendorf*	2019:376
Tax and spending shocks in the open economy: are the deficits twins? *by Mathias Klein and Ludger Linnemann*	2019:377
Mind the gap! Stylized dynamic facts and structural models *by Fabio Canova and Filippo Ferroni*	2019:378
Financial Buffers, Unemployment Duration and Replacement Labor Income *by Mats Levander*	2019:379
Inefficient Use of Competitors' Forecasts? *by André Reslow*	2019:380
How Much Information Do Monetary Policy Committees Disclose? Evidence from the FOMC's Minutes and Transcripts *by Mikael Apel, Marianna Blix Grimaldi and Isaiah Hull*	2019:381
Risk endogeneity at the lender/investor-of-last-resort *by Diego Caballero, André Lucas, Bernd Schwaab and Xin Zhang*	2019:382
Heterogeneity in Households' Expectations of Housing Prices – Evidence from Micro Data *by Erik Hjalmarsson and Pär Österholm*	2019:383
Big Broad Banks: How Does Cross-Selling A Affect Lending? *by Yingjie Qi*	2020:384
Unemployment Fluctuations and Nominal GDP Targeting *by Roberto Billi*	2020:385
FAQ: How do I extract the output gap? *by Fabio Canova*	2020:386

Drivers of consumer prices and exchange rates in small open economies *by Vesna Corbo and Paola Di Casola*	2020:387
TFP news, stock market booms and the business cycle: Revisiting the evidence with VEC models *by Paola Di Casola and Spyridon Sichlimiris*	2020:388
The costs of macroprudential deleveraging in a liquidity trap *by Jiaqian Chen, Daria Finocchiaro, Jesper Lindé and Karl Walentin*	2020:389
The Role of Money in Monetary Policy at the Lower Bound *by Roberto M. Billi, Ulf Söderström and Carl E. Walsh*	2020:390
MAJA: A two-region DSGE model for Sweden and its main trading partners *by Vesna Corbo and Ingvar Strid*	2020:391
The interaction between macroprudential and monetary policies: The cases of Norway and Sweden *by Jin Cao, Valeriya Dinger, Anna Grodecka-Messi, Ragnar Juelsrud and Xin Zhang*	2020:392
Withering Cash: Is Sweden ahead of the curve or just special? *by Hanna Armelius, Carl Andreas Claussen and André Reslow*	2020:393
Labor shortages and wage growth *by Erik Frohm*	2020:394
Macro Uncertainty and Unemployment Risk *by Joonseok Oh and Anna Rogantini Picco*	2020:395
Monetary Policy Surprises, Central Bank Information Shocks, and Economic Activity in a Small Open Economy *by Stefan Laséen*	2020:396
Econometric issues with Laubach and Williams' estimates of the natural rate of interest *by Daniel Buncic*	2020:397
Quantum Technology for Economists *by Isaiah Hull, Or Sattath, Eleni Diamanti and Göran Wendin*	2020:398
Modeling extreme events: time-varying extreme tail shape *by Bernd Schwaab, Xin Zhang and André Lucas*	2020:399
The Effects of Government Spending in the Eurozone *by Ricardo Duque Gabriel, Mathias Klein and Ana Sofia Pessoa*	2020:400
Narrative Fragmentation and the Business Cycle *by Christoph Bertsch, Isaiah Hull and Xin Zhang*	2021:401
The Liquidity of the Government Bond Market – What Impact Does Quantitative Easing Have? Evidence from Sweden *by Marianna Blix Grimaldi, Alberto Crosta and Dong Zhang*	2021:402
Five Facts about the Distributional Income Effects of Monetary Policy *by Niklas Amberg, Thomas Jansson, Mathias Klein and Anna Rogantini Picco*	2021:403
When domestic and foreign QE overlap: evidence from Sweden *by Paola Di Casola and Pär Stockhammar*	2021:404
Dynamic Macroeconomic Implications of Immigration *by Conny Olovsson, Karl Walentin, and Andreas Westermark*	2021:405
Revisiting the Properties of Money *by Isaiah Hull and Or Sattath*	2021:406
The cost of disinflation in a small open economy vis-à-vis a closed economy *by Oleksandr Faryna, Magnus Jonsson and Nadiia Shapovalenko*	2021:407
On the Performance of Cryptocurrency Funds *by Daniele Bianchi and Mykola Babiak*	2021:408
The low-carbon transition, climate commitments and firm credit risk *by Sante Carbone, Margherita Giuzio, Sujit Kapadia, Johannes Sebastian Krämer, Ken Nyholm and Katia Vozian*	2022:409
Seemingly Irresponsible but Welfare Improving Fiscal Policy at the Lower Bound *by Roberto M. Billi and Carl E. Walsh*	2022:410
Pension Reform and Wealth Inequality: Evidence from Denmark *by Torben M. Andersen, Joydeep Bhattacharya, Anna Grodecka-Messi and Katja Mann*	2022:411

Inflation Targeting or Fiscal Activism? *by Roberto M. Billi*	2022:412
Trading volume and liquidity provision in cryptocurrency markets *by Daniele Bianchi, Mykola Babiak and Alexander Dickerson*	2022:413
DISPERSION OVER THE BUSINESS CYCLE: PASSTHROUGH, PRODUCTIVITY, AND DEMAND *by Mikael Carlsson, Alex Clymo and Knut-Eric Joslin*	2022:414
Electoral Cycles in Macroeconomic Forecasts *by Davide Cipullo and André Reslow*	2022:415
The Curious Incidence of Monetary Policy Across the Income Distribution *by Tobias Broer, John Kramer and Kurt Mitman*	2022:416
Central Bank Mandates and Monetary Policy Stances: through the Lens of Federal Reserve Speeches *by Christoph Bertsch, Isaiah Hull, Robin L. Lumsdaine, and Xin Zhang*	2022:417
The Political Costs of Austerity *by Ricardo Duque Gabriel, Mathias Klein and Ana Sofia Pessoa*	2022:418
Central bank asset purchases: Insights from quantitative easing auctions of government bonds *by Stefan Laséen*	2023:419
Greenflation? *by Conny Olovsson and David Vestin*	2023:420
Effects of foreign and domestic central bank government bond purchases in a small open economy DSGE model: Evidence from Sweden before and during the coronavirus pandemic *by Yildiz Akkaya, Carl-Johan Belfrage, Paola Di Casola and Ingvar Strid*	2023:421
Dynamic Credit Constraints: Theory and Evidence from Credit Lines* *by Niklas Amberg, Tor Jacobson, Vincenzo Quadrini and Anna Rogantini Picco*	2023:422
Stablecoins: Adoption and Fragility *by Christoph Bertsch*	2023:423
CBDC: Lesson from a Historical Experience *by Anna Grodecka-Messi and Xin Zhang*	2023:424
Do Credit Lines Provide Reliable Liquidity Insurance? Evidence from Commercial-Paper Backup Lines *by Niklas Amberg*	2023:425
Price Pass-Through Along the Supply Chain: Evidence from PPI and CPI Microdata *by Edvin Ahlander, Mikael Carlsson and Mathias Klein*	2023:426
Cash for Transactions or Store-of-Value? A comparative study on Sweden and peer countries *by Carl Andreas Claussen, Björn Segendorf and Franz Seitz*	2023:427
Fed QE and bank lending behaviour: a heterogeneity analysis of asset purchases *by Marianna Blix Grimaldi and Supriya Kapoor*	2023:428
Monetary policy in Sweden after the end of Bretton Woods *by Emma Bylund, Jens Iversen and Anders Vredin*	2023:429
Banking Without Branches *by Niklas Amberg and Bo Becker*	2024:430
Climate impact assessment of retail payment services *by Niklas Arvidsson, Fumi Harahap, Frauke Urban and Anissa Nurdiawati*	2024:431
Four Facts about International Central Bank Communication b*y Christoph Bertsch, Isaiah Hull, Robin L. Lumsdaine, and Xin Zhang*	2024:432
Optimal Monetary Policy with r* < 0 *by Roberto Billi, Jordi Galí, and Anton Nakov*	2024:433
Quantitative Easing, Bond Risk Premia and the Exchange Rate in a Small Open Economy *by Jens H. E. Christensen and Xin Zhang*	2024:434
Supply-Chain Finance: An Empirical Evaluation of Supplier Outcomes *by Niklas Amberg, Tor Jacobson and Yingjie Qi*	2024:435
Optimal Contracts and Inflation Targets Revisited *by Torsten Persson and Guido Tabellini*	2024:436
Potential Climate Impact of Retail CBDC Models *by Niklas Arvidsson, Fumi Harahap, Frauke Urban and Anissa Nurdiawati*	2024:437

Do we need firm data to understand macroeconomic dynamics? *by Michele Lenza and Ettore Savoia*	2024:438
Inflation-Dependent Exchange Rate Pass-Through in Sweden: Insights from a Logistic Smooth Transition VAR Model *by Gabriella Linderoth and Malte Meuller*	2024:439
Quantitative Easing and the Supply of Safe Assets: Evidence from International Bond Safety Premia *by Jens H. E. Christensen, Nikola N. Mirkov and Xin Zhang*	2024:440
Bank fragility and the incentives to manage risk *by Toni Ahnert, Christoph Bertsch, Agnese Leonello and Robert Marquez*	2024:441
A Traffic-Jam Theory of Growth *by Daria Finocchiaro and Philippe Weil*	2024:442
Intertemporal MPC and Shock Size *by Tullio Jappelli, Ettore Savoia and Alessandro Sciacchetano*	2024:443
Plundered or profitably pumped-up? The effects of private equity takeover *by Anders Kärnä and Samantha Myers*	2024:444
Measuring Riksbank Monetary Policy: Shocks and Macroeconomic Transmission *by Jakob Almerud, Dominika Krygier, Henrik Lundvall and Mambuna Njie*	2024:445
Joint extreme Value-at-Risk and Expected Shortfall dynamics with a single integrated tail shape parameter *by Enzo D'Innocenzo, André Lucas, Bernd Schwaab and Xin Zhang*	2025:446
The Inflationary Effects of Quantitative Easing *by Mathias Klein and Xin Zhang*	2025:447
Shadow banks or just not banks? Growth of the Swedish non-bank sector *by Jieying Li and Samantha Myers*	2025:448
Sveriges Riksbank´s Foreign Exchange Reserve, 1823–2023 *by Gustav Ingman*	2025:449
Unconventional Monetary Policies in Small Open Economies *by Marcin Kolasa, Stefan Laséen and Jesper Lindé*	2025:450
Long-Lag VARs *by Ferre De Graeve and Andreas Westermark*	2025:451
Riding the Housing Wave: Home Equity Withdrawal and Consumer Debt Composition *by Anna Grodecka-Messi, Jieying Li and Xin Zhang*	2025:452
Decoding climate-related risks in sovereign bond pricing: A global perspective *by Sofia Anyfantaki, Marianna Blix Grimaldi, Carlos Madeira, Simona Malovana and Georgios Papadopoulos*	2025:453
Central Bank Liquidity Support, Bank Lending, and the End of Currency Competition *by Anna Grodecka-Messi and Xin Zhang*	2025:454
The Signaling Effects of Fiscal Announcements *by Leonardo Melosi, Hiroshi Morita, Anna Rogantini Picco and Francesco Zanetti*	2025:455
Financial Flows and Exchange Rate Dynamics: Evidence from Sweden *by Katja Artta, Marianne Nessén, Ettore Savoia and Anders Vredin*	2025:456
Central Bank Losses and Inflation: 350 Years of Evidence *by Anna Grodecka-Messi, Martin Kliem and Gernot J. Müller*	2025:457
Predicting Credit Deterioration: Internal Default Models versus Lending Rates *by Anders Kärnä and Karin Östling Svensson*	2025:458

Sveriges Riksbank
Visiting address: Brunkebergs torg 11
Mail address: se-103 37 Stockholm

Website: www.riksbank.se
Telephone: +46 8 787 00 00, Fax: +46 8 21 05 31
E-mail: registratorn@riksbank.se