The Postpandemic U.S. Immigration Surge: New Facts and Inflationary Implications*

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Abstract

The U.S. experienced an extraordinary postpandemic surge in unauthorized immigration. This paper combines administrative data on border encounters and immigration court records with household survey data to document two new facts about these immigrants: They tend to be hand-to-mouth consumers and low-skilled workers that complement the existing workforce. We build these features into a model with capital, household heterogeneity, and population growth to study the inflationary effects of this episode. Contrary to the popular view, we find little effect on inflation, as the increase in supply was largely offset by an increase in demand.

Keywords: Immigration, population growth, inflation, skill complementary, hand-to-month
JEL Classifications: E21, E22, E31, F22, J11, J15

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1 INTRODUCTION

Prior to the COVID-19 pandemic, immigration to the U.S. was relatively stable, with roughly 1 million immigrants added to the U.S. population annually from 2000 to 2019, according to Congressional Budget Office (CBO) estimates. The onset of the pandemic drastically slowed U.S. immigration, due to the halt in global mobility and a slowdown in application processing. In late 2021, however, the U.S. started to experience an extraordinary surge in immigration that far outpaced the prepandemic trend. The CBO projects an annual average of 3 million (net) immigrants from 2022 to 2025, implying a boost to year-over-year population growth from about 0.5% just before the pandemic to 1.2% at its peak. This unprecedented shock triggered widespread discussions about its macroeconomic impact, particularly on inflation. What is unusual about this episode is the influx of unauthorized immigrants, as past U.S. immigration was dominated by authorized immigrants (e.g., lawful permanent residents). This motivates a thorough examination of the postpandemic immigration surge.

To better understand the labor market outcomes and consumption-saving patterns of postpandemic immigrants, we combine administrative data on border encounters and immigration court records with data from the Current Population Survey (CPS) and the Panel Study of Income Dynamics (PSID). These surveys allow us to identify immigrants based on their citizenship status and birthplace, but they do not reveal the legal status of an immigrant. This could create bias in our results, since household surveys are likely to undercount unauthorized immigrants. To address this concern, we use as a proxy survey respondents who were born in the same countries as the postpandemic unauthorized immigrants. This approach is motivated by a well-established finding in the literature that newly arriving immigrants tend to have similar characteristics as earlier immigrants from the same country of origin and tend to move to ethnic enclaves established by earlier immigrants (Bartel, 1989; Card, 2001, 2009).

Administrative data on border encounters and immigration court records reveals that 80%–90% of postpandemic immigrants have been from a few countries in Central and South America. Focusing on immigrants from these counties in the CPS and PSID surveys reveals two key facts. First, postpandemic immigrants tend to be less educated and work in industries and occupations with lower skill requirements than the native population. This indicates that the skills of unauthorized immigrants are likely to complement those of the existing U.S. workforce. Second, postpandemic immigrants tend to consume a larger fraction of their income and have much lower wealth, particularly liquid wealth, than native households. A wide range of household finance measures indicate that unauthorized immigrants behave like hand-to-mouth consumers.

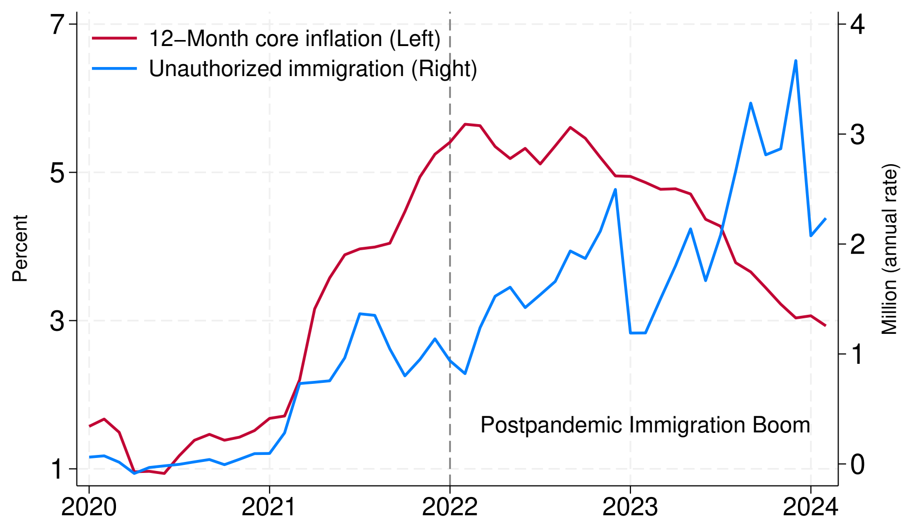
To study the general equilibrium effects of the postpandemic immigration surge, we develop a New Keynesian model with capital accumulation, population growth, and features consistent with the empirical facts we established using microdata. In particular, immigrants in the model are hand-to-mouth consumers whose labor is complementary to that of native-born, high-skilled consumers. Household survey data do not allow us to assess the complementarity between workers and capital. However, given the empirical evidence in Krusell et al. (2000) and Bilbiie et al. (2023), we model a higher degree of complementarity between high-skilled labor and capital than that between low-skilled labor and capital.

A popular view is that an increase in immigration behaves like a positive supply shock that is disinflationary. As shown in Figure 1, U.S. inflation had steadily declined since the immigration boom began in late 2021. This led some to argue that a major contributor of the decline was the supply-side effects brought on by the surge in immigration.[1] Our quantitative model reveals that the dynamic effects are more complex. Not only does an increase in immigration boost labor supply, it also drives up aggregate demand. We first document these demand-side effects in the representative agent version of our model. In this setting, a larger workforce increases the return to capital and hence investment. Since the capital stock is slow to adjust, investment initially responds more than output, generating a small, but positive, inflation response.

In the baseline model, the inflation response is similar to the representative agent model, but the transmission mechanism is more involved. An abundance of low-skilled labor reduces the need

[1] See, for example, “How Immigrants Tame Inflation” (Wall Street Journal, May 1, 2023) and “One key reason inflation is cooling: Immigrant workers” (Yahoo Finance, January 15, 2024).

Figure 1: Postpandemic immigration boom and falling U.S. inflation



Notes: Core inflation is measured by the Personal Consumption Expenditures Price Index. The inflow of unauthorized immigration is measured by border encounters net of repatriations and exclusions.
Sources: Bureau of Economic Analysis; U.S. Department of Homeland Security.

to build up capital, dampening the increase in investment. In addition, the wage rate for low-skilled workers falls, driving down their consumption. However, aggregate consumption increases since there are more people in the economy and high-skilled households substitute from investment into consumption due to the lower return to capital. When combining these effects in general equilibrium, we find little effect on inflation, contrary to the popular view.

We show that the muted inflationary effects of the postpandemic immigration surge are robust to different assumptions about how costly it is to adjust investment. We also consider a counterfactual scenario in which the immigration surge was concentrated among high-skilled workers, given that these individuals made up the bulk of the immigration before the pandemic. In this case, firms respond by significantly increasing investment, which generates a somewhat larger increase in inflation, depending on how quickly investment adjusts. These results highlight that an immigration shock would have had a larger effect on inflation if it was driven by high-skilled immigrants.

Related literature The question of how population growth affects the macroeconomy dates back to the theoretical work by Samuelson (1958) and Lerner (1959), who debated over whether to use the household-level utility or per-person utility specification in modeling economic growth. Becker and Barro (1988) were the first to introduce a model encompassing both preference specifications as special cases. More recently, Weiske (2019b) estimates a medium-scale dynamic stochastic general equilibrium (DSGE) model and finds that an intermediate specification fits U.S. data well, although his work differs from ours in that it focuses on fertility shocks.

A related strand of literature has employed general-equilibrium models to explore the implications of immigration. Canova and Ravn (2000), for example, consider an influx of low-skilled workers as a consequence of the reunification of Germany. Storesletten (2000) utilizes an overlapping generations model to examine the fiscal repercussions of immigration. Ben-Gad (2004, 2008) applies a similar modeling approach with overlapping dynasties to investigate the effects of immigration on investment. While our analysis shares some of the modeling features with these studies, unlike their approach, we build nominal rigidity into our model, allowing us to assess the impact of immigration on inflation dynamics.

Several recent studies have applied stylized DSGE models to study net migration in alternative institutional contexts. Burriel et al. (2010), for example, develop and estimate a New Keynesian model for the Spanish economy, and Bentolila et al. (2008) show that immigration moderates the slope of the New Keynesian Phillips curve in Spain. Similar DSGE models with net migration are analyzed for Greece (Bandeira et al., 2018), Germany (Braun and Weber, 2021), and the U.S. (Hauser and Seneca, 2022). Some papers also examine the cross-country effects of immigration (Burstein et al., 2020; Mandelman and Zlate, 2012). Relative to these papers, we account for the unique elements of the postpandemic immigration wave in the U.S.

On the empirical front, vector auto regression (VAR) models have been used in the literature to assess the impact of migration on macroeconomic variables. Kiguchi and Mountford (2019), for example, estimate a VAR model with sign restrictions on U.S. data, observing muted impacts of immigration. Likewise, Furlanetto and Robstad (2019) apply a similar approach to Norwegian data, concluding that immigration shocks are a significant contributor to unemployment fluctuations but have negligible effects on inflation. Smith and Thoenissen (2019) use a VAR model to analyze New Zealand data, finding that migration shocks contribute to per capita GDP growth and its volatility, with the size of the effects depending on the relative human capital levels of immigrants and natives. Weiske (2019a) estimates a VAR model with long-run restrictions for the U.S., finding that immigration leads to a temporary decrease in the real wage, stimulates investment for up to five years, and has modest effects on per capita output, consumption, and hours. These results are broadly consistent with our model predictions.

Finally, our paper is related to a large empirical literature using cross-sectional data concerning the impact of immigration on the labor market (Borjas, 2003; Caiumi and Peri, 2024; Card, 2005, 2009; Ottaviano and Peri, 2012), prices and the composition of demand (Cortes, 2008; Frattini, 2024; Lach, 2007), and productivity (Peri, 2012). These studies highlight that the responses of capital, such as the magnitude and speed with which it adjusts following an immigration surge, are crucial for assessing the effects of immigration. In addition, since immigration tends to endogenously respond to economic conditions, identification is challenging even in the cross-sectional setting. Our paper, by building a model motivated by salient empirical facts, incorporates the dynamic effects of capital accumulation, while sidestepping the identification challenge of reduced-form estimation.

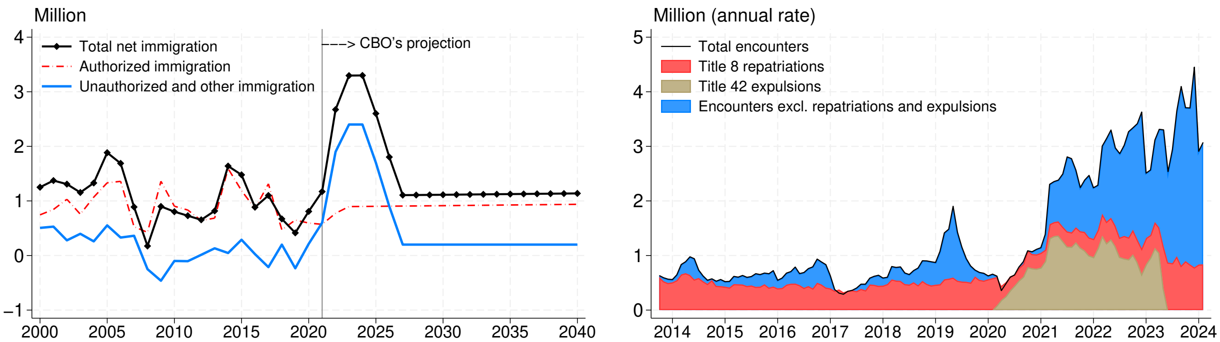
Outline The remainder of the paper is organized as follows. Section 2 presents our empirical analysis based on administrative data and household surveys. Section 3 describes our general equilibrium model motivated by the empirical analysis. Section 4 discusses the macroeconomic effects of the postpandemic immigration surge using impulse responses that are calibrated to match CBO projections for the postpandemic increase in population growth. Section 5 highlights the role of investment and the importance of the skill-level of recent immigrants. Section 6 concludes.

2 CHARACTERISTICS OF POSTPANDEMIC IMMIGRANTS

In this section, we first discuss the U.S. immigration surge following the COVID-19 pandemic, drawing on administrative data from various government agencies. The composition of immi-

Figure 2: Postpandemic immigration boom

(a) Immigration by type **(b)** Border encounters



Notes: Encounters are the sum of apprehensions (arrests of potentially removable noncitizens by the U.S. Border Patrol under Title 8 authority), inadmissibles (determined by the Office of Field Operations at ports of entry under Title 8 authority), and expulsions under Title 42 public health authority.
Sources: Congressional Budget Office; U.S. Department of Homeland Security.

grants during this surge differs systematically from that before the pandemic due to the influx of unauthorized immigrants. We then use household survey data to infer the labor market characteristics and consumption-saving patterns of these immigrants. Our analysis shows that they tend to be hand-to-mouth consumers and low-skilled workers that complement the existing U.S. workforce. These results motivate our model in Section 3.

2.1 THE POSTPANDEMIC IMMIGRATION SURGE

Before the pandemic, immigration to the U.S. was relatively stable (Figure 2a). The CBO estimates that about one million immigrants were added to the U.S. population annually from 2000 to 2019.[2] Authorized immigrants, which include lawful permanent residents, individuals who are eligible to apply for lawful permanent residency, and nonimmigrants admitted under the Immigration and Nationality Act (such as students and temporary workers), accounted for the majority of annual net immigration (about 75%). Unauthorized immigrants, on the other hand, were not an important contributor to immigration over this period.[3]

In the first year of the pandemic, immigration inflows dropped sharply, as travel restrictions

[2] See *The Demographic Outlook: 2024 to 2054*, January 18, 2024, https://www.cbo.gov/publication/59697.
[3] Unauthorized and other immigrants, referred to as "other foreign nationals" by the CBO, include people who entered the U.S. illegally, people who overstay their legal temporary status, and people who were permitted to enter through the use of parole and who may be awaiting proceedings in immigration court.

and a slowdown in the processing of applications reduced the inflow of authorized immigrants. In addition, the issuance of a public health order under Title 42 allowed the rapid expulsion of unauthorized immigrants at the U.S. border.[4] As travel restrictions gradually unwound after the first year of the pandemic, the U.S. experienced a surge in unauthorized immigrants.

Starting in 2021, border protection officers working between or at ports of entry encountered an increasing number of foreign nationals who attempted to enter the U.S. without legal immigration status (Figure 2b). Meanwhile, a higher fraction of these individuals were released into the country through the use of parole or with a "notice to appear", which permits the individual to wait in the U.S. while petitioning an immigration court for asylum. While in the U.S., these individuals can apply for work authorization subject to some delay, typically 0-6 months for parolees (depending on the country of origin) and 150 days for asylum seekers (Edelberg and Watson, 2024).[5]

The inflow of unauthorized immigrants, measured by border encounters net of repatriations and expulsions, surged from $17{,}000$ in 2020 to 2.2 million in 2023 (Figure 3a). This increase coincided with a sharp rise in new deportation cases filed in U.S. immigration courts. Authorized immigration, in contrast, has been stable since 2022 and only slightly higher than the prepandemic level, based on visa-issuance data from the Department of State (Figure 3b). The CBO projects that the boom in unauthorized immigration will peak in 2024, before gradually returning to the prepandemic trend.[6]

The surge of unauthorized immigrants in this episode raises the question of whether this is a national shock or a regional shock that mainly impacts border states. While most of these immigrants (about 80%) attempted to enter through the Southwest land border (Figure 4a), immigration court

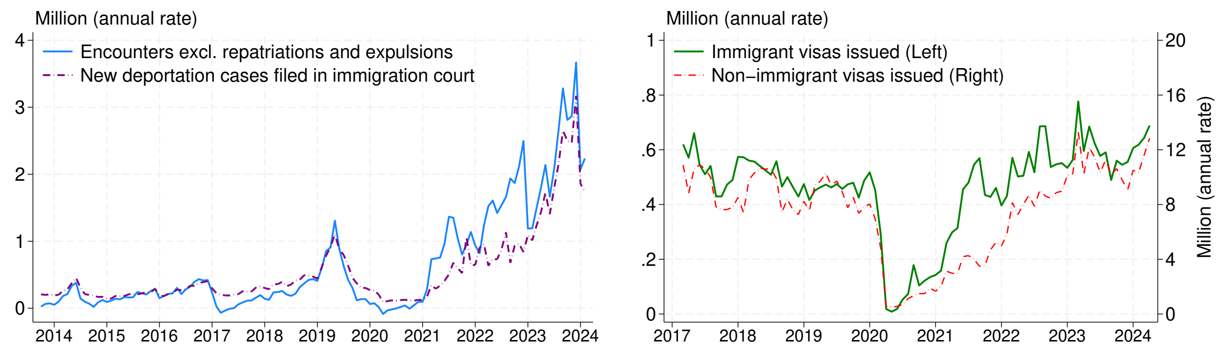
[4] In March 2020, the Center for Disease Control issued a public health order under a provision of a 1944 U.S. public health law (section 265 of Title 42), which allowed for the rapid expulsion of unauthorized border crossers and asylum seekers, citing COVID-19 concerns. The order was lifted on May 11, 2023.

[5] Although the processing time of an immigration court case varies, it often takes several years, especially when the court faces a large influx of newly arrived cases. Immigration court data from TRAC, a research center at Syracuse University, show that the average time between the filling date and the date when the outcome is determined (e.g., removal, relief granted or termination) is 1,027 days for cases completed in fiscal years 2021-2023.

[6] The CBO projects net immigration for each immigration category using data from the Department of Homeland Security, the Census Bureau, various government reports and testimony, as well as the CBO's own judgments (on emigration rates, for example). The CBO's projections for 2022-2024 are higher than those of other agencies such as the Social Security Administration and Census Bureau (which did not incorporate border encounters data), but they appear to be reasonable and consistent with administrative data (Edelberg and Watson, 2024).

Figure 3: Measures of immigration inflows

(a) Unauthorized immigration **(b)** Authorized immigration



Sources: U.S. Department of Homeland Security; Transactional Records Access Clearinghouse, Syracuse University; U.S. Department of State.

records, which track mailing addresses of individuals who received a notice to appear, suggest that their geographical footprint has been more widespread. New deportation cases filed after 2021 exceeded 0.5% of the population in 33 states (Figure 4b). One caveat about immigration-court data is that they only cover a subset of unauthorized immigrants (e.g., individuals paroled into the country without being placed into removal proceedings and individuals who entered illegally without being encountered are not covered).[7] Nevertheless, the spatial distribution of this subset of immigrants supports the view that the postpandemic immigration surge is a national, not a regional shock.

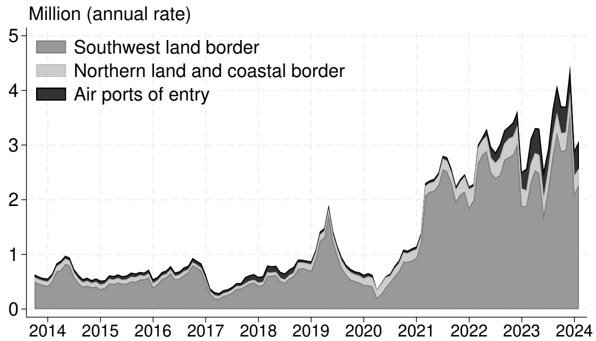
2.2 NEW FACTS ABOUT POSTPANDEMIC IMMIGRANTS

Given the lack of information about immigrants' demographic and economic conditions in administrative data, we use household survey data to characterize their expected labor-market outcomes and consumption-saving patterns. We focus on two representative household surveys: (i) monthly CPS, which provides an up-to-date picture of labor market conditions, and (ii) PSID, which allows a more complete view of households' consumption, income and wealth. Appendix A provides an overview of these surveys and

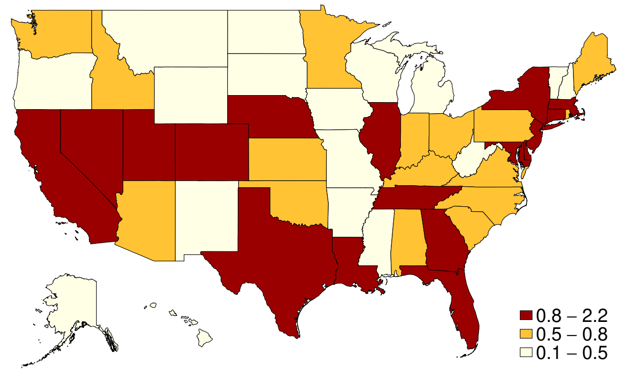
[7] Individuals granted parole are allowed to enter the U.S., but they are not provided with an immigration status nor are they formally admitted into the country for purposes of immigration law. Individuals are typically expected to leave the country when the parole period expires. As of January 2023, major parole programs include those created for Afghans, Ukrainians, Cubans, Haitians, Nicaraguans, and Venezuelans.

Figure 4: Geographic distribution of encounters and immigration court cases

(a) Encounters by border region



(b) New deportation cases by state



Notes: The left panel shows encounters in each border region. The right panel shows new deportation cases filed in immigration courts from 2022–2024 as a percent of the state's population in 2021.
Sources: U.S. Department of Homeland Security; Transactional Records Access Clearinghouse, Syracuse University.

details how we identify immigrants using these data.[8]

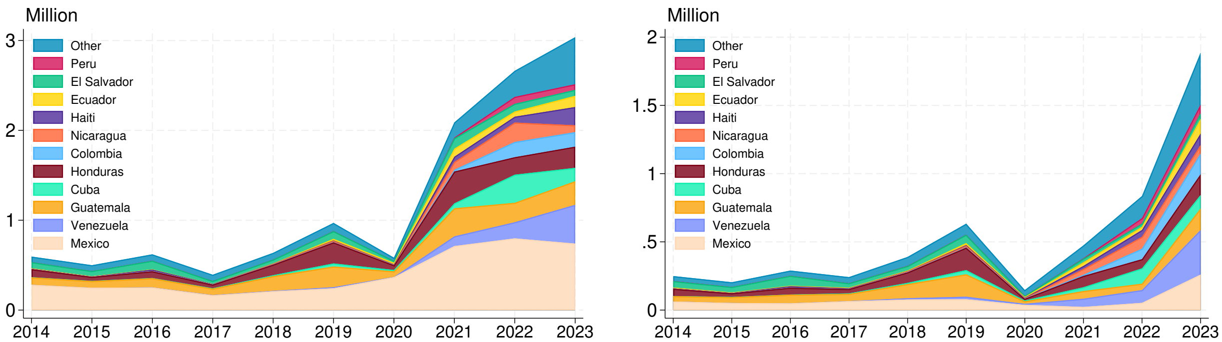
While survey data allow us to identify immigrants based on their citizenship status or birthplace, they do not reveal the legal status of an immigrant. To overcome this challenge, we use as a proxy survey respondents who were born in countries where the majority of unauthorized immigrants came from. This approach is motivated by the fact that newly arriving immigrants tend to have similar skills to earlier immigrants from the same country of origin and tend to move to enclaves established by these earlier immigrants (Bartel, 1989; Card, 2001, 2009). This approach also avoids using the average new immigrant in the survey as a proxy for the postpandemic unauthorized immigrants. Appendix A shows that household surveys are likely to undercount unauthorized immigrants in particular, rendering the average new immigrant in the survey not representative of the immigrants arriving after the pandemic.

To determine the nationality of unauthorized immigrants, we use administrative data on border encounters and new deportation cases filed in immigration courts. We find that a small number

[8]We obtain very similar results to the CPS-based analysis when using the American Community Survey (ACS). The latest version of the ACS, however, reflects only the population through July 2022. On consumption and wealth, the PSID is the only household survey data that allow us to identify immigrants. The Consumer Expenditure Survey and the Survey of Consumer Finances, for example, do not provide information such as birthplace or citizenship status.

Figure 5: Nationality of unauthorized immigrants

(a) Encounters by country of origin **(b)** New deportation cases by country of origin



Notes: Encounters data underlying the left panel are the sum of the U.S. Border Patrol encounters, the Office of Field Operations enforcement encounters, and confirmed CHNV paroles.

Sources: U.S. Department of Homeland Security; Transactional Records Access Clearinghouse, Syracuse University.

of countries in Central and South America have been associated with most (80%–90%) of these records since 2021 (Figure 5). These countries include Mexico, Guatemala, Honduras, and El Salvador—the main contributors before the pandemic—and new contributors after the pandemic (Venezuela, Colombia, Cuba, Ecuador, Nicaragua, Haiti, and Peru). We refer to these eleven countries as high-encounter (HE) countries, and we contrast immigrants born in these countries with those born in other countries and native-born individuals. Our analysis establishes two key facts.

Fact 1. *The skills of unauthorized immigrants tend to complement those of native-born workers.*

We use the CPS from January 2017–April 2024 to document the expected labor market outcomes of individuals born in different country groups. In Table 1, the first three rows show that conditional on the working-age population, the labor force participation and employment rates do not differ much across groups. We then restrict the sample to individuals in the labor force and present three pieces of evidence to support the existence of skill complementarity between immigrants born in HE countries and other workers (i.e., native-born workers and immigrants born in non-HE countries).

Table 1: Labor market characteristics

		Immigrants born in	
	Native-born	HE countries	Non-HE countries
% of working age (16–65)	62.1	84.6	77.3
Labor force participation rate, % (conditional on working age)	73.1	74.7	74.5
Employment rate, % (conditional on participation)	95.3	95.2	95.6
Education (conditional on participation)			
% of high school or below	32.2	68.8	25.6
% of master degree and above	13.3	4.5	26.5
Wage and salary, thous. 2019 dollars (conditional on employment)	54.0	34.3	64.6

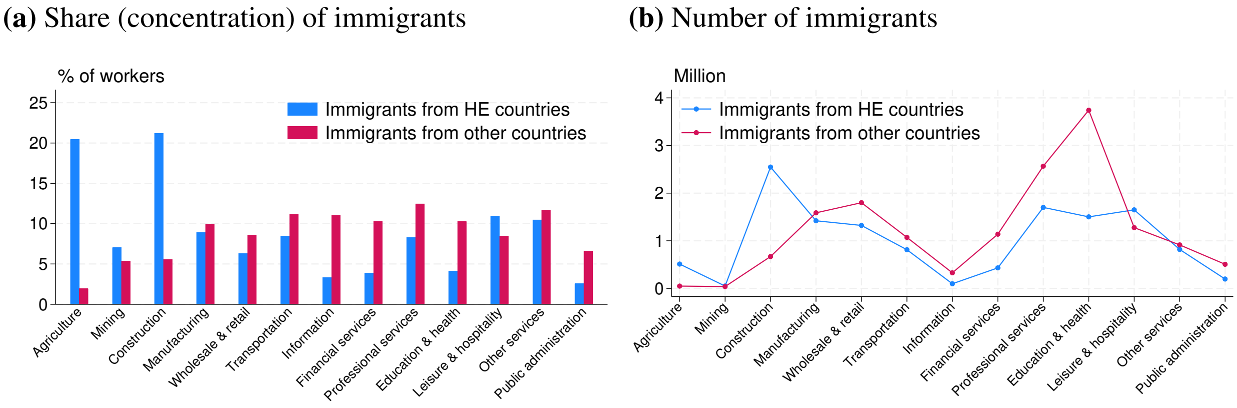
Notes: Mean values computed using the Current Population Survey, 2017–2024.

First, the educational attainment of HE immigrants is particularly low. Almost 70% of them have a high-school degree or lower, compared to about 30% for the other two groups. Non-HE immigrants, in contrast, are more concentrated at the upper end of educational attainment: about 26% of them hold at least a master's degree, compared to 13% for native-born workers and only 4% for HE immigrants. The difference in education is reflected in their wage and salary. Compared to native-born workers, HE immigrants earn 38% less, while non-HE immigrants earn 20% more.

Second, immigrants born in HE countries are more likely to work in industries with lower skill requirements (measured by workers' average educational attainment), such as agriculture, construction, and leisure and hospitality. In contrast, non-HE immigrants are more concentrated in private sector jobs that require higher skills, such as information, financial services, and education (Figure 6). Native-born workers are the most likely of these groups to work in the public sector.

Third, within an industry, HE immigrants tend to work in occupations that require lower skills. Table 2 lists 10 industries (NAICS 3-digit) that have the highest concentration of HE immigrants. We then classify occupations into three broad categories: management occupations, computer and IT related occupations, and all other occupations. The table shows that within each industry, HE

Figure 6: The presence of immigrants by industry



Notes: Current Population Survey, 2017–2024. Industry classification based on the NAICS 2-digit code.

immigrants are more likely to work in non-management, non-IT occupations. These occupations tend to require lower skills (based on workers' average education) and pay less than management and IT related occupations.

Table 2: Share of high-encounter country immigrants by industry and occupation

Industry		Occupations		
Code	Description	Management	Computer & IT	Other
5617	Buildings, dwellings and landscaping services	10.9	2.0	32.6
814	Private households	11.7	0.0	30.8
315	Apparel, knitting and fabric manufacturing	7.4	1.4	28.5
23	Construction	7.8	2.3	24.2
311	Food manufacturing	6.3	1.2	19.5
721	Accommodation	3.8	9.0	19.1
493	Warehousing and storage	7.1	3.1	16.0
811	Repair and maintenance	7.3	4.1	14.5
327	Nonmetallic mineral products manufacturing	6.1	8.3	14.7
337	Furniture and related product manufacturing	6.3	0.0	14.6

Notes: Industry classification based on the NAICS 3-digit code; occupation classification based on the SOC code for major groups. The last three columns show the percent of HE country immigrants in a given industry-occupation cell, based on the monthly Current Population Survey, 2017–2024.

Fact 2. *Unauthorized immigrants tend to behave like "hand-to-mouth" consumers.*

Using the PSID family surveys from 2017–2021, Table 3 presents several key indicators of

Table 3: Measures of the prevalence of hand-to-mouth consumers

	All Households			Renters Only		
	Native-born (1)	HE (2)	Non-HE (3)	Native-born (4)	HE (5)	Non-HE (6)
Total expenditures (percent of income)	52	71	51	59	78	60
Basic expenditures (percent of income)	39	57	39	48	66	49
Total household wealth (thous. 2019 dollars)	277	97	365	35	17	53
Total liquid wealth (thous. 2019 dollars)	26	6	37	9	3	10
# of months liquid wealth support spending	8	2	9	4	1	3
KV hand-to-mouth prob. (percent)	35	55	29	51	63	39

Notes: Panel Study of Income Dynamics 2017–2021. Immigration status determined by the birthplace of the household head. Total expenditures include spending on nondurable goods, durable goods, and services. Basic expenditures refer to spending on food, housing, utility, and gasoline. Liquid savings include cash, checking and savings accounts, money market funds, CDs, Treasury bills and government bonds. Total wealth includes net liquid assets and net illiquid assets. KV hand-to-mouth probability is the share of households whose liquid savings are less than or equal to half of their income per pay period as in Kaplan and Violante (2014).

household financial conditions for each group on average (columns 1–3) and the subgroup of renters (columns 4–6).

On the consumption side, the total consumption-to-income ratio is the highest for HE immigrants, with 71% compared to about 50% for the other two groups (row 1).[9] This difference is mainly explained by the much lower income earned by HE immigrants, suggesting that most of their income is likely to be spent, a necessary condition for being "hand-to-mouth" (Kaplan et al., 2014).[10] However, the consumption basket of earlier immigrants may differ from that of more recent immigrants. To conduct a more direct comparison, we isolate spending on necessities (food,

[9] We measure consumption, wealth, and income in the PSID as in Zhou (2022). See Appendix A for more details.

[10] Kaplan et al. (2014) and Kaplan and Violante (2014) distinguish between two types of hand-to-mouth households: the poor hand-to-mouth, who hold little or no wealth, and the wealthy hand-to-mouth, who hold significant amount of illiquid wealth despite having little or no liquid wealth. The balance sheets of HE immigrants, as shown in Table 3, suggest that they are closer to poor hand-to-mouth consumers.

housing, utilities, and gasoline). These expenditures take up 57% of HE immigrants' income, compared to only 39% for other households (row 2).

On the wealth side, HE immigrants have the lowest household wealth, with $\$97$K compared to $\$277$K for native-born and $\$365$K for non-HE families (row 3). The liquid savings of HE immigrants, in particular, can support only two months of their expenditures, compared to 8–9 months for other households (rows 4 and 5).

A conservative approach to measuring the prevalence of hand-to-mouth consumers is to count the surveyed households whose average liquid savings are no more than half of their earnings per pay period. Using the PSID data, this probability is about one-third for native-born and non-HE households, consistent with the estimates in Kaplan and Violante (2014) and Kaplan et al. (2014), while it is 55% for HE immigrants (row 6). This result further supports the view that HE immigrants are more likely to be hand-to-mouth consumers.[11] Finally, when restricting the sample to renters to reflect the fact that new immigrants are less likely to be homeowners, we find that HE immigrants behave even more like hand-to-mouth consumers.[12]

3 MODEL OF POSTPANDEMIC IMMIGRATION

In this section, we introduce a New Keynesian model with capital accumulation, population growth, and features consistent with the empirical facts established in Section 2. N_{ht} households are hand-to-mouth as in Gali et al. (2004) and Bilbiie (2008) and relatively low skilled. The remaining N_{st} households are savers. The production process includes capital-skill complementarity as in Krusell et al. (2000), where high-skilled labor is more complementary to capital than low-skilled labor.[13]

Both the saver and hand-to-mouth population grow exogenously. Saver population growth is

[11] Since the PSID does not have information on paycheck frequency, we apply the distribution-implied mean frequency from Kaplan and Violante (2014) to compute the per-pay-period income for every household.

[12] A fraction of immigrants' unspent income is likely to be remitted to their home country. Previous studies based on surveys of Mexican immigrants suggest that a quarter of their monthly income is remitted (see Amuedo-Dorantes et al., 2005). Using more recent data (2022-2024) from the Bank of Mexico on workers' remittances and the average income of Mexican immigrants in the CPS, we estimate that about 13% of immigrants' income is remitted. These estimates are small and unlikely to weaken the aggregate demand effects from the postpandemic immigration wave.

[13] Bilbiie et al. (2023) make the same assumption of perfect correlation between household financial market access and the labor skill type in the production process.

deterministic at the constant gross growth rate Γ_N. Gross population growth of the hand-to-mouth households, $\Gamma_{ht} = {}^{N_{ht}}/_{N_{h,t-1}}$, evolves according to

$$\ln \Gamma_{ht} = (1-\rho_N)\ln \Gamma_N + \rho_N \ln \Gamma_{h,t-1} + \sigma_{hN}\epsilon_{ht}, \quad \epsilon_{ht} \sim N(0,1), \tag{1}$$

where Γ_N, ρ_N, and σ_{hN} are the steady-state population growth rate, population growth persistence, and the standard deviation of the hand-to-mouth population growth shock, respectively. An ϵ_{ht} shock can be interpreted as a population growth shock due to the postpandemic immigration surge.

Define ν_t as the saver population share in period t, ${}^{N_{st}}/_{N_t}$, where $N_t = N_{st} + N_{ht}$. This population share can be written recursively as

$$\nu_t = \frac{\Gamma_N}{\Gamma_{Nt}}\nu_{t-1}, \tag{2}$$

where the gross population growth rate is given by

$$\Gamma_{Nt} = \Gamma_N \nu_{t-1} + \Gamma_{ht}(1-\nu_{t-1}). \tag{3}$$

3.1 HOUSEHOLDS Households denoted by j maximize lifetime utility over consumption, $c_t(j)$, and hours worked, $h_t(j)$. Households are sorted such that the first N_{st} households are savers and households of a particular type are identical in every other way, so $c_t(j) \equiv c_{st}$ for all $j \in [0, N_{st}]$ and $c_t(j) \equiv c_{ht}$ for all $j \in (N_{st}, N_t]$. Thus, aggregate consumption is given by

$$C_t = \int_0^{N_t} c_t(j)dj = N_t\left(\nu_t c_{st} + (1-\nu_t)c_{ht}\right) = N_t c_t,$$

where lower-case letters denote per capita variables.

Given that households of the same type are assumed to be identical in every other way, we consider the problems of the representative saver and hand-to-mouth households. Each household receives per period utility flows from consumption with disutility over hours worked. Household preferences are consistent with balanced growth as in King et al. (1988) and Jaimovich and Rebelo (2009). Households of type $i \in \{h, s\}$ supply labor to the production sector and receive a type-specific real wage w_{it} per hour worked.

The type s households save via a risk-free nominal bond, B_t, which returns gross nominal interest rate R_t in the subsequent period and is in zero net supply in equilibrium. Savers also own all firms in the economy with firm ownership distributed uniformly across these households. Firms maximize the present discounted value of aggregate profits, discounting future cash flows by the owners' stochastic discount factor, and remit profits to households via per capita dividends, d_t.

The representative saver's optimization problem is given by

$$\max_{c_{st},\, l_{st},\, b_t} \quad \mathbb{E}_t \sum_{m=0}^{\infty} \beta^m \frac{\left(c_{s,t+m}\left(1-\psi l_{s,t+m}^{1+\theta}\right)\right)^{1-\sigma}}{1-\sigma}$$
$$\text{s.t.} \quad c_{st} + b_t = w_{st} l_{st} + \frac{R_{t-1}}{\Pi_t} b_{t-1} + d_t,$$

where $b_t = {}^{B_t}/_{P_t}$ is the real quantity of household bond holdings, P_t is the aggregate price of the consumption good, $\Pi_t = {}^{P_t}/_{P_{t-1}}$ is the gross inflation rate, σ is the elasticity of intertemporal substitution, θ controls the Frisch elasticity of labor supply, and ψ determines the steady-state labor supply. Optimality implies

$$L_{st} = (1+\theta)\frac{\psi l_{st}^{1+\theta}}{1-\psi l_{st}^{1+\theta}}\frac{C_{st}}{w_{st}}, \tag{4}$$
$$1 = \mathbb{E}_t\left[\Lambda_{t,t+1}\frac{R_t}{\Pi_{t+1}}\right], \tag{5}$$

where the stochastic discount factor is given by

$$\Lambda_{t-1,t} = \beta\left(\frac{1-\psi l_{st}^{1+\theta}}{1-\psi l_{s,t-1}^{1+\theta}}\right)^{1-\sigma}\left(\frac{C_{s,t-1}}{C_{st}}\Gamma_{Nt}\right)^{\sigma}. \tag{6}$$

Utility maximization by the representative hand-to-mouth household,

$$\max_{c_{ht}, l_{ht}} \quad \frac{\left(c_{ht}\left(1-\psi l_{ht}^{1+\theta}\right)\right)^{1-\sigma}}{1-\sigma}$$
$$\text{s.t.} \quad c_{ht} = w_{ht} l_{ht}, \tag{7}$$

implies

$$1 = (1+\theta)\frac{\psi l_{ht}^{1+\theta}}{1-\psi l_{ht}^{1+\theta}}. \tag{8}$$

Therefore, the labor supply of type-h households is effectively inelastic, because income and substitution effects cancel out at all wage levels.

3.2 PRODUCTION SECTOR The production sector includes three levels, consistent with the setups in Sims and Wu (2021) and Mau (2023). The wholesaler produces a good for sale to a continuum of monopolistically competitive retailers. Retailers differentiate the wholesale good for sale to a final good bundler and exercise market power in pricing. Price setting is staggered, as each retailer can update its price each period with fixed probability. The bundler operates in a perfectly competitive market, selling the final good to households.

We describe the production sector from the top down. The final good bundler purchases $Y_t(f)$ units of each retail good, $f \in [0,1]$. This firm bundles retail goods using a CES bundling technology to produce a finished good, $Y_t = \left(\int_0^1 Y_t(f)^{(\varepsilon-1)/\varepsilon} df\right)^{\varepsilon/(\varepsilon-1)}$, that is sold to households, where ε is the elasticity of substitution across goods. The final good bundler chooses retail good purchases to maximize its total profits, $P_t Y_t - \int_0^1 P_t(f) Y_t(f) df$. Profit maximization implies final good bundler demand for retail good f, $Y_t(f) = \left(P_t(f)/P_t\right)^{-\varepsilon} Y_t$. The zero profit condition implies the aggregate price level can be written as $P_t = \left(\int_0^1 P_t(f)^{1-\varepsilon} df\right)^{1/(1-\varepsilon)}$.

Monopolistically competitive retailers each purchase $Y_{wt}(f)$ units of the wholesale good at the relative price p_{wt}. Retailers differentiate the wholesale good for sale to a final good bundler using a one-for-one production technology, $Y_t(f) = Y_{wt}(f)$. Each retailer maximizes profits, subject to final good firm demand, and optimally resets its prices each period with probability $1-\zeta$. A retailer that can reset its price chooses $P_{\#t}$ to maximize the expected discounted present value of real future profits, or the value of the firm,

$$\mathbb{E}_t \sum_{m=0}^{\infty} \zeta^m \Lambda_{t,t+m} \left(\frac{P_{\#t}}{P_{t+m}} - p_{w,t+m}\right) \left(\frac{P_{\#t}}{P_{t+m}}\right)^{-\varepsilon} Y_{t+m},$$

where we have substituted the demand curve retailer f faces into the value of the firm. The optimal relative reset price, $p_{\#t} = P_{\#t}/P_t$, is given by

$$p_{\#t} = \frac{\varepsilon}{\varepsilon - 1} \frac{X_{1t}}{X_{2t}}, \tag{9}$$

where

$$X_{1t} = p_{wt}Y_t + \zeta\mathbb{E}_t[\Lambda_{t,t+1}\Pi_{t+1}^{\varepsilon}X_{1,t+1}], \tag{10}$$

$$X_{2t} = Y_t + \zeta\mathbb{E}_t[\Lambda_{t,t+1}\Pi_{t+1}^{\varepsilon-1}X_{2,t+1}]. \tag{11}$$

Aggregate inflation evolves according to

$$1 = (1-\zeta)p_{\#t}^{1-\varepsilon} + \zeta\Pi_t^{\varepsilon-1}. \tag{12}$$

The wholesaler produces the wholesale good using a nested CES production technology with capital and total employed labor of each type,

$$Y_{wt} = \left((1-\mu)L_{ht}^{\eta} + \mu\left((1-\chi)L_{st}^{\xi} + \chi K_{t-1}^{\xi}\right)^{\frac{\eta}{\xi}}\right)^{\frac{1}{\eta}}, \tag{13}$$

where η and ξ govern the elasticity of substitution between inputs. This nesting restricts the elasticity of substitution between hand-to-mouth and saver labor to be the same as that between hand-to-mouth labor and installed capital as in Krusell et al. (2000) and Bilbiie et al. (2023). To preserve strict quasiconcavity of the production function, $\eta, \xi \leq 1$. Saver labor is more complementary to capital than hand-to-mouth labor if $\xi < \eta$.

The wholesaler maximizes the expected present discounted value of real profits,

$$\max_{L_{ht},L_{st},K_t,I_t} \quad \mathbb{E}_t\sum_{m=0}^{\infty}\Lambda_{t,t+m}\left[p_{w,t+m}Y_{w,t+m} - w_{h,t+m}L_{h,t+m} - w_{s,t+m}L_{s,t+m} - I_{t+m}\right]$$

subject to the production function and the law of motion for capital,

$$K_t = I_t + (1-\delta)K_{t-1}, \tag{14}$$

where δ is the depreciation rate. Define R_t^k as the implicit capital rental rate. The optimality conditions imply

$$w_{ht} = p_{wt}\frac{Y_{wt}}{L_{ht}}\frac{(1-\mu)L_{ht}^{\eta}}{(1-\mu)L_{ht}^{\eta}+\mu\left((1-\chi)L_{st}^{\xi}+\chi K_{t-1}^{\xi}\right)^{\frac{\eta}{\xi}}}, \tag{15}$$

$$w_{st} = p_{wt}\frac{Y_{wt}}{L_{st}}\frac{\mu\left((1-\chi)L_{st}^{\xi}+\chi K_{t-1}^{\xi}\right)^{\frac{\eta}{\xi}}}{(1-\mu)L_{ht}^{\eta}+\mu\left((1-\chi)L_{st}^{\xi}+\chi K_{t-1}^{\xi}\right)^{\frac{\eta}{\xi}}}\frac{(1-\chi)L_{st}^{\xi}}{(1-\chi)L_{st}^{\xi}+\chi K_{t-1}^{\xi}}, \tag{16}$$

$$R_t^k = p_{wt}\frac{Y_{wt}}{K_{t-1}}\frac{\mu\left((1-\chi)L_{st}^{\xi}+\chi K_{t-1}^{\xi}\right)^{\frac{\eta}{\xi}}}{(1-\mu)L_{ht}^{\eta}+\mu\left((1-\chi)L_{st}^{\xi}+\chi K_{t-1}^{\xi}\right)^{\frac{\eta}{\xi}}}\frac{\chi K_{t-1}^{\xi}}{(1-\chi)L_{st}^{\xi}+\chi K_{t-1}^{\xi}}, \tag{17}$$

$$1 = \mathbb{E}_t[\Lambda_{t,t+1}(R_{t+1}^k+1-\delta)]. \tag{18}$$

3.3 MONETARY POLICY

The central bank sets the gross nominal interest rate according to

$$R_t = R\left(\Pi_t/\Pi\right)^{\upsilon_\pi}, \tag{19}$$

where υ_π controls the response to the inflation gap.[14]

3.4 COMPETITIVE EQUILIBRIUM

Aggregate supply is defined by equating wholesaler and total retailer output,

$$Y_{wt} = \int_0^1 Y_t(j)dj \equiv \Delta_t Y_t, \tag{20}$$

where price dispersion follows

$$\Delta_t = \int_0^1 \left(\frac{P_t(j)}{P_t}\right)^{-\varepsilon} dj = (1-\zeta)p_{\#t}^{-\varepsilon} + \zeta\Pi_t^{\varepsilon}\Delta_{t-1}. \tag{21}$$

The aggregate resource constraint is given by

$$Y_t = C_{st} + C_{ht} + I_t. \tag{22}$$

A competitive equilibrium is defined by sequences of quantities, $\{C_{st}, C_{ht}, l_{ht}, l_{st}, L_{ht}, L_{st}, N_{ht}, N_{st}, K_t, I_t, Y_t, Y_{wt}\ \nu_t\}$, prices, $\{\Lambda_{t-1,t}, R_t, \Pi_t, p_{\#t}, X_{1t}, X_{2t}, \Delta_t, w_{ht}, w_{st}, R_t^k, p_{wt}\}$, and

[14] The specification of the monetary policy rule is subjective. Appendix C shows that generalizing this rule to allow for a positive response to the output gap has very little effect on our results.

exogenous variables, $\{\Gamma_{ht}, \Gamma_{Nt}\}$, such that equations (1) – (22) hold, given the definitions of the saver population share, $\nu_t = {}^{N_{st}}/_{(N_{st}+N_{ht})}$, gross population growth, $\Gamma_{it} = {}^{N_{it}}/_{N_{i,t-1}}$, and hours worked per household, $l_{it} = {}^{L_{it}}/_{N_{it}}$, $i \in \{h, s\}$.[15]

3.5 CALIBRATION Table 4 provides the model calibration at a quarterly frequency. The factor shares of production (μ and χ) are set to target a steady-state capital income share of $1/3$ and a wage skill premium of 85% following Carroll and Hur (2023). The elasticity of substitution between low-skilled labor and the capital/high-skilled labor bundle (η) and the elasticity of substitution between capital and high skilled labor (ξ) are set to be consistent with empirical estimates from Bilbiie et al. (2023), who estimate a medium-scale New Keynesian model with features similar to our model, absent population growth. In line with estimates in the New Keynesian literature, the goods elasticity of substitution (ε) is set such that the steady-state markup is 12.5%, while the degree of price stickiness (ζ) implies that retailers reset prices every 5 quarters on average.[16] The annualized capital depreciation rate (δ) is set to 10% to match the depreciation rate on private fixed asset and durable goods in the data.

The subjective discount factor (β) implies that the annualized steady-state real interest rate is 1%. The elasticity of intertemporal substitution is set to unity. The labor disutility preference shifter (ψ) and labor preference elasticity (θ) are set to target steady-state average labor equal to $1/3$ and a population weighted average Frisch elasticity of 0.5 in steady state following Chetty et al. (2012). The steady-state saver population share (ν) is set to 0.8 following Bilbiie et al. (2023) and is consistent with empirical estimates of the average marginal propensity to consume out of transitory income shocks (see Kaplan et al., 2014; Parker et al., 2013; Souleles et al., 2006). Monetary policy follows an interest rate rule that satisfies the Taylor principle ($\upsilon_\Pi = 1.5$) with an annual inflation target (Π) equal to 2%.

The steady-state population growth rate equals the prepandemic average in the U.S. The persistence of the immigration shock, ρ_N, is set to 0.9 so that the average duration of the shock is

[15] Appendix B provides the definition of the stationary competitive equilibrium.

[16] We also considered smaller values for ζ, which increase the slope of the Phillips curve. As shown in Appendix C, the degree of price stickiness has very little effect on our results.

Table 4: Model calibration

Parameter	Description	Value
Production		
μ	Krusell et al. (2000) share parameter,	0.198
χ	Krusell et al. (2000) share parameter,	0.992
η	Krusell et al. (2000) elasticity, $1/(1-\eta) = 9$	0.889
ξ	Krusell et al. (2000) elasticity, $1/(1-\xi) = 0.4$	-1.5
ε	Goods elasticity of substitution	9
ζ	Price stickiness	0.8
δ	Depreciation rate	$1.1^{1/4} - 1$
Households		
β	Subjective discount factor	$1.01^{-1/4}$
σ	Elasticity of intertemporal substitution	1
ψ	Labor disutility preference shifter	3
θ	Labor preference elasticity	1.16
ν	Steady-state saver population share	0.8
Monetary Policy		
υ_Π	Interest rate policy inflation sensitivity	1.5
Π	Gross inflation target	$1.02^{1/4}$
Demographics		
Γ_N	Steady-state population growth rate	$1.005^{1/4}$
ρ_N	Persistence of the immigration shock	0.9

2.5 years, consistent with CBO projections. When computing impulse responses, the immigration shock is calibrated such that aggregate population growth increases by 0.7 percentage points, consistent with the increase during the postpandemic immigration surge.

4 INFLATIONARY IMPLICATIONS OF THE IMMIGRATION SURGE

We now use the DSGE model in Section 3 to analyze the macroeconomic implications of the postpandemic immigration shock. Contrary to the popular view, we find that this shock has very little effect on inflation and show that this key result is robust to alternative modeling assumptions.

Our baseline model is two steps removed from the standard representative agent New Keynesian (RANK) model with capital. First, we add hand-to-mouth agents who do not smooth consumption across time (i.e., the two-agent New Keynesian model, TANK). Second, we introduce capital-skill complementarity where skill is assumed to be perfectly correlated with whether or not the household is consumption-smoothing or hand-to-mouth (i.e., TANK with capital-skill complementarity, TANK-CSC). Before we discuss the quantitative findings from our baseline TANK-CSC model, we first examine the implications of a surge in immigration in the RANK and TANK models, as these simplified settings provide useful intuition for the dynamics in our baseline model.

Responses in the RANK model In the RANK model, all households are identical, so an increase in immigration is simply a shock to the growth rate of the overall population (Figure 7, dash-dotted red lines).[17] A population surge leads to an increase in labor supply and aggregate output, but it also increases aggregate investment as firms respond to the higher return to capital driven by the larger workforce. In equilibrium, the increase in demand exceeds the increase in supply because capital takes time to adjust, as can be seen from the decline and delayed recovery of the capital-labor ratio. Furthermore, while aggregate consumption initially contracts to accommodate higher investment, over time it increases with more people demanding consumption goods. Combining these two effects generates a small but positive inflation response.

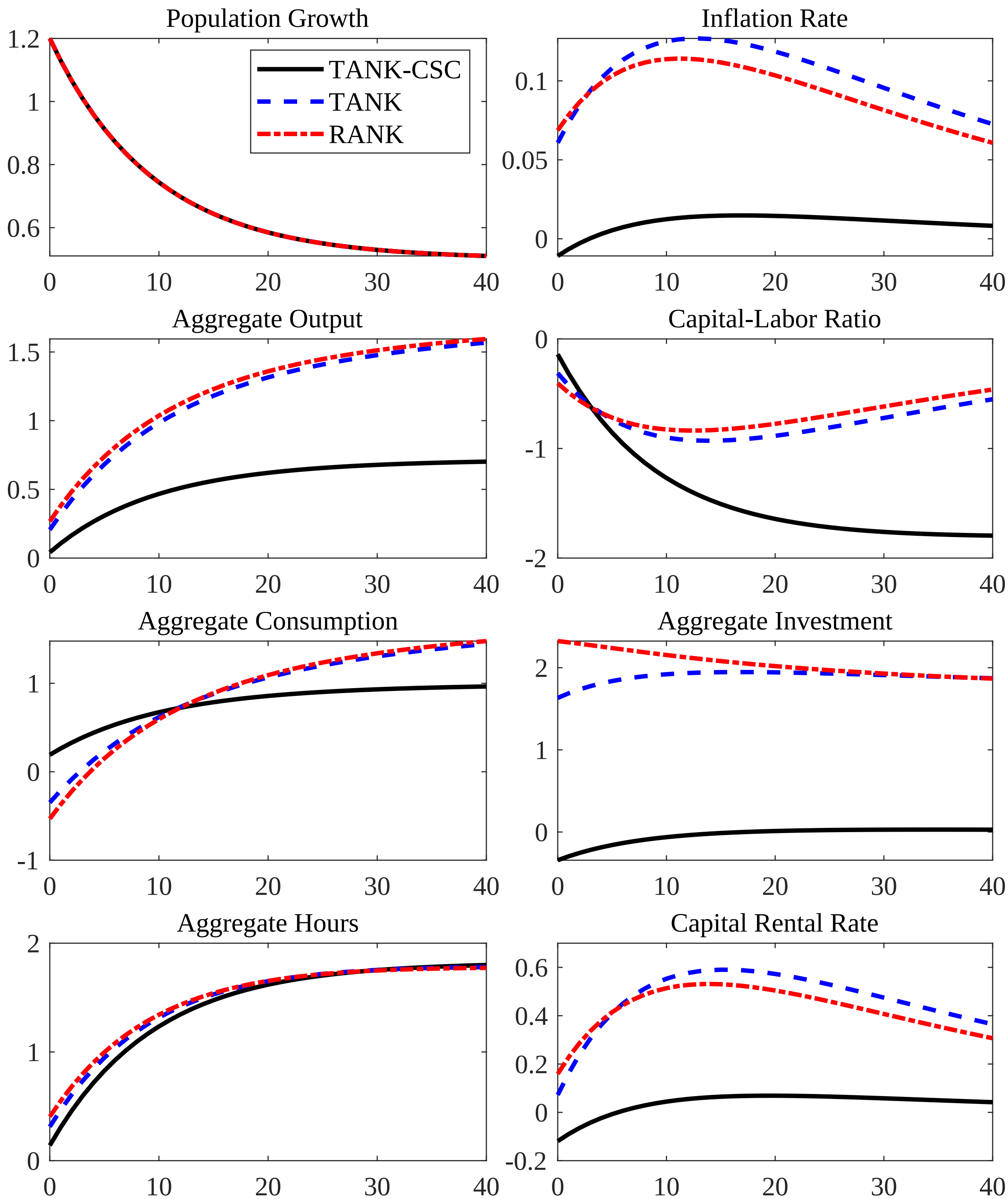
Responses in the TANK model Next, consider the case in which immigrants are modeled as hand-to-mouth households whose labor is perfectly substitutable with the labor supplied by the rest of the population. In this case, the immigration shock is an increase in the growth rate of the hand-to-mouth population (Figure 7, dashed blue lines).

Qualitatively, the responses in the TANK model are similar to the RANK model. An increase in the low-skilled population increases labor supply, reduces the capital-labor ratio, and boosts aggregate investment as the return to capital rises in response to the higher population growth. However, in this model, all of the increase in investment is financed by high-skilled households.

Low-skilled households are hand-to-mouth and interest rate insensitive. This means they do not adjust their consumption in response to the higher return to capital. For this share of the population, the consumption response is larger than in the RANK model. In contrast, the high-

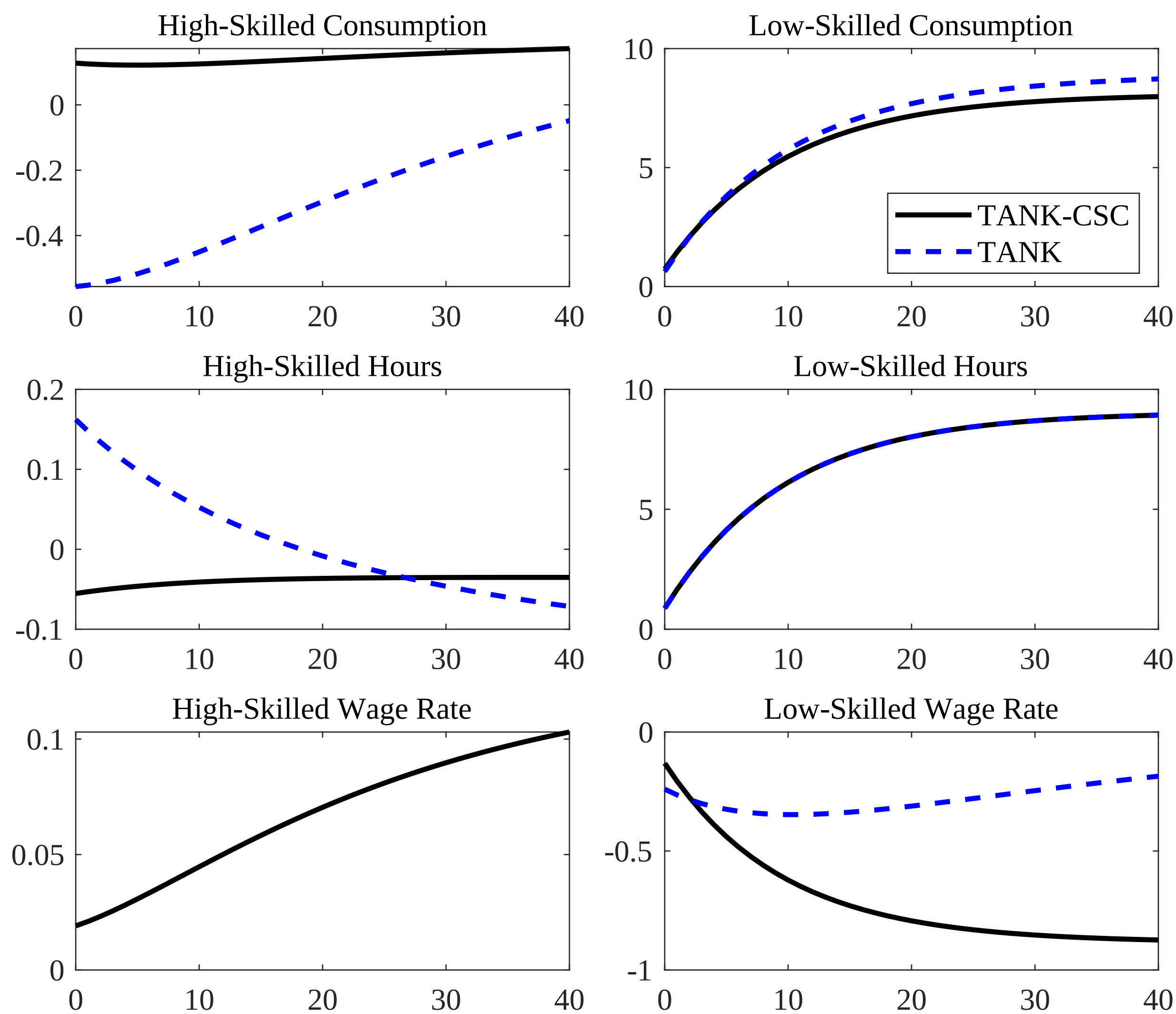
[17] In the RANK and TANK models, we assume production is Cobb-Douglas with a cost share of capital equal to $1/3$, consistent with the calibration target in the baseline model.

Figure 7: Impulse responses to an immigration shock across models



Notes: The population growth response is the net annualized aggregate population growth rate. The inflation rate responses are annualized percentage point deviations from steady state. The capital-labor ratio and capital rental rate responses are percentage deviations from the detrended steady state. The remaining impulse responses are percentage deviations from the pre-shock trend.

Figure 8: Impulse responses of skill-specific variables to an immigration shock across models



Notes: The wage rate response is in percentage deviations from the detrended steady state. The remaining impulse responses are percentage deviations from the pre-shock trend. In the TANK model, the high-skilled and low-skilled wage rates are identical.

skilled households take advantage of the higher return to capital by increasing investment, but they only represent a fraction of the population and are reluctant to sacrifice too much of their consumption. Thus, the investment response is somewhat dampened relative to the RANK model.

A larger consumption response in the TANK model increases inflationary pressures relative to the RANK model, but a smaller investment response has the opposite effect. Quantitatively, these effects essentially wash out in the short run, so the impact on inflation is similar in the two models. Over time, the consumption channel dominates, so the inflation response is persistently, albeit modestly, higher than in the RANK model.

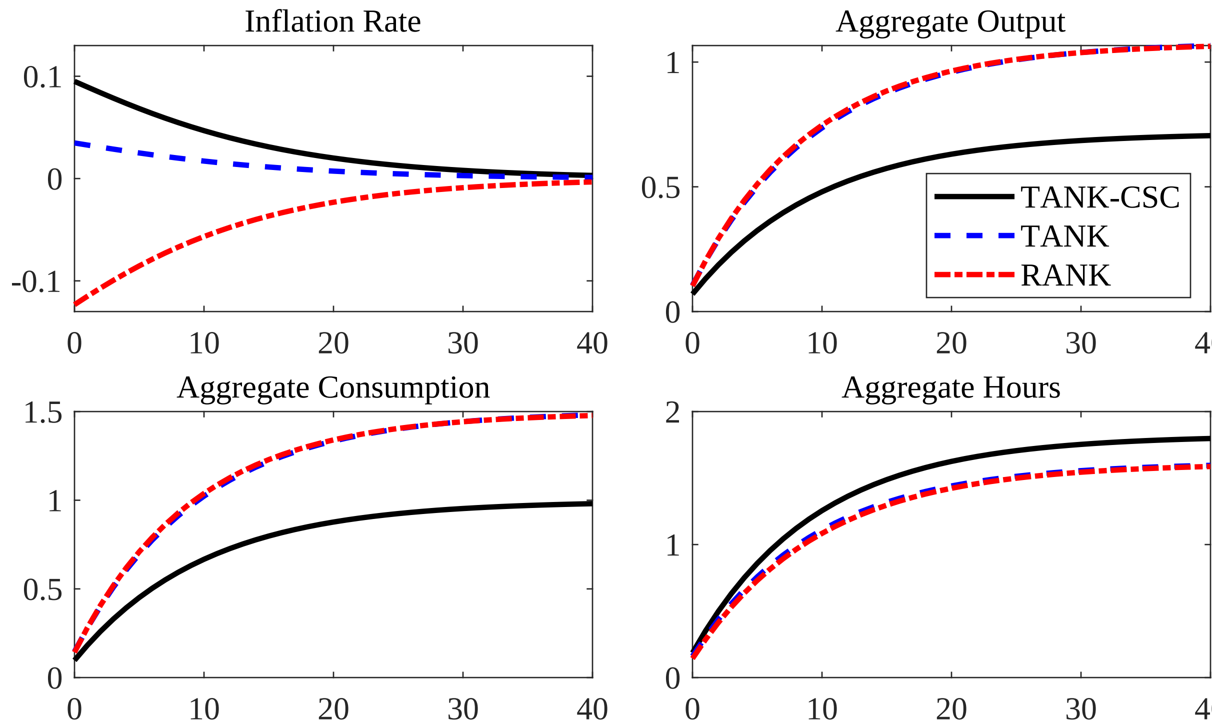
Responses in the baseline model Relative to the TANK model, low-skilled labor is less complementary to capital, so the immigration shock generates weaker investment demand in our baseline model (Figure 8, solid black lines). In addition, given the complementarity between high-skilled labor and capital, high-skilled households do not need to work as much or reduce consumption in order to support investment, in contrast with the TANK model where high-skilled households work more and lower their consumption (Figure 8). Thus, the limited investment demand not only occurs because immigration is concentrated among low-skilled workers, but also because high-skilled workers cut their labor supply, reducing the marginal product of capital.

The low-skilled consumption and hours responses are nearly identical to the TANK model because these workers are hand-to-mouth and their labor supply is inelastic. Despite the fact that the low-skilled wage rate falls, the higher population causes low-skilled consumption to rise. Thus, the inflationary effects of additional consumption demand from low-skilled workers discussed in the TANK model still persist in our baseline model. While capital-skill complementarity completely unwinds the investment demand channel and its effects on inflation that occur in the RANK and TANK models, additional consumption demand from high-skilled workers limits the disinflationary nature of this channel. Although there are differences in the transmission mechanism, all three models show that there is little effect on inflation from the postpandemic immigration surge.

5 Alternative Model Specifications

In this section, we consider two alternative model specifications to further probe the inflationary implications of an immigration shock. We first examine the effects of shutting down investment dynamics. We then consider a counterfactual scenario in which the immigration surge is concentrated among high-skilled workers, rather than low-skilled workers.

Figure 9: Impulse responses to an immigration shock when investment is fixed



Notes: The inflation rate responses are annualized percentage point deviations from steady state. The remaining impulse responses are percentage deviations from the pre-shock trend.

Investment dynamics The response of investment plays a key role in determining the macroeconomic effects of an increase in immigration. In this section, we consider the effects of dampening this channel by introducing investment adjustment costs into the law of motion for capital,

$$K_t = \left(1 - \frac{\phi_I}{2}\left(\frac{I_t}{I_{t-1}\Gamma_N} - 1\right)^2\right) I_t + (1-\delta)K_{t-1}.$$

Under this specification, deviations of investment growth from trend growth are costly. As the size of this cost, governed by ϕ_I, rises, investment growth adjusts to its new trend more slowly.

Figure 9 shows the responses to the postpandemic immigration shock when investment is fixed ($\phi_I \to \infty$, so investment always grows at the rate Γ_N). This limiting case is useful to consider because it shuts down the investment demand channel emphasized in Section 4. Relative to our baseline model ($\phi_I = 0$, shown in Figure 7), investment adjustment costs dampen the rise of the marginal product of capital in response to the influx of new workers, reducing investment demand.

When investment is fixed, the increase in supply dominates the increase in demand in the RANK model, causing inflation to fall. Absent the increase in investment demand, consumption rises, but not enough to offset the disinflationary pressure from the increase in labor supply. In the TANK model, the consumption demand channel is stronger, since the new workers consume all of their income. This additional boost in demand is strong enough to flip the sign of the inflation response from the RANK model, since nothing changes on the supply side of the economy.

In the baseline model, immigrants are not only hand-to-mouth consumers, but also relatively low-skilled workers. As discussed in Section 4, this feature causes divestment in response to an increase in immigration when investment is flexible. The inability to divest in the fixed investment case boosts demand relative to supply, leading to more inflation than in the flexible investment setting. These results show that the assumptions surrounding the size of the investment adjustment cost affect inflation, but the magnitude of the response is consistently small. We do not find any evidence of a sharp decline in inflation in response to an immigration shock, as suggested by the popular view.

Surge in high-skilled immigration Our analysis thus far has focused on the influx of low-skilled workers driven by the postpandemic immigration surge. A related question is how high-skilled immigration impacts the economy, given that U.S. immigration inflows had been concentrated among highly educated individuals in the two decades prior to the pandemic (Caiumi and Peri, 2024), and that the U.S. public generally supports high-skilled immigration.[18] The literature on this question has mostly focused on the labor market effects, with little evidence on the inflationary effects. We use our model to shed light on this issue by introducing shocks to the high-skilled population. Analogous to low-skilled population growth, high-skilled population growth follows

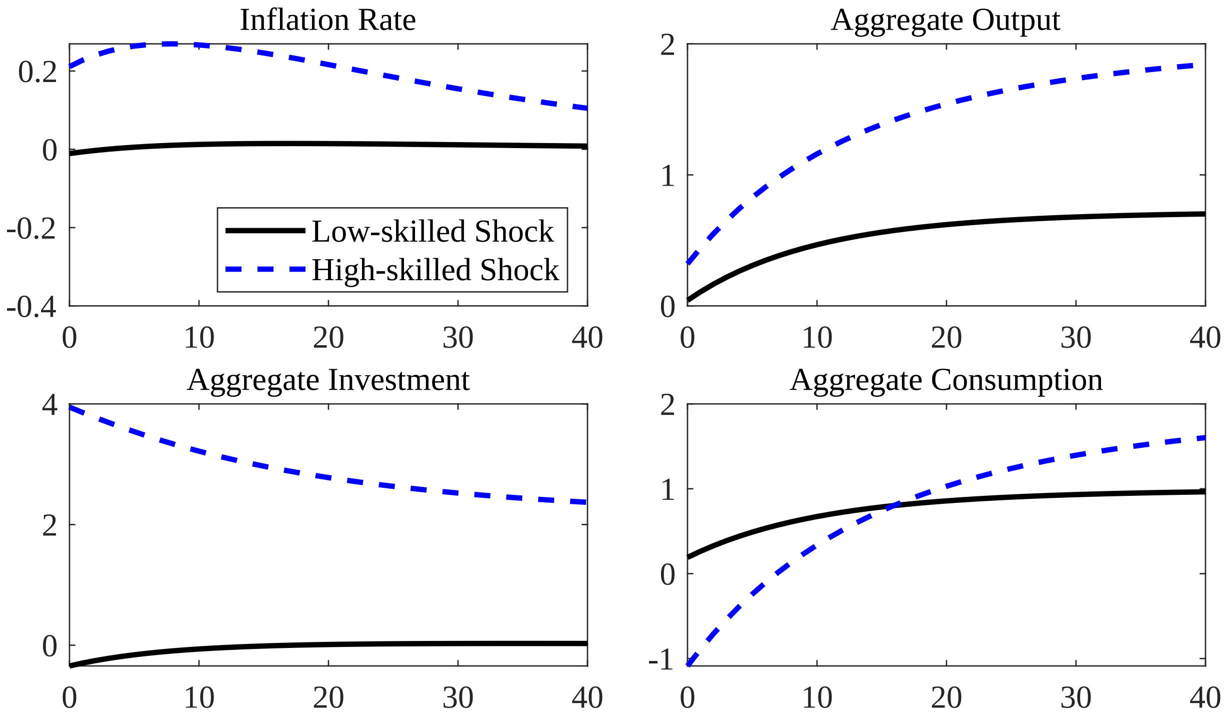
$$\ln \Gamma_{st} = (1-\rho_N)\ln \Gamma_N + \rho_N \ln \Gamma_{s,t-1} + \sigma_{sN}\epsilon_{st}, \quad \epsilon_{st} \sim N(0,1),$$

where the shock size is scaled by the relative population share ($\sigma_{sN} = (1-\nu)\sigma_{hN}/\nu$).

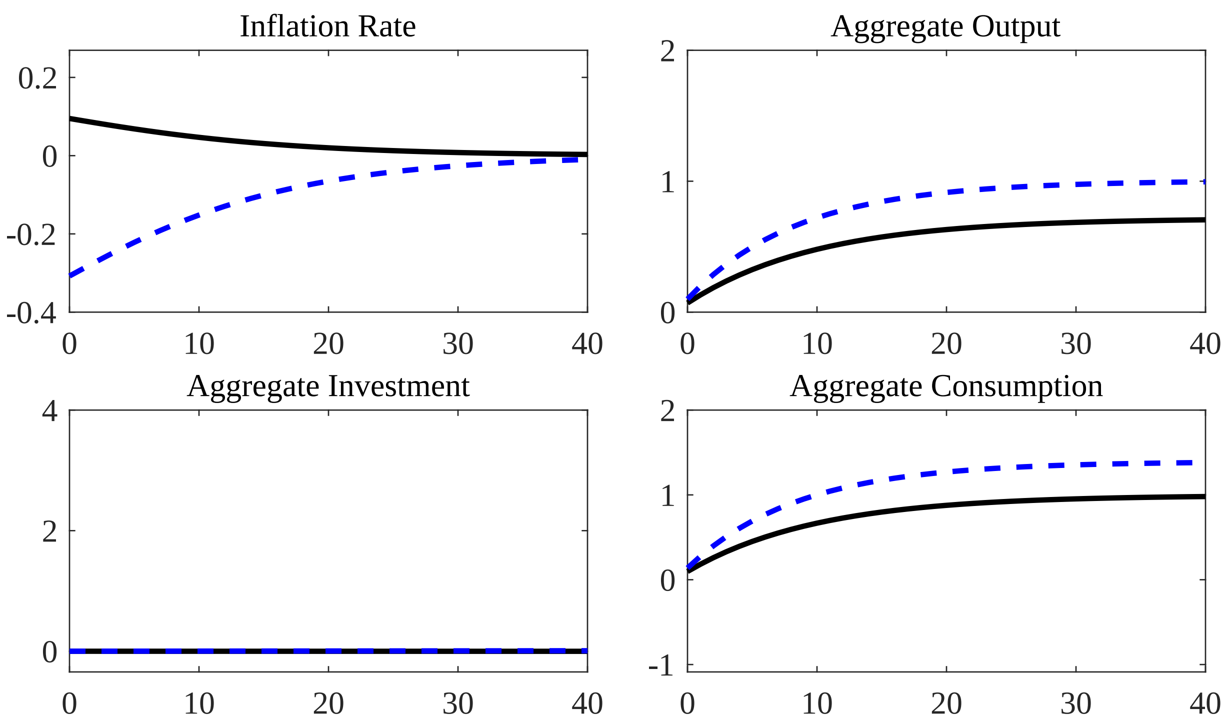
[18] See, for example, the results of a Pew Research survey from 2018 (https://www.pewresearch.org/global/2019/01/22/majority-of-u-s-public-supports-high-skilled-immigration/).

Figure 10: Impulse responses to a high and low-skilled immigration shock

(a) Flexible Investment



(b) Fixed Investment



Notes: The inflation rate responses are annualized percentage point deviations from steady state. The remaining impulse responses are percentage deviations from the pre-shock trend.

Figure 10 compares the responses to a high- and low-skilled immigration shock in our baseline TANK-CSC model. The top panel shows the responses under flexible investment, while the bottom panel shows the responses under fixed investment. When investment is free to adjust, the high-skilled immigration shock generates a sharp increase in investment demand, which causes a modest increase in inflation. In contrast, when ~~capital~~**investment growth** is fixed, there is a notable decline in inflation. This is because the lack of investment creates an excess supply of high-skilled workers, which reduces their wage rate and lowers their consumption. These results highlight that an immigration shock would have a more material effect on inflation if it was concentrated among high-skilled workers.

6 CONCLUSION

The surge in U.S. immigration starting in late 2021 triggered widespread discussion about its macroeconomic impacts. This surge happened when the labor market was transitioning from the pandemic-induced disruption and when the Fed was deliberating its policy in the postpandemic era. Existing studies, however, are not well-suited to addressing questions about the postpandemic immigration surge. For example, quantitative models with household heterogeneity often abstract from nominal frictions, and hence inflation dynamics, while VAR-based analysis for the U.S. mainly captures the impact of authorized immigration, which differs from the current episode. These challenges require new facts and an empirically motivated general equilibrium model.

Our paper combines administrative records with household survey data to provide a more complete picture of unauthorized immigrants arriving in the U.S after the pandemic: They tend to be hand-to-mouth consumers and low-skilled workers that complement the existing workforce. We build these features into a model, allowing us to assess the inflationary effects of these immigrants.

While some have argued that the postpandemic immigration surge was disinflationary on the basis that it boosts labor supply, our model reveals that the effects of the shock are more complex. Not only does it increase labor supply, it also drives up aggregate demand through interactions between capital and labor. Accounting for both supply and demand channels in our empirically motivated model, we find that the postpandemic immigration surge had little effect on inflation.

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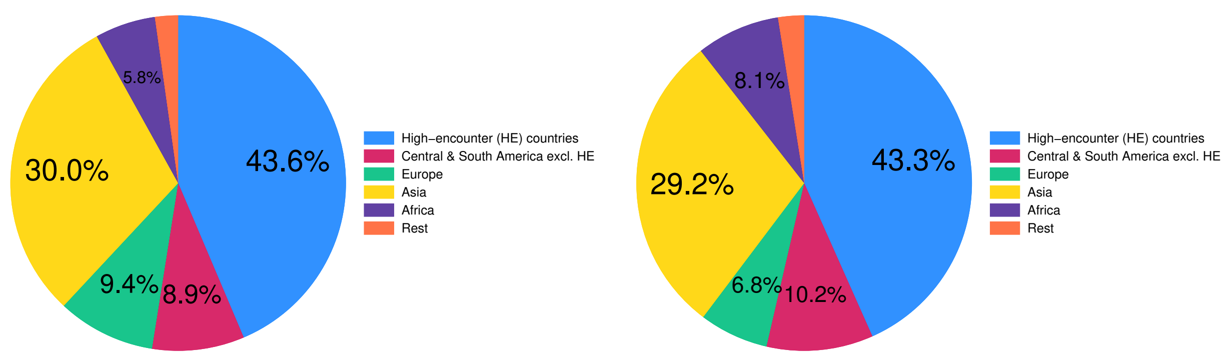
A EMPIRICAL METHODOLOGY

The Current Population Survey (CPS) is a monthly household survey conducted by the U.S. Census Bureau and the Bureau of Labor Statistics. It is the primary source of labor force statistics in the U.S., containing information about the labor force, employment, unemployment, hours, earnings, and other demographic characteristics. We use two survey questions to determine immigrants and their country of origin. First, the survey asks about the citizenship status of the respondent (i.e., born in U.S., born in U.S. outlying, born abroad of American parents, naturalized citizen, or not a citizen). We identify immigrants as those reporting themselves as a naturalized citizen or not a citizen. Second, we identify immigrants' country of origin based on their reported birth country.

Figure A.1: Composition of CPS immigrants

(a) All immigrants ($N = 1,133,105$)

(b) Immigrants arriving after 2020 ($N = 73,912$)



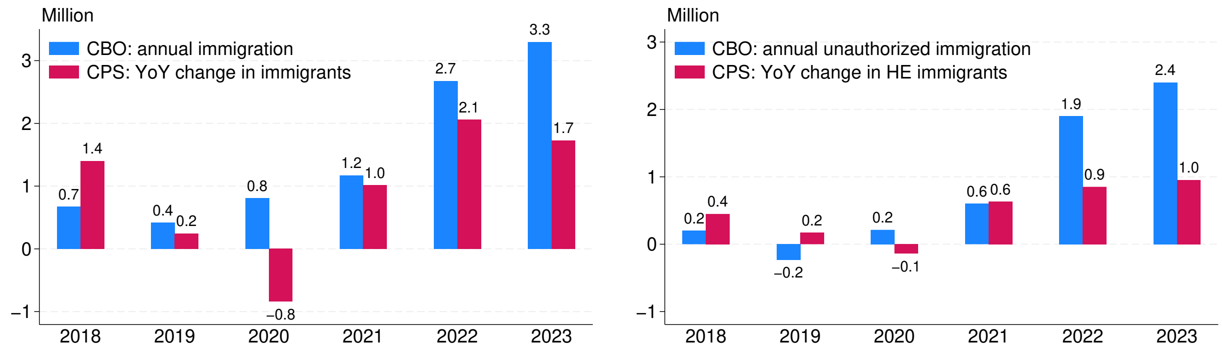
Notes: The composition of immigrants' country of origin using the monthly Current Population Survey, 2017-2024. High-encounter (HE) countries refer to the eleven countries listed by name in Figure 5.

Using data from January 2017–April 2024, Figure A.1 shows that immigrants from HE countries account for 44% of all immigrants. When we restrict the sample to immigrants arriving in the U.S. after 2020, the composition of their country of origin remains similar. This suggests that the CPS is likely to undercount unauthorized immigrants arriving in the U.S. after the pandemic, as administrative data on border encounters, visa issuance, and immigration court cases suggest that this surge was mainly driven by unauthorized immigrants born in HE countries.

This undercounting problem can also be seen by comparing the CBO's estimates of net immigration and unauthorized immigration to those implied by the CPS (Figure A.2). For example, the CPS implies 1.6 million (or 48%) less total immigration and 1.4 million (or 58%) less unauthorized immigration in 2023 than those estimated by the CBO. Since the labor market characteristics differ substantially between HE immigrants and non-HE immigrants (see Section 2.2), focusing on the average new immigrant in the CPS is likely to provide a biased picture of unauthorized immigrants.

Figure A.2: Immigration estimates using CBO and CPS data

(a) Total immigration **(b)** Unauthorized immigration



Notes: Comparison of CBO estimates of annual net immigration, and the unauthorized immigration component, to those implied by the CPS.

Our approach of focusing on HE immigrants mitigates this concern.

The Panel Study of Income Dynamics (PSID) is a biennial household survey conducted by the University of Michigan. It contains detailed information on wealth, income, and expenditures. We use two survey questions to determine immigrants and their country of origin. First, the survey asks whether or not the respondent (head of the household) was born in a U.S. state. We identify those reporting "no" as immigrants. Second, the survey asks what country or part of the world the respondent's ancestors came from. We use immigrants' answers to this question to determine their country of origin. Similar to the pattern in the CPS, the share of immigrants born in HE countries is 47% using the PSID family surveys from 2017–2021.

We measure consumption, wealth, and income in the PSID as in Zhou (2022). Total expenditures consist of (i) nondurable goods, which include food, gasoline, and clothing, (ii) durable goods, which include furniture, auto consumption, and recreation, and (iii) services, which include housing, utility, telephone and internet, education, health, childcare, transportation, and home repairs. We do not include investment expenditures such as vehicle and home purchases or home improvements in the consumption measurement. Household wealth includes: (i) net liquid assets, which are the sum of liquid savings (cash, checking and savings accounts, money market funds, CDs, Treasury bills, and government bonds) and risky assets, net of non-mortgage debt, and (ii) net illiquid assets, which include home equity, IRAs and private annuities, and net values of real estate, farms, business, and other assets. Income refers to total annual family income.

Data sources The data is available from the following sources:

1. Congressional Budget Office population projection, https://www.cbo.gov/publication/59697#data
2. Current Population Survey microdata, https://cps.ipums.org/cps/
3. Panel Study of Income Dynamics, https://simba.isr.umich.edu/data/data.aspx
4. Immigration enforcement and legal processes monthly tables, https://ohss.dhs.gov/topics/immigration/immigration-enforcement/immigration-enforcement-and-legal-processes-monthly
5. New proceedings filed in immigration court, https://trac.syr.edu/phptools/immigration/ntanew/
6. Monthly immigrant and nonimmigrant visa issuances, https://travel.state.gov/content/travel/en/legal/visa-law0/visa-statistics.html

B STATIONARY EQUILIBRIUM

Let lowercase quantities denote per capita variables, $c_{st} = {}^{C_{st}}/_{N_t}$. A stationary competitive equilibrium is defined by sequences of quantities $\{c_{st}, c_{ht}, l_{ht}, l_{st}, k_t, i_t, y_t, \nu_t\}$, prices $\{\Lambda_{t-1,t}, R_t, \Pi_t, p_{\#t}, x_{1t}, x_{2t}, \Delta_t, w_{ht}, w_{st}, R_t^k, p_{wt}\}$, and exogenous variables $\{\Gamma_{ht}, \Gamma_{Nt}\}$, so the following hold:

$$\ln \Gamma_{ht} = (1-\rho_N)\ln\Gamma_N + \rho_N \ln \Gamma_{h,t-1} + \sigma_{hN}\epsilon_{ht}$$

$$\nu_t = (\Gamma_N/\Gamma_{Nt})\nu_{t-1}$$

$$\Gamma_{Nt} = \Gamma_N \nu_{t-1} + \Gamma_{ht}(1-\nu_{t-1})$$

$$l_{st} = (1+\theta)\frac{\psi l_{st}^{1+\theta}}{1-\psi l_{st}^{1+\theta}}\frac{c_{st}}{w_{st}},$$

$$1 = \mathbb{E}_t\left[\Lambda_{t,t+1}\frac{R_t}{\Pi_{t+1}}\right]$$

$$\Lambda_{t-1,t} = \beta\left(\frac{1-\psi l_{st}^{1+\theta}}{1-\psi l_{s,t-1}^{1+\theta}}\right)^{1-\sigma}\left(\frac{c_{s,t-1}}{c_{st}}\right)^{\sigma}$$

$$c_{ht} = w_{ht} l_{ht}$$

$$1 = (1+\theta)\frac{\psi l_{ht}^{1+\theta}}{1-\psi l_{ht}^{1+\theta}}$$

$$p_{\#t} = \frac{\varepsilon}{\varepsilon-1}\frac{x_{1t}}{x_{2t}}$$

$$x_{1t} = p_{wt}y_t + \zeta\mathbb{E}_t[\Lambda_{t,t+1}\Gamma_{N,t+1}\Pi_{t+1}^{\varepsilon}x_{1,t+1}]$$

$$x_{2t} = y_t + \zeta\mathbb{E}_t[\Lambda_{t,t+1}\Gamma_{N,t+1}\Pi_{t+1}^{\varepsilon-1}x_{2,t+1}]$$

$$1 = (1-\zeta)p_{\#t}^{1-\varepsilon} + \zeta\Pi_t^{\varepsilon-1}$$

$$k_t = i_t + (1-\delta)k_{t-1}/\Gamma_{Nt}$$

$$w_{ht} = p_{wt}\frac{\Delta_t y_t}{(1-\nu_t)l_{ht}}\frac{(1-\mu)\left((1-\nu_t)l_{ht}\right)^{\eta}}{(1-\mu)\left((1-\nu_t)l_{ht}\right)^{\eta} + \mu\left((1-\chi)(\nu_t l_{st})^{\xi} + \chi\left(\frac{k_{t-1}}{\Gamma_{Nt}}\right)^{\xi}\right)^{\frac{\eta}{\xi}}}$$

$$w_{st} = p_{wt}\frac{\Delta_t y_t}{\nu_t l_{s,t}}\frac{\mu\left((1-\chi)(\nu_t l_{st})^{\xi} + \chi\left(\frac{k_{t-1}}{\Gamma_{Nt}}\right)^{\xi}\right)^{\frac{\eta}{\xi}}}{(1-\mu)\left((1-\nu_t)l_{ht}\right)^{\eta} + \mu\left((1-\chi)(\nu_t l_{st})^{\xi} + \chi\left(\frac{k_{t-1}}{\Gamma_{Nt}}\right)^{\xi}\right)^{\frac{\eta}{\xi}}}\frac{(1-\chi)(\nu_t l_{st})^{\xi}}{(1-\chi)(\nu_t l_{st})^{\xi} + \chi\left(\frac{k_{t-1}}{\Gamma_{Nt}}\right)^{\xi}}$$

$$R_t^k = p_{wt}\frac{\Delta_t y_t}{k_{t-1}}\Gamma_{Nt}\frac{\mu\left((1-\chi)(\nu_t l_{st})^{\xi} + \chi\left(\frac{k_{t-1}}{\Gamma_{Nt}}\right)^{\xi}\right)^{\frac{\eta}{\xi}}}{(1-\mu)\left((1-\nu_t)l_{ht}\right)^{\eta} + \mu\left((1-\chi)(\nu_t l_{st})^{\xi} + \chi\left(\frac{k_{t-1}}{\Gamma_{Nt}}\right)^{\xi}\right)^{\frac{\eta}{\xi}}}\frac{\chi\left(\frac{k_{t-1}}{\Gamma_{Nt}}\right)^{\xi}}{(1-\chi)(\nu_t l_{st})^{\xi} + \chi\left(\frac{k_{t-1}}{\Gamma_{Nt}}\right)^{\xi}}$$

$$1 = \mathbb{E}_t(\Lambda_{t,t+1}(R_{t+1}^k + 1 - \delta))$$

$$R_t = R(\Pi_t/\Pi)^{\upsilon_\pi}$$

$$\Delta_t y_t = \left((1-\mu)\left((1-\nu_t)l_{ht}\right)^{\eta} + \mu\left((1-\chi)(\nu_t l_{st})^{\xi} + \chi(k_{t-1}/\Gamma_{Nt})^{\xi}\right)^{\frac{\eta}{\xi}}\right)^{\frac{1}{\eta}}$$

$$\Delta_t = (1-\zeta)p_{\#t}^{-\varepsilon} + \zeta\Pi_t^{\varepsilon}\Delta_{t-1}$$

$$y_t = \nu_t c_{st} + (1-\nu_t)c_{ht} + i_t$$

B.1 DERIVING THE FRISCH ELASTICITY WITH KING ET AL. (1988) PREFERENCES Type-i households receive utility flows from consumption, $c_{i,t}$, and disutility from labor, $l_{i,t}$, with nonseparable preferences,

$$u\left(c_{i,t}, l_{i,t}\right) = \frac{\left(c_{i,t}\left(1-\psi l_{i,t}^{1+\theta}\right)\right)^{1-\sigma}}{1-\sigma}$$

where hours worked provide total labor income $w_{it} l_{i,t}$. Equating marginal benefits and costs provides the type-i household's labor supply curve,

$$w_{it}\lambda_{i,t} = c_{i,t}^{1-\sigma}\left(1-\psi l_{i,t}^{1+\theta}\right)^{-\sigma}(1+\theta)\psi l_{i,t}^{\theta},$$

where $\lambda_{i,t}$ is the household's marginal utility of wealth,

$$\lambda_{i,t} = c_{i,t}^{-\sigma}\left(1-\psi l_{i,t}^{1+\theta}\right)^{1-\sigma}.$$

To derive the Frisch elasticity, first log-linearize the labor supply curve,

$$w_{it}\lambda_{i,t}\left(1-\psi l_{i,t}^{1+\theta}\right)^{\sigma} = c_{i,t}^{1-\sigma}(1+\theta)\psi l_{i,t}^{\theta}$$

$$w_i\lambda_i\left(1-\psi l_i^{1+\theta}\right)^{\sigma}\left[\widehat{w}_{i,t}+\widehat{\lambda}_{i,t}-\frac{\sigma\psi(1+\theta)l_i^{1+\theta}}{1-\psi l_i^{1+\theta}}\widehat{l}_{i,t}\right] = c_i^{1-\sigma}(1+\theta)\psi l_i^{\theta}\left[(1-\sigma)\widehat{c}_{i,t}+\theta\widehat{l}_{i,t}\right]$$

$$\widehat{w}_{i,t}+\widehat{\lambda}_{i,t}-\frac{\sigma\psi(1+\theta)l_i^{1+\theta}}{1-\psi l_i^{1+\theta}}\widehat{l}_{i,t} = (1-\sigma)\widehat{c}_{i,t}+\theta\widehat{l}_{i,t}$$

$$\widehat{w}_{i,t}+\widehat{\lambda}_{i,t}-(1-\sigma)\widehat{c}_{i,t} = \left[\theta+\frac{\sigma\psi(1+\theta)l_i^{1+\theta}}{1-\psi l_i^{1+\theta}}\right]\widehat{l}_{i,t}$$

Next, log-linearize the household's marginal utility of wealth,

$$\lambda_i\widehat{\lambda}_{i,t} = -\sigma c_i^{-\sigma}\left(1-\psi l_i^{1+\theta}\right)^{1-\sigma}\widehat{c}_{i,t}-(1-\sigma)c_i^{-\sigma}\left(1-\psi l_i^{1+\theta}\right)^{-\sigma}(1+\theta)\psi l_i^{1+\theta}\widehat{l}_{i,t}$$

$$\widehat{\lambda}_{i,t} = -\sigma\widehat{c}_{i,t}-(1-\sigma)\frac{(1+\theta)\psi l_i^{1+\theta}}{1-\psi l_i^{1+\theta}}\widehat{l}_{i,t}$$

The Frisch elasticity is the wage elasticity of labor supply conditional on the marginal utility of wealth being fixed, $\widehat{\lambda}_{i,t}=0$, implying

$$\widehat{c}_{i,t} = -\frac{1-\sigma}{\sigma}\frac{(1+\theta)\psi l_i^{1+\theta}}{1-\psi l_i^{1+\theta}}\widehat{l}_{i,t}.$$

Substitute this into the labor supply curve and impose $\widehat{\lambda}_t = 0$,

$$\sigma\widehat{w}_{i,t} = \left[\theta\sigma+(2\sigma-1)\frac{\psi(1+\theta)l_i^{1+\theta}}{1-\psi l_i^{1+\theta}}\right]\widehat{l}_{i,t},$$

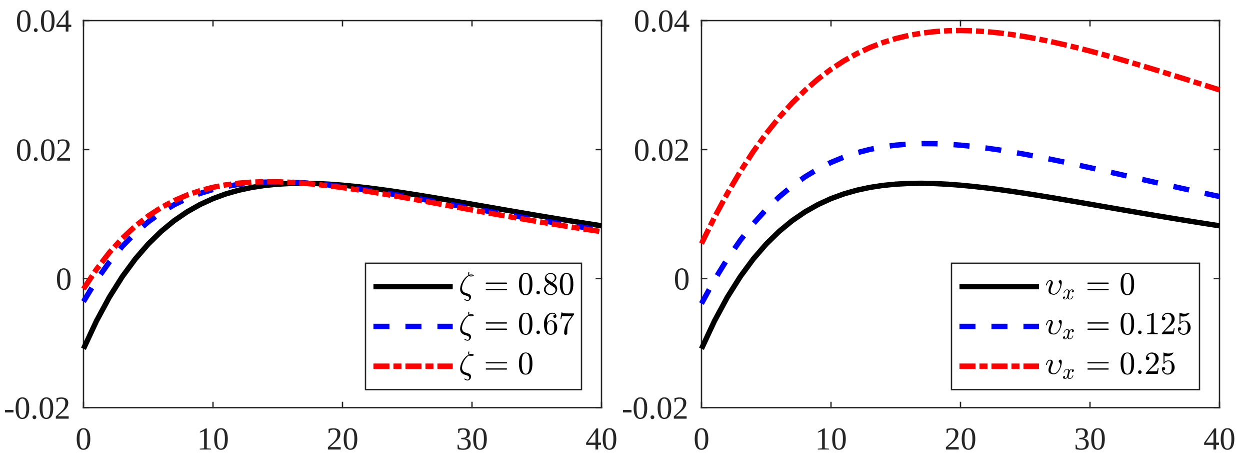
implying the Frisch elasticity is given by

$$\text{Frisch} = \frac{\sigma}{\theta\sigma + (2\sigma - 1)\dfrac{\psi(1+\theta)l_i^{1+\theta}}{1-\psi l_i^{1+\theta}}}$$

$$\text{Frisch} = \frac{\sigma\left(1-\psi l_i^{1+\theta}\right)}{\theta\sigma\left(1-\psi l_i^{1+\theta}\right) + (2\sigma-1)(1+\theta)\psi l_i^{1+\theta}}$$

C Robustness of the Inflation Response

Figure C.1: Impulse responses of inflation to an immigration shock under alternative parameters



Notes: The responses are annualized percentage point deviations from steady state.

This section examines whether the small response of inflation to an immigration shock is robust to alternative parameterizations of our baseline TANK-CSC model. The results are shown in Figure C.1. In the left panel, we consider smaller degrees of price stickiness (ζ) to allow for a steeper Philips curve. In the right panel, we allow for a positive response to the output gap in the monetary policy rule. In particular, we generalize the Taylor rule to

$$R_t = R\left(\Pi_t/\Pi\right)^{\upsilon_\pi} gap_t^{\upsilon_x},$$

where the output gap (gap_t) is defined as the ratio of aggregate output in our baseline sticky price economy to aggregate output in the flexible price economy ($\zeta = 0$) multiplied by a scaling factor such that the steady-state output gap is unity.[19] Despite the wide range of values we consider, we find very little effect on the inflation responses. This highlights the robustness of our key result that the postpandemic immigration surge had very little effect on inflation.

[19]Since there is positive (net) trend inflation, there will be a permanent gap between the output levels in the sticky and flexible price economies. This is because steady-state output per capita in the sticky price model differs from steady-state output per capita in the flexible price model. Thus, the scaling factor equals the ratio of steady-state output per capita in the flexible price economy to steady-state output per capita in the sticky price economy.