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ARTICLE

Is reducing low-skilled immigration good for Americans?

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Abstract

This paper studies the effect of immigration on welfare via complementarities with foreign workers and market size effects. We build these channels into a general equilibrium model to assess the welfare effects of the 2016 immigration reversal and the 2022 immigration comeback. Our findings suggest that the 2016 slowdown reduced welfare, especially for high-skilled Americans, with no changes for low-skilled workers. The 2022 comeback partially offset these changes. The larger effects on high-skilled workers stem from complementarities with low-skilled immigrants. Low-skilled Americans lose from the increased competition in the labor market, but the increase in population drives firm creation, with positive welfare effects that roughly offset the wage losses.

Keywords: low-skilled immigration; heterogeneous firms; welfare and immigration

JEL classifications: F12; F22; J24; J61

1. Introduction

The year 2016 witnessed a strong reversal in immigration patterns in the United States. While immigration had been strongly increasing relative to the native population, this trend reversed sharply following President Trump's rise to power, especially for low-skilled workers. Six years later, immigration spiked, recovering sharply. These sharp swings produce considerable effects on welfare, and in this paper, we provide an estimate of the aggregate welfare effects of immigration.

Figure 1 shows the immigration of high- and low-skilled workers. Low-skilled refers to individuals with high school education or less, and high-skilled includes more than high school education. Notice that both in 2016 and in 2022, it is the low-skilled immigrants who are affected. Deviations from the trend among high-skilled are less likely. For this reason, our analysis focuses mostly on low-skilled immigration.

The way immigration affects natives depends on a number of features, such as occupation, industry, education, gender, race, etc. Each characteristic determines the interactions between natives and immigrants; that is, how substitutable they are. By aggregating across these different features, one would learn how immigrants affect the average American. In this paper, we propose to work backward. In the absence of data on the relevant features needed to carry out a deep welfare analysis, we use a micro-founded model to estimate the aggregate. By modeling the "average" complementarity between natives and immigrants, our aim is to approximate the aggregate effects.

Working with the aggregate requires additional considerations relative to a sectoral analysis. The increase in population triggered by immigration has effects on consumption that affect native welfare.

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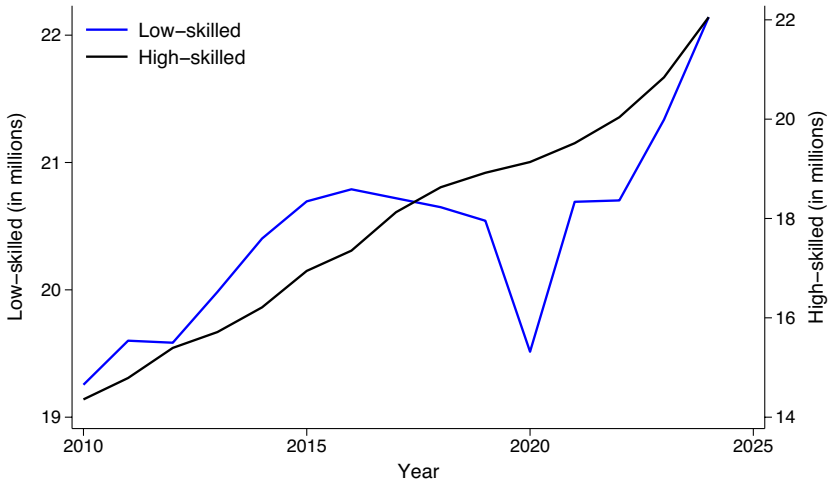


Figure 1. High- and low-skill immigration in the U.S.
Note: Immigration in millions of people. The blue line represents low-skilled immigration (left axis) and the black line represents high-skilled immigration (right axis).

To capture these effects, we build a general equilibrium model with four types of workers: high-skilled natives, high-skilled immigrants, low-skilled natives, and low-skilled immigrants. The model is motivated by the need to account simultaneously for the labor-market interactions between these groups and for the aggregate demand effects of a larger population.

The production side of the model nests the different worker types following Ottaviano and Peri (2012). High-skilled and low-skilled workers are imperfect substitutes, and within each skill group, natives and immigrants are also imperfect substitutes. This nesting structure allows the model to capture both the complementarity between skill groups and the degree of competition between native and immigrant workers within the same skill group.

To capture the aggregate demand effects of a larger population, we model preferences of the "love for variety" type, building on Dixit and Stiglitz (1977). The number of varieties produced is endogenous: a larger workforce supports a greater number of firms and products, which lowers the price of the consumption aggregate and raises welfare. This market-size channel is a key novel element of our framework relative to a standard labor-market analysis.

The welfare estimates depend on three key parameters: (*i*) the elasticity of substitution between domestic and foreign workers of the same skills; (*ii*) the elasticity of substitution between high-skilled and low-skilled workers; and (*iii*) the elasticity of substitution between varieties. Clemens and Lewis (2022) and Brinatti and Morales (2025) argue that the choice of these parameters determines the direction of welfare change from immigration. They show that the strength of the scale effect from additional products relative to the strength of the substitution effect between workers determines the net impact on welfare from immigration. We apply this notion to evaluate the effects of recent immigration swings.

Our headline finding is that the drop in immigration reduces welfare for the average U.S. citizen by 0.3 percentage points of consumption-equivalent units. This aggregate effect is shaped by two distinct channels: the complementarity and substitution channel between worker types and the market-size channel arising from endogenous firm creation. We discuss each in turn.

The gains from immigration are not spread out evenly across the population. High-skilled workers lose more, about 0.5% of consumption units. These gains vary depending on the substitution parameter between high- and low-skilled workers. Considering alternate choices for the parameter, we show that high-skilled natives have higher gains from low-skilled immigration

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when the elasticity of substitution between skill groups is low. That is, the more the complementarity, the larger the losses from less low-skilled immigrants.

Similar complementarity arguments show that low-skilled workers see increases in their wages when low-skilled immigrants leave. This is because native and immigrant low-skilled workers are relative substitutes.

The market effect worsens for both high- and low-skilled workers, which implies that high-skilled natives are unambigously worse off, given that both channels go in the same direction.

Immigration increases the number of consumers, and in Dixit and Stiglitz (1977) models, larger populations can lead to welfare increases. Given preferences featuring "love for variety," the price of a unit of consumption depends on how many intermediate goods are used to produce the consumption good. The more varieties of intermediate goods, the lower the price of the final consumption good. There is ample empirical evidence that supports the relationship between immigration and firm creation. Orrenius et al. (2020) study 160 U.S. Core-Based Statistical Areas between 1997 and 2013 and find more immigrants increase the number of firms. Similarly, Olney (2013) finds that increasing the share of low-skilled immigrants by 10% in the 30 largest U.S. metropolitan cities between 1998 and 2008 resulted in a 2% increase in the number of firms. Dustmann and Glitz (2015) find firm entry accounts for almost 15% of immigrant absorption in the tradable sector in Germany. Beerli et al. (2021) study Swiss firms following an immigration reform, and find that the reform boosted firm expansion and increased high-skilled native wages by 5% through job creation. Altındağ et al. (2020) study Syrian migrants in Turkey and find that the influx of Syrian refugees increased the number of firms in the Turkish informal sector. In the U.S. context, Mahajan (2024) studies the time period 1980–2010 and finds a positive impact of immigration on firm counts within local industries.[1]

We extend the benchmark model to multiple sectors that aggregate via a Cobb-Douglass function into the final consumption good, where sectors differ in how intensive they are in low-skilled immigrants. We compare a two-sector economy to our baseline, with the low-skilled immigrant-intensive sector mapped to the construction sector in the data. Introducing this second sector amplifies the losses from immigration. This is because adding a sector introduces a margin of adjustment of the economy that makes one unit of low-skilled immigrant labor more productive. We map this low-skilled immigrant-intensive sector to the construction sector. Quantitatively the results are very close to the baseline, primarily because of the small share of construction in GDP.

The results in this paper are related to the effects of immigration via complementarities and market size. There are other potential sources of welfare effects that we abstract from. Birinci et al. (2025) show that differences across immigrants other than skill matter: gender, age, time in the country, and country of origin are important. Cortés and Tessada (2011) find effects on market vs. home production. Borjas (2006) finds effects on internal migration: the inflow of foreigners may impact the location of natives. Howard et al. (2024) find that low-skilled immigration reduces the price of construction. These are effects associated with heterogeneity and are not likely related to market size or worker complementarity.

Several papers link immigration and welfare via the increase in varieties channel. These highlight that inflows of immigrants increase the domestic market size, which results in more varieties in the economy and a higher number of firms in the economy (see Di Giovanni et al., 2015; Hong and McLaren, 2015; Aubry et al., 2016; Waugh, 2017, among others). Clemens (2022) quantify the effects of the reduction in refugee immigration and estimates that the U.S. loses over $30,000 per refugee that does not immigrate per year. We contribute to this literature by analyzing the welfare effects of immigration in the U.S., particularly looking at the post-2016 period, where several rigorous immigration policies led to a decline in low-skilled immigrants.

The paper proceeds as follows. Section 2 describes our theoretical model. Section 3 describes the different channels present in the model. Section 4 calibrates the model. Section 5 shows

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our results. Section 6 expands our model with multiple sectors that differ in low-skilled worker intensity. Section 7 concludes.

2. Model

The theoretical setup features a static closed economy, with a perfectly competitive final goods sector and a monopolistically competitive intermediate goods sector, and four types of labor classified by skill and nativity. Intermediate good producers are heterogeneous in productivity, as in the closed economy in Melitz (2003).

2.1 Individuals

There are four types of individuals: high-skilled natives, high-skilled immigrants, low-skilled natives, and low-skilled immigrants. Let $S_n, S_i, U_n, U_i \geq 0$ represent the mass of each of these types respectively. They all share the same utility function, given by: $U = C$, where $C \geq 0$ is consumption of the final good. They maximize utility subject to the budget constraint. Let w_{jk} be the wage rate for $j = s, u$ and $k = n, i$, where s stands for high-skilled labor, u low-skilled, n is native, and i is immigrant. The budget constraint is $PC_{jk} = w_{jk}$, where P is the price of the consumption good. Notice that income consists only of wages, that is, there are no profits in this economy. As we mention later, this is because of the free entry condition, which implies no aggregate profits in equilibrium.

2.2 Final good

There is a stand-in firm that produces a consumption good using intermediate good $\omega \in \Omega$, where ω is the name of the good and Ω is the endogenous set containing the names of all goods produced in the economy. The final good producer sells under perfect competition.

The production function follows a CES structure as in Dixit and Stiglitz (1977), with elasticity of substitution between intermediates $\sigma > 1$,

$$Q = \left[\int_{\Omega} q(\omega)^{\frac{\sigma-1}{\sigma}} d\omega\right]^{\frac{\sigma}{\sigma-1}}, \tag{1}$$

where Q is the final consumption good and $q(\omega)$ is the quantity of intermediate good ω, for all $\omega \in \Omega$. Let $P = \left[\int_{\Omega} p(\omega)^{1-\sigma} d\omega\right]^{\frac{1}{1-\sigma}}$, where $p(\omega)$ is the price of the intermediate good ω. The problem of the firm is:

$$\max_{\{q(\omega)\}} \quad \Pi = PQ - \int_{\Omega} p(\omega) q(\omega) d\omega \tag{2}$$

subject to the technology in equation (1). The solution yields demand functions for intermediate goods $q(\omega)$:

$$q(\omega) = Q\left[\frac{p(\omega)}{P}\right]^{-\sigma}. \tag{3}$$

2.3 Intermediate goods

Intermediate goods producers operate in a monopolistically competitive market and use labor as inputs in production. The production function is a CES aggregate of high-skilled and low-skilled labor. The skill demands are further nested into natives and immigrants within skill groups

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following Ottaviano and Peri (2012). The production function is

$$q(\omega(\varphi), A) = A\varphi \left[\alpha S^{\frac{\eta-1}{\eta}} + (1-\alpha)U^{\frac{\eta-1}{\eta}}\right]^{\frac{\eta}{\eta-1}}, \tag{4}$$

where A is aggregate productivity, common across all intermediate good producers, φ is firm ω's idiosyncratic productivity level, η is the elasticity of substitution between high- and low-skilled labor, and S and U are skill aggregates of native and immigrant labor defined as:

$$S = \left[\gamma_s S_n^{\frac{\rho_s-1}{\rho_s}} + (1-\gamma_s)S_i^{\frac{\rho_s-1}{\rho_s}}\right]^{\frac{\rho_s}{\rho_s-1}}, \text{ and} \tag{5}$$

$$U = \left[\gamma_u U_n^{\frac{\rho_u-1}{\rho_u}} + (1-\gamma_u)U_i^{\frac{\rho_u-1}{\rho_u}}\right]^{\frac{\rho_u}{\rho_u-1}}. \tag{6}$$

The parameters ρ_s and ρ_u represent the elasticity of substitution between natives and immigrants within the skill groups and γ_s and γ_u capture the average intensity of immigrant labor of either skill type in the production process. The reason for introducing the aggregate productivity parameter A is to account for changes outside the model in our empirical application. While the model is static, we obtain our results by calibrating it to all years in the analysis, and allow A to change to capture changes outside the scope of the model.

In what follows we drop the name of the good ω and refer to prices as functions of the productivity parameters φ and A, since decisions change only when these parameters change. It is convenient to define the aggregate price index in terms of these variables as follows:

$$P(A) = \left[\int_0^\infty p(\varphi, A)^{1-\sigma} M(A) g(\varphi) d\varphi\right]^{\frac{1}{1-\sigma}} \tag{7}$$

where $p(\varphi, A)$ solves the maximization problem of each intermediate good producer. These behave monopolistically in their output market, solving the following problem:

$$\max_{p,q,l_{sn},l_{si},l_{un},l_{ui}} pq - \sum_{k=sn,si,un,ui} w_k(A) l_k \tag{8}$$

subject to the technology described in equations (4) through (6). The solution to this problem is that price is a constant mark-up over marginal cost. The marginal cost of a type φ firm is $w(A)/\varphi$, where

$$\begin{aligned} w(A) = \frac{1}{A}\Bigg\{ & \alpha^\eta \left[\left(\gamma_s^{\rho_s} w_{sn}(A)^{1-\rho_s} + (1-\gamma_s)^{\rho_s} w_{si}(A)^{1-\rho_s}\right)^{\frac{1}{1-\rho_s}}\right]^{1-\eta} \\ & + (1-\alpha)^\eta \left[\left(\gamma_u^{\rho_u} w_{un}(A)^{1-\rho_u} + (1-\gamma_u)^{\rho_u} w_{ui}(A)^{1-\rho_u}\right)^{\frac{1}{1-\rho_u}}\right]^{1-\eta} \Bigg\}^{\frac{1}{1-\eta}} \end{aligned} \tag{9}$$

The pricing rule that maximizes profits is to set a constant mark-up, that is,

$$p(A, \varphi) = \frac{\sigma}{\sigma - 1} \frac{w(A)}{A\varphi} \tag{10}$$

2.4 Free entry condition

There is an infinite pool of potential entrants. To enter, a potential firm incurs a fixed entry cost of f_e units of the final good to draw a productivity parameter φ from a cumulative distribution function (CDF) $G(\varphi)$, with probability distribution function (PDF) $g(\varphi)$. In equilibrium, firms enter the market until the expected profits from entering are equal to the cost of entry, that is,

$$\overline{\pi}[1 - G(\varphi^*(A))] = f_e P(A) \tag{11}$$

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where, $\overline{\pi}$ is the expected profits before knowing the productivity parameter φ, that is,

$$\overline{\pi} = \int_0^{\infty} \pi(A, \varphi) g(\varphi) d\varphi \tag{12}$$

where $\pi(A, \varphi)$ is the profit of a type φ firm when the aggregate productivity is A.

Equation (11) implies that there are no profits to rebate back to the consumer. This is convenient, given that if this were not the case, we would have to determine how profits are rebated back to the four different types of consumers. Note that this does not prevent firms from making a profit. Net of entry costs, some firms will make positive profits and others negative in a way that aggregate profits are zero.

2.5 Welfare

In equilibrium, consumption (and welfare) is equal to the real wage:

$$C_{jk}(A) = \frac{w_{jk}(A)}{P(A)}, \ \forall \ j = s, u \, ; k = n, i. \tag{13}$$

We define aggregate welfare as the sum of individual welfare levels:

$$W(A) = \frac{w_{sn}(A)S_n + w_{un}(A)U_n + w_{si}(A)S_i + w_{ui}(A)U_i}{P(A)(S_n + U_n + S_i + U_i)}. \tag{14}$$

Similarly, native welfare is

$$W_n(A) = \frac{w_{sn}(A)S_n + w_{un}(A)U_n}{P(A)(S_n + U_n)}. \tag{15}$$

3. Equilibrium characterization

Before moving on to the quantitative analysis, we describe the potential mechanisms by which immigration can affect natives' welfare. In particular, we are interested in how welfare changes from a change in immigration under different parameter values. The most important parameters determining welfare effects are the elasticity of substitution between varieties (σ), the elasticity of substitution between domestic and foreign workers of a given type (ρ_u and ρ_s), and the elasticity of substitution between skills (η). Symmetry implies that changes in ρ_u affect low-skilled workers in the same way that ρ_s affects high-skilled workers, so we only illustrate how different values of ρ_u matter.

For each native type, immigration has two distinct mechanisms that can change welfare: a market effect and a substitution effect. We present figures as aids to our description. All parameters are set to the values described in Section 4 except for our parameters of interest (ρ_u, η and σ). We also set $\theta = 3.5$, which is larger than the one we obtained in Section 4. A small value of θ limits the feasible range for σ, since we require $\sigma < 1 + \theta$.[2]

Consider first the *substitution* channel. Low-skilled natives are highly substitutable with low-skilled immigrants, so low-skilled immigrants increase the competition faced by low-skilled natives, lowering their wages. The degree of substitutability is governed by ρ_u: the larger this is, the stronger the channel. Figure 2 shows how a 10% increase in low-skilled immigrants affects the wages of low-skilled natives under different values of ρ_u. As the substitutability between native low-skilled workers and foreign low-skilled workers increases, the gains from immigration drop for domestic low-skilled workers. This is reflected in the fact that the increase in real wages for low-skilled individuals given a 10% increase in low-skilled immigration is decreasing in ρ_u (all three lines show this).

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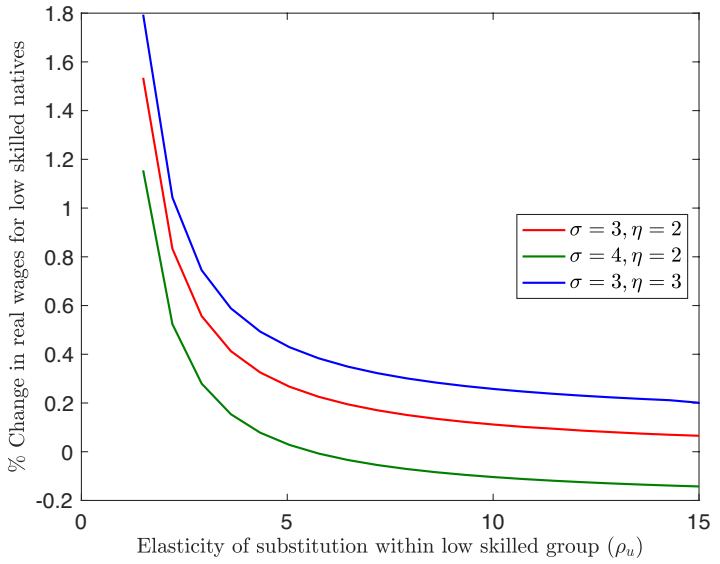


Figure 2. Change in low-skilled native wages from a 10% increase in low-skilled immigrants under different parameter values: Substitutability.

Next, consider the *complementarity* between high-skilled and low-skilled workers. The strength of this complementarity is governed by η. The smaller this parameter, the higher the complementarity. Figure 2 shows the effect of increasing η by comparing the red line to the blue line. As we increase the substitutability between workers of different skills, the gains for low-skilled domestic workers increase. This is because, when high-skilled and low-skilled workers are highly substitutable, immigrants compete with both skilled and low-skilled workers, so that labor demand changes will be spread out between skilled and low-skilled. As a result, the drop in demand for low-skilled domestic workers is lower. If this parameter is relatively small, Figure 3 shows that domestic low-skilled workers can lose from an inflow of low-skilled immigrants. The gain in real wages is decreasing in η, and negative when the complementary channel is strong. This is because when substitution across skill groups is low, low-skilled immigrant workers compete only with low-skilled domestic workers, and the labor demand change accrues to only the low-skilled group.

Lastly, consider the *market-size* channel. Moving from the red line to the yellow line in Figure 2 shows the effects of increasing σ: the higher this parameter, the lower the gains for low-skilled domestic labor. The reason is that when σ is large, goods are easily substitutable among each other. Thus, the gains from varieties drop since one can easily replace across goods. In other words, the degree of increasing returns is decreasing in σ, so that as $\sigma \to \infty$, this model resorts to a representative firm model, with no increasing returns to scale.

4. Calibration

The discussion in Section 3 shows that domestic workers can gain or lose from immigration, depending on parameter values. This section assumes parameter values consistent with the literature to pin down the actual effect of the changes in 2016 and 2022. By using independent estimates, we provide an unbiased estimate of how welfare is likely to have been affected. More precise results would involve a proper estimation of these parameters, and this is beyond our scope.

We calibrate the model to the U.S. economy for each one of the years between 2010 and 2024. Our strategy divides our parameters into two sets. The first includes parameters whose value we draw from existing research, and the second set targets data moments. Table 1 reports the

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Table 1. Calibrated parameters

Parameter	Value	Target	Source
Parameters drawn from the literature			
σ	3		Broda and Weinstein (2006)
η	2		Goldin and Katz (2007), Ottaviano and Peri (2012))
ρ_s	4.3		Mahajan et al. (2024)
ρ_u	11		Ottaviano and Peri (2012), Kantova et al. (2025)
f_e	1	Normalization	
S_n	1	Normalization	
Parameters targeting data moments			
θ	2.3600	Firm size distribution	Survey of manufacturing 2012
$\bar{S}_i$	0.1736	S_i/S_n in data	ACS 2010–2024
$\bar{U}_n$	0.7781	U_n/S_n in data	ACS 2010–2024
$\bar{U}_i$	0.2001	U_i/S_n in data	ACS 2010–2024
$\bar{\alpha}$	0.6582	Skill premium in data	ACS 2010–2024
$\bar{\gamma}_s$	0.5819	w_{si}/w_{sn} in data	ACS 2010–2024
$\bar{\gamma}_u$	0.5847	w_{ui}/w_{un} in data	ACS 2010–2024
$\bar{A}$	3.9740	Real GDP per capita	BEA 2010–2024

Note: For the parameters calibrated to target data moments from 2010 through 2024, that includes A, α, γ_s, γ_u, S_i, U_n, U_i, Table reports the average of the parameter values over 15 years. The complete set of these parameters for each year is reported in Appendix A, Table A1.

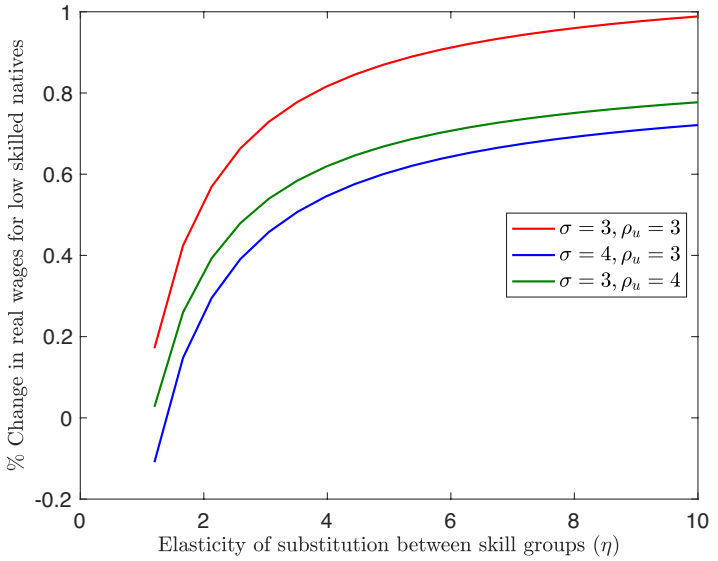


Figure 3. Change in low-skilled native wages from a 10% increase in low-skilled immigrants under different parameter values: Complementarity.

calibrated parameters. For parameters that change by year, we report the means and denote this with a bar, that is, $\bar{x}$ denotes the mean of x between 2010 and 2024. We report the complete set of parameters in Table A1 in Appendix A.

We set the elasticity of substitution between intermediate varieties σ equal to 3, which lies close to the median estimates by Broda and Weinstein (2006). Following the standards in the literature,

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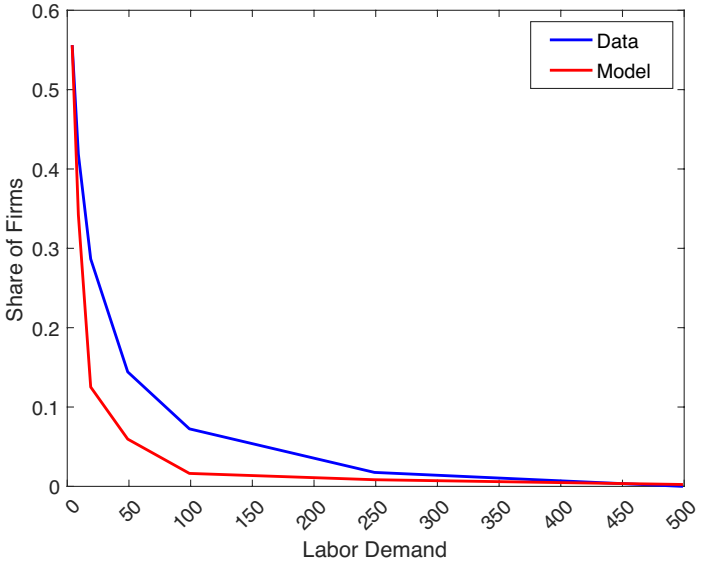


Figure 4. Firm size distribution fit between the model and the data.
Note: The blue line plots the distribution of manufacturing firms across the employment thresholds from the data. The red line plots the distribution generation in the model equilibrium for the year 2012.
Source: 2012 Census of Manufactures.

we assume that the distribution of productivity is Pareto. This implies that in equilibrium the firm size distribution is Pareto, which closely resembles the upper tail of the firm size distribution in the U.S. (Axtell, 2001). More specifically, we assume

$$g(\varphi) = \theta \varphi^{-\theta-1}, \quad \varphi \in [1, \infty), \ \theta > 0 \tag{16}$$

We calibrate θ so that our firm size distribution is as close as possible to that in the data. For data, we use the U.S. manufacturing sector for the year 2012 following Rubini (2014) which gives us a value of θ of 2.36. We obtain this by minimizing the sum of the squared difference between the employee size distribution of manufacturing firms in the data and the model in 2012. The data on the distribution of firms across the employee size bins comes from the 2012 Census of Manufacturing. The Census provides the number of firms hiring less than L_i workers for a given employment threshold L_i, where the thresholds are 4, 9, 19, 49, 99, 249, and 499, and the employment bins are denoted as $L_{i-1} - L_i$. In the model, we consider L_i as the summation of the four types of workers for each employment bin. To compare the workers in the model to the workers in the data, we compute the maximum number of workers in each bin with respect to the first bin in the model, such that the share of firms in that bin is the same in the model and in the data. Figure 4 shows the model fit of the firm size distribution observed in the data.

The fixed entry cost f_e is normalized to 1. Changing this normalization does not affect our results. The elasticity of substitution between high-skilled and low-skilled labor η has been extensively studied, with estimates ranging from 1.5 (Katz and Murphy, 1992; Goldin and Katz, 2007) to 2.5 (Card and Lemieux, 2001; Ottaviano and Peri, 2012). We take the mid-point of these estimates and set $\eta = 2$.

The elasticity of substitution between natives and immigrants across skill groups (ρ_s, ρ_u) that governs the effect of immigrant influx on the wages is available from the existing literature studying the wage impacts of immigration in the U.S. (Borjas, 2003, 2005; Borjas et al., 2007; Raphael and Smolensky, 2009; Card, 2009; Ottaviano and Peri, 2012). The elasticity parameter most widely used is around 20, implying imperfect substitution between natives and immigrants when the elasticity is not allowed to vary by skill. Allowing for the substitution parameter to vary by skill,

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the substitution is higher between natives and immigrants within the high-skilled group which is estimated at around 33, compared to 11.1 for the low-skilled group (Ottaviano and Peri, 2012). Recent studies that focus on firm-level data have estimated elasticities much lower. Mahajan et al. (2024) studies college-educated H-1B immigrants and natives and finds an elasticity of substitution of 4.3 between these groups. This number is close to 4.28 as estimated by Brinatti and Morales (2025) for the case of Germany. Thus, we use $\rho_s = 4.3$ in our calibration. Following Ottaviano and Peri (2012) and meta-analysis by Kantova et al. (2025), we adopt a conservative value of $\rho_u = 11$. This value lies between the lower-bound estimates ($= 5$) and upper-bound estimates ($= 20$), and reflects substantial but imperfect substitutability between natives and immigrants within low-skilled groups.

Data on labor supply in the U.S. comes from the American Community Survey (ACS) for the years 2010 through 2024. Labor is classified by citizenship as immigrants or natives, and is classified into skill groups of high-skilled (more than schooling) and low-skilled (schooling and less) by years of education. The supply of high-skilled natives S_n is normalized to 1 for every year, and the labor supply of the other three types of labor S_i, U_n, U_i is calibrated to match their levels relative to high-skilled natives for each year.[3]

The remaining parameters that are calibrated to match the U.S. economy are α,γ_s,γ_u, and A. These parameters determine the technology in production and how it has changed over the years. The parameter governing the skill share in production α is calibrated to match the skill premium in data, that is, the wage ratio between all high-skilled and all low-skilled workers in the US for the years 2010–2024. The parameter governing the share of high-skilled natives in production γ_s is calibrated to match the ratio of high-skilled immigrant wages to high-skilled native wages in the U.S. for the years 2010–2024 and γ_u is calibrated to match the change in the wage ratio between immigrants and natives in the low-skilled group over the years. The common productivity parameter A captures other factors that might affect changes in the technological mix in the economy over the years. It is calibrated to match the GDP per capita for the U.S. economy over each year between 2010 and 2024. We use data from the Bureau of Economic Analysis' (BEA) gross domestic product data series.

5. Results

We present our results in two steps, describing first our analysis of the 2016 immigration reversal, and then focus on the changes in 2022. We conclude this section with an analysis of the expected welfare consequences of policies being considered by the current administration.

Figure 5 shows the level of consumption of all four labor types between 2010 and 2024, normalized to 1 in 2010. It is noteworthy that the low-skilled natives are the ones whose consumption grew the least in this time period, with consumption decreasing from 2015 to 2016. Soon after, this group's consumption started increasing again, until COVID hit in 2020.

Our counterfactual assumes that low-skilled immigration observed the average growth between 2016 and 2024 that occurred between 2010 and 2016, of 1.3% annually. We represent this in Figure 6 with a green dashed line, while the blue line shows the data.

Notice that the behavior of high-skilled immigration is smoother. While it did fall behind trend between 2019 and 2024, it fully recovered by then. Accordingly, our focus is on low-skilled immigration.

5.1 The 2016 immigration reversal

Figure 7(a) plots the aggregate welfare for all natives based on equation (15). The blue line shows the change in aggregate welfare over the years based on the actual change in the immigrant population. The red line shows the counterfactual change.

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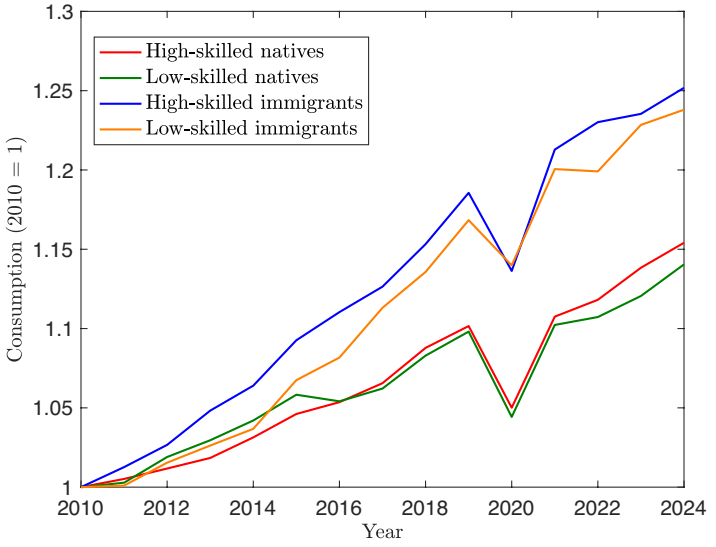


Figure 5. Consumption across labor types (2010–2024).
Note: Parameters targeting data moments vary by year. Variables are normalized to 1 in 2010.

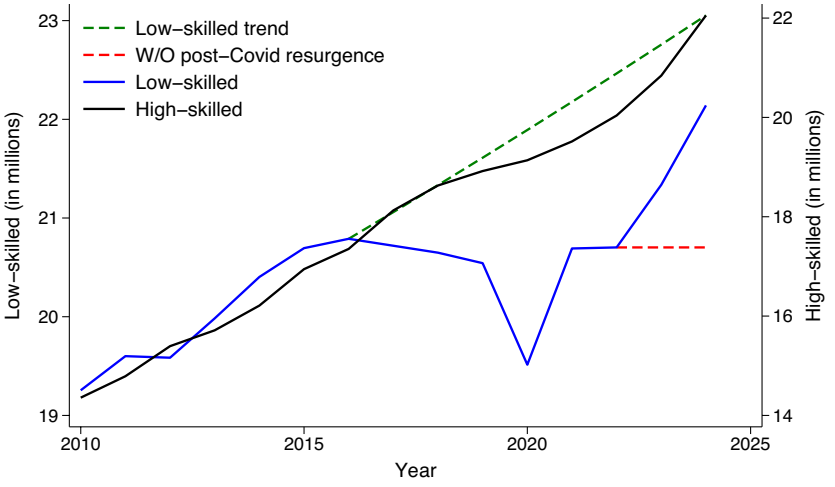
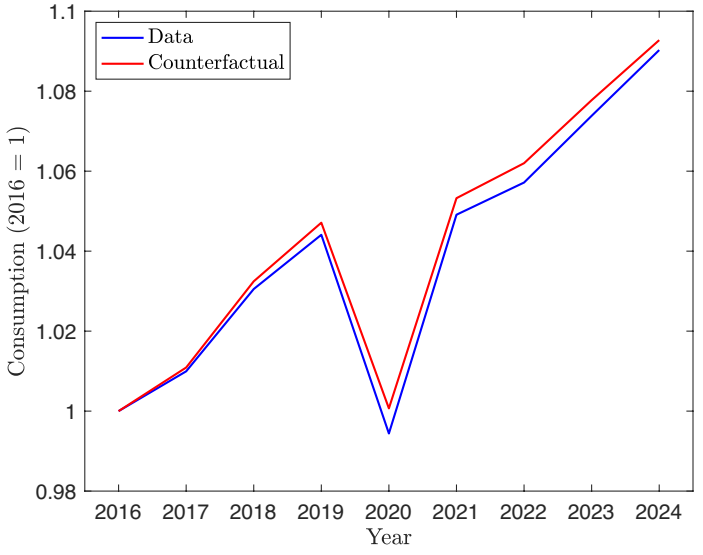


Figure 6. Immigrant population in the U.S. (2010–2024).
Note: Immigration in millions of people. The blue line represents low-skilled immigration (left axis) and the solid black line represents high-skilled immigration (right axis). The dashed green line represents the low-skilled immigration following the pre-2016 trend (left axis), and the red dashed line represents no growth in low-skilled immigration after 2022. (left axis).

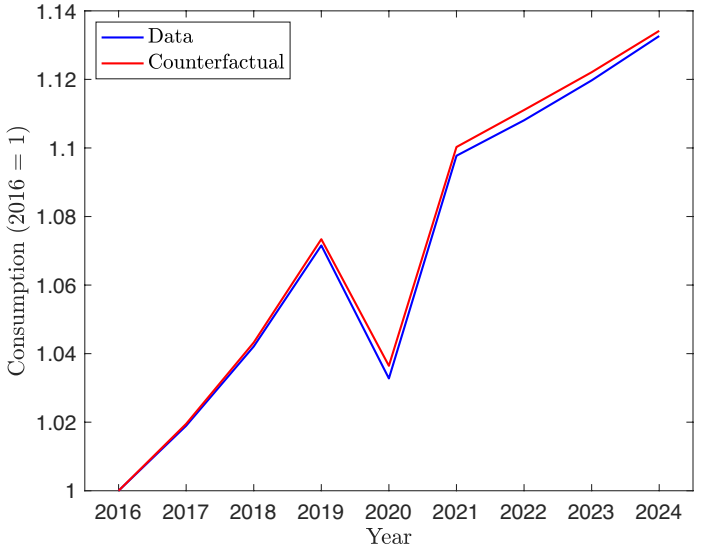
The counterfactual implies higher welfare in every year. Between 2016 and 2019, native consumption would have grown by around 4.6% with a steady annual growth of immigrants of 1.3% in that period, as opposed to an observed growth of 4.3%. As suggested by Figure 3, the substitutability between varieties is key to determine these effects. In Appendix C we show how welfare changes when we increase the value of σ.

Figure 8 breaks down the effects on natives by skills. There are two lines for the counterfactuals, one corresponding to the lower estimate of η ($= 1.5$), and one to the higher estimates ($\eta = 2.5$). We do this because our results for the low-skilled change qualitatively based on this parameter, with mild gains for high values of η, and mild losses for low values.

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(a) Consumption changes to all native workers



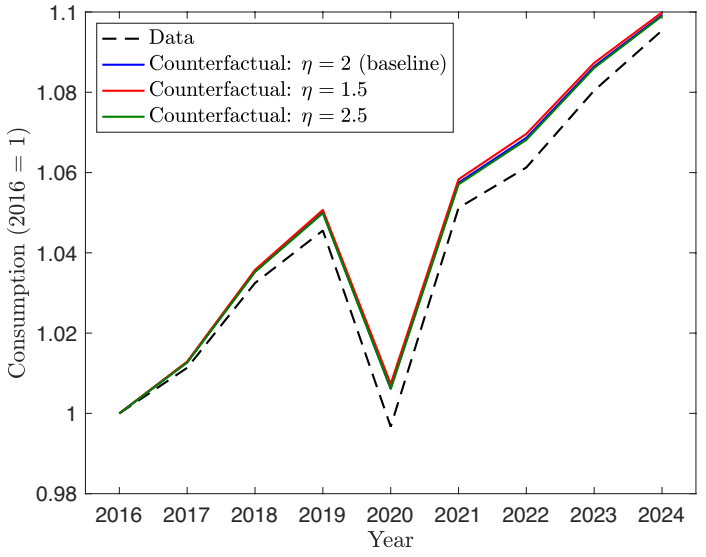
(b) Consumption changes to all immigrant workers

Figure 7. Welfare impacts with counterfactual growth in low-skilled immigrants.
Note: Parameters targeting data moments vary by year. Variables are normalized to 1 in 2016.

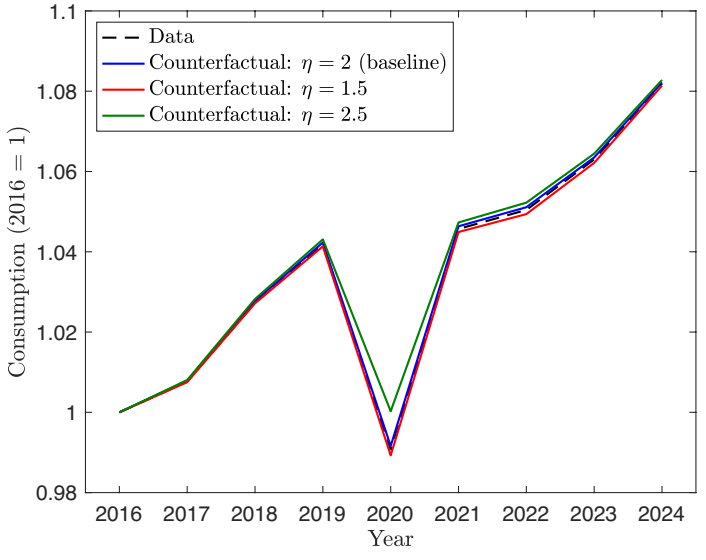
Figure 8(a) shows the effects for high-skilled workers. The counterfactual shows a considerable increase in welfare, and the increase is roughly the same under both values of η. Between 2016 and 2019, high-skilled natives would see an average consumption growth of around 5% as opposed to the observed 4.5%, if the immigrant population grew at an annual rate of 1.3%. In 2019 in particular, the welfare of skilled natives would have been 0.5% in consumption-equivalent units larger had immigrants continued on the pre-2016 trend.

Figure 8(b) shows the effects on low-skilled natives. These effects are very mild, hovering around zero. They are slightly positive under high values of η, and turn slightly negative under

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(a) Consumption changes to high-skilled native workers



(b) Consumption changes to low-skilled native workers

Figure 8. Skill complementarity and welfare impacts of counterfactual growth in low-skilled immigrants: Native workers. *Note:* Parameters targeting data moments vary by year. Variables are normalized to 1 in 2016.

low values. Intuitively, the higher the η, the larger the substitutability between low-skilled immigrants and high-skilled natives. The more substitutable these are, the more they compete in the labor market. Thus, the losses from more competition affect low-skilled natives less, since the effects are more transmittable to high-skilled workers.[4]

One can see this by focusing on the effects on the wage of the native low-skilled in Figure 9. Since immigrants are in direct competition with these workers, the wage relative to the native high-skilled wage drops with immigration. The larger the substitutability with skilled workers, the milder the drop.

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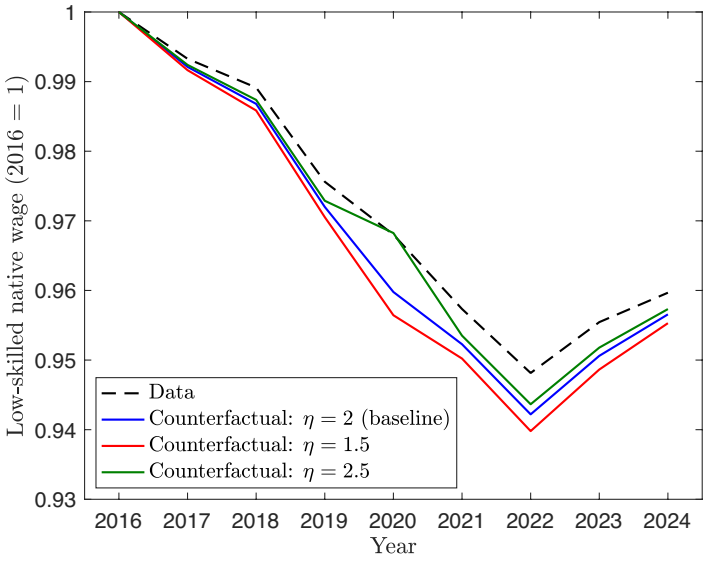


Figure 9. Wage effect.
Note: Parameters targeting data moments vary by year. Variables are normalized to 1 in 2016.

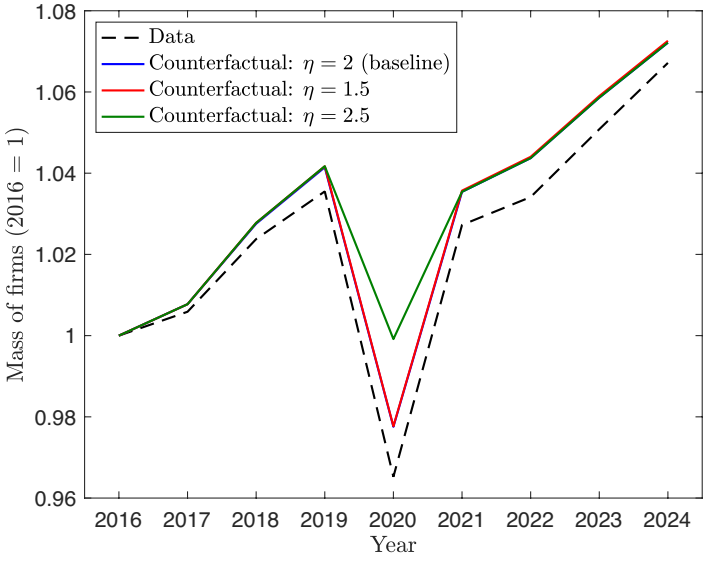


Figure 10. Change in mass of varieties.
Note: Parameters targeting data moments vary by year. Variables are normalized to 1 in 2016.

The positive effects come from changes in market size. With more workers, the number of varieties produced in equilibrium increases, and this is a source of welfare gains. We show this in Figure 10. The increase in varieties implies a lower cost of the consumption aggregate. Figure 11 shows the effect on the aggregate price level.

Quantitatively, under the counterfactual, the average native would be able to consume 0.3% more consumption units in 2019 relative to the data. This is a combination of an increase of 0.5% coming from the high-skilled, and no change coming from the low-skilled.

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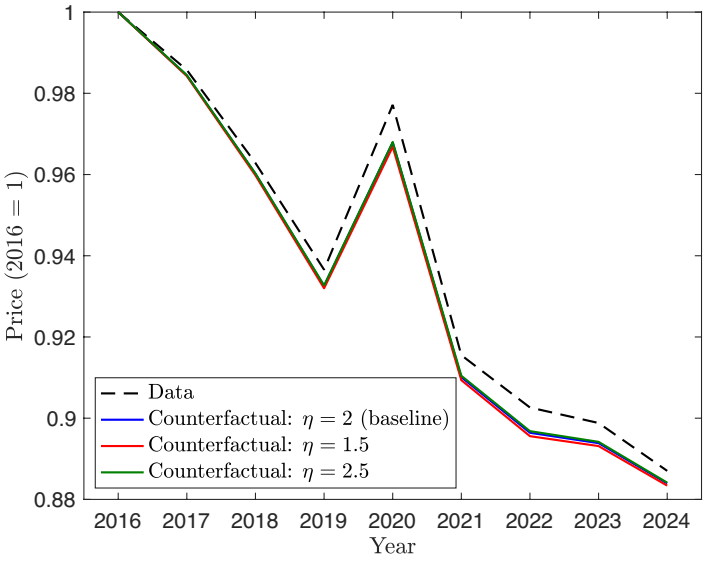


Figure 11. Change in aggregate price.
Note: Parameters targeting data moments vary by year. Variables are normalized to 1 in 2016.

Part of the gains for the high-skilled come from a reduction in the price of the aggregate consumption good, that increases real wages. The low-skilled also benefit from the reduction in the aggregate price level. But the increased competition among this group brings downward pressure on wages. In net, we find that these effects roughly cancel out, so that the counterfactual does not affect the real wages of the native low-skilled.

Next, we ask what percentage of these welfare gains or losses arises from 'standard' labor market mechanisms that operate through wage changes and how much accrues to increased market size. Using equations (13) and (7), we can decompose the welfare change for high-skilled and low-skilled natives into its components. Specifically,

$$\Delta \log(C_{jk}) = \underbrace{\Delta \log\left(\frac{w_{jk}}{w(A)}\right)}_{\text{Standard}} + \underbrace{\left(\frac{1}{\sigma - 1}\right) \Delta \log(M)}_{\text{Variety}}, \quad \forall\ j = s, u\,;\, k = n. \tag{17}$$

The first component on the right-hand side of equation (17) identifies what proportion of welfare change comes from wage and price changes from the counterfactual increase in low-skilled immigrants. The second component identifies what proportion comes from a change in market size due to the counterfactual. We consider the baseline scenario of $\eta = 2$, and compute these components for all the years, which are reported in Table 2. On average, around 33% of welfare gains to high-skilled natives arise from changes in wages and prices. Much of the gains, close to 67%, arise from increased market size from increasing low-skilled immigrants. Since low-skilled natives are directly competing with low-skilled immigrants, the standard component leads to a drop in welfare, which is compensated by the market-size channel.

Notice that the gains from the variety channel depends explicitly on σ. In fact, increasing σ considerably reduces the welfare gains. Appendix C shows this. Intuitively, a larger value of σ reduces the gains from varieties. In the limit as $\sigma \to \infty$, the model becomes one of a representative good, with no gains from variety.

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Table 2. Components of welfare change (percentage points)

	2017	2018	2019	2020	2021	2022	2023	2024
High-skilled natives								
Standard: $\Delta \log\left(\frac{w_{jk}}{w(A)}\right)$	0.05	0.09	0.14	0.32	0.20	0.23	0.18	0.12
Variety: $\left(\frac{1}{\sigma-1}\right) \Delta \log(M)$	0.09	0.18	0.29	0.63	0.39	0.46	0.37	0.23
Welfare: $\Delta \log(C_{sn})$	0.14	0.27	0.43	0.95	0.59	0.69	0.55	0.35
Low-skilled natives								
Standard: $\Delta \log\left(\frac{w_{jk}}{w(A)}\right)$	−0.07	−0.14	−0.23	−0.53	−0.33	−0.40	−0.32	−0.21
Variety: $\left(\frac{1}{\sigma-1}\right) \Delta \log(M)$	0.09	0.18	0.29	0.63	0.39	0.46	0.37	0.23
Welfare: $\Delta \log(C_{un})$	0.02	0.04	0.06	0.10	0.06	0.06	0.05	0.02

5.2 The 2022 immigration comeback

The declining trends in low-skill immigration that started in 2016 reversed in 2022, when low-skilled immigration sped up, following the relaxation of many restrictions by the Biden Administration. Figure 6 shows these changes. Note that, in spite of the spike, low-skilled immigration is still considerably below the pre- 2016 trend.

Part of this comeback follows the reopening of international travel and visa processing in 2021–2022 related to the travel bans during COVID. There were also efforts by the administration to encourage more immigration. The federal government expanded the cap on H-2B temporary nonagricultural worker visas to address labor shortages in seasonal industries reliant on low-skilled immigrant labor. The termination of Title 42 in May 2023 ended a restriction that limits immigrant entry on public health grounds.

This section asks to what extent did it help natives recover from drops in 2016. Related to this is the question of how different would things be had Biden not lifted some of the restrictions to immigration. Accordingly, our first counterfactual compares the observed welfare levels to those that would have happened had immigration followed its pre-2016 trend. Our second counterfactual "removes" the immigration resurgence between 2022 and 2024. We represent this with a dashed red line in Figure 6.

Figure 12 presents a visual representation of our results. Focusing on high-skilled workers, welfare in 2024 would have been higher by 0.35% consumption units had immigration followed the pre-2016 trend. Notwithstanding, the post-COVID resurgence helped in milding the losses: without it, the high-skilled would be 0.91% worse off in terms of welfare. The effects for low-skilled natives are virtually zero, given the offsetting effects of more competition and more varieties.

5.3 Anti-immigration policies under consideration

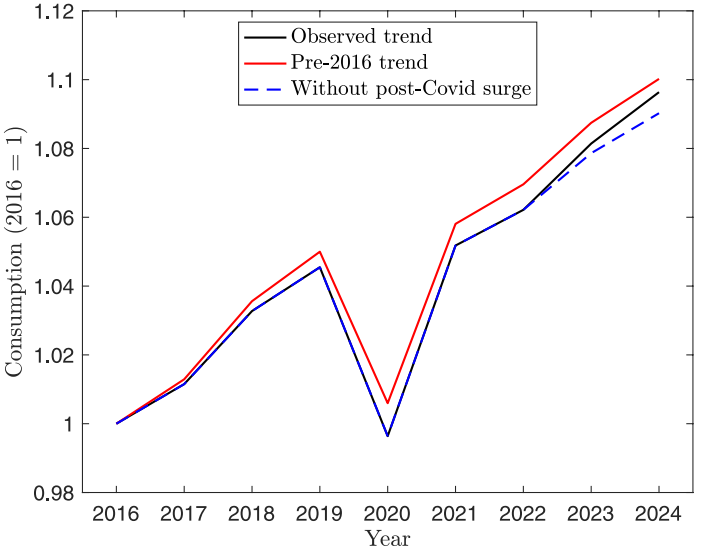
We end this section with an analysis of the anti-immigration policies the Trump Administration is currently enforcing. The Deportation Data Project (Hausman, 2025), suggests that the second Trump Administration has deported around 1.5 million low-skilled immigrants.[5] Similarly, the Department of Homeland Security reports 3 million low-skilled immigrants deported.[6]

We compute welfare changes for high-skilled and low-skilled natives with a 1.5 million drop and a 3 million drop in the low-skilled immigrant population using our calibration for 2024. Table 3 reports the welfare change for high-skilled and low-skilled natives for the corresponding deportation numbers of low-skilled immigrants. With twice the number of deportations, the loss in welfare doubles. High-skilled natives again have a higher welfare loss compared to low-skilled natives.

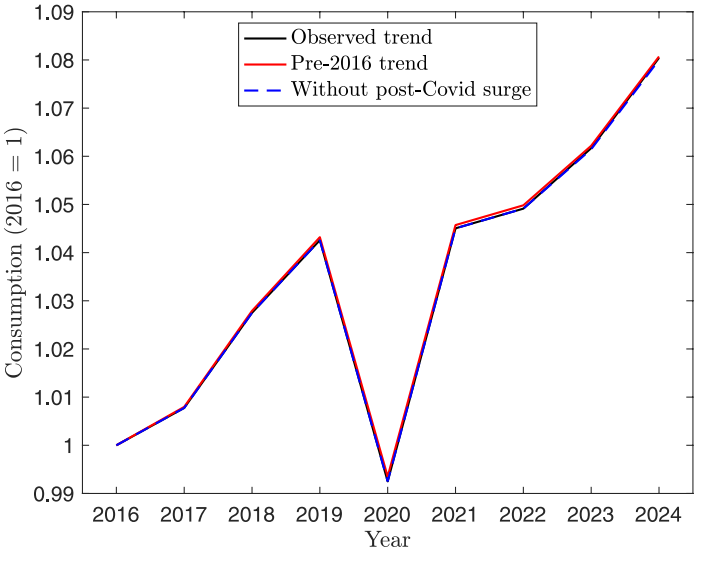
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Table 3. Change in welfare with approximate deportations in 2025

	High-skilled natives	Low-skilled natives
1.5 million deportations	−0.58%	−0.04%
3 million deportations	−1.16%	−0.08%



(a) Consumption changes to high-skilled native workers



(b) Consumption changes to low-skilled native workers

Figure 12. Welfare changes post-Covid.
Note: Parameters targeting data moments vary by year. Variables are normalized to 1 in 2016.

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6. A two-sector economy

This section expands our benchmark model by introducing a second sector that is more intensive in low-skilled workers. We do this to explore how sectoral heterogeneity affects our results.

There are two intermediate goods sectors operating independently in a perfectly competitive market. A representative final goods sector aggregates these sectoral composites via a Cobb-Douglas technology.

$$Q = Q_1^{\beta} Q_2^{1-\beta}, \qquad \beta \in (0,1). \tag{18}$$

Each sectoral composite $Q_m, m \in \{1,2\}$ is a CES aggregate of a continuum of intermediate varieties $\omega \in \Omega_m$:

$$Q_m = \left[\int_{\Omega_m} q_m(\omega)^{\frac{\sigma_m - 1}{\sigma_m}} d\omega\right]^{\frac{\sigma_m}{\sigma_m - 1}}, \qquad \sigma_m > 1. \tag{19}$$

Cost minimization by the final-good firm gives the demand for each sectoral aggregate as

$$Q_1 = Q\left(\frac{\beta}{1-\beta}\right)^{1-\beta}\left(\frac{P_2}{P_1}\right)^{1-\beta}, \tag{20}$$

$$Q_2 = Q\left(\frac{\beta}{1-\beta}\right)^{-\beta}\left(\frac{P_2}{P_1}\right)^{-\beta} \tag{21}$$

where the sectoral price indices are $P_m = \left[\int_{\Omega_m} p_m(\omega)^{1-\sigma_m} d\omega\right]^{\frac{1}{1-\sigma_m}}$, for $m = 1, 2$. This implies constant expenditure shares for each sector, $E_m = \lambda_m PQ$, where $\lambda_1 = \beta$, $\lambda_2 = 1-\beta$, and the economy-wide price index P is given as,

$$P = \left(\frac{P_1}{\beta}\right)^{\beta}\left(\frac{P_2}{1-\beta}\right)^{1-\beta} \tag{22}$$

Similar to the one-sector setup, the intermediate varieties are produced using CES technology in each sector, where a firm with draw ϕ_m and sectoral productivity A_m produces output according to,

$$q_m(\phi_m; A_m) = A_m \phi_m \left[\alpha_m S_m^{\frac{\eta-1}{\eta}} + (1-\alpha_m) U_m^{\frac{\eta-1}{\eta}}\right]^{\frac{\eta}{\eta-1}}, \tag{23}$$

where S is the high-skill aggregator and U is the low-skill aggregator. Each of these skill aggregates nests natives and immigrants:

$$S_m = \left[\gamma_{s,m} S_{n,m}^{\frac{\rho_s - 1}{\rho_s}} + (1-\gamma_{s,m}) S_{i,m}^{\frac{\rho_s - 1}{\rho_s}}\right]^{\frac{\rho_s}{\rho_s - 1}} \tag{24}$$

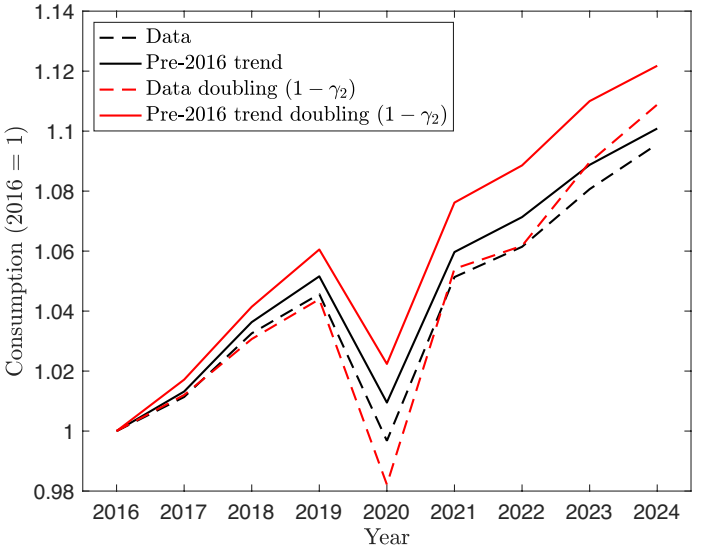
$$U_m = \left[\gamma_{u,m} U_{n,m}^{\frac{\rho_u - 1}{\rho_u}} + (1-\gamma_{u,m}) U_{i,m}^{\frac{\rho_u - 1}{\rho_u}}\right]^{\frac{\rho_u}{\rho_u - 1}} \tag{25}$$

6.1 Gaining intuition: a sector with only low-skilled labor

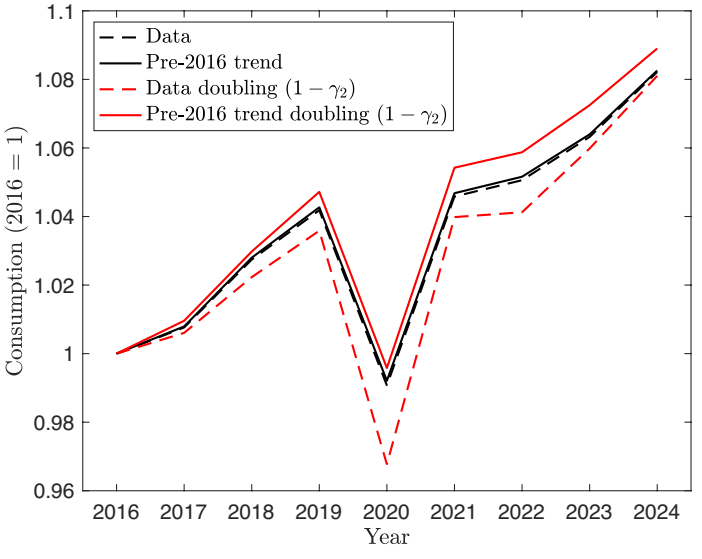
This section examines two changes to the baseline model. First, it investigates how introducing a low-skill intensive sector affects the results, emphasizing the role of its relative size. Second, it considers how changing the labor composition of natives and immigrants in the low-skill intensive sector affects the results.

To explore the effects of changing the immigrant composition in sector 2, we set $\gamma_{u,1} = \gamma_{u,2}$ as a baseline for comparability, and then double the immigrant share parameter in sector 2 so that $1 - \gamma_{u,2} = 2((1-\gamma_{u,1}))$. We calibrate α_1 to match the skill premium in the US, and $\gamma_{s,1}$ to match

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(a) Consumption changes to high-skilled native workers



(b) Consumption changes to low-skilled native workers

Figure 13. Skill complementarity and welfare impacts of counterfactual growth in low-skilled immigrants: a two-sector economy.
Note: Parameters targeting data moments vary by year. Variables are normalized to 1 in 2016.

the wage ratio between high-skilled immigrants and high-skilled natives in the US. We assume $A_1 = A_2$ for simplicity, and calibrate the common productivity parameter to match US GDP per capita. Table A2 in Appendix A shows all parameter values.

Figure 13 plots our results. The top panel plots the welfare change for high-skilled natives, and the bottom panel for low-skilled natives. The black dashed lines show our estimates of the increase in consumption. The black solid line shows the counterfactual path consumption would have followed had immigration not slowed down.

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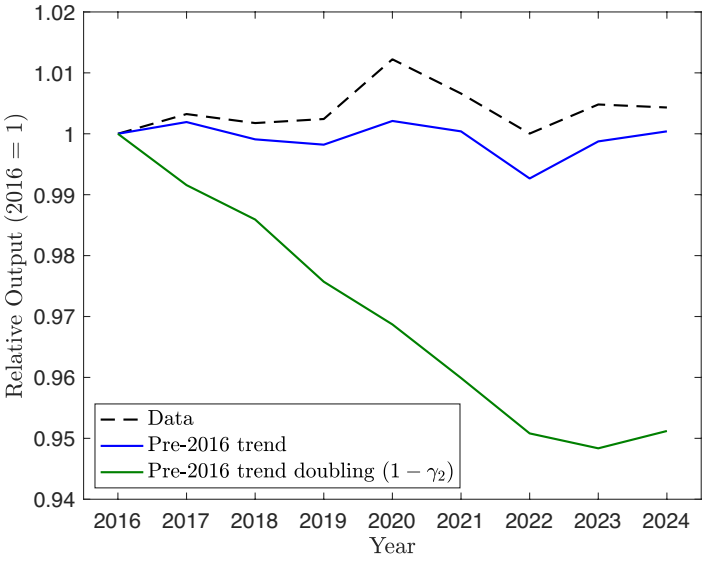


Figure 14. Relative output of sector 1 to sector 2.
Note: Parameters targeting data moments vary by year. Variables are normalized to 1 in 2016.

Introducing the second sector amplifies the gains from immigration (or the losses from the lack of it). High-skilled natives gain about 0.6% of consumption-equivalent units, and low-skilled natives 0.07% (compared to 0.5% and 0.05% in the baseline, respectively).

The reason why the gains are larger is that this adds a margin of adjustment to the economy: the relative amount of good 2. In fact, we show in Figure 14 that the ratio Y_1/Y_2 changes. In particular, resources flow towards the good Y_2 that is relatively more intensive in low-skilled immigrants.[7]

The red lines in Figure 13 replicate these results for a larger immigrant share in sector 2. This amplifies all effects even further. Doubling the immigrant share parameter in sector 2 triples the gains for high-skilled natives (by 1.55%). Gains for the low-skilled natives increase by 1.05%. This amplification happens because, by decreasing $\gamma_{u,2}$, we increase the marginal productivity of low-skilled immigrants. Thus, the same increase in employment produces a larger increase in the production possibility set.

These findings are consistent with Brinatti and Morales (2025), who finds that when immigrant intensity differs across firms, and the elasticity of substitution between natives and immigrants is larger than the demand elasticity, immigrants make the production more efficient by relocating natives to native-intensive firms. This amplifies the welfare gains from immigration.

We explore changes to the size of sector 2 in Figure 15. Our benchmark sets $\beta = 0.8$, so that sector 2 accounts for 20% of GDP. Making this sector larger amplifies the gains for both native types. This is because when β is smaller, the marginal productivity of low-skilled immigrants is larger. Thus, as in the case with the share parameter, under a smaller value of β, the expansion of the production set is larger given the same increase in low-skilled immigrants.

6.2 Construction vs. Non-construction

To explore quantitatively the welfare effects of low-skilled immigration in a context where one firm is intensive in their use of low-skilled workers, we map the low-skilled intensive sector with construction in the data. The choice of the construction sector is grounded in the observed pattern of immigrant employment in the U.S., as shown in Table 4. First, the construction sector on average employs twice the number of low-skilled relative to high-skilled workers, whereas on

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Table 4. Construction vs non-construction intensities

Sector	Ratio of high-skilled to low-skilled	Ratio of immigrant to to native in low-skilled	Ratio of immigrant to to native in high-skilled
Construction	0.51	0.37	0.15
Non-construction	1.56	0.26	0.17
All sectors	1.45	0.28	0.17

Note: The ratios correspond to the average of the time period 2010–2019. The construction sector is identified using the ACS industry classification, and the non-construction sector includes all other industry classifications. All sectors represent the national average for the U.S.

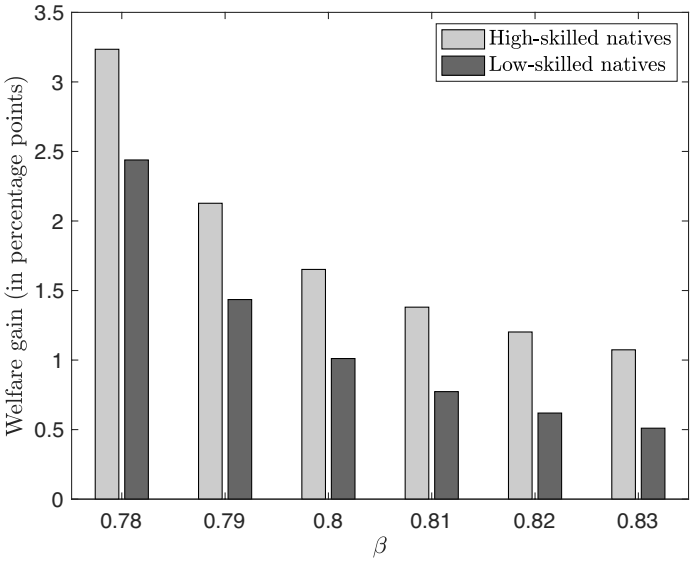
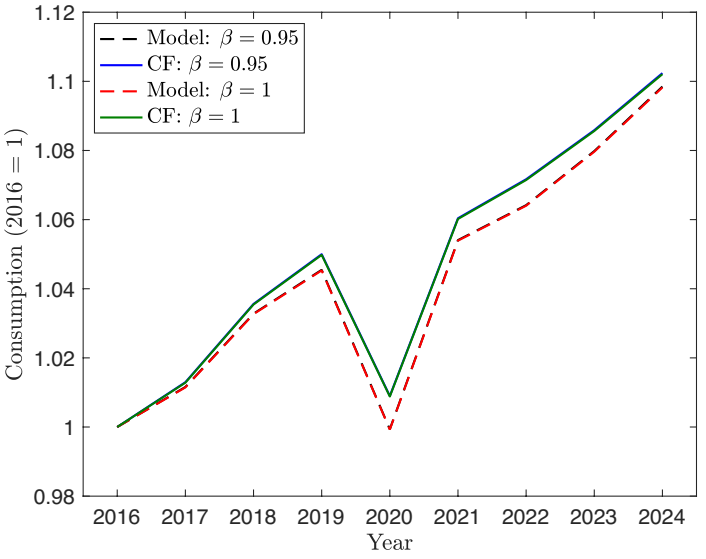


Figure 15. Welfare gain between 2016 and 2024 with different values of β.
Note: The welfare gains correspond to the scenario where $(1-\gamma_{u,2})$ is doubled and the model is initially calibrated for $\beta = 0.8$, with marginal changes in the counterfactual. The welfare gain is calculated as the difference between consumption with an increase in low-skilled immigrants and consumption without an increase.

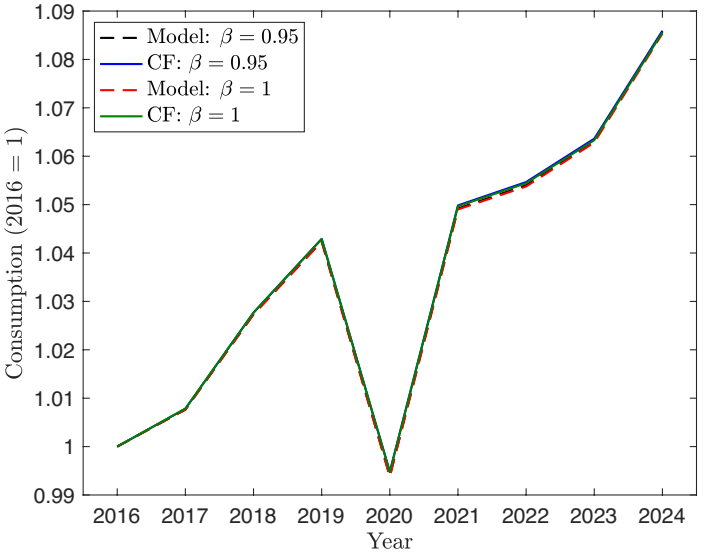
average a sector in the U.S. employs more high-skilled workers as opposed to low-skilled workers. Second, considering the ratio of low-skilled immigrants to low-skilled natives, the construction sector employs more low-skilled immigrants than the average U.S. sector, for any given number of low-skilled natives.[8] This ratio is reversed when looking at the high-skilled immigrant employment pattern in the U.S., but the ratios are close to the rest of the economy. The construction sector employs fewer high-skilled immigrants than the average U.S. sector. These patterns suggest that the construction sector becomes an important channel through which low-skilled immigration changes can affect the economy. In fact, Howard et al. (2024) finds that increased immigration enforcement in the form of deportations of low-skilled immigrants reduces new housing construction and drives up the price of existing houses. Thus, to capture how the drop in low-skilled immigrants can affect welfare in the presence of heterogeneous sectors, we focus on construction and non-construction sectors.

This section maps the low-skilled sector (sector 2) with the construction sector in the data. Sector 1 maps to the rest of the economy. We calibrate the production function parameters in sector 1 to match the observed wage ratios for workers across all industries in the U.S. The corresponding parameters in sector 2 are calibrated to match the labor demands observed in the

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(a) Consumption changes to high-skilled native workers



(b) Consumption changes to low-skilled native workers

Figure 16. Skill complementarity and welfare impacts of counterfactual growth in low-skilled immigrants: construction vs. non-construction.
Note: Parameters targeting data moments vary by year. Variables are normalized to 1 in 2016.

construction sector in the U.S. We set $\beta = 0.95$ to match a share of the construction sector in the U.S. GDP of 5%. All other parameters are calibrated following the targets used in our benchmark model.

Figure 16 plots the welfare for high-skilled and low-skilled natives over the years in the equilibrium and the counterfactual with more low-skilled immigrants. We compare these welfare values with the one-sector equilibrium where β is equal to 1.

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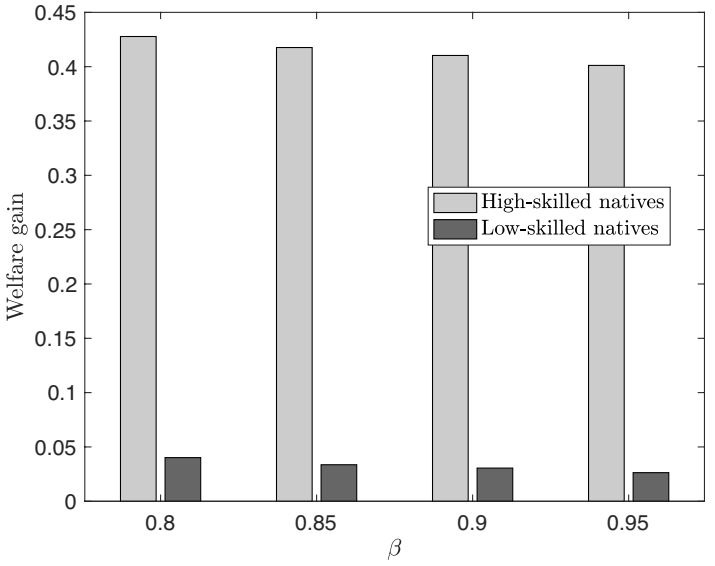


Figure 17. Welfare gain between 2016 and 2024 with different values of β.

Welfare changes remain practically the same as in our baseline, mostly because of the small size of the new sector. In fact, expanding this sector would increase the gains for low-skilled natives of further low-skilled immigration, although these changes are likely to be small. The robustness of our results to heterogeneous sectors ratifies our confidence in our baseline results.

Both high-skilled and low-skilled natives gain from an inflow of low-skilled immigrants. Thus, even when immigrant workers are disproportionately distributed across sectors, the inflow of low-skilled immigrants generates welfare gains for natives.

It is important to mention that these results hardly change as we increase the size of the low-skilled sector. Figure 17 shows that increasing this share from 5% to 20% has very little effect on the welfare changes for all natives.[9]

7. Conclusion

Immigration is a subject of controversy in the United States, in particular low-skilled immigration. The main arguments center around competition and the downward pressure immigration produces on low-skilled wages.

By using a general equilibrium model of immigration, we approximate the aggregate welfare effects of recent changes in immigration. We do find that immigration reduces native wages among low-skilled workers. But we also uncover an additional effect of immigration: it provides welfare gains via general price reductions, given the increase in varieties. While low-skill nominal wages can drop with more immigration, reductions in the cost of consumption offset these effects. High-skilled workers gain via two channels: because more low-skilled workers increase their marginal productivity given complementarities; and the overall price drop effect.

Currently, aggressive anti-immigration efforts suggest welfare is bound to drop, at least for high-skilled natives. Rather than immigration, policymakers should focus on the root of the problems for low-skilled workers. Most of these are in manufacturing sectors (Clina and Rubini, 2024), and this sector is currently shrinking for reasons unrelated to immigration. Candidates include structural transformation, under which, as economies develop, they consume more services and less goods (see for example Herrendorf et al., 2013; Boppart, 2014; Comin et al., 2021,

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among others) and automation, which affects the manufacturing sector more severely than others (Acemoglu and Restrepo, 2022). These processes are healthy, shifting demand to higher skills, and encouraging education among the population.

Curtailing immigration will not likely affect the pace of these processes. As we show in this paper, this is more likely to hurt native workers. Rather than create an artificial demand for low-skilled workers, policymakers should focus on policies that are consistent with development, such as subsidizing education to increase the supply of high-skilled workers.

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Competing interests. The author(s) declare none

Notes

1 Also see Dostie et al. (2023), Arellano-Bover and San (2020) for assimilation through changes in native premium within firms, and Kerr et al. (2015) for assimilation through changes in high-skilled employment within firms.

2 Changing the parameter θ has very small effects on welfare, so our results would go through with other choices of θ, but the range for σ would be narrower.

3 Notice that this model has increasing returns to scale so that changes in S_n can potentially affect welfare per person, so this normalization can hide welfare gains. This is not a problem because these changes would be absorbed by changes in A. In other words, our results would remain unchanged if we change the mass of high-skilled natives as we observe in the data. The only difference would be the estimates of A.

4 We report these effects for immigrants in Appendix B, Figure B1.

5 Data is provided for the total number of individuals detained by ICE in different ICE facilities daily. These are government data provided by ICE in response to a FOIA request and processed by the Deportation Data Project. Using the daily number of detainees who are booked overnight, we calculate the total number of detainees in 2025, which sums up to 1.5 million. Even though not all detainees are deported, this number serves as a good approximation of the probable number of deportations by ICE.

6 Homeland Security Press Release: "DHS Sets the Stage for Another Historic, Record-Breaking Year Under President Trump."

7 Note the similarity with the Rybcynski Theorem, that states that an inflow of low-skilled workers will expand the output of the good intensive in low-skilled labor relative of that of the high-skill intensive sector when the good prices do not change. In our case, the prices change, but the relative output of the low-skill labor intensive sector expands more than the high-skill intensity sector.

8 Table A3 in Appendix A lists top and bottom ten industries in the US based on the average number of low-skilled immigrants employed in those industries between 2010 and 2019. The construction industry has the highest number of low-skilled immigrants employed in the US over this period.

9 These gains are much smaller than those depicted in Figure 15. The reason is that low-skilled immigrants are extremely productive in Figure 15 given the counterfactually high immigrant share $1 - \gamma_{u,2}$.

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Appendix A. Additional tables

Table A1. Calibrated parameters for all years, 2010–2024

Year	S_i	U_n	U_i	α	γ_s	γ_u	A
2010	0.1604	0.9082	0.2152	0.6386	0.5991	0.5963	3.6882
2011	0.1620	0.8859	0.2147	0.6425	0.5968	0.5962	3.7173
2012	0.1645	0.8575	0.2092	0.6449	0.5942	0.5965	3.7630
2013	0.1652	0.8427	0.2101	0.6467	0.5905	0.5960	3.8019
2014	0.1669	0.8248	0.2101	0.6494	0.5893	0.5959	3.8390
2015	0.1715	0.8111	0.2095	0.6514	0.5848	0.5923	3.8960
2016	0.1718	0.7868	0.2059	0.6566	0.5825	0.5879	3.9367
2017	0.1756	0.7678	0.2007	0.6596	0.5806	0.5828	3.9838
2018	0.1780	0.7580	0.1973	0.6619	0.5791	0.5827	4.0350
2019	0.1783	0.7486	0.1936	0.6633	0.5753	0.5793	4.0932
2020	0.1733	0.7044	0.1767	0.6692	0.5756	0.5738	4.0478
2021	0.1773	0.7091	0.1880	0.6686	0.5714	0.5731	4.1631
2022	0.1803	0.7006	0.1862	0.6722	0.5693	0.5744	4.1866
2023	0.1856	0.6898	0.1901	0.6734	0.5710	0.5706	4.2138
2024	0.1928	0.6769	0.1936	0.6754	0.5689	0.5722	4.2453

Note: The labor supply for high-skilled natives (S_n) is normalized to 1 for all years, and the other labor types (S_i, U_n, U_i) are calibrated as a share of the high-skilled natives for each year.

Table A2. Calibrated parameters with two sectors

Year	α_1	$\gamma_{s,1}$	$\gamma_{u,1}$	$\gamma_{u,2}$	A
2016	0.6887	0.5825	0.5879	0.1758	6.7474
2017	0.6923	0.5806	0.5828	0.1656	6.8240
2018	0.6949	0.5791	0.5827	0.1654	6.9059
2019	0.6966	0.5753	0.5793	0.1587	7.0027
2020	0.7041	0.5756	0.5738	0.1476	6.9177
2021	0.7031	0.5714	0.5731	0.1462	7.1127
2022	0.7068	0.5693	0.5744	0.1489	7.1405
2023	0.7085	0.5710	0.5706	0.1413	7.1871
2024	0.7108	0.5689	0.5722	0.1444	7.2355

Note: The table reports only the time-varying parameters that are separately calibrated in the two-sector model. The labor supply values correspond to Table A1. $\gamma_{u,2}$ is calibrated such that, $(1-\gamma_{u,2}) = 2 \times (1-\gamma_{u,1})$. α_2 and $\gamma_{s,2}$ are 0 by construction. Parameters that do not vary across years are σ, η, ρ_s, ρ_u, f_e, and θ, use the values in Table 1. β is assumed 0.8 in this calibration, and Figure 15 reports the welfare estimates with alternate values of β.

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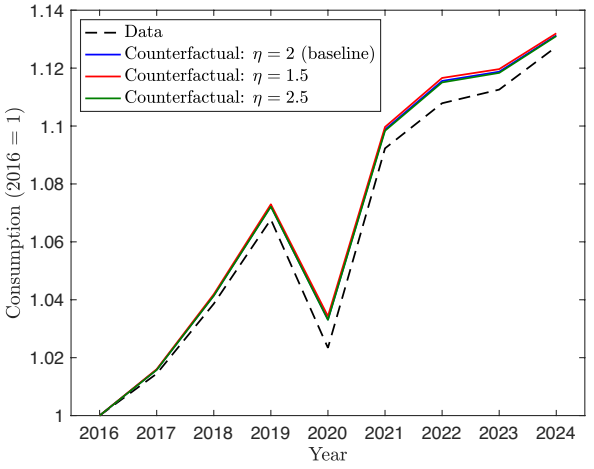
Table A3. Low-skilled immigrant employment across ACS industries

Industry	Low-skilled immigrants	Share in industry employment
Top ten industries by low-skilled immigrant employment		
All construction	1, 350, 771	0.2215
Eating and drinking places	1, 173, 498	0.2276
Agricultural production, crops	347, 883	0.4919
Services to dwellings and other buildings	318, 414	0.3588
Hotels and motels	307, 690	0.2497
Landscape and horticultural services	275, 415	0.4262
Grocery stores	257, 641	0.1300
Health services, n.e.c.	224, 592	0.0645
Real estate, including real estate-insurance offices	130, 903	0.0854
Miscellaneous personal services	129, 783	0.2023
Bottom ten industries by low-skilled immigrant employment		
Farm-product raw materials	1, 917	0.0381
Railroad locomotives and equipment	1, 542	0.0551
Electric and gas, and other combinations	1, 475	0.0224
Music stores	1, 007	0.0296
Bowling centers	984	0.0391
Libraries	966	0.0213
Tobacco manufactures	818	0.0469
Video tape rental	635	0.0539
Coal mining	578	0.0080
Utilities, n.s.	413	0.0307
Aggregate	9, 669, 525	0.1032

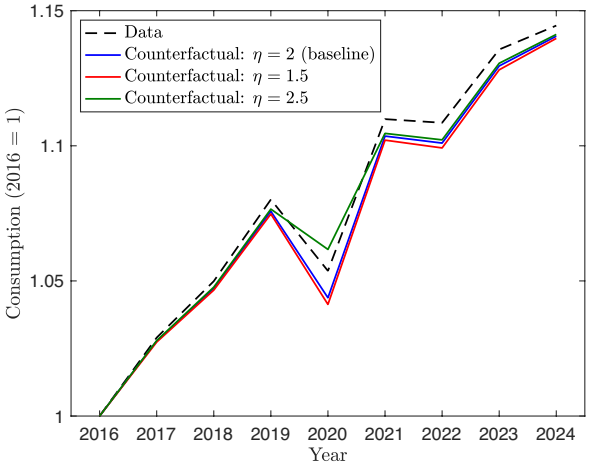
Source: American Community Survey (2010–2019).

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Appendix B. Counterfactual effects on immigrants



(a) Consumption changes to high-skilled immigrant workers



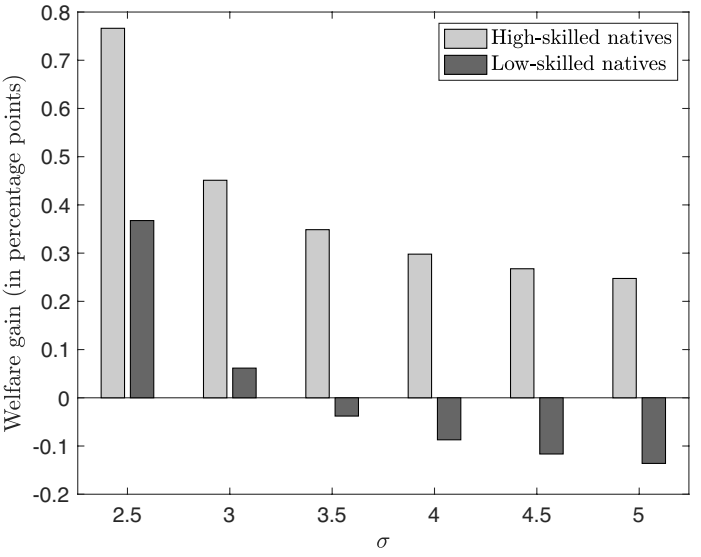
(b) Consumption changes to low-skilled immigrant workers

Figure B1. Skill complementarity and welfare impacts of counterfactual growth in low-skilled immigrants: immigrant workers.
Note: Parameters targeting data moments vary by year. Variables are normalized to 1 in 2016.

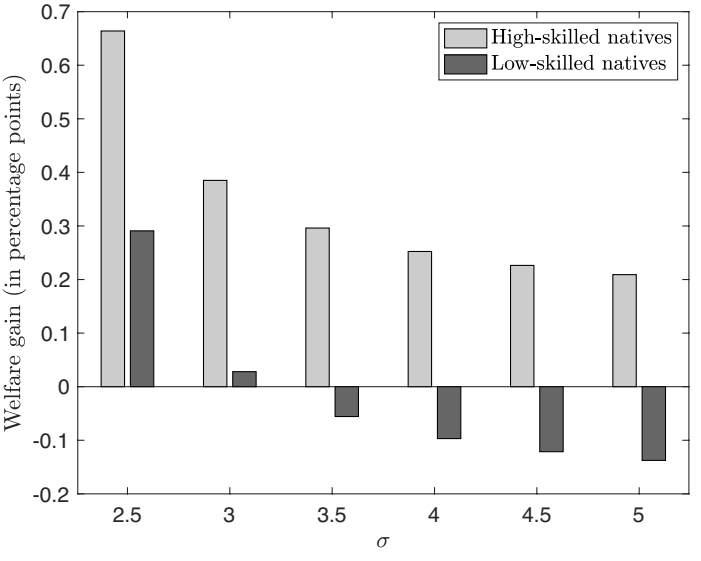
Appendix C. Sensitivity to σ

The market-size channel plays an important role and is key to non-negative welfare gains from immigration. As such, we perform a sensitivity analysis on σ, the parameter governing this channel. We quantify the welfare gains from the counterfactual increase in low-skilled immigrants under alternative values of σ. Figure C1 shows these welfare gains. The welfare gains from additional low-skilled immigrants are decreasing in σ. The high-skilled natives still enjoy positive welfare gains. However, when the love for variety channel is weak, the low-skilled natives have negative welfare gains. This negative gains arise because the variety channel in equation (17) fails

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(a) Welfare gain between 2016 and 2019



(b) Welfare gain between 2016 and 2024

Figure C1. Sensitivity of welfare gains to σ.

to compensate for the downward pressure on low-skilled native welfare coming from the standard wage channel under high values of σ. Thus, this parameter becomes key to determining the welfare effects of immigration.

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