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Revisiting Minimum Wage: From Labor Economics to Spatial Economics

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Revisiting Minimum Wage: From Labor Economics to Spatial Economics *

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Abstract

This paper offers an integrated perspective that bridges labor economics and spatial economics to shed light on the broader implications of minimum wage policies. Traditional labor economics, grounded in neoclassical and partial equilibrium models, yields ambiguous theoretical predictions regarding the employment effects of minimum wages, making empirical analysis essential. Yet empirical findings from both developed and developing countries remain mixed, shaped by differences in data, methods, and variable definitions. Spatial economics, particularly through general equilibrium frameworks, provides insight into how agglomeration forces, transport costs, increasing returns, and factor mobility influence regional economic outcomes. These models suggest that core regions benefiting from agglomeration rents may be better positioned to sustain generous public policies, including higher minimum wages. We also review evidence on how minimum wages affect migration and firm location decisions, though results remain inconclusive. Through a comprehensive review of the extant literature, this paper underscores the value of incorporating spatial perspectives in understanding minimum wage effects and identifies directions for future research.

Keywords: Minimum wage; Labor economics; Regional labor markets; Agglomeration rent; Spatial economics

JEL Classification: J38; R12; R23

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1 Introduction

The minimum wage has been one of the most controversial topics in labor market institutions for over a century, with broader implications for firms, workers, and markets. In labor economics, the neoclassical competitive model predicts that minimum wages reduce employment, whereas alternative models in the presence of monopsonistic or oligopsonistic competition suggest that minimum wages may increase employment (Boeri and Ours, 2014; Azar et al., 2023; Dube and Lindner, 2024). Consequently, assessing the impacts of minimum wages remains an empirical challenge, evidenced by a substantial body of research and ongoing debates over inconclusive findings, both from developed countries (Neumark and Wascher, 2008; Card and Krueger, 2016; Clemens, 2019) and developing countries (Freeman, 2010; Broecke et al., 2017; Neumark and Corella, 2021).

Spatial economics offers a broader framework through general equilibrium models within the context of competitive labor markets. Initiated by Krugman (1991a,b) and later synthesized in Fujita et al. (1999), the New Economic Geography (NEG) offers theoretical approaches through general equilibrium models to analyze the spatial distribution of human and economic activities (Fujita, 2010; Brakman et al., 2019). It emphasizes that the uneven distribution arises from the balance between agglomeration forces and dispersion forces, driven by the interactions among increasing returns, transport costs, and factor mobility (Fujita et al., 1999; Fujita and Thisse, 2013; Fujita et al., 2021; Koster and Thisse, 2024). Furthermore, Baldwin et al. (2003) explores a range of models, revealing how the sweet agglomeration rent attributed to the mobile factor fosters the potential for generous public policies in the core region. This is evidenced by theoretical discussions on tax and social policies (Baldwin and Krugman, 2004; Pflüger, 2004; Borck and Pflüger, 2006) and supported by empirical findings (Koh et al., 2013; Fréret and Maguain, 2017).

Taken together, an inclusive and compelling objective emerges: how labor market institutions, such as minimum wages, affect the mobility of workers and firms. Nevertheless, this area remains comparatively underexplored, with a growing body of studies having emerged only recently. These studies have both theoretically incorporated minimum wages into spatial equilibrium models (Méjean and Patureau, 2010; Egger et al., 2012; Monras, 2019; Bai et al., 2021; Pan and Zeng, 2024), and empirically examined the impact on migration patterns (Giulietti, 2014; McKinnish, 2017; Hamaguchi and Kondo, 2022; Minton and Wheaton, 2023; Ma et al., 2024) and firms' location decisions (Rohlin, 2011; Aaronson et al., 2018; Luca and Luca, 2019; Chava et al., 2023; Li et al., 2023), offering new insights into the role of minimum wage policy in general equilibrium contexts.

Drawing on these achievements, this paper presents a comprehensive review of the existing literature, spanning from labor economics to spatial dynamics. The rest of the paper is organized as follows. Section 2 reviews the theoretical and empirical debates on minimum wages in labor economics. Section 3 presents key concepts and implications in spatial economics. Section 4 surveys the literature on minimum wages and location decisions. Section 5 concludes.

2 Minimum Wage in Labor Economics

2.1 Theoretical Debate

The employment effect is at the core of the theoretical debate regarding minimum wages. In labor economics, the impact of minimum wage increases on employment is theoretically ambiguous. According to the competitive neoclassical model, the introduction of a minimum wage above the market-clearing level leads to unemployment, as it results in higher labor supply and lower labor demand (Boeri and Ours, 2014; Neumark and Wascher, 2008, p.39 in both).

In an imperfect labor market with frictions, such as the monopsonistic or oligopsonistic competition models, minimum wages may lead to increased employment and welfare, as detailed by Boeri and Ours (2014, p.40-45), Neumark and Wascher (2008, p.53-57), Manning (2003), and Azar et al. (2023). This can occur, for instance, in more monopsonistic markets, where the prevailing wages are lower than the marginal productivity of labor, leaving room for wage increases without reducing employment. Evidence from Japan, presented in Okudaira et al. (2019), shows that the employment effects of minimum wage policies are significant and negative in plants with low surplus (where the marginal product of labor is close to the wage rate) but negligible in plants with larger surplus. Similarly, Azar et al. (2023) highlights heterogeneous effects of minimum wage increases in the United States, showing that highly concentrated markets (with a Herfindahl-Hirschman index above 0.25) experienced more positive employment effects from 2010 to 2016.

2.2 Empirical Evidence

The large and inconclusive body of empirical evidence on the effects of minimum wages on labor market outcomes spans over a century. Notable reviews include Card and Krueger (2016), Neumark and Wascher (2008), Belman and Wolfson (2014), Schmitt (2015), and Dube and Lindner (2024) for developed economy contexts, and by Belman and Wolfson (2016), Broecke et al. (2017), Neumark and Corella (2021), and Fang and Ha (2023) for the growing contexts of developing economies. Rather than revisiting and diving into this extensive debate, we follow the categorical summary suggestions by Dube and Lindner (2024, p.314-315) in the latest volume of the *Handbook of Labor Economics*, focusing on recent research through two adjustment channels: employment margins and non-employment margins.

More specifically, employment margins refer to adjustments related to workers' employment and compensation, such as wage levels and disparities, non-compliance, non-wage amenities, firm exit/entry, migration and labor force participation. Adjustments related to firm entry/exit and migration, which are particularly relevant to our main focus on geographical mobility, are discussed in more detail in Section 4.1. Non-employment margins, on the other hand, relate to firm performance and how a minimum wage hike is absorbed, including substitution with other inputs, pass-through to consumers or supplies (either by raising output prices or lowering input prices), lower profits, and productivity improvements.

2.2.1 Evidence from developed countries

The impact of minimum wages on employment margins in developed economies has been extensively reviewed by Neumark and Wascher (2008), Card and Krueger (2016), Manning (2021), and Dube and Lindner (2024), all of which suggest that the extent to which the minimum wage policy affects labor market outcomes varies with the sample dataset (e.g., region, period, industry), empirical methods, and variable specifications. Additionally, publication bias should be considered, as Andrews and Kasy (2019) suggest that studies finding a negative and significant effect of minimum wages on employment are more likely to be published. Regarding non-employment margins, insightful reviews and discussions are offered by Clemens (2021) and Dube and Lindner (2024). Below, we highlight several recent studies on the topic.

In the United Kingdom, Draca et al. (2011) use a difference-in-differences approach and find that firm profitability was significantly reduced following the introduction of the national minimum wage in 1999, particularly in industries with relatively high market power. With a similar empirical strategy, Harasztosi and Lindner (2019) examines the impact of a large and persistent minimum wage increase in Hungary in 2002, using firm-level data from 1997 to 2000. The results suggest that firms adjusted by substituting labor with capital, raising wages instead of reducing employment, and absorbing the increased labor costs primarily through higher output prices and increased total revenue, indicating a pass-through to consumers. Dustmann et al. (2022) examines the effects of Germany's 2015 minimum wage introduction at 8.50 euro per hour, which significantly compressed the wage distribution. The findings show the minimum wage is associated with higher wages without substantial employment losses, alongside a reallocation of low-wage workers to larger, higher-paying, and more productive firms.

In the United States, Chava et al. (2023) uses a dataset of 15.2 million firms from 1989 to 2013 to explore how federal minimum wage increases affect the financial health of small businesses, measured by firms' payment performance to suppliers and vendors (PAYDEX score). Employing difference-in-differences and triple-differences strategies, they find that a \$1 increase in the federal minimum wage reduces the average PAYDEX score by 0.73 points in bounded states, and the effect is stronger for labor-intensive, small, and young businesses. Focusing on the hotel industry, Agarwal et al. (2024) examines the impact of state and federal minimum wage increases on firm performance from 2000 to 2008, using a fixed-effects model and a contiguous border county design. Their baseline results indicate that doubling (a 100% increase in) the federal minimum wage leads to an average 6% reduction in annual hotel revenues and a 3.1% decline in occupancy rates.

2.2.2 Evidence from developing countries

There has been a growing body of research on the effects of minimum wages in developing countries in the last two decades. Belman and Wolfson (2016) and Fang and Ha (2023) provide comprehensive literature reviews, while Broecke et al. (2017) and Neumark and Corella (2021) conduct meta-analyses on the employment effects of minimum wages in developing countries, covering 95 and 61 studies, respectively. These studies highlight the unique characteristics of labor markets in developing economies, including the structure of the minimum wage system, robust informal sectors, enforcement challenges, the extent to which minimum wages are binding, and the vulnerability of the workers impacted. Overall, the results are mixed, with more vulnerable groups (e.g., younger workers, low-skilled individuals, and rural-urban migrants) being more negatively affected.

Taking China's minimum wage policy with its distinctive regional heterogeneity as an example, we primarily review several recent studies from China on the adjustment channels of both employment and non-employment margins. Studies using provincial-level macro data (Wang and Gunderson, 2011), firm-level data (Huang et al., 2014), and individual-level microdata (Fang and Lin, 2015) find a negative employment effect of minimum wages in China. However, Mayneris et al. (2018) provides compelling evidence of no significant disemployment effect following the 2004 *Minimum Wage Regulations* reform. Using firm-level data from 1998 to 2007 and employing difference-in-differences and instrumental variable strategies, they indicate that surviving firms absorb the wage cost shock by increasing wages and productivity, allowing them to maintain profitability and limit job losses. Long and Yang (2016) and Cuong (2017) also show evidence that minimum wage increases do not significantly affect the profitability of private firms in China and Vietnam, respectively.

Several empirical studies using firm-level datasets provide evidence that minimum wage hikes increase the likelihood of outward foreign direct investment (Fan et al., 2018), raise firm markups estimated using a cost-minimizing method (Du and Wang, 2020), increase firms' adoption of robots (Fan et al., 2021), increase financialization (Du et al., 2022), and boost research and development investments (Wei et al., 2023). Additionally, Haepp and Lin (2017) finds that minimum wage increases reduce human capital investment, measured by training expenditures per worker, whereas Geng et al. (2022) reports a positive effect on capital investment, measured by changes in net fixed assets plus depreciation relative to total assets.

Concerning wage inequality, Lin and Yun (2016) finds that the minimum wage policy reduces the earnings gap between the median and the bottom decile over the period from 2004 to 2009, based on the annual Urban Household Survey data. Howell (2020) uses an unconditional quantile regression framework with the 2012 China Household Ethnic Survey data, showing that minimum wages lead to wage compression at the lower end of urban workers' wage distribution. This effect is larger for low-skilled workers in ethnic minoritydominated areas, suggesting a reduction in the ethnic-based wage gap. The latest study by Chen and Xu (2024) suggests that minimum wage increases help narrow the gender wage gap at the bottom and middle parts of the wage distribution, using data from the 2011-2019 China Household Finance Survey.

In conclusion, while partial equilibrium models in labor economics offer valuable insights, their predictions regarding the employment effects of the minimum wage remain inconclusive. Empirical findings from both developed and developing economies further reflect this ambiguity. Given the increasing mobility of workers and firms across regions, it is crucial to move beyond a single-market perspective and adopt a broader approach – such as spatial economics within a general equilibrium framework – to improve the resolution of analysis and provide a more comprehensive understanding of how minimum wage policies shape labor markets and regional economies.

3 Spatial Economics: Key Concepts and Implications

3.1 Increasing Returns, Transport Costs, and Factor Mobility

Spatial economics, also known as the New Economic Geography (NEG), offers a comprehensive approach through general equilibrium models to study the location of economic activity – where it occurs and why (Fujita et al., 1999). It provides modern analytical tools to explain the uneven distribution of human and economic activity across space, ranging from various geographical scales, including international and regional to urban and local levels. (Fujita and Thisse, 2013; Brakman et al., 2019; Koster and Thisse, 2024).

In the early 1990s, Krugman (1991a,b) present the first spatial general equilibrium framework – the *core-periphery model*, by integrating the Dixit-Stiglitz monopolistic competition model (Dixit and Stiglitz, 1977) with iceberg transport technology (Samuelson, 1954) in a 2 regions \times 2 sectors \times 2 production factors economy, as well as extending the framework to urban systems (Krugman, 1993).¹ Krugman demonstrates how the three-way interactions among increasing returns, transport costs, and factor mobility lead to the emergence and evolution of spatial economic structures (Fujita, 2010). In other words, it is the balance between agglomeration and dispersion forces that shapes the spatial distribution of activities.

Increasing returns, whether internal or external to firms, are fundamental to spatial economics, as they manifest themselves and foster the cumulative causation that leads to agglomeration (see Fujita et al., 1999; Fujita and Thisse, 2013; Fujita et al., 2021, among others). In the *core-periphery model*, the agricultural sector produces a homogeneous good with constant returns under perfect competition, while the manufacturing sector produces a large variety of differentiated goods with increasing returns under monopolistic competition. The increasing return technology renders market-size effects operational through changes in varieties, which are linked to the *price index effect*. The more differentiated varieties are produced, the lower the local price index, resulting in higher real wages and a larger home market. This, in turn, tends to have disproportionately larger manufacturing sectors to produce these varieties, known as the *home market effect*.

Transport cost, representing various obstacles to trade between locations, is a key parameter in NEG models (Fujita et al., 1999; Brakman et al., 2019). It plays a crucial role in determining the spatial distribution of workers and firms in the *core-periphery model*. Sufficiently high transport costs result in a symmetric equilibrium (dispersion pattern), while sufficiently low transport costs lead to a core-periphery equilibrium (agglomeration

¹We limit the following discussion of the three key concepts to the basic *core-periphery model*. For detailed reviews and discussions on NEG model extensions, see Fujita and Thisse (2013), Baldwin et al. (2003), and Brakman et al. (2019).

or concentration pattern). Intermediate transport costs, on the other hand, can give rise to multiple equilibria.

Factor mobility is a central concept in spatial economics, as mobile workers and firms are free to choose their locations, subject to utility or profit maximization. This defines the spatial equilibrium, where all agents have no incentive to relocate (Koster and Thisse, 2024). Taken together, the spatial distribution of human and economic activity is the outcome of the balance between agglomeration and dispersion forces, arising from the interactions among increasing returns, transport costs, and factor mobility.

3.2 The Agglomeration Rent

A key feature of the *core-periphery model* is the concept of "agglomeration rent". More specifically, for a worker located in the core, when full agglomeration is the stable equilibrium, the agglomeration rent measures the loss incurred if she were to relocate to the periphery. In NEG models, the agglomeration rent is generally accrued to the mobile factor in the core region.

Baldwin et al. (2003) presents a comprehensive analysis of this bell-shaped agglomeration rent across various models, suggesting that when the economy starts at a stable core-periphery (agglomeration) equilibrium, the sweet agglomeration rent provides the potential strength for marginal policy changes to not alter economic outcomes. That is, the core region has room to implement more generous public policies, to some extent, depending on the level of trade freeness.

Within the NEG framework, Baldwin and Krugman (2004) and Borck and Pflüger (2006) analyze tax competition in the presence of agglomeration forces and goods market integration (i.e., lower transport costs). They show that the agglomeration rent allows the core region to impose a higher tax rate without losing mobile capital, and the extent of such rent is a bell-shaped function of the level of integration. Pflüger (2004) offers a similar theoretical discussion regarding social policies, such as unemployment benefits and wage taxes. Empirical studies by Koh et al. (2013) in the German context and Fréret and Maguain (2017) in the French context provide evidence of taxable agglomeration rents for local governments in regions with strong agglomeration economies. In contrast, Brülhart and Simpson (2018) finds that, conditional on the number of firms, governments tend to offer more generous subsidies to firms in more agglomerated industries in areas with a higher density of industry employment in Great Britain.

4 Reconsidering Minimum Wage in Spatial Context

Despite the extensive debate surrounding the impact of minimum wages on employment, as discussed in Section 2, there remains limited understanding of how such wage distortions affect the location decisions of workers and firms. This issue can be viewed as a geographical refinement of the employment responses, as suggested by Dube and Lindner (2024). Section 4.1 presents a comprehensive review of the literature exploring the effect of minimum wage on location decisions in spatial contexts, both theoretically and empirically.

4.1 Minimum Wage and Location Decisions

This subsection surveys the theoretical and empirical literature regarding minimum wage and location decisions. We begin with an overview of spatial general equilibrium models that incorporate minimum wages, then move on to a review of empirical evidence concerning the impact of such wage distortions on migration and firms' location decisions, respectively.

4.1.1 Theoretical approach: minimum wage and spatial equilibrium

Theoretically, the relationship between the minimum wage and location decisions is ambiguous (Manning, 2003; Méjean and Patureau, 2010; Giulietti, 2014; Monras, 2019; Dube and Lindner, 2024; Ma et al., 2024). For individuals, regions with higher minimum wages may either drive migrants away due to potential unemployment or attract them in search of higher expected earnings. For firms, the minimum wage policy can act as a deterrent, given the associated increase in production costs, or as a benefit, due to the potential for increased household income and larger local markets.

Incorporating labor market institutions, particularly minimum wages, into NEG models has only emerged in recent decades. In general, the channels and impacts of minimum wage in these models have varied and diverged according to specific model settings. Theoretical literature argues that the geographical distribution effect of minimum wage policy is closely related to labor substitutability (Méjean and Patureau, 2010), local labor demand elasticity (Monras, 2019), firm heterogeneity (Egger et al., 2012; Bai et al., 2021), the power of goods market distortions (Pan and Zeng, 2024), and the level of transport costs (Pflüger, 2004; Strauss-Kahn, 2005).

Specifically, Méjean and Patureau (2010) explicitly examines the ultimate impact of minimum wages on firms' location decisions in a spatial general equilibrium framework, with a particular focus on the substitutability between skilled and unskilled workers (both immobile across regions). The results suggest that the negative effect of the associated cost competitiveness loss appears to be dominant, with the minimum wage hike more likely to reduce the local region's attractiveness and deter firms continuously with endogenous skilled wages. The claim aligns with that of Strauss-Kahn (2005), which investigates the vertical linkages and highlights the role of trade costs in stimulating vertical specialization across asymmetric countries. Egger et al. (2012) develops a two-country model with a single factor (immobile labor), monopolistic competition in intermediate goods production, and heterogeneous firms to analyze the impact of minimum wages. They indicate that a higher minimum wage in one country leads to the exit of inefficient firms, and harms workers at home and abroad.

More recently, Monras (2019) offers a simple Rosen-Roback spatial equilibrium model with free mobility, constant returns to scale, and unemployment in a two-region economy to explore the effect of minimum wage hikes on migration. He shows that how internal migrants respond to a higher minimum wage depends on the local labor demand elasticity and on how unemployment benefits are funded (locally or nationally). The region with a higher minimum wage may prove attractive through increased unemployment benefits that are nationally funded. However, if the local labor demand elasticity is high (above 1), the impacts of higher minimum wages on migration are always negative. In the context of international trade, Bai et al. (2021) incorporates minimum wages and develops a new model with heterogeneous firms under perfect competition in a Heckscher-Ohlin-Samuelson setting. The findings predict that a binding minimum wage leads to increases on firm-level exit and productivity, resulting in harm to both domestic and foreign workers. Conversely, from the viewpoint of the goods market, the latest study of Pan and Zeng (2024) demonstrates the effectiveness of a minimum wage policy within a spatial general equilibrium framework with heterogeneous firms. The theoretical analysis, supported by empirical evidence from Japan, suggests that the introduction of minimum wages has the potential to mitigate distortions in the goods market and enhance overall social welfare.

4.1.2 Empirical evidence: minimum wage and migration

In contrast to the extensive literature on the employment effect of minimum wages reviewed in Section 2.2, there is a paucity of studies that explicitly examine the impact of minimum wages on geographical labor mobility. Table 1 provides a comprehensive overview of this empirical literature, showing that the existing studies focus mainly on the United States and provide inconclusive results, in line with theoretical predictions.

In the US context, most early studies in the 2010s focused on the immigration population and used the two-way fixed effects model. Cushing (2003), Boffy-Ramirez (2013) and Giulietti (2014) suggest that minimum wage increases appear to be a magnet for lowskilled migrants/immigrants, while Cadena (2014) and Martin and Termos (2015) show an opposite impact: low-skilled migrants seem to move away from states with higher minimum wages. Specifically, a 10% increase in the minimum wage leads to a roughly 8% decrease in the number of low-skilled immigrants arriving within 10 years (Cadena, 2014), or a \$1 rise in the local minimum wage leads to 3.1% more out-migration of low-skilled workers (Martin and Termos, 2015). Moreover, for cross-border commuters, McKinnish (2017) provides compelling evidence using a triple difference approach that low-wage cross-border workers tend to commute away from higher minimum wages, in contrast to Kuehn (2016), which uses a gravity model and finds that a 10% increase in the minimum wage of working county is associated with a 25% increase in cross-county commuter flows.

Recent research of Monras (2019) argues that low-skilled workers migrate away from states that increase minimum wages. He employs an event study design based on 441 events, all state- and federal-level changes in the minimum wage between 1985 and 2012. The findings indicate that the in-migration rate of low-skilled workers with at most a high school diploma declines in response to the policy change. Conversely, the out-migration rate appears to undergo no substantial change. Minton and Wheaton (2023) presents comparable evidence utilizing an up-to-date machine learning algorithm to predict earnings one year ago and identify near-minimum-wage individuals. They construct treatment and control

Study	Region	Strategy	Effect on migration	
Cushing (2003)	US	CL; MG	Increase in the probability of low-income migration	
Boffy-Ramirez (2013)	US	\mathbf{FE}	Increase the number of immigrants arriving in 2–4 years	
Cadena (2014)	US	\mathbf{FE}	Reduce the number of low-skilled immigrants	
Giulietti (2014)	US	ML; IV	Increase the share of low-skilled immigrants; OLS under-	
			estimates the impact	
Martin and Termos (2015)	US	FE; MG	Increase out-migration of low-skilled workers; no signifi-	
			cant effect on high-skilled migrants	
Kuehn (2016)	US	MG	Increase in cross-county commuters	
McKinnish (2017)	US	TD	Reduce low-wage cross-border commuters	
Monras (2019)	US	ES	Decrease the in-migration rate of low-skilled workers;	
			no change or if anything increase slightly in the out-	
			migration rate	
Hamaguchi and Kondo $\left(2022\right)$	Japan	FE; IV; CF	Spatial gaps in real minimum wages motivate new high	
			school graduates to seek jobs outside resident prefectures;	
			OLS overestimates the impact	
Minton and Wheaton (2023)	US	ES; DiD; TD	Increase in the net migration rate of near-minimum-	
		MLA	wage individuals; driven almost entirely by reduced out-	
			migration; little or no effect on in-migration	
Ma et al. (2024)	China	FE; DiD	Decrease in the probability of out-migration; low-wage	
		RB; IV	workers respond more strongly	
Moog (2024)	Germany	DiD; ES	Increase in the out-migration of individuals with migrant	
			backgrounds; no effect on the out-migration of native-	
			born low-skilled workers; no effect on in-migration for	
			both	
Feld (2024)	EU	FE; IV	Increase in the regional inflow rate of low-skilled migrants	

Table 1: The impact of minimum wages on migration

Notes: This table presents a comprehensive overview of the empirical literature regarding the impact of minimum wage increases on migration. US = United States; EU = European Union. CL = conditional logit model; MG = modified gravity model; FE = fixed effects model; ML = multiple linear regression; IV = instrumental variable method; TD = triple-differences design; ES = event study design; CF = counterfactual analysis; DiD = difference-in-differences design; MLA = machine learning algorithm; RB = refined border approach.

groups using the predicted wages before moving, as predicted by the algorithm. The event study design, which focuses on individuals whose predicted earnings are slightly above the minimum wage, provides compelling evidence that a \$1 minimum wage increase is associated with a 1.5 percentage point increase in the net migration rate. However, the outcome is driven by declines in out-migration rather than increases in in-migration, which is contrary to the findings of Monras (2019). In other words, individuals are more likely to stay in their state with a higher minimum wage rather than relocate.

There is also a small amount of empirical evidence available for other countries. In the latest study regarding the case of Japan, Hamaguchi and Kondo (2022) finds a positive effect that the spatial gaps in real minimum wages between urban and rural prefectures motivate new high school graduates to search for jobs outside resident prefectures. However, contrary to Giulietti (2014), their results with the instrumental variable method (the Bartik-like instruments with geographical weights based on previously matched job flows) and

the counterfactual evaluation of a uniform minimum wage policy both suggest that the simple correlation analysis overestimates the causal impact. That is to say, in addition to minimum wage disparities, urban amenity and non-wage factors also play a crucial role in understanding teenagers' spatial job-seeking behavior.

Moog (2024) examines the impact of the introduction of a uniform minimum wage in Germany in 2015 on internal migration, identifying the heterogeneous effects between individuals with a migrant background and native-born. He uses a difference-in-differences specification with continuous treatment and captures migration flows based on the number of individuals changing their district of residence between 2010 and 2019. The results suggest that introducing a uniform minimum wage generally does not affect in-migration. On the other hand, out-migration from high-bite districts (those with a high share of lowpaid workers) increases on average by 10% in the post-treatment period, by 20%–40%for low-skilled workers with migrant background, and has no effect on low-skilled native workers. This finding is somewhat consistent with that of Cadena (2014) in the US context, showing the flow of low-skilled immigrants (foreign-born individuals) away from minimum wage hikes.

Ma et al. (2024) presents evidence within the Chinese context that is analogous to that of Minton and Wheaton (2023). Specifically, by combining individual-level migration data in 2013 and 2015 with county-level minimum wage variations in China, the baseline results, estimated using a two-way fixed effects model, indicate that a 10% increase in the local minimum wage reduces the probability of out-migration by 1.52 percentage points. The latest working paper by Feld (2024) also suggests that higher minimum wages in Europe attract low-skilled migrants. Using data from 103 regions across 6 European countries (2003-2019) and employing a fixed effects model with an instrumental variable approach, the study finds that a 10% rise in the local Kaitz index increases the inflow rate of low-skilled individuals by 0.3 percentage points.

To conclude, what policy implications can we draw from the mixed evidence? Studies that support the negative effect of minimum wages on out-migration imply that a higher minimum wage may not be sufficiently positive in stimulating in-migration from other regions, but could be an effective tool to encourage local low-wage workers to remain in place. Conversely, studies that support a positive impact of minimum wages on in-migration suggest that a higher minimum wage in urban areas may serve as an incentive for migrants, while worsening the labor supply market in economically disadvantaged regions.

4.1.3 Empirical evidence: minimum wage and firms' location decisions

We now turn to another aspect of economic mobility, namely the impact of minimum wage policy on firms' location decisions. Intuitively, raising the wage floor may discourage new firms from entering the market. Further, as discussed in Section 2.2, an increase in labor costs due to minimum wage hikes can either reduce firm profitability or enhance firm productivity, potentially forcing low-productivity firms to exit. Consequently, the dynamics of firm exit and entry serve as important mediators in the response to wage floors (Dube and Lindner, 2024). Table 2 presents a review of empirical research investigating the impact of minimum wage increases on firm exit/entry.

Study	Region	Period	Strategy	Effect on firm exit/entry
Card and Krueger (1994)	US	1986–1991	ML	Increase insignificantly the number of oper-
				ating or newly opened McDonald's stores
Orazem and Mattila (2002)	Iowa	1989 - 1992	ML	Reduce the number of firms
Draca et al. (2011)	UK	1996 - 2002	DiD	Increase in the exit rate and reduction in the
				entry rate, although both insignificantly
Rohlin (2011)	US	2003 - 2006	RB	Reduce the share of new firms (≤ 1 year), par-
				ticularly in industries with higher reliance on
				low-education workers; no effect on existing
				firms (≥ 4 years)
Aaronson et al. (2018)	US	2001 - 2006	RB	Increase in both the exit and entry rates of
				fast-food restaurants; no effect on full-service
				restaurants or other firms
Harasztosi and Lindner (2019)	Hungary	1998 - 2004	ML	No effect on the entry rate
Mayneris et al. (2018)	China	1998 - 2007	DiD; IV	Increase in the exit rate of exposed firms
Luca and Luca (2019)	US	2008-2016	LP; DiD	No overall effect on the restaurant exit rate;
				increase the exit rate for lower-quality restau-
				rants; reduce the entry rate of restaurants
Bai et al. (2021)	China	1998 - 2007	IV; FE	Increase in the probability of firm exit
Kong et al. (2021)	China	2006-2016	RB	Reduce the number of new business entries
Dustmann et al. (2022)	Germany	2011-2016	DiD; ES	Reduce the number of firms; more reduction
				in the number of very small businesses
Chava et al. (2023)	US	1989-2013	RB	Increase in the exit rate in states bounded by
				the federal minimum wage
Li et al. (2023)	China	1997 - 2012	RB	Reduce the number of new business entries

Table 2: The impact of minimum wages on firm exit/entry

Notes: This table provides an overview of the empirical literature regarding the impact of minimum wage increases on firms' entry and exit. UK = United Kingdom; US = United States. ML = multiple linear regression; DiD = difference-in-differences design; RB = refined border approach; IV = instrumental variable method; LP = linear probability model; FE = fixed effects model; ES = event study design.

It is not new to examine the effect of minimum wages on firm entry, yet surprisingly, there is a lack of empirical evidence. The earlier benchmark study of Card and Krueger (1994) has investigated the impact of minimum wages on store opening. They compare the numbers of operating or newly opened McDonald's stores in different states between 1986 and 1991, and find little evidence that higher minimum wages significantly affect the net number of restaurants or the rate of new openings. The absence of a negative effect on firm entry is also demonstrated in Draca et al. (2011) and Harasztosi and Lindner (2019), respectively, within the contexts of the United Kingdom and Hungary. Whereas, Aaronson et al. (2018) employs a county border discontinuity approach and suggests that restaurant entry rises following a minimum wage hike. Utilizing five state-level minimum wage hikes, they find that a 10% increase in the minimum wage raises the entry rate of fast-food restaurants by 13.7%, particularly for chains by 26.4%. However, there is no impact on the entry of full-service restaurants, hotels and motels, or other establishments.

Several studies support the entry-discouraging effect of minimum wage policies. For instance, using a refined border discontinuity approach and firm-level data from the Dun and Bradstreet Marketplace files, Rohlin (2011) shows that a \$1 increase in the minimum wage decreases the share of new establishments (in operation for one year or less) in an area relative to its comparison area by roughly 6%, particularly in industries with a high reliance on low-education workers. Similar evidence is presented in Luca and Luca (2019), employing a difference-in-differences identification strategy and firm-level restaurant data from the online review platform Yelp. The findings suggest that a \$1 increase in the minimum wage is associated with an approximate 4 to 6% reduction in restaurant entry rates. Li et al. (2023) employs a similar identification strategy to that of Rohlin (2011) in the context of Chinese adjacent county pairs between 1997 and 2012. The results indicate that a 10% increase in minimum wages reduces new business entries by 2.69%, particularly in industries with larger shares of low-wage unskilled workers. The negative impact of minimum wage hikes on new firm registrations in China is also found in Kong et al. (2021).

With regard to the impact on firm exit, existing studies offer a general consensus that minimum wages appear to force out firms that are more exposed to such legislation and have no notable effect on others, which is broadly consistent with the findings concerning the employment effect discussed in Section 2.2. For instance, the findings of Mayneris et al. (2018) and Bai et al. (2021), both based on firm-level data from 1998 to 2007, suggest that the minimum wage hike in China is associated with an increased firm exit rate. In the US context, Chava et al. (2023) finds that for a \$1 increase in the federal minimum wage, the exit probability rises by almost 12% for establishments located in the bordering county with a higher effective minimum wage. Aaronson et al. (2018) shows that a 10% increase in the minimum wage is associated with a 24.0% rise in exit rates among fast-food establishments, while there is no effect on full-service restaurants or other non-restaurant establishments. Luca and Luca (2019) indicates that a 1 increase in the minimum wage results in a 10%rise in the exit rate for lower-quality restaurants, though no significant effect is found for overall restaurants or those with higher ratings. Rohlin (2011) also highlights the negligible impact of minimum wages on overall business activity. The findings indicate that existing establishments, defined as firms with four or more years of operation and accounting for roughly 96% of the total sample, are not found to be affected by the minimum wage policy, including those with a high reliance on low-education workers. Regarding international investment, Delbecque et al. (2014) finds that the minimum wage legislation has a minor and ambiguous effect on French firms' location decisions in 18 OECD countries from 1992 to 2002. Luo et al. (2022) shows that the minimum wage hike in China does not significantly affect the probability of divestment by Japanese multinational firms from 1995 to 2016.

In general, as argued in Dube and Lindner (2024), empirical evidence on the firm dynamics implies that minimum wage increases are likely to reduce the total number of firms, as the exit rate increases, while the entry rate may not. This is supported by Dustmann et al. (2022), for example. They employ an event study design and a difference-in-differences approach, utilizing a continuous exposure measure for all 401 districts, to examine the impact of the national minimum wage introduction in Germany in 2015. The findings suggest that the minimum wage legislation is associated with a reduction in the number of firms (by 0.45%) within districts with greater exposure, with the reduction being more pronounced for very small businesses with no more than two employees (by 0.65%).

5 Conclusion

In this paper, we offered an integrated perspective that bridges labor economics and spatial economics, providing new insights into the broader labor market and spatial implications of minimum wage policies. From the standpoint of traditional labor economics, both neoclassical competitive and partial equilibrium models yield ambiguous theoretical predictions regarding the employment effect of minimum wages, rendering empirical analysis essential. Yet, the empirical literature–spanning developed and developing countries–has produced mixed results, often shaped by variations in data sources, empirical strategies, and contextual factors such as region, period, and industry.

By incorporating a spatial economics lens, particularly through general equilibrium frameworks and NEG models, we gain a deeper understanding of how agglomeration forces, transport costs, increasing returns, and factor mobility influence regional economic outcomes. These models suggest that core regions benefiting from sweet agglomeration rents may have greater capacity to sustain generous public policies, including higher minimum wages. We also reviewed theoretical and empirical work on the effects of minimum wages on migration and firm location decisions, though findings remain inconclusive.

Overall, while the existing literature offers valuable insights, it also reveals notable gaps. Future research would benefit from further integration of spatial and labor economic approaches to better capture how minimum wages affect the spatial distribution of workers, firms, and broader labor market outcomes.

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