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The Resurfacing of an Old Debate: Immigrants as Complements or Substitutes in High-Tech Labor Markets

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There is a war for talent going on. Managers must plan for hiring talent differently in the emerging world.

Yet again, the United States finds itself at a familiar policy crossroad. On one hand, a global war for talent is underway, where leading firms and governments are offering compensation packages worth **hundreds of millions of dollars** to attract top scientists and engineers. On the other hand, a new wave of restrictions proposed under **President Trump's administration** targets the H-1B visa program, reigniting debates over whether skilled immigrants are economic assets or liabilities for the country. Politicians like **Steve Bannon** and **Marjorie Taylor Greene** have labeled the program a "scam," accusing tech firms of replacing native workers with lower-paid foreign labor. At the same time, leaders in Silicon Valley and academia are **sounding alarms** over the potential damage to the U.S. innovation ecosystem if access to global talent is curtailed.

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These policy swings echo a broader theoretical dilemma: Do skilled immigrants function as complements to native workers—filling vital gaps, spurring innovation, and founding firms that increase locals' welfare and job prospects—or as substitutes who displace locals

from existing jobs while depressing wages?

This post explores this question through multiple lenses. Drawing from economic theory, empirical studies, and real-world policy dynamics—particularly the controversies surrounding the H-1B visa—it offers a nuanced view. It contends that immigrants can be both complements and substitutes, depending on their skill portability, institutional context, and sectoral alignment. Despite real challenges, immigrants have historically created enormous value for the U.S. economy, especially in technology and innovation. In the era defined by artificial intelligence and clean energy transitions, talent is the ultimate currency as well as catalyst for the economy. Whether the U.S. remains a magnet for the world's brightest minds will determine not just its economic future, but its place in the global order. Thus, framing immigration as a zero-sum game is not only analytically flawed but economically self-defeating.

I. Theoretical Foundations: Substitution vs. Complementarity

The debate over skilled immigration often rests on two competing economic theories: labor market competition and human capital theory.

The **substitution perspective**, supported by economists like **George Borjas (2003)**, argues that when immigrants share similar qualifications as natives, they compete for the same jobs. This increase in labor supply within a skill set, exerting downward pressure on locals' wages and employment opportunities. Such substitution could be particularly pronounced in sectors like software engineering or data analytics, where tasks and skills are standard and codifiable.

By contrast, **human capital theory**, rooted in **Becker (1964)**, suggests that workers are bundles of productive skills that enhance a nation's wealth. If immigrants bring unique or complementary talents—such as advanced technical expertise or diverse perspectives—they can enhance firm performance and overall productivity, and create new jobs, benefiting rather than harming native workers. **Aobdia, Srivastava, and Wang (2017)**

show that skilled immigrants are complements to the native US workers as they bring unique skills while bridging the gap in jobs requiring specialized skills and working in geographical areas traditionally shunned by local workers.

These two models lead to dramatically different policy implications. If immigrants are substitutes, restrictions like those proposed by Trump administration in 2025 may protect native jobs. If they are complements, backlash on skilled immigration risks weakening the U.S.'s innovative capacity and global competitiveness.

II. The Substitution Argument: Real but Contextual

Substitution fears are not baseless. Borjas (2003) found that immigrants with similar education and experience depress native wages in the same occupation. In the U.S. H-1B system, critics argue that **firms exploit visa holders' limited mobility** to reduce labor costs. Since these workers often depend on employers for legal status, they have little bargaining power and may accept lower wages—indirectly undercutting their American peers.

The Trump administration's latest proposals reflect this concern. In 2025, the White House advanced a wage-based selection model to **replace the H-1B lottery**, aiming to prioritize high-paid applicants and curtail cheaper labor inflows. While such reform could prevent abuse, it also risks narrowing the talent pipeline for startups and research institutions unable to match large corporate salaries.

Employer-side incentives also exacerbate the issue. **Offshore outsourcing** firms have gamed the system, used H-1Bs to staff U.S. client offices, often replacing native workers. These episodes feed into broader populist narratives about immigrants "stealing jobs"—a trope that continues to drive restrictive legislative proposals from figures like **Senator J.D. Vance**, who called out Big Tech for firing Americans while hiring cheap foreign H-1B visa replacements.

III. The Complementarity Case: Innovation, Productivity, and Growth

Despite concerns, the weight of empirical evidence favors a more optimistic view: Skilled immigrants often complement native workers in high-tech sectors.

Research by **Kerr and Lincoln (2010)** showed that inflows of H-1B holders increased patent filings, startup formation, and regional productivity. Similarly, **Ottaviano and Peri** (2008) found that even in identical job categories, immigrant and native workers are not perfect substitutes. Differences in language, education systems, and cultural perspectives create productive heterogeneity, which enhances team performance and innovation. The impact on local's wages is positive, not negative.

This complementarity is particularly evident in STEM and entrepreneurship. Over half of U.S. tech unicorns—including Nvidia, Google, Tesla, and eBay—were founded by immigrants or their children. According to a **2022 NFAP** report, 80% of billion-dollar startups had at least one immigrant in a key leadership role. **A 2023 report** shows that immigrant inventors account for over 25% of all U.S. patents and dominate citation rankings in AI, biotech, and semiconductors.

Academic institutions tell a similar story. **Immigrants** hold over 50% of STEM PhDs in the U.S. and constitute two-thirds of leading AI researchers. These individuals are not merely employees—they are pioneers driving America's edge in global technology. For example, **52.7%** of the employees in one of the most valuable companies in the world today, NVIDIA, are of Asian origin.

IV. Endogenous Barriers: Certification, Culture, and Discrimination

Even when immigrants hold world-class credentials, institutional and social barriers frequently undermine their complementarity. Credential recognition is often opaque, inconsistent, and costly. **Immigrants face** prolonged delays in obtaining licenses or

securing recognition for foreign degrees—even in sectors desperate for talent.

Language fluency and cultural fit add another dimension. While technical skills may be portable, communication-heavy roles (e.g., client-facing consulting or public health) often require **local cultural capital**. These are areas where even highly skilled immigrants face steep learning curves, limiting their effective integration.

Discrimination further compounds the problem. In a landmark study, **Oreopoulos (2011)** showed that applicants with non-Anglophone names were 39% less likely to receive job callbacks—even with identical resumes. Such biases, whether conscious or structural, reinforce labor market segmentation and prevent immigrants from contributing at their full capacity.

Worse, these barriers are often endogenously reinforced by **native professionals**. Licensing bodies, industry associations, and unions may restrict access to protect domestic workers. For example, requiring Canadian work experience or U.S.-based education disproportionately disadvantages skilled newcomers. This form of gatekeeping is both economically inefficient and socially inequitable.

V. A More Nuanced Framework: Portable vs. Host-Specific Human Capital

One way to reconcile these conflicting outcomes is through the lens of portable vs. host-specific human capital (**Bodvarsson & Van den Berg, 2013**). Portable capital—such as coding ability, statistical modeling, or mathematics—transcends borders and allows immigrants to plug directly into innovation pipelines. Host-specific capital—like legal training, language proficiency, or licensed credentials—requires local adaptation.

When immigrants possess highly portable skills, they enhance firm productivity, often creating jobs downstream. Conversely, when their value depends on host-country licensing or norms, they may face underemployment or become substitutes in narrow job niches.

VI. Policy Solutions: Maximizing Complementarity, Minimizing Substitution

The challenge is not whether to admit skilled immigrants—but how to integrate them in ways that boost national welfare. Several policy measures could tilt the balance toward complementarity:

1. **Credentialing Reform**: Accelerate the recognition of foreign degrees and licenses, particularly in high-demand fields. For example, nursing faces tremendous **demand supply** gap both in the US and Canada but has onerous **licensing requirements**.
2. **Targeted Sectoral Programs**: Align immigration flows with real-time labor market needs. Utilize temporary foreign worker programs to ease seasonal or sectoral labor shortages (e.g., seasonal shortages in hospitality or agriculture). Prioritize professionals at the forefront of technological advancement (e.g., AI) to stay competitive in today's knowledge-based world economy.
3. **Incentivizing Employers**: Provide tax breaks or support for firms that offer training, mentorship, and career mobility to immigrant professionals.
4. **Strengthen Labor Standards**: Prevent abuse of immigrant workers by enforcing wage floors, job mobility rights, and visa transparency. This levels the playing field for all workers.
5. **Combat Discrimination**: Enforce anti-bias hiring practices and support data transparency on immigrant employment outcomes.

VII. Conclusion: Rethinking the Immigration Equation in the Innovation Age

The polarized debate over whether skilled immigrants act as complements or substitutes in high-tech labor markets ignores subtle nuances and intricate realities. As this post demonstrates, the answer is not binary but conditional—dependent on the nature of immigrant human capital, the sectoral context, regulatory environment, and employer practices. While concerns about wage suppression and job displacement are not

unfounded, they are often overstated and miss the broader macroeconomic picture. More important, the concerns ignore the shifting technological context and the fact that human capital is the biggest value creator in today's economy.

The evidence is clear: when properly integrated, skilled immigrants enhance innovation, expand firm capacity, fill critical labor shortages, and generate significant spillovers in productivity, entrepreneurship, and patent creation. They have founded iconic U.S. tech firms, advanced frontier research, and staffed the engineering backbones of companies driving the fourth industrial revolution. In an era increasingly defined by artificial intelligence, clean technology, and global digital transformation, restricting such talent amounts to economic self-sabotage.

Yet, to fully realize the benefits of skilled immigration, the U.S. must address structural barriers that distort immigrant labor market outcomes. These include opaque credential recognition systems, discriminatory hiring practices, employer-tied visa restrictions, and underinvestment in support mechanisms like training and mentoring. Such constraints not only undercut immigrant potential but also fuel the very substitution effects critics fear.

Ultimately, the H-1B controversy should serve as a wake-up call—not to retreat from global talent but to reform the institutions that govern its utilization. The goal should not be to choose between protecting native workers and welcoming immigrants, but to design policies that achieve both. A forward-looking immigration strategy must emphasize fairness, mobility, merit, and alignment with evolving labor market demands.

Immigrants are not merely economic participants—they are catalysts, builders, and innovators. Framing their role as a zero-sum threat ignores the dynamic, generative nature of modern economies. Intangibles and knowledge assets now command roughly **$30 trillion valuation** in the US markets. The world is going through the **fifth industrial revolution** that relies on seamless integration of human ingenuity. If the United States aspires to maintain its leadership in global innovation, it must continue to be a magnet for the world's brightest minds. That future hinges not on restriction, but on smart integration of global talent.

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