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POLICY PAPER

Local Labour Market Concentration in Ireland

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Abstract: We measure local labour market (LLM) concentration in Ireland from 2008 to 2019 using an employment share Herfindahl-Hirschmann Index (HHI), a proxy for monopsony power. LLM concentration in Ireland has followed a similar pattern to the US and UK since 2008, surging as firms closed during the financial crisis and falling throughout the recovery. There is substantial variation in HHI across regions, with the Midland having the highest average HHI in every year. We also describe the characteristics of the 5,502 LLMs in Ireland.

I INTRODUCTION

Labour markets in which a small number of firms dominate employment are *concentrated*. Classical monopsony theory predicts that employers in concentrated labour markets hold wages below the marginal product of labour and employ fewer workers than would be employed in a competitive market.[1] Long considered implausible in modern times, recent evidence that concentration

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[1] Robinson (1933).

suppresses wages has revived interest in classical monopsony,[2] with implications for competition regulation, trade unionisation, and minimum wage legislation.

We present the first evidence on local labour market (LLM) concentration in Ireland. We find substantial variation in concentration across both industries and regions, with the Midland sticking out as the most concentrated region in every year from 2008 to 2019, and Greater Dublin the least. Concentration surged during the financial crisis, but fell to pre-crisis levels by 2012, subsequently declining further until stabilising in 2016. Rinz (2022) and Abel *et al.* (2020) document similar patterns for the US and UK respectively.

Consider a monopsonist employer – the only employer in a labour market. In order to attract marginal workers, who have relatively weak labour market attachment (for example, those nearing retirement, or second earners), the monopsonist must offer higher wages. The monopsonist weighs the benefit of a larger workforce against the cost of matching the new, higher wage offer for its existing employees. In equilibrium the monopsonist hires fewer workers than would be hired in a competitive market, resulting in lower employment – and as it declines to bid wages up in order to attract them, wages are also lower than in a competitive market.[3] This argument extends to markets with few employers, or where one employer dominates. In contrast, employers in a competitive market do not hesitate to post higher wages in order to attract marginal workers because this cuts mostly into competitors' bottom lines.

Although there are many employers in Ireland, employment options for a particular worker may be limited by specialty and geography. In this case employers in concentrated markets can exploit monopsony power to suppress wages. Following recent studies on the US and Europe, we define a LLM as an industry-region, with industry given at the two-digit NACE level, and region based on NUTS 3 designation used to allocate EU structural funds.[4] This approach approximates the employment options open to a worker, and has been validated by a variety of alternative and/or more sophisticated definitions of employment options that are not possible with our data.[5]

[2] See Azar *et al*. (2022), Benmelech *et al.* (2020), Hershbein *et al.* (2019), and Rinz (2022) for recent studies in the US; Bassanini *et al.* (2020) and Marinescu *et al.* (2021) for France; *Abel et al.* (2020) for the UK; Martins (2018) for Portugal; and Bassanin*i et al.* (2023) for a study of Denmark, France, Germany, Italy, Portugal, and Spain. Azar *et al.* (2019) shows that higher concentration is associated with lower application elasticity in the US.

[3] Perfectly price-discriminating monopsonists do not face this trade-off, and so hire the socially efficient number of workers.

[4] The two-digit NACE classification contains a similar number of industrial categories as the three-digit NAICS classification that has been used for the US. Although NUTS 3 regions are not explicitly designed to minimise cross-border commuting as are US commuting zones, they are similar in terms of geographic size and population, and exhibit little inter-regional commuting aside from Dublin and the Mid-East, which we combine into the Greater Dublin region.

[5] Azar *et al.* (2022) define a LLM as an occupation-region and finds similar results to Rinz (2022), who defines a LLM as we do. Arnold (2021) uses the same US dataset as Rinz (2022) and, augmented with cross-industry exposure, finds similar results.

To measure monopsony power, we calculate the employment-share Herfindahl-Hirschman Index (HHI) of each Irish LLM using the Business Register (BR). The HHI is the sum of squared employment shares across all employers within a LLM. For example, a monopsonist employs all workers in its LLM, and so has a share of one, and the market has a HHI of one. Two equally-sized competitors each employ half the market, which has a HHI of one-half. A perfectly competitive market – with an infinite number of employers, each having an infinitesimal employment share – has a HHI of zero. We find that Irish LLMs have HHIs ranging from 0.002 to one. The average HHI is 0.15, which is the US Federal Trade Commission's threshold for a moderately concentrated product market (although since HHIs are sensitive to the delineation of markets, this is not an apples-to-apples comparison). If LLMs approximate workers' employment options and firms exert monopsony power, then all else equal, earnings in concentrated LLMs should be lower. Our results suggest a role for classical monopsony power in Irish labour markets and open the door to future work on its effect on wages and employment with implications for both competition regulation and minimum wage legislation. If high concentration levels enable employers to suppress wages in the labour market, regulatory authorities should be aware of the impacts of mergers not only on product markets but also on labour markets. In our paper (Devereux and Studnicka, 2023) we present the evidence on the potential effectiveness of minimum wage policies in boosting workers' earnings without significant job losses and even with the possibility of employment gain depending on the level of market concentration.

This paper is organised as follows. Section II describes our data and our definition of labour markets and concentration. Section III examines the evolution of concentration in Ireland over time and its determinants, as well as cross-sectional variation by region and industry. The final section concludes.

II DATA

We use two datasets from the Central Statistics Office (CSO): the Irish Business Register (BR) and the Labour Force Survey (LFS). We use the BR to calculate employer concentration at the local labour market (LLM) level, which we match to worker-level earnings data from the LFS. Our matched dataset covers the period 2009-2019, the longest span included in both the BR and LFS. In this section we first discuss our definition of the LLM in subsection 2.1. We then turn to our concentration measure in subsection 2.2. In the final subsection we describe the earnings data.

2.1 Defining the Local Labour Market

Following recent literature using US administrative data (Benmelech *et al*., 2020; Rinz, 2022) we define a LLM as a given industry in a given geographic region. While using geography to approximate the effective market facing a worker is

uncontroversial, recent studies have taken various approaches to approximating what type of job is a relevant option. Studies using occupations rather than industries (Azar *et al*., 2022; Marinescu *et al*., 2021) have found comparable levels of concentration, and a similar relationship between concentration and earnings defining LLMs as occupation-regions to those using industries. Furthermore, studies that allow for spillovers across industries (Arnold, 2021) or occupations (Schubert *et al*., 2021) find that the earnings-concentration relationship estimated from simple measures is robust to more sophisticated measurement of a worker's outside options. On the other hand, Dodini *et al.* (2020) find that using a skill-based LLM definition yields lower concentration measures than those based on occupation or industry. Nonetheless, they find a similar negative relationship between concentration and earnings.

2.1.1 Industrial Classification

We classify industries as two-digit NACE categories – the finest industrial definition common to both data sources.[6] This gives us 88 categories, far fewer than the 1,005 four-digit NAICS/SIC industrial categories used by US studies, but comparable in number to the 85 two-digit SIC industrial codes used in the study of concentration in the UK by Abel *et al*. (2020). Using fewer categories mechanically lowers concentration measures, as there are by definition (weakly) more firms operating within a broader industrial category in any given area. Our measurements should therefore be taken as a conservative benchmark compared to US studies, but are comparable to the aforementioned study of the UK.[7] Rinz (2022) observes that only a quarter of job-switchers remain within the same four-digit NAICS industry, suggesting our broader measure has the advantage of not artificially separating related industries.[8] Moreover, analysing cross-industry job flows, Corella (2020) finds that LLMs can be well-approximated using as few as 60 industry clusters. Overall, our broad industrial definition accommodates cross-industry job-switching better than comparable US studies, at the expense of a potentially underestimating concentration. Classifying industry more broadly also reduces sample size, as there are fewer LLMs when industry is more broadly defined, hampering statistical power.

2.1.2 Geographical Classification

Studies of the US and France have used commuting zones to delineate LLMs geographically. In the US these are developed by the Department of Agriculture

[6] Although the BR reports industry at the four-digit NACE Rev. 2 industrial code level, the LFS reports only the two-digit level.

[7] Marinescu and Wolthoff (2020) observes that the elasticity of applications to wage offers within a six-digit SOC occupational code is negative. Azar *et al.* (2022) argue that this indicates the six-digit SOC, which they use to define a LLM, may itself be overly broad. There are 1,463 six-digit SOC codes, comparable to the number of four-digit NAICS codes.

[8] The LFS asks workers about the industry of their previous occupation, but these data are not made available to non-CSO researchers so we cannot construct a similar measurement for Ireland.

specifically to group together counties in a way that minimises cross-border commuting.[9] Although no equivalent geographic unit is readily available for Ireland, the NUTS 3 regions designed to allocate EU structural funds are similar in population size and geographic area.[10] As the LFS reports the region both of residence and employment for a worker, we observe that in most cases there is little cross-region commuting – only 11 per cent of workers commute across NUTS 3 borders nationally – supporting this delineation. However, 35 per cent of workers residing in the Mid-East commute to Dublin. We therefore consider Dublin and the Mid-East a single commuting zone. We term this modified regional delineation as NUTS 3*. As a result, we have a total of seven regions across Ireland consisting of roughly similar populations to US commuting zones.[11] After combining the Mid-East and Dublin into a single region, only 5.7 per cent of workers commute across regional borders. To calculate concentration we assign firms to NUTS 3* groups based on the county of registration. In sum, we define LLMs according to the above categorisations of geography and industry, as well as by year. We define a market as an industry-region; for example, *Financial services activities* (NACE 64)-Midland and *Construction of buildings* (NACE 41)-South-West are two markets we observe when defining the LLM at the two-digit NACE-NUTS 3* level. With 88 two-digit NACE categories and seven NUTS 3* categories, there are a maximum of 88 × 7 markets each year, but there are fewer in practice because not all industries are active in every region in every year.

2.2 Measuring Concentration

We measure labour market concentration using the Herfindahl-Hirschman Index (HHI) of employment. The HHI is widely used by researchers and policymakers, having theoretical justification[12] as well as several intuitive properties.

Consider a market m containing one or more firms. Each firm f employs a number of workers e_f. The total number of workers employed in the market is $E_m \equiv \Sigma_{f \in m} e_f$ and any firm f's employment share is $\frac{e_f}{E_m}$. The HHI is defined as the sum of squared employment shares:

$$HHI_m = \Sigma_{f \in m} \left(\frac{e_f}{E_m} \right)^2 \tag{1}$$

which ranges from just above zero to one. A monopsonist employer employs every worker in its labour market, having an employment share of one. The market then

[9] See Azar *et al*. (2022) for a discussion.

[10] Abel *et al.* (2020) use NUTS 2 regions, each containing around one million jobs – substantially more than the average US commuting zone.

[11] These are: Border, Greater Dublin, Midland, Mid-West, South-East, South-West, and West. See Appendix A for a discussion of inter-regional commuting.

[12] A Cournot model of quantity competition in the labour market produces a wage markdown proportional to the HHI of that market.

has a HHI of one, the highest possible level of concentration. A labour market split evenly by two firms has a HHI of one-half. The US Department of Justice/Federal Trade Commission (FTC) guidelines consider a HHI of 0.15-0.25 as moderately concentrated and above one-quarter to be highly concentrated (the latter corresponding to a market of four equally-sized firms). As the number of firms in a market grows large and each possesses a small share of employment, the HHI approaches zero.

The BR reports the number of workers employed by each active enterprise in Ireland annually. Each enterprise is associated with a county and an industry, which we use to assign it to a LLM. We use these employee counts to calculate the employment shares of firms in a LLM, from which we calculate the HHI concentration index. The county is given as the address at which the enterprise is registered for revenue purposes, which may not correspond to the operating location. This introduces measurement error to our HHI calculation, which should be considered with this caveat.[13]

The BR data are available for the period 2008-2019. We use the entire span in our descriptive analysis of market LLM concentration and calculate the HHI of each LLM in each year.

Some studies use job posting (Azar *et al*., 2022) or hiring (Marinescu *et al*., 2021; Dodini *et al.*, 2020) rather than employment to calculate market shares. These yield results quantitatively similar to studies using employment. Moreover, these studies find similar results using employment as a robustness check; additionally, Marinescu *et al*. (2021) reports that hiring and employment are highly collinear in France.

2.3 Earnings

The Labour Force Survey (LFS) is nationally representative of Irish households, reporting individual-level data employment status, industry, and region both of work and residence. One caveat for our analysis is that over our sample period, the survey does not contain precise information on income; rather, it groups individuals into income deciles based on income bands set by the CSO. We use the information on income deciles to calculate the midpoint income for each income band and calculate average and median midpoint income per worker at the LLM level.

The second caveat is the large number of missing information regarding the income decile. Since the information on income decile is available from 2009 on, we limit our descriptive analysis of concentration and earnings to the 2009-2019 period.

[13] All employees of a firm registered in a given county are counted as working in that country's LLM, regardless of where they reside, and where the firm operates. There exists no comprehensive database of firm operating locations in Ireland. The full sample of the Earnings Analysis from Administrative Data Sources (EAADS) could be used to construct HHI measurements based on the location at which the worker resides, but these data are not currently available to researchers outside the CSO.

Table 1 presents summary statistics of the 5,502 LLMs we identify in Ireland. Average midpoint income was around €460, while average HHI was 0.15.[14] The highest midpoint income was €1,100 in the *Publishing activities*-Border LLM and *Mining of metal ores*-Mid-West LLM (both in 2013).

The average LLM contains 280 firms, with a maximum of 5,715 (*Specialised construction activities*-Dublin in 2019). Around half of workers in a LLM were men. The average employment per LLM was around 3,740 employees with a maximum of 1366,266 (*Retail trade, except of motor vehicles and motorcycles*-Dublin LLM).

Table 1: Summary Statistics (LLM level)

	Obs.	*Mean*	*Median*	*Std. Dev.*	*Min*	*Max*
Average midpoint income (€)	5,502	459.97	460.43	139.76	70.5	1,100
HHI (NACE 2-digit-region)	5,502	0.15	0.07	0.2	0.002	1
Number of firms	5,502	280.19	65	575.89	1	5,715
Employment	5,502	3,739.29	827	10,024.37	1	136,266
Male	5,502	0.526	0.53	0.33	0	1
Year	5,502				2009	2019

Source: Authors' calculations based on the Labour Force Survey and Business Register.
Notes: A unit of observation is a LLM-year. A LLM is an industry-region, with industry defined at the two-digit NACE level and region at the NUTS 3* level.

III LOCAL LABOUR MARKET CONCENTRATION IN IRELAND

In this section we present results on labour market concentration in Ireland over the period of 2008-2019. National concentration has followed the same trend as average concentration at the LLM level, peaking during the 2009 crash, and falling below 2008 levels by 2013. This is driven by firm exit, broadly distributed across the country.

3.1 National Trends

Employment concentration within industries has varied substantially both at the local and national level over 2008-2019. Figure 1 presents time series of concentration using two alternative labour market definitions. Panel (a) presents average concentration by industry, classing all employment in that industry nationwide in a single labour market. There are 88 labour markets according to this definition: one for each two-digit NACE industry. Panel (b) uses our LLM definition of an industry-region, showing average concentration over every LLM (5,502 in total). The former labour market definition mechanically produces smaller HHI measurements, as more firms are included in each market.

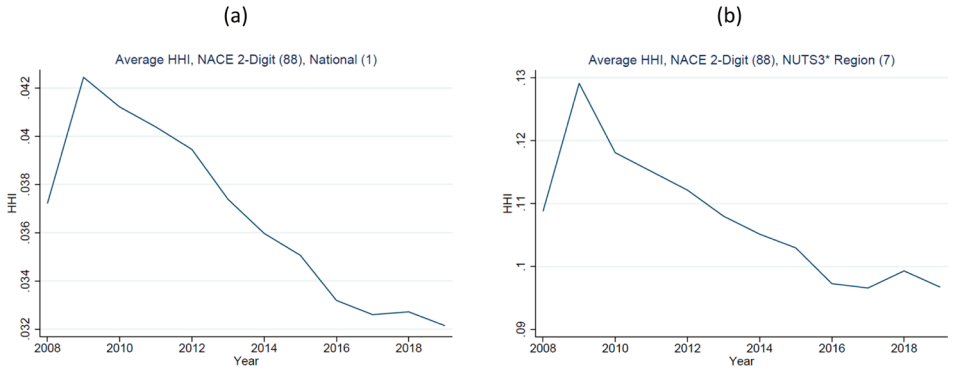
[14] For comparison, Marinescu *et al.* (2021) find that the average LLM concentration in France is 0.17.

Both national and local concentration exhibited a surge during the post-2008 downturn.[15] Concentration then steadily declined until stabilising in 2016. Qiu and Sojourner (2019) and Rinz (2022) find a similar pattern over the same period for the US, as does Abel *et al*. (2020) for the UK.[16]

Figure 2 shows that the crisis-era concentration surge was driven by firm exits, and the subsequent decline in concentration by firm entry. Before the crisis, there were around 5,200 firms in an average two-digit NACE sector at the national level, shown in panel (a). By 2010 this fell to around 4,400. Starting in 2010, firm numbers gradually recovered, with the number of firms exceeding 5,400 in 2019. At the LLM level, we see a similar drop in the number of firms (from around 1,350 to around 1,200 firms per LLM) with a steady recovery; the number of firms per LLM exceeded 1,550 by 2019.

While national and local trends in concentration are similar over our sample period, these can diverge if large firms spread their operations across many regions, increasing concentration at the national level, but decreasing it in LLMs. Rinz (2022) and Hershbein *et al*. (2019) document such a divergence in the US over the

Figure 1: Average HHI by Year



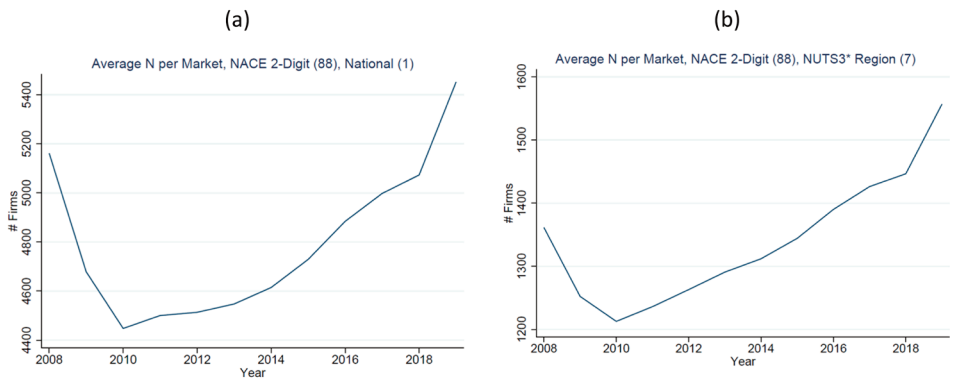
Source: Authors' calculations based on the Business Register.
Notes: This figure plots the HHI of concentration, defined in Equation 1, for LLMs across Ireland. A LLM is an industry-region in a given year.

[15] Divergence between national and local trends is underestimated, as we calculate concentration based on the county in which a firm is registered. A firm operating in multiple LLMs is properly counted as operating in a single national market, but falsely counted as operating in a single LLM. See the discussion in Section 2.1.2.

[16] Rinz (2022) shows that over this time period, US national and LLM-level concentration follow similar patterns, as they do in Ireland. However, during the 1990s to mid-2000s, national concentration in the US was increasing while local concentration decreased; Lipsius (2018) confirms this pattern. We are unable to investigate such a divergence in Ireland due to the unavailability of the BR prior to 2008.

period of 1976-2015, with national concentration in the US falling sharply in the 1980s and rising steadily until the financial crisis surge, while average local concentration fell from the 1980s to the 2000s (the latter finding being confirmed also by Lipsius, 2018). Because LLM concentration has been falling in the US even as national concentration has increased, it has been rejected as a cause of declining real wages (Stansbury and Summers, 2020; Rinz, 2022; Lipsius, 2018). Because the BR reports only county of registration rather than the county in which employees work, we would be unable to document such divergence even with a longer sample period: we must assign all employees of a given firm to the LLM in which the firm is registered.[17] Therefore the extent to which national and local trends differ is driven by the non-linearity of the HHI; aggregating markets to the national level weights each LLM by its squared share of national employment, whereas taking the mean HHI over LLM weights each HHI by its share of employment. National level HHI therefore weights large markets relatively more than does mean HHI across markets.[18]

Figure 2: Number of Firms by Year

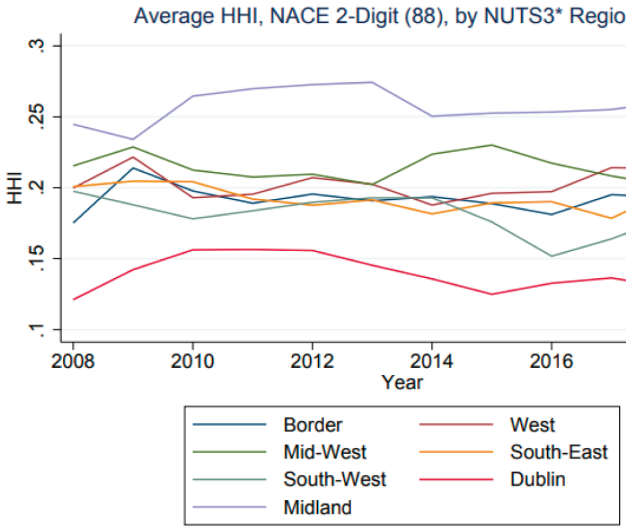


Source: Authors' calculations based on the Business Register.
Notes: This figure plots the number of firms in a local labour market (LLM) for a variety of LLM definitions. A LLM is an industry-region in a given year.

[17] The full sample of the Earnings Analysis from Administrative Data Sources links employees to employers, and could reveal discrepancies between national and local trends as seen in the US. However, this dataset is only available to CSO researchers.

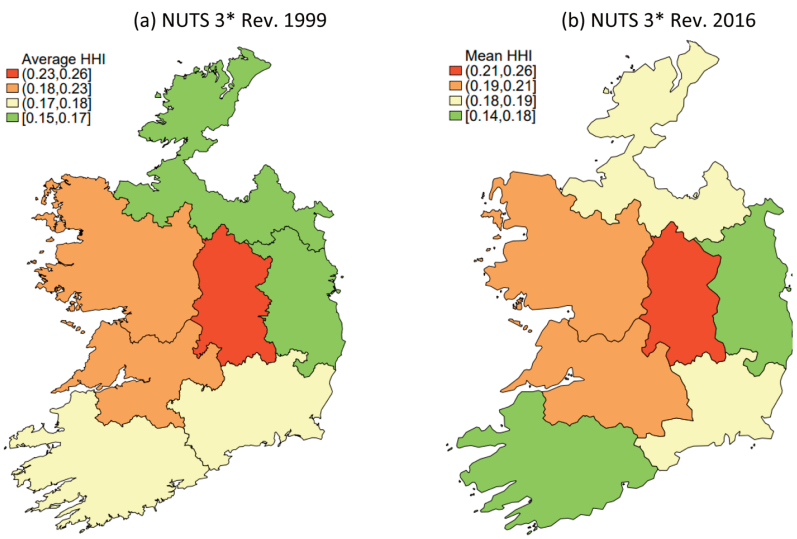
[18] Consider two markets a and b, containing respectively E_a and E_b workers. The employment-weighted average HHI of the two markets is $\overline{HHI}_{a,b} = HHI_a \frac{E_a}{E_a + E_b} + HHI_b \frac{E_b}{E_a + E_b}$ whereas the HHI for the total market $a \cup b$ is $HHI_{a \cup b} = HHI_a \left(\frac{E_a}{E_a + E_b}\right)^2 + HHI_b \left(\frac{E_b}{E_a + E_b}\right)^2$

Figure 3: Average HHI by Year



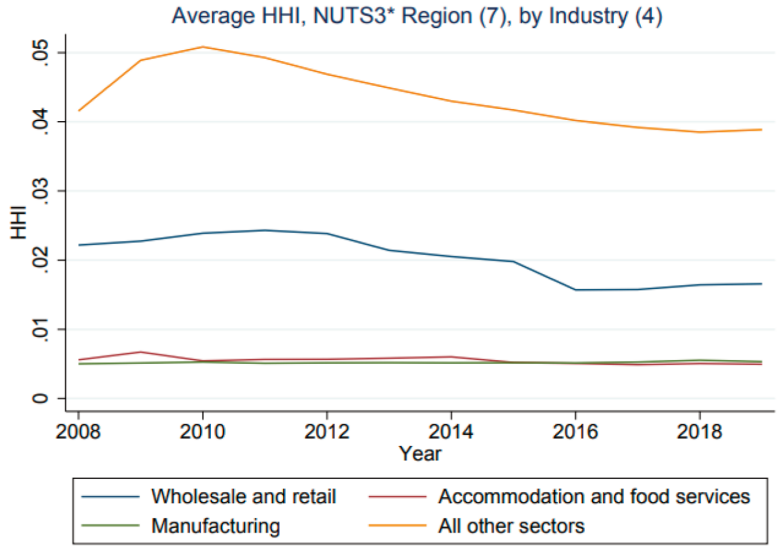
Source: Authors' calculations based on the Business Register.
Notes: This figure plots the evolution of the average HHI by region. Our NUTS 3* grouping follows the EU structural funds NUTS 3 regions, with Dublin and the Mid-East combined into a single region.

Figure 4: Average HHI (2008-2019)



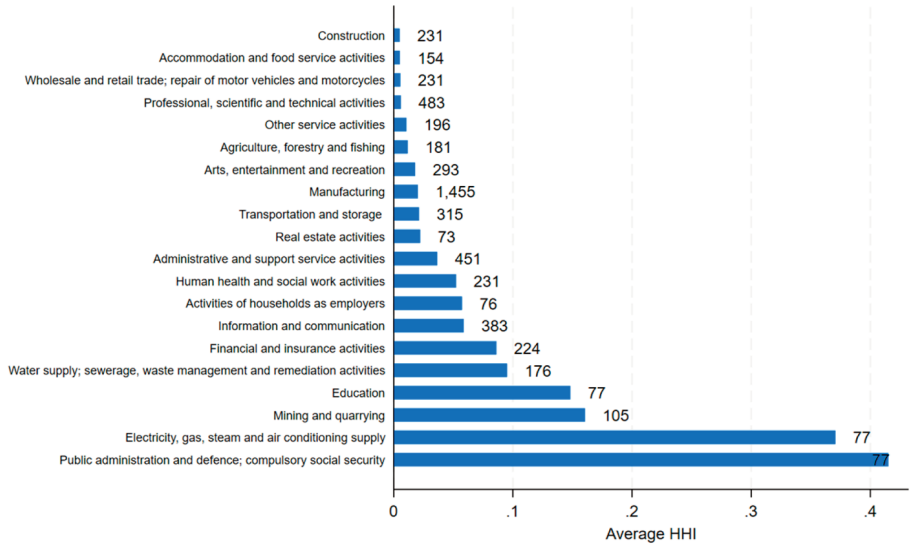
Source: Authors' calculations based on the Business Register.
Notes: This figure plots the average HHI by region across all years. Our NUTS 3* grouping follows the EU structural funds NUTS 3 regions, with Dublin and the Mid-East combined into a single region.

Figure 5: Average HHI by Sectors (2008-2019)



Source: Authors' calculations based on the Business Register.
Notes: This figure plots the evolution of the average HHI by industry.

Figure 6: Average HHI by NACE 1-Digit Sector (2008-2019)



Source: Authors' calculations based on the Business Register.
Notes: This figure plots the average HHI by sector across all years. For clarity, activities of extraterritorial organisations and bodies containing 13 LLMs was omitted. The labels represent the number of LLMs (industry-region) in each category.

3.2 Regional Analysis

Figure 3 shows average HHI at NACE 2-digit level in each NUTS 3* region from 2008 to 2019. The initial 2009 surge in concentration is driven by the Border, the Mid-West, and West regions, but concentration reverts sharply to 2008 levels in 2010. High levels of concentration in the following crisis years are driven by the Midland and Greater Dublin, wherein concentration remains high until 2014 and 2015 respectively. During this time the Mid-West surged a second time before declining again in 2016. Unlike other regions, the South-West and South-East do not show any apparent concentration response to the crisis; concentration in the South-East stays relatively stable throughout the sample period, while concentration in the South-West shows a modest decline.

Concentration was the highest in the Midland and the lowest in Dublin in every year through 2019. Figure 4 shows the average HHI at NACE 2-digit level in each NUTS 3* region across all years for both revisions. These results rationalise the finding of McGuinness *et al*. (2019) that Dublin and the western regions – with generally low levels of concentration – show relatively large disemployment effects following the 2018 minimum wage increase; markets with low concentration should be closer to a competitive equilibrium, in which any binding minimum wage causes disemployment. In a companion paper we study the three national minimum wage increases from 2016-2019, explicitly allowing the employment response to minimum wage changes to vary by degree of concentration, confirming this intuition (Devereux and Studnicka, 2023).

3.3 Analysis by Sector

We present average HHI for select one-digit NACE sectors at the NUTS 3* level in Figure 5. We focus on *Wholesale and retail*, *Accommodation and food services*, and *Manufacturing* – the three sectors McGuinness *et al*. (2019) identify as having the highest proportion of minimum wage workers. We group together all other sectors. Concentration in *Wholesale and retail* increases slightly in 2009 and plateaus through 2012, when it starts to decline. *Accommodation and food services* shows an initial surge in 2009 before falling back down in 2010, holding steady, then declining further starting in 2015. The grouping of all other sectors also shows a surge in 2009 then declines steadily starting in 2011. Concentration in *Manufacturing* remains low and steady throughout the duration.

McGuinness *et al*. (2019) find disemployment effects of the 2018 minimum wage increase in the *Manufacturing* sector. This is consistent with its low average level of concentration compared to the other sectors with high concentrations of minimum wage workers. Although manufacturing concentration does not vary substantially over time, we can make use of contemporaneous regional variation market concentration within industries order to identify the relationship between concentration and wages. For other sectors we can take advantage of both time-series and cross-sectional variation in concentration.

Figure 6 shows time-averaged HHI for each of the 20 one-digit NACE sectors. At this level, the average concentration was 0.08. Outside of the publicly-dominated sectors, where average concentration across regions exceeds the FTC threshold for high concentration of 0.25, concentration is highest in *Electricity* and *Mining* (0.16). *Education* and *Water supply and waste management* are also close to the moderate concentration threshold of 0.15. Among sectors with high concentrations of minimum wage workers, concentration is among the lowest of any one-digit NACE sector for *Accommodation and food services* and *Wholesale and retail trade*, and low also for *Manufacturing*. In addition, the Figure presents the number of LLMs (defined at the industry-region level) in each of the NACE one-digit categories. The sectors with the largest number of LLMs are *Manufacturing* (1,455 LLMs) and *Professional, scientific, and technical activities* (483 LLMs). *Real estate activities* has the lowest number of LLMs (73) but a below-average HHI of 0.02.

3.4 Counterfactual Decomposition

We now decompose the average HHI into different components in a series of counterfactual exercises, following Rinz (2022).

We start with the average national HHI at time t which can be written as:

$$\overline{HHI_t} = \Sigma_i \, Share_{it} \times HHI_{it} \tag{2}$$

where $Share_{it}$ is the share of national employment of industry i at time t (industrial composition), and HHI_{it} is the HHI within this industry at the given time. We plot the actual national average HHI against two counterfactual trends: (1) keeping industry shares of employment constant at their 2008 levels and letting HHI_{it} vary over time; (2) and keeping the HHI_{it} constant, letting the industry shares vary (Figure 7, Panel (a)). The counterfactual trend where only the HHI_{it}varies over time is the one that follows closely the actual trend in average HHI. The industrial composition was, on the other hand more stable over time, suggesting that changes in HHI_{it} are driving changes in the national trend. Rinz (2022) finds similar results for the US.

At the local level, we can write the average HHI of regions as:

$$\overline{HHI_t^r} = \Sigma_r \Sigma_i \, \text{NUTS 3*} \, Share_{rt} \times LLMShare_{rit} \times HHI_{rit} \tag{3}$$

where $NUTS3^* \, Share_{rt}$ is the region r's share of national employment, $LLMShare_{rit}$ is the share of local employment in region r and industry i of the total employment in industry i, and HHI_{rit} is the HHI of a local labour market, all evaluated at time t.

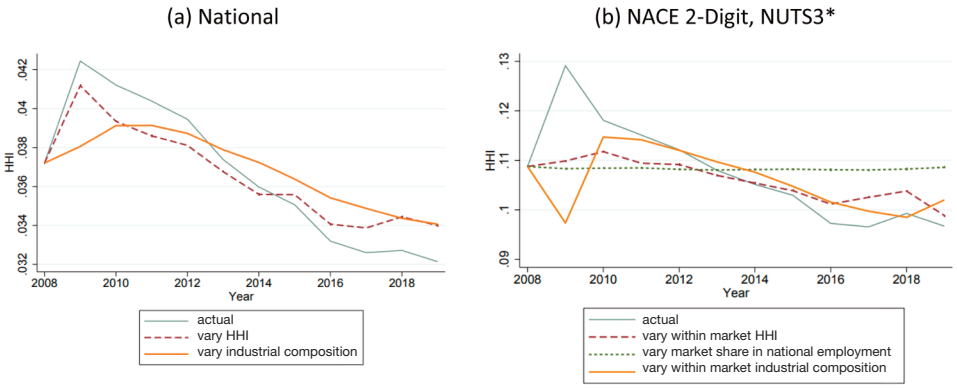
Figure 7 Panel (b) presents counterfactual trends that vary each of the three components of the local labour market HHI trend, keeping the two other terms constant.

Our findings show that changes in local labour market employment shares were stable, having little impact on the actual trend. Letting the within market industrial

composition vary put a downward pressure on the actual HHI in 2008 and 2009. After those years it was roughly in line with the actual HHI, mostly above it from 2012 on. Within market HHI, was rather stable and evolved below the actual HHI until 2014.

Overall, our counterfactual exercise suggests that changes in the average national HHI were driven more by the evolution of the industry-specific and industry-LLM-specific HHIs, rather than by the evolution of the respective industrial compositions.

Figure 7: Decomposition



Source: Authors' calculations based on the Business Register.
Notes: Panel (a) plots the decomposition of the HHI, defined in equation (2). Panel (b) plots the decomposition of the HHI defined in Equation (3).

IV CONCLUSION

We provide the first evidence of local labour market (LLM) concentration in Ireland. LLM concentration in Ireland surged during the financial crisis, before falling to pre-crisis levels by 2012. It declined further until stabilising in 2016. This trend mirrors the experience of the US and UK over the same period. In Ireland, the surge and subsequent decline were driven by the number of active firms, rather than disproportionate employment share increases by some competitors. Concentration surged as many firms shut down during the crisis and fell as new firms opened up during the recovery.

There is substantial variation in average LLM concentration across regions. The Midland has the highest average concentration in every year from 2008 to 2019, and Greater Dublin (consisting of Dublin and the Mid-East) the lowest. There is also large sectoral variation, with the typically low-wage sectors accommodation and food services having among the lowest levels of concentration, and

manufacturing having low concentration also. Other sectors have higher concentration on average.

Our results have implications for competition regulation and minimum wage legislation. If concentration allows employers to suppress labour market earnings, regulators should be cognisant of the effects of mergers on labour markets – not just product markets. This evidence also suggests the viability of minimum wages to increase workers' earnings without substantial employment losses, and with potential gains to employment. We present evidence to this effect in Devereux and Studnicka (2023).

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APPENDIX – COMMUTING PATTERNS

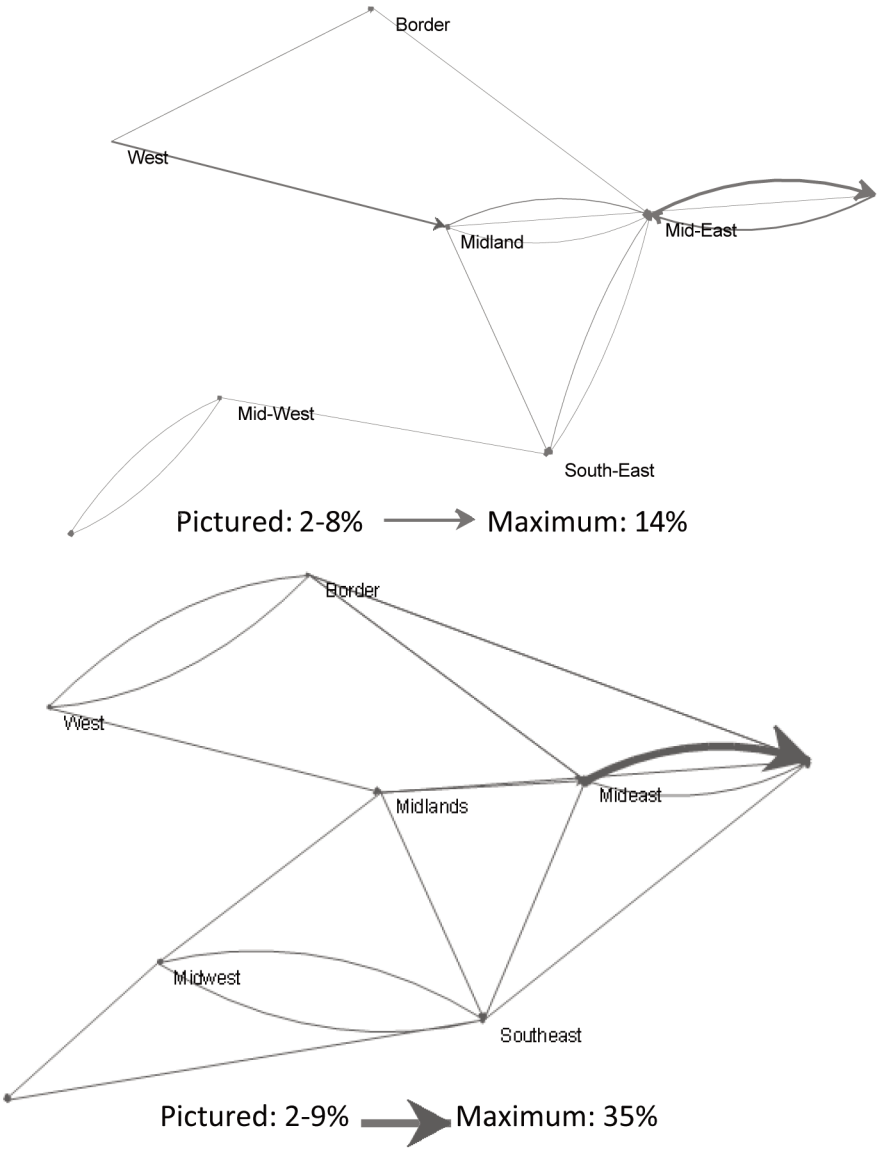
In this appendix we present commuting patterns across NUTS 3 regions in order to justify our grouping together of Dublin and the Mid-East into the Greater Dublin region for our preferred NUTS 3* classification. All other regions remain unchanged. Data come from the Labour Force Survey (LFS), which reports the region both of work and residence. Figures are averages over all years using the 2016 revision of NUTS 3 that reallocated Louth from the Border to the Mid-East, and South Tipperary from the South-East into the Mid-West.

Figure A.1 top panel shows the percentage of workers working in a destination NUTS 3 region who commute from any other region. This indicates how large a share outside-region commuters play as a share of the destination region. The largest flow is from the Mid-East to Dublin, with 14 per cent of Dublin's workforce commuting from the Mid-East. The second highest flow is the reverse, with 8 per cent of the Mid-East's workforce commuting from Dublin. Flows consisting of less than 2 per cent of the destination's workforce are not pictured.

Figure A.1 bottom panel shows the percentage of workers in an origin region who commute into the destination region. This indicates how important the destination region is to the origin as a source of work. The largest flow again is the Mid-East to Dublin, with 35 per cent of workers residing in the Mid-East commuting into Dublin. The second highest flow is from the Midland into Dublin, at 9 per cent.

These patterns show the integration of the Mid-East and Dublin as a commuting zone – particularly the dependence on the former on the latter as a place of work, but also the Dublin's dependence on the Mid-East as a source of labour. For this reason we group the two regions together in our NUTS 3* classification.

Figure A.1: Percentage of Workers in Destination Commuting from Region



Source: Authors' calculations based on the Business Register.
Notes: The top panel shows the percentage of workers in a destination NUTS 3 region who commute from another region; for example, 14 per cent of workers employed in Dublin commute from the Mid-East. The bottom panel shows the percentage of working residents from a region who commute to the destination; for example, 35 per cent of workers living in the Mid-East commute to Dublin. Percentages below 1 per cent are suppressed.