Mismatch in the 21st Century: An Overview

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Abstract

Technological change is reshaping labor market dynamics at an increasingly rapid pace, making it crucial to understand the interaction between workers' skills and job requirements. Mismatch between the two plays a key role in shaping wages, productivity, career mobility, and unemployment. This paper provides an up-to-date survey of the theoretical and empirical literature on the sources, measurement, and consequences of worker–job mismatch. We classify the theoretical drivers of mismatch into two main categories—search frictions and incomplete information—and empirical measures into three groups, depending on whether they rely on (i) observed matches and/or expert evaluations, (ii) workers' subjective assessments, or (iii) a combination of the two. We review recent contributions emphasizing the importance of multidimensional skills and the use of machine-learning techniques to construct measures of occupational skill mismatch from employer–employee data when direct skill measures are unavailable. We then survey the evidence on the impact of financial constraints, employment protection legislation, managerial practices, and recent technological changes on mismatch and its consequences for workers' careers and firm productivity. Finally, we discuss policy interventions aimed at reducing mismatch and outline directions for future research.

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1. Introduction

Heterogeneity is an intrinsic feature of labor markets: on the one hand, workers differ in their innate abilities, skill sets, and preferences; on the other, jobs involve a variety of tasks, while workplaces and firms exhibit heterogeneity in available amenities. Productivity, as well as workers' job satisfaction, is the result of a match between these two sides, and it is then natural to consider the quality of worker-firm and worker-job matches crucial for both firms' efficiency and workers' welfare. Understanding the nature, determinants, and consequences of occupational mismatch has become a central focus for researchers and policymakers (Brunello and Wruuck, 2021). This is particularly true in a labor market shaped by rapid and frequent technological shocks. This paper provides an up-to-date survey of the main theoretical approaches and empirical evidence in this field, as well as of the policies that can potentially reduce the level of mismatch.

We begin by noting that the drivers of mismatch identified by the theoretical literature fall into two core concepts: search costs and imperfect information. As discussed in Section 2, heterogeneity across workers, firms, and jobs, combined with decentralized labor market interactions, requires workers to search—sometimes extensively—for suitable employers. The costliness of this search induces workers to accept jobs that do not optimally match their skills. Moreover, incomplete information on both sides of the market contributes to shaping the alignment between workers' skills and job requirements: if the worker's type is not observable to the firm and/or the worker herself, the match quality is not known ex ante. Acquiring this information is costly and can lead to substantial mismatch.

Section 3 discusses the forms that mismatch can take in the labor market—i.e., horizontal and vertical—and related notions such as skill gaps, shortages, and obsolescence. The empirical literature has used a broad set of measures of mismatch, surveyed in Section 4. They range from objective indicators (based on realized match distributions or expert assessments) to subjective indicators (typically survey-based), as well as mixed approaches, and vary with the availability of data on workers' education, skills, and tasks. Among the objective indicators, we focus on recent contributions that highlight the importance of considering multiple dimensions of skills (and skill requirements) to evaluate the quality of a match: the multidimensional skill mismatch measures proposed

by Lise and Postel-Vinay (2020), Guvenen et al (2020), Fredriksson et al (2018), and the machine-learning-based measure developed by Coraggio et al. (2025). Section 4 also discusses measures of skill shortages, currently an increasingly salient issue in European labor markets.

Section 5 examines the economic factors that interact with search frictions and informational imperfections, influencing the prevalence of mismatch. The section also considers how mismatch responds to the macroeconomic cycle, to structural determinants such as education and technology, and to major shocks, such as the "China shock," and the COVID-19 pandemic.

Section 6 turns to the consequences of mismatch for firms and workers, and to their persistence. Evidence shows that the quality of workers' allocation matters for their career development, as well as for firms' productivity. Consistently, disruptions that break successful matches have persistent adverse effects. Section 7 reviews interventions to reduce mismatch and Section 8 identifies open questions, emphasizing the importance of improving data sources and further research, in light of ongoing structural transformations of labor markets and production processes that will require extensive firm restructuring and worker reallocation.

2. Theoretical Frameworks

Skill mismatch emerges when workers' qualifications or abilities do not align with job requirements. Clearly, this issue arises from the heterogeneity in firms and workers operating in decentralized and frictional labor markets.

2.1 Search Models

In search-based theories, labor markets are decentralized, and workers and firms face costly, uncertain matching processes. In random search models, beginning with McCall (1970), workers sequentially receive wage offers and decide whether to accept them based

on their reservation wages. Biased beliefs and search costs can lead to prolonged unemployment, with significant scarring effects (Jarosch, 2023; Mueller et al., 2021).

The framework proposed by Diamond, Mortensen, and Pissarides in a series of contributions modifies this setting by assuming that wages are not posted by firms but result from bargaining between firms and workers. In this context, matches between workers and firms are determined by a reduced-form "matching function" that takes as inputs the numbers of job seekers and vacancies in the market (Diamond, 1982; Mortensen and Pissarides, 1994). As the ratio of vacancies to job seekers increases—i.e., labor market tightness increases —workers find jobs more easily—a thick market externality—but firms find workers more slowly—a congestion externality. The efficiency of the market depends on the balance between these two externalities and may be reduced by holdup problems (Acemoglu and Shimer, 1999) or job rationing (Michaillat, 2012; Landais et al., 2018). Allowing for on-the-job search, Burdett and Mortensen (1998) highlight how job-to-job transitions create wage dispersion and potential misallocation if firms differ in productivity, while later work by Postel-Vinay and Robin (2002) and Cahuc et al. (2006) shows how heterogeneity, counteroffers, and employer competition contribute to shaping wage dynamics and matching quality.

Directed search models shift the attention to workers' ability to target specific vacancies. Here, workers and firms anticipate congestion effects and adjust applications and wages accordingly (Acemoglu and Shimer, 1999; Albrecht et al., 2006; Shi, 2002). These models show how coordination failures, finite applications, and on-the-job search can generate wage inequality and inefficiency (Menzio and Shi, 2011).

All these models focus on the search process, while abstracting from the complexity of skills definition. A complementary line of research studies multidimensional skills, moving beyond one-dimensional competence. Lise and Postel-Vinay (2020) allow for different skills—cognitive, manual, and interpersonal—to have different returns, accumulation functions, and obsolescence rates. Mismatch costs will then vary across skill types. Choné and Kramarz (2021) study how outcomes differ when skills can be sold separately and show that, when skills can be unpacked, the matching equilibrium is more polarized.

2.2 Imperfect Information Models

Mismatch may also arise from imperfect information. Workers, firms, or both may be unsure of their actual skill levels and job requirements. This setting generates predictions about how mismatch may evolve with job-to-job mobility, as uncertainty about skills and requirements may change through information accumulation (Gibbons et al., 2005). Jovanovic (1979) predicts that match quality improves with experience as firms learn about workers' productivity, and Topel and Ward (1992) show that many job switches occur in the first few years of workers' careers and that job changes are associated with significant wage gains, suggesting possible improvements in matches. Recent empirical work based on Swedish administrative data and direct measures of match quality (Fredriksson et al., 2018; Coraggio et al., 2025) is in line with these predictions.

Information asymmetries across firms can also distort internal mobility: Waldman (1984) argues that firms may underpromote workers to avoid poaching, thereby reducing allocative efficiency; later work by Waldman and Zax (2020) shows how this can bias firms toward investing in firm-specific rather than general human capital. Workers may counteract these frictions through educational signaling (Ordine and Rose, 2009). Yet, schooling choices are not immune to externalities and potential inefficiencies. When education expands, the marginal entrant alters average ability in both educated and uneducated groups, affecting employment probabilities and potentially generating socially inefficient overinvestment (Charlot and Decreuse, 2005).

2.3. Models with Search, Learning, and Multidimensional Skills

Recent models combine multidimensional skills with directed search and imperfect information, in which search and learning occur together, and workers can reallocate themselves along a job complexity ladder and across career paths requiring different skills.

Baley et al. (2022) formalize and estimate such a model and find that, in this context, recessions have ambiguous effects on mismatch. Two opposing forces are at play: on the one hand, under-qualified workers are more likely to be fired ("cleansing effect"), reducing

mismatch in ongoing work relationships; on the other hand, overqualified workers are more likely to be hired for lower-complexity jobs, increasing the mismatch in new hires ("sullying effect"). They also uncover an interaction between job mobility and mismatch: transitions within a given career path tend to reduce mismatch, as workers learn about their skills; by contrast, transitions into new career paths tend to increase mismatch, as workers have less accurate beliefs about the skills they have not previously used.

Guvenen et al. (2020) also develop a dynamic model of occupational choice and human capital accumulation with multidimensional skills and show that mismatch not only leads to lower wages and slower growth in workers' current jobs, but also produces a scarring effect that lowers their wages in subsequent occupations.

3. Forms of Mismatch

Surveying the literature on mismatch models, it is clear that skill mismatch is a multifaceted concept. This complexity is reflected on the forms that mismatch can take. Mismatch can be *vertical*—a discrepancy between the level of skills a worker possesses and those required for the job—or *horizontal*, referring to a misalignment between a worker's field of study and the skills required.

With vertical mismatch, workers' skill levels exceed or fall short of job requirements (over- or under-skilling). Early work typically measured skill levels through education, leading to the notions of over- and under-education (Freeman, 1976; Duncan and Hoffman, 1981). Education is, though, an imprecise proxy for skills acquired on the job and for firm-specific requirements (McGuinness and Wooden, 2009). Recent studies use more detailed assessments (Desjardins and Rubenson, 2011; Flisi et al. 2017) and distinguish clearly between being over- or under-skilled. Evidence focuses primarily on over-skilled workers: they experience wage penalties relative to properly matched peers with the same education or skills, though they still earn more than less-educated coworkers in the same jobs (Leuven and Oosterbeek, 2011; McGuinness et al., 2018). Evidence on under-skilled workers is mixed, though some studies find adverse effects on firm productivity (Kampelmann and Rycx, 2012).

Horizontal mismatch concerns the content of skills. When measured through education, it captures whether workers are employed in jobs unrelated to their field of study. This also is a crude measure because it neglects learning and specialization acquired on the job. Empirically, horizontally mismatched workers tend to earn lower wages, express lower job satisfaction, and often regret their academic choices (Somers et al., 2019).

A further layer of complexity arises from the multidimensionality of skills, with both cognitive and non-cognitive components, so that mismatch may occur along several dimensions (e.g., Lise and Postel-Vinay, 2020; Guvenen et al., 2020).

Related concepts include skill gaps (workers lacking skills required in their current job), skill shortages (firms' difficulty in filling vacancies), and skill obsolescence (a decline in the economic value of skills due to aging or technological change). Skill shortages appear common in self-reported data, but less so in vacancy-based evidence (Weaver and Osterman, 2017; Cedefop, 2015). Skill obsolescence may result from depreciation or from technological shocks such as computerization (Autor et al., 2003; Hudomiet and Willis, 2022). As these issues differ in nature, measurement often requires aggregating information at the worker level (e.g., for obsolescence) or at the firm level (e.g., for shortages).

4. Measuring Mismatch

Central to all measures of mismatch is the choice of what constitutes a good match, which requires information on both workers' skills and job requirements. To do so, researchers use objective, subjective, and mixed methods. On the workers' skill side, a longstanding reliance on educational attainment as a proxy for skills persists because schooling is easily observed. Yet, education-based measures fail to capture the evolution of skills through experience, differences across educational systems, and discrepancies between qualifications and abilities used in the workplace.

Objective methods evaluate worker-job match quality by comparing workers' skills to the skill requirements of their job. In expert-based approaches, job classification systems such as DOT or O*NET are used to define the education or skills required for each occupation.

These requirements are then compared with workers' qualifications. Importantly, recent developments in the literature have highlighted the fundamental importance of considering multidimensional skills, as emphasized by Lise and Postel-Vinay (2020) and Guvenen et al. (2020).

A second type of objective measures defines job requirements based on the realized distribution of matches, inferring the skills required for an occupation from those of the workers who hold that job. Early contributions compared workers' education with the mean or modal values within occupational groups (Verdugo and Verdugo, 1989; Kiker et al., 1997). A more refined and theoretically-grounded version, introduced by Fredriksson et al. (2018), takes into account the importance of multidimensional skills and defines required skills as those of tenured workers in the same occupation-firm cell, the idea being that tenure results from good matches. Neffke et al. (2024) further extend realized-match methods by constructing indices of skill redundancies and shortages in job switches by displaced workers, using rich German survey data aggregated into multidimensional skill factors. Relatedly, the machine-learning approach proposed by Coraggio et al. (2025) relies on administrative data and machine learning techniques to infer the optimal assignment of workers' characteristics (and job histories) to occupations from the realized matches in highly productive firms. Mismatch is then measured as deviations from these estimated "optimal" assignments, and is shown to correlate negatively with firm productivity and with workers' wages, and positively with the likelihood of switching employer. This methodology overcomes some potential limitations of expert-driven measures and previous measures based on realized matches. Expert-driven measures, indeed, may become outdated quickly and depend on analysts' judgment, whereas this method allows for changes in the optimal assignment of workers to tasks over time. Multidimensional measures based on realized matches, on the other hand, require detailed information on workers' skills, which is often missing from administrative datasets that nevertheless constitute the state-of-the-art data used for causal analysis in labor economics. The ability to apply this measure without direct information on skills clearly comes at the cost of some loss of transparency, since the mapping is between workers' CVs and jobs rather than between skills and jobs. Furthermore, this measure relies on the assumption that realized matches in the most productive firms reflect (constrained) optimal assignments. However,

Coraggio et al. (2025) show that this assumption can be relaxed by focusing on the high-quality matches between workers and firms, as identified by high values of the residuals in a model a' la Abowd et al. (1999).

Subjective methods rely, instead, on workers' perceptions. Direct assessments ask employees whether their skills or education match the job; indirect assessments ask what the job requires. Studies such as Duncan and Hoffman (1981), Chevalier (2003), and Allen and Van der Velden (2001) show that subjective assessments capture dimensions of mismatch—particularly general abilities or job-specific nuances—that are absent from administrative or expert-coded data.

Mixed methods combine objective and subjective information. Chevalier (2003) and Chevalier and Lindley (2009) merge expert-based assessments with self-reported satisfaction to distinguish between "apparent" and "genuine" overqualification. Béduwé and Giret (2011) use objective definitions of educational mismatch together with subjective evaluations of skill use. Broader indicators in Budría and Moro-Egido (2008) and Green and Zhu (2010) integrate both the adequacy of formal qualifications and the perceived adequacy of skills when the two cannot be cleanly separated.

Finally, measures of skill shortages focus on the employer's perspective and are typically drawn from firm surveys. Studies such as Bennett and McGuinness (2009), Neumark et al. (2013), and Healy et al. (2015) show that shortages can be identified through both subjective perceptions and objective indicators and that they are often associated with reduced firm productivity. These measures play an important role in understanding firms' responses to shifting skill demands and the allocative frictions underlying labor market dynamics.

5. Determinants of Mismatch

Skill mismatch ultimately reflects the search and imperfect information frictions discussed in Section 2, but its intensity depends on a broader set of economic forces that either amplify or dampen those frictions.

A first set of determinants arises from **geographical frictions**. Distance and relocation costs make it harder for workers to search for, apply to, and accept suitable jobs, as empirical work shows that workers avoid applying to distant jobs (Marinescu and Rathelot, 2018). When housing markets tighten or become more illiquid, mobility becomes even more constrained, leading workers to accept lower-quality matches (Bernstein and Struvyen, 2022; Brown and Matsa, 2020). Homeowners are less likely than tenants to accept job offers in distant locations (Head and Lloyd-Ellis, 2012), and there is evidence that countries with fewer barriers to residential mobility exhibit lower mismatch (McGowan and Andrews, 2015b). Liquidity constraints interact with these frictions and expanded credit access can reduce geographical mismatch (Van Doornik et al. 2024). Firms themselves may partly offset these frictions when operating across multiple locations (Gong et al., 2024). In this context, new technologies and, in particular, working from home arrangements have the potential to influence geographical frictions (see Barrero et al., 2023, for a comprehensive review on the evolution of working from home).

Frictions within firms also matter; **hiring and firing costs** influence whether mismatched workers are replaced and how readily firms reallocate labor. Higher dismissal costs can slow reallocation and reduce productivity (Autor et al. 2007). When firing costs vary by tenure, financially constrained firms may disproportionately dismiss junior workers, affecting future productivity (Caggese et al., 2019). Reforms that loosen contracting rules or reduce dismissal costs have, in some instances, improved match quality (Maida and Tealdi, 2021; Berton et al., 2017), although reforms encouraging excessive reliance on temporary contracts have trapped some workers in precarious jobs and impaired upward mobility (Daruich et al., 2023). In cross-country data, strict employment protection tends to correlate with poorer match quality and lower labor mobility (McGowan and Andrews, 2015b; Brunello et al., 2007).

A related set of mechanisms concerns the role of **financial constraints**. Workers' credit constraints can also distort skill acquisition and job search: although firms sometimes finance general training—which can be explained by the presence of informational asymmetries that reduce poaching and give firms partial monopsony power (Katz and Ziderman 1990; Acemoglu and Pischke 1999)—workers still rely heavily on their own funds to invest in training or sustain longer job searches. This is consistent with evidence that, when credit becomes more accessible, job search improves, and mismatch falls (Herkenhoff et al., 2023; He and Le Maire, 2023).

Mismatch is further shaped by **managerial quality and promotion practices**. A growing literature shows that structured, high-quality management practices improve productivity and the allocation of talent within firms (Bloom and Van Reenen 2007; Bloom et al. 2013, 2019), as well as match quality (Coraggio et al., 2025). Conversely, conflicts of interest between firms' owner-managers and their financiers potentially increase mismatch by leading to non-meritocratic criteria for promotions (Pagano and Picariello, 2025; La Porta et al., 2000). Dynastic appointments and favoritism within family firms have been shown to reduce productivity and limit career progression for non-family employees (Burkart et al., 2003; Bennedsen et al., 2007; Bandiera et al., 2018; Di Porto et al., 2024). Deviations from meritocracy may also arise from racial discrimination in personnel practices (Gao et al., 2022).

Beyond market imperfections, **macroeconomic fluctuations** can temporarily worsen mismatch. Recessions weaken job–worker alignment by forcing workers into poorer matches and reducing job tenure, with effects that often persist for years (Bowlus 1995; Summerfield and Theodossiou 2017). Mismatch is countercyclical at the aggregate level: Şahin et al. (2014) estimate a sharp rise in sectoral mismatch during the Great Recession. Moreover, displaced workers typically struggle to find better matches: evidence from plant closures indicates that the quality of post-displacement matches strongly shapes earnings losses (Neffke et al. 2024).

The role played by changes in **technology** in affecting mismatch is also potentially large. Artificial Intelligence (AI) and digitalization create demand for new skills and render existing skills obsolete. This point has been emphasized by the skill-biased technological

change hypothesis (Goldin and Katz, 2008). Mismatch can be further exacerbated by task-based technological change, which leads to the obsolescence of certain jobs (Autor et al., 2003; Acemoglu and Autor, 2011; Atalay et al., 2020). Which jobs become obsolete depends on the type of innovation: while automation tends to destroy routine-intensive jobs (Goos et al., 2014), AI has the potential to affect cognitive, non-routine jobs. At the same time, innovations create jobs in which labor has a comparative advantage, so the net effect on total labor demand is not clear, as argued by Acemoglu and Restrepo (2019, 2022).

Large economic shocks have similar effects. The so-called "China shock" displaced workers specializing in routine tasks and contributed to job polarization (Autor and Dorn, 2013; Autor et al., 2013). The COVID-19 pandemic generated sharp, uneven changes in labor demand and accelerated the diffusion of telework, but mismatch appears to have receded as workers and firms have adapted (Pizzinelli and Shibata, 2023). The transition to a low-carbon economy is generating surges in demand for new, specialized skills; early evidence suggests that regions with pre-existing "green skills" adapt more successfully (Popp et al., 2021). Demographic factors such as aging also play an increasingly important role (Bennett and McGuinness, 2009; Le Barbanchon et al., 2023a).

Immigration introduces another source of mismatch. Migrants often arrive with educational credentials acquired abroad, and as a result, their qualifications fit local labor markets less well than those of natives (Nieto et al., 2013; Visintin et al., 2015), although these patterns differ by origin, destination, and occupation of the immigrant workers. Skill-based measures indicate that migrants are often under-skilled rather than over-skilled relative to job requirements, complicating interpretations based solely on formal education (McGowan and Andrews, 2015a). Migration can also mitigate some skill shortages, particularly when high-skill migrants move across borders with fewer frictions (Orefice and Peri, 2023).

Finally, structural forces shape the long-run evolution of mismatch. The design of **educational systems** influences the distribution of skills in the workforce, yet educational and skill mismatches are only weakly correlated, highlighting the role of heterogeneity within schooling levels and the importance of skills acquired through work experience (Allen and van der Velden, 2001; Green and McIntosh, 2007; Flisi et al., 2017).

6. Effects of Mismatch

Reducing occupational mismatch improves the allocation of workers to jobs; better matches should, in turn, raise firms' productivity and profitability, and also enhance workers' wages, career trajectories, and job satisfaction.

6.1 Productivity

Reducing mismatch raises productivity by assigning workers to the tasks in which they are most effective. Coraggio et al. (2025) show that firms with better matches display higher productivity, even after controlling for standard firm-level determinants. Improvements in managerial quality further enhance match quality, as capable managers can sharply increase firm output (Minni, 2023) or productivity in the public sector (Fenizia, 2022) by reallocating workers to more suitable roles. The broader productivity cost of misallocating talent is sizable: Hsieh et al. (2019) estimate that reductions in racial and gender barriers account for a large share of U.S. productivity growth, and Bandiera et al. (2024) find that enhanced skill-based sorting explains more than a third of the gains achieved when countries adopt frontier technologies. Cross-country OECD evidence shows that measures of over-skilling and under-qualification correlate with lower productivity, when skilled workers remain employed at less productive firms, more productive firms struggle to expand (McGowan and Andrews, 2015a). Calibrated models suggest that eliminating skills and education mismatch would raise output by 0.26% on average across US states (Garibaldi et al., 2025a) and by 3-4% on average across OECD countries (Garibaldi et al., 2025b).

6.2 Wages and Careers

Mismatch also shapes earnings and career development, especially early in working life. Studies using U.S. and Nordic data find that both cognitive and non-cognitive mismatch reduce wages and push workers into more frequent occupational changes (Guvenen et al., 2020; Fredriksson et al., 2018; DeLoach et al., 2022). Over time, workers tend to gravitate toward better matches, with positive returns: using Swedish data, Coraggio et al. (2025)

show that match quality rises sharply in the early years of a career and that workers assigned to their most suitable job earn more and switch employers less frequently than comparable mismatched workers. How these gains are shared between workers and firms depends on labor market institutions. In settings where workers hold substantial bargaining power, such as in Sweden, workers appear to capture much of the surplus from improved job allocation through wage gains, while effects on firm profits are not significant.

6.3 Unemployment and Underemployment

Mismatch contributes to unemployment and underemployment when job seekers struggle to find jobs where their skills are required. Prolonged search can push workers into poor matches, with long-term consequences for wages and career progression. Displacement from good matches is particularly costly: workers who lose high-quality matches face persistent earnings losses, reflecting the difficulty of reestablishing comparable matches elsewhere. These scarring effects make mismatch a mechanism through which adverse shocks generate persistent labor market weakness. Indeed, macroeconomic downturns tend to increase mismatch and underutilization of skills, and these effects can endure long after the recession itself. This pattern is often described as hysteresis (Cerra et al. 2023).

7. Policies Affecting Mismatch

Because occupational mismatch stems chiefly from search frictions and imperfect information, policies targeting information or search costs address the problem directly at its roots. Other policies operate indirectly, by relaxing the frictions discussed in Section 5. Given the complexity of mismatch, the use of a single policy is unlikely to meaningfully reduce its effect; rather, it requires joint improvements in labor, housing, and training markets.

A first set of policies consists of **improving labor market information and reducing search costs**. In this respect, AI and information technologies have the potential to reduce search costs and improve job-finding rates, as shown by three studies that performed large-scale experiments providing automated and custom-designed search advice to job seekers.

In France, Behagel et al. (2022) find that automated recommendations increase job-finding rates, particularly for women, and even raise aggregate employment. In Denmark, Altmann et al. (2022) show that providing online advice to job seekers boosts re-employment working hours and earnings, although competitive spillovers erode these gains when a higher number of workers receive online advice. In Sweden, Le Barbanchon et al. (2023b) show that personalized job recommendations based on job seekers' click history increase employment, especially among unemployed and less-educated workers. Reducing the physical cost of searching can also matter: a field experiment in South Africa shows that subsidizing transportation enables job seekers to search more intensively and update their beliefs, improving match outcomes (Banerjee and Sequeira, 2023).

Policies affecting the **housing market** can have sizable implications for mismatch because mobility is often constrained by high rents, transaction costs, and restrictive land-use regulations. Lowering rental costs may ease search by reducing lock-in, while relocation programs like those studied by Chetty et al. (2016) can connect families to areas with better employment prospects. Cross-country evidence confirms that skill mismatch is lower where residential mobility is less constrained (McGowan and Andrews, 2015b).

The consequences of **labor market flexibility** are more complex. Strict dismissal rules can slow reallocation, while reducing firing costs can improve job-skill alignment (Davis and Haltiwanger, 2014; Maida and Tealdi, 2021; Berton et al., 2017). Minimum wage hikes sometimes have lock-in effects that discourage reallocation (Dube et al., 2016; Brochu and Green, 2013), yet other analyses show the opposite: in Germany and Brazil, higher minimum wages helped low-wage workers move to more productive firms without harming employment (Dustmann et al., 2021; Engbom and Moser, 2022). Policies limiting wage adjustment at the local level increase geographic misallocation, worsening local unemployment (Boeri et al., 2021). Flexible work arrangements—telework, job sharing, part-time work—can allow workers to exploit their skills more effectively, though employers may be less willing to invest in training for such workers (Felstead et al., 2000), and gendered patterns in their use can produce uneven impacts (Garnero et al., 2014).

The design of **unemployment insurance (UI)** also affects mismatch. Classical models show that moderate UI generosity can improve match quality by enabling more selective

search (Diamond, 1981; Marimon and Zilibotti, 1999). Yet empirical results are mixed. Boeri and Macis (2010) show that the introduction of unemployment benefits promoted positive job reallocation in a large panel of OECD countries. Nekoei and Weber (2017) document that UI improves the quality of the firms where the jobless eventually find work and raises their wages. Other studies find minor or negative wage effects (Card et al., 2007; Lalive, 2007; Van Ours and Vodopivec, 2008; Schmieder et al., 2016). However, these studies infer the effect of UI on mismatch indirectly by examining its impact on workers' earnings upon transitioning to employment. Farooq et al. (2020) analyze temporary UI extensions adopted in the US during the Great Recession and find that the increase in UI duration increased match quality by 4.1%.

UI may also encourage workers to enter high-risk, high-productivity occupations by protecting them against layoff risk: the model by Pagano and Picariello (2023) predicts that UI can encourage employees to choose more talent-sensitive jobs. Van Doornik et al. (2022) find that an unexpected reform in Brazil reducing eligibility for UI benefits for some workers triggered a greater decline in employment among workers at firms with higher layoff risk. Furthermore, affected workers moved to safer employers. Symmetrically, ongoing work by Pagano et al. (2025) documents that Italian workers more exposed to a 2015 reform which substantially expanded UI generosity became significantly more likely to switch jobs and reallocate toward riskier occupations.

On the firms' side, **bankruptcy laws** may improve firms' allocative efficiency by limiting the survival of zombie firms that prevent labor reallocation. Andrews and Cingano (2014) explore bankruptcy laws that can make it harder for lower-productivity firms to exit the market and free up misallocated labor. Relatedly, Li and Ponticelli (2022) find that the staggered introduction of specialized Chinese courts led to the reallocation of employment away from zombie firms. Davydenko and Franks (2008) show that bankruptcy laws also affect access to credit, which may, in turn, affect skill mismatch.

Policies aimed at improving **education and training** address mismatch by improving workers' ability to adapt to changing job requirements. Active labor market programs yield modest short-run gains but increasingly positive effects after two to three years (Card et al. 2018). Lifelong learning is associated with better matching (McGowan and Andrews,

2015b), and numerous studies highlight the importance of training for displaced and low-skill workers (Jacobson et al., 2005; Hersch 1991). On-the-job training accounts for a large share of cross-country differences in lifetime wage growth, partly because it reduces mismatch early in workers' careers (Ma et al., 2024). Educational systems also shape how training interacts with mismatch: countries with more homogeneous curricula experience more over-education and under-skilling, making specialized on-the-job training particularly valuable (Flisi et al., 2017).

Finally, **migration policies** can alleviate shortages when the domestic labor supply is insufficient. Several European countries offer preferential tax treatment to high-skill immigrants, helping attract scarce talent. Evidence on their fiscal effects remains limited, though Bassetto and Ippedico (2023) document positive effects for Italy.

8. Conclusions

This survey highlights both the substantial progress made in measuring and understanding occupational mismatch and the challenges still awaiting further work. A central message emerging from recent research is the importance of treating skills as multidimensional and using data capable of capturing this complexity on both the worker and job sides. Advances in employer–employee datasets, together with the adoption of machine-learning techniques, offer promising opportunities for future work, despite cross-country differences in data coverage, access rules, and data availability.

Technology plays also a role in assisting job seekers directly, by personalizing labor-market information and reducing search frictions. Early large-scale experiments show that tailored recommendations can meaningfully improve job-finding rates. Because these systems require detailed administrative data and careful evaluation to avoid unintended spillovers, further research and institutional investment are needed to fully exploit their potential.

Despite the breadth of the existing literature, a significant limitation is that most work still views mismatch at the individual worker level, neglecting that productivity depends

heavily on the composition and interactions of teams. This raises challenging empirical questions and developing systematic approaches to measure and model team-level matching remains a major open challenge.

Further research is also needed on the policy side, particularly on interventions affecting labor market flexibility, minimum wages, and training systems, given the mixed empirical results to date. In addition, the literature offers relatively little evidence on how structural shocks, as the digital or climate transitions, affect mismatch, despite the scale of the transformations currently underway.

Finally, demographic decline, especially pronounced in Europe and East Asia, will make skill shortages more common and more severe. Understanding how these shortages interact with mismatch, and how migration, education, and labor-market institutions can be designed to alleviate them, is essential. Taken together, these developments underscore that occupational mismatch will remain a central economic issue, and that continued theoretical, empirical, and policy-oriented research will be crucial for addressing the labor-market challenges of the coming decades.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

During the preparation of this work the authors used ChatGPT to condense and copy-edit the text. After using this tool, the authors reviewed and edited the text extensively and take full responsibility for the content of the published article.

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