

Estimating the Effect of Immigration on Public Finances: Evidence from the Influx of Venezuelan Migrants to Colombia

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Abstract

What is the fiscal impact of immigration on all levels of government? We study this question using the large and sudden increase in Venezuelan immigration to Colombia from 2013 to 2018. Over a million Venezuelan-born individuals and roughly 350 thousand native-born returnees moved to Colombia during this period. Our findings indicate that while immigrants tend to have less access to, and make lower use of, the welfare system, they have lower net fiscal contributions relative to natives overall, driven by lower contributions to regional and local government budgets. However, relative to the size of the economy, their overall fiscal effect is small. Lower fiscal contributions by immigrants are explained entirely by recent arrivals. Immigrants that have been in the country for more than a year have—if any—a better per capita fiscal position relative to natives. We show that the fiscal effect on local budgets is mediated by two forces: cities' ability to raise revenues from their own sources and the size of immigrant inflows relative to the local population.

Keywords: immigration, public finances, public goods, local governments.

JEL: H41, H50, H70, J15.

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1. Introduction

From the seminal work of the National Research Council (1997) and Auerbach and Oreopoulos (1999), the impact of immigration on public finances has been a highly debated issue in the literature.¹ This has also consistently turned out to be an important concern in the public opinion where a significant fraction of natives sees immigration as a burden for the economy. Natives' concerns—at least partially—are based on the belief that immigration reduces the government's fiscal space and affects the level and quality of services provided. While the evidence to date has focused on the effects in high-income countries using a combination of empirical approaches, it has left unattended the analysis in low- and middle-income countries.

Increasingly, the literature has looked at the net fiscal impact of immigration, estimated as the difference between the taxes and other contributions immigrants make to public budgets and the costs of transfers and services they receive. While there does not seem to be a consensus in the empirical literature on the magnitude or direction of the fiscal effects of immigration, the overall effect has been shown to be relatively small to the size of the fiscal deficit and the economy (OECD, 2013). Therefore, immigration seems to be neither a major burden to public finances nor a potential solution to fiscal imbalances.

In this paper, we investigate the fiscal impact of immigration in Colombia from 2013 to 2018 using the large and sudden increase in inflows from Venezuela. According to our estimates using Colombia's Labor Force Survey and the 2018 Population Census, about 1.1 million Venezuelan-born individuals and 350 thousand Colombian returnees had crossed the border between 2013 and 2018. This is the largest flow ever experienced by Colombia (Reina *et al.*, 2018). Over the years, Colombia had been a country mostly of emigrants, however, the Venezuelan crisis changed that trend. Information from the UN Migration Agency shows that, as of April 2020, approximately 5.1 million Venezuelan migrants were living abroad, of which over 80% were residing in Latin American countries. Colombia has been the preferred destination for Venezuelan immigrants with roughly 35% of total outflows. Inflows of immigrants to Colombia may have impacted the public budget by changing the composition and size of the population, the revenue-contributing capacity of existing groups, and the cost of provision of public goods likely from an increase in the demand.

Our assessment of the effects of immigration on public finances is carried out in four steps. First, we estimate the welfare dependency of migrants using self-reported information in Colombia's Labor Force Survey (*Gran Encuesta Integrada de*

¹ A review of more recent contributions can be found in the National Academies of Sciences, Engineering and Medicine (2017).

Hogares—GEIH). We look at whether individuals claim any type of welfare benefits, such as subsidized health care, conditional cash transfers, unemployment benefits, pension-related benefits, housing-related benefits, or other type of cash assistance. Second, we estimate the net fiscal contributions by level of government for different groups (permanent natives, natives returning from Venezuela, Venezuelan-born immigrants, and other immigrants). In each case we present estimates allocating the cost of all public goods proportionally to the size of each group (*average effect* scenario) and assuming that immigrants only pay their marginal cost to non-congestible public goods (*marginal effect* scenario). Third, we discuss recent evidence on the role of relative elasticities on the labor market and indirect taxation, particularly from capital taxation. Finally, we examine the fiscal impact across local governments. We estimate the fiscal contribution of Venezuelan immigrants (including native-born returnees) for a group of cities with their metropolitan areas. From a methodological standpoint our paper follows broadly Dustmann and Frattini (2014).

Our main findings can be summarized as follow. First, Venezuelan immigrants tend to have less access to, and make lower use of, the welfare system. However, results suggest a relationship between the length of time in Colombia and the probability—and level—of welfare take-up. Second, Venezuelan immigrants pay less in taxes than they use in public transfers.² This is also true for natives. Although Venezuelan immigrants have lower net fiscal contributions relative to natives overall, which is driven by lower contributions to regional and local government budgets, their overall fiscal effect is small relative to the size of the economy. Nonetheless, once we include contributions from other foreign-born groups, immigrants in Colombia do not generate an additional fiscal cost.

When we consider the effect that demographic characteristics play on explaining the differences in the net fiscal contributions among groups, our results suggest that age and educational attainment play a small role in explaining the gap between foreign- and native-born individuals. The main driver seems to be the lack of access to ‘good’ jobs. The higher fiscal cost of Venezuelan immigrants is driven by recent cohorts (i.e. those that arriving after 2015). Despite having higher levels of education, Venezuelan immigrants present on average a lower employment rate and a higher unemployment rate when comparing them to natives and are more likely to be self-employed or working in informal jobs—i.e. without social security coverage. In contrast, immigrants that arrived in or before 2015 have a better per capita fiscal position compared to natives. Estimates of the fiscal effect on tax expenditures indicate that Venezuelan immigrants have higher per capita tax expenditures in

² As we explain in detail in Section 3, Venezuelan immigrants consisting of both the Venezuelan-born population with their dependent children and those native-born returnees who were previously living in Venezuela.

personal income tax and fuel tax relative to permanent natives, but lower tax expenditures over corporate income tax and value-added tax.

To complement the core results, we introduce three extensions that relax key assumptions underlying standard fiscal accounting methods. First, we consider the effect of differences in labor supply elasticities, showing that informal immigrant workers—particularly those with irregular status—may bear a substantial share of the tax burden through depressed wages, even if they do not pay taxes directly. However, after adjusting the wage distribution by imputing wages for Venezuelan informal wage workers with the closest predicted value, we see slight increases in tax payments in some of the sampled years but, on the aggregate, there is no significant improvement on immigrant’s net fiscal impact. Second, we incorporate capital tax revenues generated by firms employing immigrant labor, following Clemens (2022), and show that omitting these effects leads to a significant undervaluation of immigrants’ contributions, with adjusted tax revenues nearly doubling. Third, our analysis discusses the potential labor market displacement effects on natives and other immigrants. Although the evidence suggests wage downgrading, the current literature finds no statistically significant evidence of reduced employment among natives. Together, these extensions move beyond narrow cash-flow accounting to capture broader economic dynamics shaped by immigration. Incorporating these considerations into the analysis, allows for a more complete picture of the fiscal effects of immigration.

Finally, since immigrant inflows are not distributed uniformly across space, our findings from the analysis on local budgets indicate that immigrants’ per capita net contributions vary considerably across cities. Roughly 60 percent of all migrants arriving from Venezuela (including returnees) were living in one of the 23 main cities and metropolitan areas as of 2018, with three quarters of these living in just five of those cities. Our results show that, when sharing the cost of public goods equally among a larger population, Venezuelan immigrants tend to have a lower revenues-to-expenditures ratio relative to natives, particularly in cities that experienced a large increase in inflows. When we attribute only to immigrants the additional cost to public goods provision resulting from their arrival to the country, in 19 out of the 22 cities considered, immigrants had a higher ratio.

Excluding transfers from the national government does not affect our qualitative results. We show that for cities with display a low fiscal effort (*i.e.*, not raising enough revenues from their own tax sources) but experience high inflows, excluding transfers from the national government improves the relative fiscal position of immigrants. Nevertheless, excluding transfers does not significantly change the relative net fiscal position of immigrants in cities with a high fiscal effort.

Contribution We make several contributions to the existing literature. First, this paper provides new evidence of the fiscal impact of immigration in a developing country and provide the first estimates for Colombia. Second, to the best of our knowledge, we present the first estimates for native-born returnees and estimate the impact on tax expenditures. Excluding tax expenditures from the analysis gives a one-sided look on the effect of immigration on public finances since in principle tax expenditures substitute for Government spending programs. Third, our results shed light on the impact of an immigration process that is neither solely voluntary nor forced. Our fourth contribution is in terms of scope. We compute the fiscal effects by level of government (national, regional, local). Most of the empirical findings in the literature refer only to the effects on the budget of the General Government or the central government, ignoring the fiscal burden at the regional and local level.

Related Literature This paper relates to two areas of research. First, a large body of literature has estimated the effects of immigration on public finances (Borjas, 1994; National Research Council, 2017; Auerbach and Oreopoulos, 1999; Storesletten, 2000; Rowthorne, 2008; OECD, 2013; Preston, 2014). In particular, our empirical approach is closely related to the strand of literature that uses a static accounting framework to compute the burden or surplus that migrants levy on public budgets in receiving countries, comparing it to the fiscal effect of the native-born population (Dustmann and Frattini, 2014; National Academies of Sciences, Engineering and Medicine, 2017). This paper differs from these studies in that we provide detailed evidence of the short run effects of an immigration episode that is both unforeseen and sizeable. Our results show that negatives effects tend to die out after one year of residence in the country. Looking at the evolution of effects over a window of time closer to immigrant's period of arrival, in contrast to defining cohorts by generations or at a fix date in time as it is usually done in the literature, provides key insights. In addition, we provide evidence on the role that native-born returnees have when accounting for the total fiscal effects of immigration.

Despite the vast amount of evidence on the fiscal effects of immigration, the evidence for developing countries is limited. A notable exception is the relatively recent report by OECD/ILO (2018). They provide the first evidence on the impact of immigration on both the fiscal balance and the quality of public services for a sample of low- and middle-income countries. Their main finding is that there is no clear pattern on the magnitude and sign of the fiscal effects. However, while fiscal revenues and expenditures allocated to immigrants are not always higher or lower than those of native-born individuals, immigrants' per-capita effect seem to be quite high in developing countries. Their results, as do others in the literature, suggest that the impact immigrants have on public finances is mostly being driven by the

sociodemographic characteristics of the population, the length of residence in the country, and the types of policies implemented in the receiving country to attend immigrants. In this paper, we disaggregate effects over space and time. Since most of the negative effects are borne by regional and local governments, looking only at results at the national level hides the heterogeneity at the subnational level. Some municipalities may have a harder time adjusting to immigrant inflows.

Insights from our results seem to align with the evidence for developed countries. This per se is not new. However, since immigrants in our sample tend to be less attached to the labor market and work mostly in informal jobs and have access to many of the benefits available to natives (e.g. education, health, and housing),³ one would have expected larger fiscal effects driven by lower tax contributions, particularly to income tax and social security. Therefore, we believe our findings are informative for the region as many countries in Latin America have experience large inflows of immigrants from Venezuela, with somewhat similar characteristics. In some sense, the context studied is atypical to the literature in a way that roughly 90% of all immigrants in the country were born in Venezuelan, limiting the composition across multiple groups. Our setting has two distinctive waves. The first one, arriving in or before 2015, is slightly more educated with more wealthy immigrants. The recent one, starting in 2016, is composed of workers with lower educational achievement and resources relative to the first wave.

As we estimate welfare dependency of immigrants, this paper naturally relates to the large literature studying the differences in welfare reliance of immigrants and natives (Blau, 1984; Borjas and Hilton, 1996; Borjas and Trejo, 1991; Hansen and Lofstrom, 2003; Barrett and McCarthy, 2008; Sarvimäki, 2011). We go beyond most of the literature as we are able to disaggregate our results not only by immigration group, but also by cohort of arrival to the country.

The remainder of the paper is organized as follows: Section 2 presents the different empirical approaches and addresses conceptual issues. Section 3 presents the methodology and data and explains the allocation criteria used to allocate revenues and expenditures. The demographic characteristics are presented in Section 4 and the estimates of welfare take-up are presented in Section 5. The estimates of the net contributions of natives and immigrants by level of government are presented in Section 6, the discussion of labor elasticities and capital taxation is presented in Section 7, while Section 8 offers a view of the effect on local budgets. A discussion of some of the limitations is presented in Section 9. Section 10 concludes.

³ This, however, is mostly true after 2017, not before.

2. Alternative empirical approaches and conceptual issues

There are two main approaches to measure the direct fiscal impact of immigration using an accounting-type exercise: a *static* and a *dynamic* application. The static approach compares the tax contributions immigrants make to public finances to the services and benefits they receive within a fiscal year, using data on labor market characteristics, expenditure patterns, public service use, and welfare system access (Borjas, 1994; Gott and Johnson, 2002; Dustmann and Frattini, 2014; National Academies of Sciences, Engineering and Medicine, 2017). A static analysis may confine attention to a single year or be a repeated cross-section across a set of years. Because the analysis is backward-looking, this approach relies on historical data on tax payments and public expenditures, reducing the need to impose strict assumptions about future trends in population composition, government spending or immigration policies (Kaczmarczyk, 2013). In this sense, results are largely driven by the demographic composition of immigrants in terms of age, skills, and access to services. However, static approaches tend to neglect behavioral responses or account for the long-term fiscal consequences of immigration (Preston, 2014).

On the other hand, the dynamic analysis is a forward-looking approach that takes on the current characteristics of immigrants and attempts to project their net fiscal impact. Also known as the generational accounting approach (National Research Council, 1997; Auerbach and Oreopoulos, 1999; Lee and Miller, 2000; Storesletten, 2000, 2003; Ekberg, 2011; Cully, 2012), this type of analysis estimates the present discounted value of lifetime fiscal contributions and benefits received by immigrants. This requires projecting future population growth, income levels and employment profiles, public services costs, and government deficits for a span of years, often making heroic assumptions. Being able to get a full picture of the distribution of migrants along the life cycle is a key component. While children are net beneficiaries—*i.e.*, they consume more in public services than what they might contribute to the treasury, later in the life cycle working age individuals typically become net contributors. In addition, high-skilled migrants on average contribute more than low-skilled migrants (National Academies of Sciences, Engineering and Medicine, 2017), which is one of the main determinants of the overall impact of immigration in the short run (Vargas-Silva, 2016).

While a complete view of the fiscal impact that can be attributed to immigration is only realized over the long-term, any forward-looking analysis relies on a detailed description of the contributions and benefits immigrants have received. In addition, cross-sectional studies are better suited to estimate fiscal effects in contexts where the size and composition of the immigrant inflows keeps evolving in short periods of time, such as the one studied in this paper. Depending on the

approach selected and the assumptions made, estimates of the effect of immigration on public finances tend to vary. Yet, the literature has found these estimates to be small relative to each country's GDP, being on average close to zero for OECD countries (OECD, 2013). Nonetheless, a common limitation of both approaches is their inability to account for the indirect fiscal effects that arise from the impact that new immigration has on the economy, particularly, on factor prices. Indirect effects are commonly studied through general equilibrium models.

A key element in accounting-type estimates are the assumptions made in terms of how the revenues and expenditures are allocated to immigrants. Some of these issues relate to the unit of analysis and the treatment of immigrants' children, the treatment of public goods or the treatment of interest on the national debt. Using the household as the unit of analysis is problematic. While households as a unit tend to consume public services and pay taxes, making it the potential unit of analysis such as in *The New Americans* (National Research Council, 1997), households are not stable over time and often are constituted of both native-born and foreign-born members.⁴ In cross-sectional studies the treatment of immigrant's children (also known as second-generation immigrants) is somewhat more difficult. Because the fiscal effect will be driven by the current demographic composition, allocating the cost of children proportionally to their parents, especially when having mixed households, is common in the literature. A drawback, however, is that second-generation immigrants can only be identified in survey data while they are still living with their parents. In our case, this will not impose a problem as Venezuelan immigration is quite recent.

Choosing how to allocate public goods is an open debate in the empirical literature. As shown by Preston (2014), the fiscal impact of immigration can be decomposed into four effects. The first is the population size effect. It captures the fiscal gain or loss from an increase in population size by the new immigration. The overall effect will depend on the combination of 'pure' and 'congested' public goods as the cost of providing these goods may change. The growth in population size from immigration will not alter the cost of providing 'pure' public goods as they are not rival in consumption and thus the marginal cost is likely to be zero. By allowing fixed costs of providing 'pure' public goods to be spread over a greater number of taxpayers, immigration is beneficial as it reduces the tax burden imposed on natives. Nonetheless, the spending for some public goods might be correlated with other

⁴ According to OECD's *International Migration Outlook* (2013), for a static accounting analysis the foreign-born population is the appropriate unit of analysis.

variables such as GDP growth (which also depend on population growth), challenging the ‘pure’ public good classification.⁵

A different story happens with ‘congestible’ public goods. As they are to some extent rival in consumption, the fiscal contribution of immigrants will depend on the relationship between the marginal cost and the average cost. If the marginal cost is lower than the average cost, then an increase in population size will be fiscally beneficial in the sense that the public good can be provided at the same level while sharing the costs among the whole population. Consider the spending in law courts. The administration of justice—in its more general sense—can be thought as both non-rival and non-excludable in consumption and, therefore, immigration may be added at zero marginal cost. However, access to the courts is mostly rival in consumption. In addition, spending on judicial services will also depend on how immigration affects crime. Bell and Machin (2012) present a comprehensive survey of the current literature on the effect of immigration on crime, concluding that there is little evidence of immigration increasing crime.⁶ As a result, most empirical studies attribute the costs of ‘pure’ public goods only to natives, with some studies assigning them on a per capita basis, and allocate ‘congestible’ public goods proportional to the number of recipients (Rowthorn, 2008). This creates a need for proper and detailed information, or assumptions otherwise, on the access and consumption of such goods.

The second effect arises from changes in the composition of the population. For example, a more diverse population can create additional costs in the provision of public goods as the demand for different services increases. The third effect takes into account differences in the average use of public services and tax payments between immigrants and natives. Lacking the appropriate data, the common assumption in the literature is that the use-rate of public services is the same for natives and immigrants. In fourth place, immigration directly induces labor market equilibrium effects. Not only can displacement effects arise from an increase in competition in the labor market as a result of immigrant inflows, but immigration could also have an effect on factor prices, especially wages (Card, 2001; Borjas, 2003; Ottaviano and Peri, 2012; Dustmann *et al.*, 2017). These effects will likely affect tax payments and

⁵ One example is expenditure on military defense. National defense is often considered as a non-excludable and non-rival good to the extent that its purpose is to defend a country from foreign attack or protect overseas interests, so it’s likely to be unaffected by population growth. However, in many circumstances the military supports actively domestic law enforcement. So, by being regarded as the ultimate guarantor of the established domestic order, population size cannot be set aside.

⁶ Using the recent Venezuelan immigration to Colombia, Tribín-Uribe and Knight (2020) show that homicides in Colombia increased in areas close to the border with Venezuela, yet these were driven by crimes against migrants.

benefits for other economic agents.⁷ These second-order effects are commonly overlooked in both static and dynamic exercises as they require additional information which may not be available, or the use of more complex methodological techniques.

Even though fiscal imbalances are often more openly discussed in forward-looking models, they also play a key role in a static analysis. As pointed out by Dustmann and Frattini (2014), the net contributions of both immigrants and natives depend on the magnitude of the deficit in a particular year. Suppose the country is running a deficit in a given year and there is only one group. Then the average net fiscal contribution in that particular year will be negative. The opposite will happen if the country is running a surplus. Therefore, even when the behavior of an average individual in terms of the taxes paid and use-rate of public goods remains the same in both situations, the outcome for a particular group is driven by the fiscal balance. So, any empirical analysis should focus on its relative contribution. In other words, comparing the net fiscal position of immigrants relative to that for native-born individuals.

Finally, there is ample debate in the literature on how to treat interest on the national debt. Studies often classify interest on the national debt as a ‘pure’ public good, ascribing it only to natives under the marginal cost scenario. However, interest payments should also be attributed to migrants. Particularly, interests for debt acquired as a result of their arrival to the host country, not the one incurred before their arrival, as immigrants net fiscal position in each fiscal year affect the rate at which countries accumulate debt (Rowthorn, 2014).

3. Assessing the effect of immigration on public finances

We use a static cross-sectional accounting approach to assess the fiscal contribution of immigrants. Our analysis focuses on individual immigrants rather than immigrant households. In that sense, we define the immigrant population as all foreign-born and their dependents. In the case of mixed households, we apportion the cost of dependents using the relationship with the head of household. Therefore, if the head of household is classified as an immigrant, then his/her direct dependents (children, grandchildren or other relatives) are also classified as such. In line with the National Academies of Sciences, Engineering and Medicine (2017) we consider dependents to be anyone (1) less than 18 years old, (2) age 18 through 22 and enrolled full-time in secondary education, or (3) age 18 through 22 working less than part time—

⁷ See Preston (2014) for a detailed discussion of the effect of immigration on the remuneration of existing factors.

regardless of their school enrollment status. If a person is married or not part of the household unit, he/she is considered independent regardless of age. This independent-person definition recognizes that the contributions or benefits received by immigrant's children are driven by the decisions of their parents regardless of the children's own immigrant status.

We assign all revenues and expenditures for each fiscal year between 2013 and 2018 among Venezuelan-born, other foreign-born, and native-born, our reference population. We further decompose Venezuelan-born based on the time they have been living in Colombia: less than a year, one to five years, more than five years. The native-born group is further broken down into permanent residents (our reference group) and returnees, to account for those native-born individuals previously living in Venezuela who returned to the country since 2012. Throughout the text we will use the terms *permanent natives* and *natives*—in general—interchangeably. Finally, our analysis will focus on the contribution of immigrants relative to permanent natives to mitigate the effect of fiscal imbalances, as discussed in the previous section.

3.1. Model

Following Dustmann and Frattini (2014), in every year t , the General Government fiscal balance ($GGFB_t$) is the difference between revenues (REV_t) and expenditures (EXP_t),⁸ including interest payments on public debt. Total revenues are computed as the sum of all N_R sources of tax, non-tax, capital, and additional income, with rev_{it} denoting the income from source i in year t . Likewise, we denote expenditure j in year t as exp_{jt} , and N_E as the number of different expenditure items. Thus, the General Government fiscal balance can be written as

$$GGFB_t = REV_t - EXP_t = \sum_{i=1}^{N_R} rev_{it} - \sum_{j=1}^{N_E} exp_{jt}. \quad (1)$$

We can decompose equation (1) into the net contributions of the different interest groups discussed above at a particular year. Indexing the groups by g , we can rewrite equation (1) as

⁸ The General Government is composed of the Central Government, including public establishments, the Social Security sector, and all subnational governments.

$$GGFB_t = \sum_{g=1}^G (\alpha_t^g REV_t - \beta_t^g EXP_t) = \sum_{g=1}^G \left(\sum_{i=1}^{N_R} \alpha_{it}^g rev_{it} - \sum_{j=1}^{N_E} \beta_{it}^g exp_{jt} \right), \quad (2)$$

where α_{it}^g denotes the share of government revenues i in year t that originated in contributions of group g and β_{it}^g denotes share of expenditures j allocated to group g . Note that for every source of revenue $\sum_{g=1}^G \alpha_{it}^g = 1$ and for every expenditure item $\sum_{g=1}^G \beta_{it}^g = 1$. In the next subsection we describe in detail how we compute these shares and how we group government revenues and expenditures. This computation relies on very detailed administrative information and a rich survey data for all groups of interest for every fiscal year.

Since each group's revenues and expenditures are proportional to the group size, we follow Dustmann and Frattini (2014) and compare net contributions across groups using the ratio of revenues to expenditures (RE_t^g) for each group in each year as

$$RE_t^g = REV_t^g / EXP_t^g \quad (3)$$

and compare net contributions of immigrants relative to natives, indexed by n , using relative net contributions (RNC_t^g), to address the effect of fiscal imbalances:

$$RNC_t^g = RE_t^g / RE_t^n, \quad \text{for } g \neq n. \quad (4)$$

When the ratio of revenues to expenditures is greater (less) than unity, the group contributes more (less) in taxes than what it receives from public spending. Similarly, a relative ratio RNC_t^g greater (less) than unity indicates that the immigrant group's net contribution is greater (less) than the contribution of permanent natives.

3.2. Data

The analysis is based on estimates of the contributions of natives and immigrants to government revenues in each fiscal year and the expenditures allocated to each group. Accordingly, we rely on two sources of information. Our first source is Colombia's Labor Force Survey (*Gran Encuesta Integrada de Hogares—GEIH*), developed by the National Department of Statistics (*Departamento Administrativo Nacional de Estadística—DANE*).⁹ The GEIH is a representative monthly survey at

⁹ Data is available to download at http://microdatos.dane.gov.co/index.php/catalog/MICRODATOS/about_collection/23/1.

the national level and for a group of cities with their metropolitan areas. We pooled monthly data for each year, consistent with the fiscal year. Each month, approximately 20,500 households are surveyed. The GEIH is a rotating panel, so each household is interviewed during a number of successive years before leaving the sample, and only once in the year. In that sense, during the same year, about 250,000 households are interviewed, or about 1.5% of the Colombian population.

The GEIH allows us to track in each month the number of immigrants living in Colombia. Since 2013, it allows us to identify the country where the migrant was living twelve months and five years before being surveyed, and his or her place of birth. This survey has other advantages. The information is collected regardless of immigrants' migratory status, regular or irregular, being representative for both groups of migrants. We estimate the stock of immigrants using sample weights. In addition, the GEIH records ample information regarding labor market participation and wages, as well as households and individuals' socioeconomic characteristics. It also collects self-reported information on access to government programs and affiliation to social protection (health care and pension), which we use to identify beneficiaries.

We draw on a number of data sets provided by the Ministry of Finance, the Colombian Tax Administration (*Dirección de Impuestos y Aduanas Nacionales—DIAN*), state and local governments' budget executions, the General Accounting Office, DANE, and several other government entities, to construct government receipts and expenditures. We now describe each of these data sources.

We derive our expenditure data from the annual information on the General Government Expenditures by Sub-function published by DANE. This data reports expenditures for different items classified according to the United Nations Classification of the Functions of Government (COFOG). Public data available online on government expenditures are only disaggregated into eleven functions: general public services, defense, public order and safety, economic affairs, environmental protection, housing and community amenities, health, recreational activities, culture and sports, education, social protection, and debt service.¹⁰ We were able to access detailed information by sub-function directly from DANE.

Information on government revenues for all fiscal years between 2013 and 2018, covering the main aspects of government finances for the General Government, is not available in Colombia. Thus, we rely on multiple administrative data to construct government revenues using the same sample of government agencies

¹⁰ Recent information is available online at <https://www.dane.gov.co/index.php/estadisticas-por-tema/cuentas-nacionales/cuentas-nacionales-anuales#cuentas-de-sectores-institucionales>.

covered in the expenditures side.¹¹ As sources of information for the central government, we use the Integrated Financial Information System (*Sistema Integrado de Información Financiera—SIIF*) and annual reports from DIAN. For local governments we use the information available in the Single Territorial Form (*Formulario Único Territorial—FUT*). The information for agencies and public establishments not included partially or totally by the previous data was complemented with the financial statements from the General Accounting Office. Revenues included follow the principle of net revenues. In this sense, tax returns paid out during the same fiscal year are discounted. Likewise, transfers between the different levels of government are excluded. Particularly, we rely on information from the fiscal accounts of the Social Security Sector (health and pensions) carried out by the Ministry of Finance. Finally, we use data from the General Royalties System (SGR by its Spanish acronym) to complement the information on investment resources available in the case of regional and local governments.

3.3. Allocation of revenues and expenditures

We proceed to describe the categories used to group revenues and expenditures and how we allocate these values in our baseline scenario. According to the discussion in Section 2, we will make explicit the difference in the allocation criteria when we assume the *average* cost or *marginal* cost of public provision, if relevant in each case. For a detailed recount of the technical details and data sources used to construct the apportioning coefficients and the items included in each revenue and expenditure category please refer to the Online Appendix. In Section 5.2 we conduct a sensitivity analysis by using alternative allocation criteria.

A. Revenues

Table 1 summarizes the criteria we use in our baseline and alternative scenarios to allocate revenues in each case. We have grouped receipts from the General Government in 14 categories.

We use income information from the Labor Force Survey (*Gran Encuesta Integrada de Hogares—GEIH*) to estimate each group’s share of total payments of *income tax, social insurance and payroll taxes*, which account for 13.1% of total government revenues on average over the period 2013-2018. To compute income tax, we use taxable income—which also includes additional sources of income (*e.g.*, capital

¹¹ The sample used by DANE to construct government expenditures follows the recommended classification of the System of National Accounts 2008 (SNA) and the Government Finance Statistics Manual 2014 (GFSM).

income)—and apply year-specific tax rates of the ordinary system. In our estimates we allow for tax benefits that reduce the tax base and take into account tax withholdings for those not obliged to file a tax return. Social insurance contributions (SICs) and payroll taxes are calculated by applying year-specific rates to the estimated Contribution Base Income. We use information on the affiliation status to a pension fund and to the contributory health care regime in the case of SICs and use all wage and salary workers to estimate payroll taxes.

To determine the allocation coefficients for *corporate and capital taxes*, which account for 18.6% of total government revenues on average, we first deduct the share of foreign ownership using information from the *Unified Commercial and Social Registry (RUES)* which collects data for all registered business in Colombia and their share of local and foreign capital. We then apportion corporate taxes using each group's share in the population receiving individual dividend and interest income and allocate the national public ownership share to natives on a *pro rata* basis. Our estimates are based on rolling 2-year GEIH samples. In our sensitivity analysis we use the information from the GEIH on individual dividend and interest income of long-term residents (>5 years), which is composed of income from interest on loans or CDs, savings deposits, profits, gains, or dividends on investments. We don't include this as our baseline scenario because the information reported by households extends beyond business profits or dividends on investment, and thus it is likely to be capturing interests from direct lending to other households.

We apportion *wealth tax* taking into account the contribution of revenues between households and firms. Relative to total government revenues, wealth tax averaged 1.5% over the period 2013-2018. Based on estimates from Londoño-Vélez and Ávila-Mahecha (2018), for each fiscal year we can distinguish between personal and corporate wealth tax receipts. We treat firms' wealth tax payments similarly to corporate and capital tax payments. In the case of personal wealth tax payments, we use a multi-step procedure to proxy for asset ownership based on information from the GEIH. First, we take self-reported values on the minimum price a household would sell their house if they decided to do so and distribute the resulting value among the head of household and his or her spouse/partner. Next, we estimate price-to-rent ratios for each year using expected rent and expected dwelling values and apply these ratios to reported annualized individual rental income (e.g., houses, apartments, rural property). Finally, we sum all individual property values and allocate revenues based on each group's share among total assets in the 90th percentile or above.

VAT and other indirect taxes are the largest contributor to total revenues, averaging 23.9%. To allocate these receipts we estimate each group's share of total payments for each tax, net of nonresident direct purchases share, following the

common multi-step procedure in the literature. First, we apply decile-specific effective tax rates to households' gross income from the GEIH depending on the position in the income distribution. Decile-specific effective tax rates are based on our own estimates using the 2014 Quality of Life Survey (*Encuesta de Calidad de Vida—ECV*) and the 2016-2017 Household Income and Expenditure Survey (*Encuesta Nacional de Presupuestos de los Hogares—ENPH*). A detailed account of how we proceed to estimate the incidence of indirect taxes, tariffs and import duties is presented in the Online Appendix. We apply the tax structure in place in 2014, 2016 and 2017. We use effective tax rates in the following way: (i) for 2013-2014 we use 2014 effective tax rates; (ii) for 2015-2016 we use 2016 effective tax rates; (iii) for 2017-2018 we use 2017 effective tax rates. Then we distribute each household's total payments in indirect taxes to all members of the household using individual contributions to the household gross income. Since we cannot separately identify effective tax rates for natives and immigrants, we implicitly assume that natives and immigrants with similar levels of income have similar consumption patterns. While Colombia and Venezuela share cultural traits, and one would expect this not to be a significant issue, Venezuelan immigrants may have lower consumption or send remittances back to their home countries at levels that may affect consumption. In our sensitivity analysis we follow the literature and assume a 20% reduction in contributions to indirect taxes paid by all immigrants relative to the average for the general population.

Finally, we compute apportioning coefficients for each indirect tax by summing total payments for the projected population using sample weights and estimating the contribution of each group in total payments. We use the information from the macroeconomic aggregates reported by Colombia's National Department of Statistics (DANE) to exclude final consumption spending by non-resident households in the country. Since firms contribute to nondeductible VAT, tariffs and import duties revenues, we use data from the supply and use tables of the National Accounts System to estimate the share of payments attributed to firms. We treat firms' nondeductible VAT, tariffs and import duties payments similarly to corporate and capital taxes payments. Wine and spirits VAT are assigned to households.

In the case of *motor vehicle taxes*, we apportion motor vehicle tax proportionately to the share of motor vehicle ownership (car or motorcycle) for each group in the adult (18+) population. Since we can only identify ownership at the household level in the GEIH we assume equal contributions from all adult members.

Property tax contributes roughly 2.6% to total General Government tax receipts over the period 2013-2018. According to estimates from Ávila-Mahecha (2015), firms contributed on average 70% to total property tax revenue between 2010-2013. We use this share to allocate total payments between firms and individuals for

all years. We treat firms' contributions similarly to corporate and capital taxes payments and treat households' revenues similarly to personal wealth tax payments, but instead of using only those asset values above the 90th percentile we use in this case the whole distribution.

The *industry and commerce tax* is the single largest share of local government revenues—excluding royalties. It is levied on direct or indirect industrial, commercial, or service activities in the jurisdiction of a specific municipality, and accounts for 2.9% of total government revenues on average. According to estimates from Ávila-Mahecha (2015), firms contributed on average 90% to total industry and commerce tax revenue between 2010-2013. We use this share to allocate total payments between firms and self-employed for all years. We treat firms' contributions similarly to corporate and capital taxes payments and allocate households' revenues using the share of self-employed owning an industrial, commercial, or service business.

Table 1
Government revenues allocation criteria

Revenue group	% of total	Baseline	Alternative
Income tax, social insurance and payroll taxes	13.1	Share of total payments: tax schedule applied to GEIH earnings	
Corporate and capital taxes	18.6	Share of population with individual dividend and interest income, after deducting nonresident foreign ownership; national public ownership share is allocated to natives	Share of long-term residents (>5 years) with individual dividend and interest income
Wealth tax	1.5	Share of adult (18+) population (firms' contrib.); share of real estate value for property owners in the 90th percentile or above (households' contrib.)	Same as corporate and capital taxes (firms' contributions)
VAT and other indirect taxes	23.9	Share of total payments, after deducting nonresident direct purchases; effective rates by household income decile from the Online Appendix.	Same as baseline, but assuming a 20% reduction in total payment of indirect taxes for immigrants
Motor vehicle tax	0.5	Share of motor vehicle ownership in the adult (18+) population	
Property tax	2.6	Share of adult (18+) population (firms' contrib.); share of real estate value for property owners (households' contrib.)	Same as corporate and capital taxes (firms' contributions)
Industry and commerce tax	2.9	Share of adult (18+) population (firms' contrib.); share of self-employed owning an industrial, commercial, or service business (households' contrib.)	Same as corporate and capital taxes (firms' contributions)

Financial transactions tax	2.7	Share of population with monthly expenses above the tax exemption threshold
Gross operating surplus, rents and royalties	13.1	Share of adult (18+) population (<i>average contribution</i>) / All to permanent natives (<i>marginal contribution</i>)
Urban phones tax	0.0	Share of adult population (18+) with access to a landline
Educational services	0.8	Share of population in higher education in public establishments
National Teachers Pension Fund (FOMAG)	1.4	Share of employees in the education sector classified as government workers
Immigration Certificates	0.0	Share of foreign-born population
Other	18.8	Share of adult (18+) population

Notes. The first column reports the revenue groups in which we have classified the list of all government revenues we assembled based on information from the Ministry of Finance, DIAN, FUT, SGR, and the General Accounting Office. The second column shows the average proportion of each group in total government revenues between 2013–2018. The last two columns summarize the criteria we use in our baseline and alternative scenarios to allocate revenues in each case.

According to estimates from Ávila-Mahecha (2015), firms contributed roughly 85% to total payments of *financial transactions tax* in 2013. We use this share to allocate total payments between firms and households for all years. We allocate households’ revenues using the share of each group’s expenditures among those with monthly expenses above the tax exemption threshold set by law on financial movements for checking or savings accounts. As we don’t have information on the access of households to financial services—or on the legal status of immigrants—and therefore we cannot identify those individuals who have or may have “potential” access to financial services, we apply estimates of the expenditures-to-income ratio by decile (see Online Appendix) to personal income reported in the GEIH. We implicitly assume that natives and immigrants above the threshold have similar access to financial services. While we know immigrants face difficulties to access the financial system as it may take time for them to have all the required documents, we have no way of addressing this.

Gross operating surplus, rents and royalties account for 13.1% of total government revenues on average over the period 2013-2018. In our *average effect* scenario, we apportion these receipts proportionately to the share of each group in the adult (18+) population. In the *marginal effect* scenario, we attribute all revenues to the permanent native-born population. As is standard in the literature, we implicitly assume these resources are the result of managerial or investment decisions that took place before immigrants’ arrival.

To apportion *urban phones tax* payments, we use the share of adult population (18+) with access to a landline. In the case of *educational services*, we use the share

of each group in the total population enrolled in higher education in public institutions. As for the *National Teachers Pension Fund*, responsible, among other activities, for making the payment of social benefits to teachers, we allocate these resources using the share of each group in the total number of workers in the educational sector (pre-school, primary or secondary education) classified as wage and salary workers working for the government. Revenues from *immigration certificates* are allocated using each group's share in the foreign-born population. All remaining tax payments, fees, fines and penalties, and other receipts, are apportioned according to the share of each group in the adult (18+) population. The tax receipts involved contribute slightly less than 19% of total revenue annually.

B. Expenditures

Table 2 summarizes the criteria we use to estimate apportioning coefficients for government expenditures. We have aggregated the list of government expenditures by sub-function (UN COFOG) into 15 groups.

Table 2
Government expenditures allocation criteria

Expenditure group	% of total	Baseline	Alternative
'Pure' public goods	11.3	Share of population (<i>average cost</i>) / All to permanent natives (<i>marginal cost</i>)	
'Congestible' public goods	21.6	Share of population (<i>average cost</i>)	
Law courts and prisons	3.2	Share of prison population	
Water supply	0.8	Share of population with access to water supply	
Health services	15.1	Share of population in age group, and share of total health cost of age group	
Education: compulsory education	9.6	Share of [3,16] years old pop. attending public institutions (<i>average cost</i>) / Excludes pop. with residence < 1 year (<i>marginal cost</i>)	
Education: job training	1.1	Share of population in job training programs	Share of pop. in job training prog. in public institutions
Education: higher education	2.4	Share of population in higher education in public establishments	
Social protection: sickness and disability	0.0	Share of inactive pop. that left their last job within a year due to illness or accident	
Social protection: pensions	19.6	Share of total pension income (includes <i>Colombia Mayor</i>)	

Social protection: family and children	2.6	Share of total income received of family-related benefits (<i>Más Familias en Acción</i>)	Share of dependent children among family-related benefits claimants
Social protection: unemployment	0.0	Share of unemployment benefit recipients	
Social protection: housing	1.0	Share of housing-related benefits claimants	
Social protection: vulnerable population	3.4	Share of vulnerable population (immigrants, internally displaced or in poverty)	
Debt service	8.3	Share of each group in the total population by year of arrival	

Notes. The first column reports the groups in which we have classified the list of all government expenditures by sub-function (UN COFOG) as adopted by Colombia’s Statistical Department (DANE). The second column shows the average proportion of each group in total government expenditures between 2013–2018. The last two columns summarize the criteria we use in our baseline and alternative scenarios to allocate expenditures in each case.

Following our discussion in Section 2, we stick with the approach used by Dustmann and Frattini (2014) and price ‘pure’ public goods both at their average cost and according to their marginal cost. Doing it this way we can see straightaway the potential effect of population growth from immigration. In our *average effect* scenario, we apportion public goods proportionately to the share of each group in the population. In the *marginal effect* scenario, we attribute all costs to the permanent native-born population. Measuring the difference in the net fiscal contribution between groups based on each scenario is a critical issue because ‘pure’ public goods account for 11.3% of total government spending on average. We include in this group all expenditures associated with public goods or services that are normally considered as non-rival in consumption—excluding debt servicing.

For those public goods that are to some extent rival in consumption, *i.e.*, that are ‘*congestible*’, we apportion the cost of providing these goods according to each group’s share in total population (*average effect*). These expenditures account for 21.6% of total government spending on average over the period 2013-2018.

Expenditure on *law courts and prisons* is allocated proportionately to the size of each group in the prison population, using information on the nationality of prison inmates from the National Penitentiary and Prison Institute, INPEC. In this case we classify immigrants based on the reported nationality which need not be consistent with the country of birth. *Water supply* is allocated using each group’s share of the total population with access to water supply as reported in the GEIH.

To estimate each group’s share of *health services* expenditure we use the distribution of health costs by age group and the affiliation status to the General Health Care Social Security System (SGSSS) as reported in the GEIH. While access

to the SGSSS benefits' plan is conditional on being affiliated to either the contributory or subsidized regime, by law, emergency services must continue to be provided to those not affiliated. We follow Reina *et al.* (2018) and assign the complete value of the capitation payment unit (UPC) to those affiliated and 45% of the UPC for the subsidized regime as the cost of health services for those not affiliated. We apply the contribution of each age group to total health spending according to their affiliation status and distribute the resulting values proportionately using the share of immigrants and natives in each age range. As we lack information on the use of health services between immigrants and natives, we assume that both groups have similar service use patterns.

Education represents 13.1% of total government spending on average over the period 2013-2018. In our *average effect* scenario, we allocate expenditures on *compulsory education* using direct information from the GEIH on the share of each group in the population between 3 and 16 years of age that attends pre-school, primary or secondary education in official establishments. In our expenditures data we cannot discriminate between levels of compulsory education, so we simply assume that the average cost is the same across school levels. Spending on compulsory education is carried out by local authorities using transfers from the National Government through the General Participation System (SGP) which are essentially distributed according to payroll costs. Thus, it is likely—at least in the short-term—that the marginal cost of educating an immigrant child is just a fraction of the average cost. So, given the high inflexibility of the teaching staff in the short-term, in the *marginal effect* scenario, we attribute costs for all children between 3 and 16 years of age attending compulsory education in official establishments in the following way: (i) all immigrants and native-born returnees residing in the country for less than a year are assign a marginal cost of zero; (ii) everyone else is assigned the average cost. Expenditures for *job training* are allocated using the share of each group in the total population attending a job training program. In our sensitivity analysis we keep only those in public institutions. Finally, for *higher education* expenditures, we compute the share of each group in the college population in public institutions.

Social protection spending represents the main component of total government spending, averaging 26.7%. Provision of social protection is delivered in the form of cash and in-kind benefits and comprises expenditures for sickness and disability, pension benefits, family and children, unemployment benefits, social housing, and vulnerable population. Using the information of self-declared benefit recipients from the GEIH, we estimate the share of each group receiving each type of benefit when we can identify them, else we use the share of overall cash benefits from government agencies. In the case of sickness and disability, unemployment benefits and vulnerable population, as we have no individual information on the amount received,

we assume beneficiaries received the same quantity. Social protection expenditures for sickness and disability and unemployment are less than 0.03% of total government spending. Since the amount of family and children benefits depends on the number of children, in our sensitivity analysis we use as an alternative allocation the share of dependent children among family-related benefits recipients. Finally, we apportion expenditures for vulnerable population using the proportion of each group in the total population classified as immigrant or native-born returnee arriving during the last twelve months, those internally displaced from armed conflict, violence or natural disasters, those associated to an ethnic group, or those receiving cash benefits from the government with the purpose of reducing their poverty level.

Determining how to allocate *debts service* is a critical issue. As we discussed in Section 2, payment of interest on the national debt should also be attributed to migrants. Particularly, interests for debt acquired as a result of their arrival to the country, not the one incurred before their arrival. In this sense, we group interest payments using immigrant's period of arrival: (i) less than a year, (ii) one to five years, (iii) more than five years. Then, we apportion debt service expenditures proportionately to the share of each group in the total resident population by year of arrival. Using information from the Ministry of Finance we were able to disaggregate about 94% of total debt service; the remaining (6% on average) is allocated on a *pro rata* basis. Excluding debt service could lead to large bias in the estimates since it represents on average 8.3% of total government spending.

4. Background on recent immigration to Colombia

The number of people that have emigrated from Venezuela due to the severe social, economic, and political crises since 2014 is unprecedented in Latin America. According to the UN Migration Agency, as of April 2020, approximately 5.1 million migrants were living abroad, of which over 80% were residing in Latin American countries.¹² Colombia has been the preferred destination for Venezuelan immigrants with roughly 35% of total outflows as the two countries share a 1,400-mile-long border. Between 2013 and 2018, the Venezuelan exodus (including Colombian-born returnees) jumped from 0.1 million to 1.5 million (Table 3), rapidly increasing since 2017. Only between 2017 and 2018 the number of Venezuelans had a 2.6-fold increase. Over that same period, Colombian-born returnees grew also considerably, increasing by a factor of six. Return flows were particularly strong between August 2015 and August 2016, after the Venezuelan government unilaterally closed the

¹² The information is available at https://displacement.iom.int/system/tdf/reports/02_INGLES_PRESENTACION%20ENCUESTA%20DTM%20GENERAL_08062020.pdf?file=1&type=node&id=9121.

border and expelled over 23,000 Colombians residing in border areas. By 2018, 3.1% of the total population in Colombia was composed of both returnees and Venezuelan-born immigrants.

As indicated in panel (c) of Table 3, migration has contributed substantially to the overall employment. Of the 1.5 million new jobs created since 2013, 43% were occupied by persons arriving from Venezuela, which is consistent with the increase in the labor force (Table 3, panel (b)). While the total employment for Venezuelan-born immigrants had a 22-fold increase, the number of employed returnees multiplied by seven.

Table 4 presents demographic information of natives and immigrants in Colombia between 2013 and 2018. A comparison of the demographic characteristics of natives and immigrants, specifically those arriving from Venezuela, suggests that the latter have a larger family size, are younger and slightly more likely to be male, but less likely to be enrolled in compulsory education.

Immigrants and their children differ from natives in many ways, but the age structure is particularly something that stands out. Venezuelan immigrants are on average eleven years younger than natives. While the share of natives under 16 years is roughly 28%, this group represents over two fifths of the Venezuelan immigrant population. Likewise, the 65-and-older population share is 8 percent for natives but under one per cent for Venezuelans. Figure 1 shows the age structure of immigrants and natives in 2013 and 2018. Inflows of Venezuelan immigrants since 2013 have produced substantial changes in the structure of the population. We see increasing inflows of working-age Venezuelan immigrants over time and an increase of children 0-5 years of age, in line with increasing number of births from Venezuelan mothers living in Colombia. Although in 2013 the age distribution of Venezuelan immigrants was less pronounced in the mid-section, it followed to some extent the age-distribution of natives. The picture in 2018 is that of an immigrant population heavily concentrated at working ages but at the same time including many children, displaying a right-skewed double-hump curve. The clear aging of the native-born population, displayed with a fatter right tail in Figure 1(b), is an indication of changes in the age structure of the resident population with a higher dependency ratio.

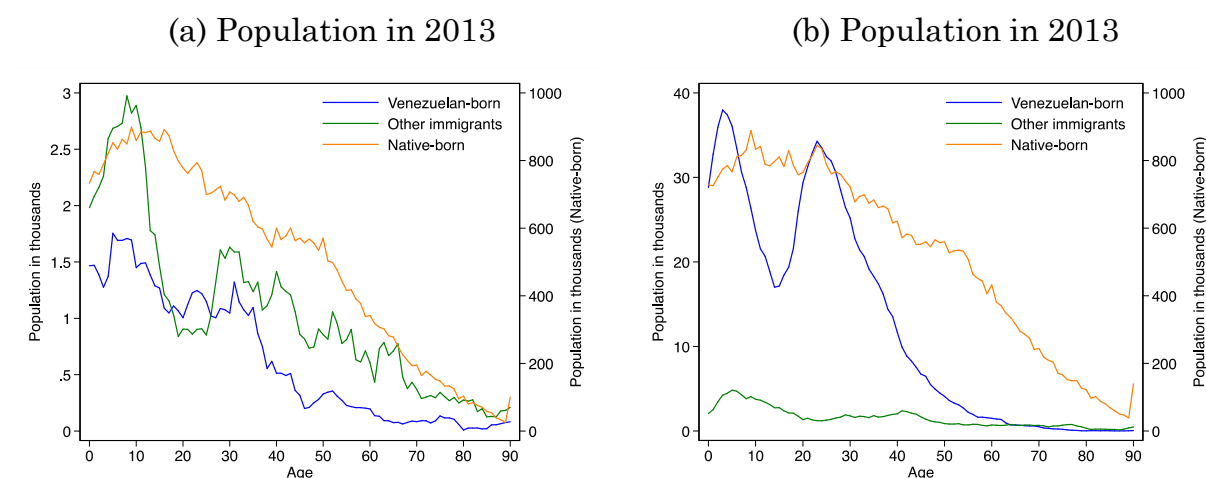
Returning to Table 4, Venezuelan immigrants have higher educational attainment with respect to natives. Both Venezuelan immigrant cohorts have higher average years of schooling and share of college graduates.¹³ However, this is not the

¹³ Cohorts were constructed using the reported time in Colombia since immigrating. Because we don't have information on the exact year of arrival, we group Venezuelan immigrants using both the fact that the border between Colombia and Venezuela was closed between August 2015 and August 2016 and that roughly 80% of all Venezuelan immigrants entered the country in 2017 or after. We group Venezuelan immigrants based on whether they arrived in or before 2015 or after 2015. Venezuelan

case with native-born returnees. They have on average one less year of education and a much lower share of college graduates. This may be an indication of either lower attainment before migration to Venezuela, or lower access to education in that country. Other contexts studied in the literature show strikingly similar facts for the foreign-born population. For instance, Dustmann and Frattini (2014) show that the foreign-born population in the UK has been consistently younger than the native population, and educational attainment has not only been higher as well, but the gap has increased over time. This age gap is also found in countries like Argentina, Costa Rica, the Dominican Republic, Ghana, Rwanda, South Africa, or Thailand, where immigrants are concentrated in the prime working-age group (25 to 54 years old) (see OECD/ILO, 2018). However, in most of these countries, foreign-born workers are less educated than native-born workers.

Figure 1

Age structure of natives and immigrant in 2013 and 2018



Notes. Figure 1(a) and 1(b) present the age distribution of natives and immigrants for years 2013 and 2018, respectively. For immigrants we compute equally weighted five-age years moving averages to smooth the effect of low frequency data. We group ages above 90 years. *Source.* Authors' estimates using data from the 2013-2018 GEIH.

Despite having higher levels of education, Venezuelan immigrants have on average a slightly lower employment rate and a higher unemployment rate compared to natives. Unemployment is particularly high for both returnees and Venezuelan immigrants arriving after 2015. However, we see these numbers improve as

immigrants in the 2017 and 2018 labor force surveys that reported being in the country for over 12 months but were in Venezuela five years before, were assigned to the second group (arriving after 2015). We fix a point in time, rather than using cohorts over time (less than a year, more than a year but less than five years, and more than five years in Colombia), to account for immigrants' characteristics changing over time.

immigrants assimilate in the country. On average, Venezuelan immigrants present a similar distribution in terms of wage and salary workers and self-employed to that of the native-born population.

Perhaps one of the most striking results is the fact that, on average, monthly income of Venezuelan-born migrants is higher than that reported by native-born. This is driven by high average wages for Venezuelans arriving to the country in or before 2015, which display a larger concentration of employment in the mining, finance and services industries. In the case of recent arrivals, we see a significant lower average wage and a large concentration of workers in wholesale and retail and in the hospitality industry (hotels and restaurants). In addition, the share of workers earning below the minimum wage reaches 62 per cent, well above other immigrants and natives—except for returnees which show a similar pattern. This difference is evident throughout the whole distribution of wages. It is not clear that differences in labor market outcomes between migrant cohorts are associated with differences in levels of schooling, which tend to be correlated with labor productivity, but suggest a relationship with the length of their stay in the country.

Now, Venezuelan immigrants tend to be less attached to the labor market and work mostly in informal jobs—i.e. without social security coverage, in part, as a result of not having a work permit. At the time, it was estimated that two-thirds of Venezuelan immigrants had an irregular status (Reina et al., 2018), either because they had overstayed their visas or entered through unauthorized border crossings. In response to the substantial increase in immigrant inflows, in August of 2018, the Colombian government allowed approximately 440,000 undocumented Venezuelan immigrants to apply for work permits through an expedite process.

Given that over 80% of Venezuelans are working in the informal sector, let us comment on the implications for our fiscal estimates. Since informal employment is more prevalent among Venezuelan immigrants, the number of workers contributing to income and payroll taxes is low. However, since the tax structure in the country is heavily biased towards indirect taxes (e.g. value-added), immigrants' spending on goods and services accounts for a substantial portion of their overall direct contribution as we will discuss later.

Now, evidence for Colombia indicates that immigrants are more likely to be employed in informal jobs not only because most of them are not legally allowed to work upon arriving to the country, but also because they rely heavily upon other immigrants (i.e. their network) for information about available job opportunities which tend to come from workers employed in the informal sector (see Mesa-Guerra, 2024). Thus, the evidence shows that giving immigrants a regular status slightly increases effective access to the formal sector. In other words, most immigrants continue to work in the informal sector at least in the short-term.

Table 3
Total population and labor force size by native and immigrant status

Fiscal year	Natives			Venezuelan-born	Other
	Total	Permanent	Returnees		
Panel (a): Total population					
2013	45,621,104	45,566,479	54,625	57,537	95,642
2014	46,069,630	45,978,222	91,408	94,803	131,618
2015	46,563,408	46,438,425	124,982	124,678	130,605
2016	46,974,270	46,744,567	229,702	228,549	140,673
2017	47,295,084	47,039,930	255,154	438,281	134,456
2018	47,104,200	46,757,727	346,473	1,147,503	138,844
Panel (b): Labor Force					
2013	22,907,321	22,871,557	35,763	25,934	41,951
2014	23,254,231	23,193,733	60,498	39,939	53,078
2015	23,800,779	23,717,733	83,046	42,802	49,758
2016	24,016,890	23,871,099	145,791	84,218	52,939
2017	24,207,241	24,040,117	167,124	187,140	51,932
2018	24,026,744	23,785,432	241,312	580,558	50,338
Panel (c): Employment					
2013	20,724,150	20,692,793	31,356	22,387	38,680
2014	21,165,687	21,114,240	51,447	35,225	49,078
2015	21,710,297	21,637,737	72,560	38,476	45,915
2016	21,837,528	21,715,326	122,202	71,780	49,037
2017	21,973,376	21,829,050	144,326	159,707	49,177
2018	21,764,468	21,551,961	212,507	495,944	45,778

Notes. The Table reports in panel (a) the number of natives and immigrants in every fiscal year. In panel (b), we report the number of individuals in the labor force in each group. In panel (c), we report the total population employed in each group. We distinguish natives between permanent and returnees coming back from Venezuela. Permanent natives include returnees within the last five years from countries other than Venezuela. Other foreign-born residents are classified apart. The labor force is defined as the total number of unemployed people of working age (aged 15 to 64) plus those in employment (aged 15 or over). *Source.* Authors' estimates using data from the 2013-2018 GEIH.

Table 4

Descriptive statistics for the native and immigrant population, 2013-2018

Characteristics	Natives			Venezuelan-born			Other
	<i>Total</i>	<i>Permanent</i>	<i>Returnees</i>	<i>Total</i>	<i>Arrived in or before 2015</i>	<i>Arrived after 2015</i>	
1. Average Family Size	4.2	4.2	4.8	4.9	4.8	5.0	3.6
2. Percent Male	49.3	49.3	52.7	51.0	50.6	51.2	55.9
3. Average Age (years)	31.4	31.4	34.1	20.0	17.6	21.2	27.4
4. Percent Age < 16	28.2	28.3	15.2	43.4	56.3	37.2	42.9
5. Percent Age 16-24	15.7	15.7	15.2	19.6	12.6	23.0	9.7
6. Percent Age 65+	8.0	8.0	4.7	0.7	1.3	0.4	7.9
7. Average years of schooling (age 15+)	8.8	8.8	7.8	10.5	10.4	10.5	13.0
8. Percent Enrolled (age 3-16)	87.2	87.2	86.5	65.3	70.2	62.2	88.5
9. Percent College Grads (age 25+)	10.7	10.7	4.0	17.7	21.1	16.4	52.6
10. Employment Rate	70.5	70.5	70.7	68.5	65.6	69.5	70.3
11. Unemployment Rate	9.2	9.1	13.5	14.3	11.4	15.1	7.4
12. Percent Wage and Salary Wkrs.	48.3	48.4	41.2	47.4	44.3	48.4	45.9
13. Percent Self-Employed	47.0	47.0	54.9	48.8	49.8	48.5	49.0
14. Avg. <i>real</i> Monthly Labor Income (<i>K</i>)	979.7	981.1	698.1	1,027.9	1,934.9	763.4	3,927.6
15. Median (<i>real</i>) Monthly Labor Income (<i>K</i>)	760.8	760.8	665.9	747.1	797.2	691.4	1,622.9
16. Percent Earning below min. wage	47.8	47.7	60.7	58.1	45.1	61.9	22.9
17. Industrial Distribution:							
a. Agriculture and Mining	17.2	17.2	16.5	6.8	10.9	5.6	5.1
b. Construction	6.2	6.1	11.8	9.8	6.9	10.7	3.1
c. Manufacturing	11.9	11.9	13.7	12.4	13.4	12.1	10.4
d. Transportation, Communication, Utilities	8.8	8.8	7.4	5.9	9.4	4.9	5.1
e. Trade, Hotels, Restaurants	27.2	27.2	29.9	42.5	28.8	46.7	30.3
f. Finance, Insurance, Real State	9.1	9.1	6.6	7.4	12.0	6.0	16.9
g. Services	19.7	19.8	14.1	15.2	18.5	14.1	29.0

Notes. The Table reports, on average for fiscal years 2013-2018, descriptive statistics for natives, Venezuelan-born immigrants and other immigrants. Family size refers to a single-person household or one with two or more persons who live in the same dwelling and are related to each other by blood, marriage, common-law union or adoption. The employment rate is defined as the ratio of the employed (aged 15 or over) to the working age population (aged 15 to 64). Unemployment is constraint to those of working age. Average and median real labor income (discounted using the 2018 CPI) includes earnings for wage and salary workers and self-employed excluding business owners. Trade industry includes wholesale and retail. *Source.* Authors' estimates using data from the 2013-2018 GEIH.

5. Welfare dependency of immigrants

Since welfare programs account for a significant share of government expenditures, estimating the welfare dependency of immigrants relative to natives is essential in understanding the fiscal pressure that immigration imposes on the budget of the central and local governments.

A large literature studying the differences in welfare reliance between immigrants and natives finds that immigrant-headed households are less likely to claim welfare relative to natives (Blau, 1984; Barrett and McCarthy, 2008; Dustmann and Frattini, 2014). When immigrants are found to use welfare more intensively than natives (Borjas and Hilton, 1996; Hansen and Lofstrom, 2003; Sarvimäki, 2011), the results are mostly driven by differences in the demographic composition of groups. Nonetheless, welfare take-up is found to be higher for recent immigrant cohorts than for cohorts arriving earlier (Borjas and Trejo, 1991).¹⁴ However, the evidence on how welfare-use changes with the length of an immigrant stay in the host country is mixed. The results shown in the literature usually consider only regular (a.k.a. legal) migration as surveys or Census data sometimes are unable to capture irregular migrants. Since irregular immigrants are often not eligible to access welfare services, social insurance dependency would be lower if we are able to account for them.

It is important to mention that since mid-2017 the National Government authorized the admission of non-nationals to the Unified Vulnerability Assessment and Identification System for Social Assistance (SISBEN, for its Spanish acronym). As a result, the National Planning Department made registration into SISBEN more flexible for Venezuelan immigrants, allowing, in addition to those holding a Colombian foreign resident identity card, those with documents that prove them as regular immigrants, especially those who have an active Special Permit of Permanence (PEP, for its Spanish acronym)—including their dependents. However, because of the large number of irregular immigrants in the country, in August of 2018 the access to this two-year special permit was expanded to cover around 440.000 undocumented Venezuelan immigrants that had voluntarily registered at the time using the Administrative Register of Migrants from Venezuela (RAMV).¹⁵ With the PEP, immigrants were allowed to register in the SISBEN and, through this, get access to the welfare system.

¹⁴ The extent to which welfare provision itself is conducive to self-selection of migrants has been a recurring topic in the literature.

¹⁵ By the end of the registration period (December 21, 2018), around 285 thousand irregular immigrants applied and received their PEP (Ibáñez *et al.*, 2021).

To estimate the welfare dependency of immigrants, we use self-reported information in the GEIH. We look at whether individuals claim any type of welfare benefits, such as subsidized health care, conditional cash transfer from *Más Familias en Acción* or *Jóvenes en Acción*, unemployment benefits, pension-related benefits (*Colombia Mayor* and other subsidies for the elderly), housing-related benefits, or other cash assistance. Using this information, we are able to create four variables identifying welfare take-up: (i) any welfare program, (ii) social insurance: health care, (iii) social insurance: pension, and (iv) cash assistance.

We estimate welfare dependency using the following linear probability model (LPM):

$$W_{it} = \alpha + \beta \mathbf{1}[M_{it} = 1] + \mathbf{X}_{it}\gamma + \Omega_t + \varepsilon_{it} \quad (5)$$

where β measures the weighted average difference in the probability of receiving welfare benefits [$P(W > 0)$] between immigrants (returnees, Venezuelan-born, and other foreign-born) and permanent natives, or the level of receipts in the case of cash assistance given participation [$W|(W > 0)$]; $\mathbf{1}[M_{it} = 1]$ is a dichotomous variable that takes the value of 1 if the individual is classified as a migrant (M) and 0 otherwise. We control for other individual factors \mathbf{X}_{it} that may influence welfare take-up such as age, sex, family size, monthly wage, nonlabor and nontransfer income, and residential location. Since we pool our monthly data, we include year dummies Ω_t to account for changes in welfare participation over time that do not affect differentially immigrants and natives.

Two well-known arguments against using LPM suggest that estimates may be bias—as it can yield predicted probabilities outside of the $[0,1]$ interval—and inconsistent. To deal with the latter we use heteroskedasticity-consistent robust standard error estimates. The fact that predicted values are not constrained to the $[0,1]$ interval is not an issue unless one is interested in predicting the value of the dependent variable. In addition, Horrace and Oaxaca (2006) show that when none (or few) of the predicted probabilities from our LPM lie outside the interval $(0,1)$ then the LPM estimates are expected to be unbiased. In our example, it turns out that over 99% of predicted probabilities for any welfare and health take-up lie in the interval $(0,1)$. This fraction is lower for pension-related benefits and cash assistance. Since our main purpose is to estimate the partial effect of migration on the probability of welfare take-up, the fact that we have predicted values outside the unit interval is

not a concern as probabilities are averaged across the distribution of individual characteristics.¹⁶

Table 5 presents estimates of welfare program participation probabilities and of the cash value of transfers received from each type of program by immigrant group and cohort. All else equal, Venezuelan-born immigrants are significantly less likely to take-up welfare benefits than permanent natives. While 46% of natives (excluding returnees) were receiving some type of welfare between 2013-2018, Venezuelan immigrants were 27.3 percentage points less likely to be participating in welfare programs. When we disaggregate these results by type of benefit, we see that Venezuelan immigrants were 26.5 percentage points less likely to be enrolled in subsidized health care, 6.6 percentage points less likely to be receiving pension-related benefits and 3.6 percentage points less likely to be receiving cash benefits. In addition, we don't see evidence of significant differences in welfare payments between immigrants and natives, although the coefficient for Venezuelan immigrants is negative.

This trend is similar among other foreign-born immigrants but slightly different among native-born returnees. While returnees are slightly more likely to be enrolled in any welfare program, this is driven by their higher enrollment in subsidized health care, as they are less likely to take-up cash assistance or pension-related benefits. In fact, when participating in cash assistance programs, the value of the welfare received is lower on average. Because health care coverage is around 95% in the country, the higher probability of being enrolled in subsidized healthcare is consistent with returnees having a higher unemployment rate and lower shares of wage and salary workers compared to permanent natives as indicated in Table 4.

Panel (b) in Table 5 splits Venezuelan-born immigrants into cohorts. Both immigrant cohorts are also less likely to receive any welfare than permanent natives, ranging from 5.3 percentage points for immigrants arriving at or before 2015 to 35.3 percentage points in the case of those arriving in the last three years. Although both cohorts are less likely to receive cash assistance, among recipients, those arriving more recently seem to receive less—though not precisely estimated, while those that arrived earlier have report higher cash values. The estimated probabilities for both cohorts suggest a relationship between the length of time in Colombia and the level

¹⁶ It is not clear that imposing a nonlinear relationship (as done by Logit and Probit models) is better than imposing a linear relationship. Angrist and Pishke (2009) show that if the conditional expectation function (CEF) is linear, then the linear probability regression function gives the CEF. When the CEF is non-linear, the regression approximates the CEF. However, since a 'wrong' non-linear model will not estimate the true marginal effects, choosing a non-linear model is a fairly arbitrary choice. Estimating the LPM gives more robust estimates and a straightforward interpretation over non-linear models.

of welfare take-up, such that those arriving after 2015 show lower welfare take-up rates.

Table 5

Welfare dependency: immigrant-native differences in welfare-take up probabilities and transfer values

	Welfare Take-up Probability				Value of Receipts (COP\$ thousands)
	Any Welfare	Health Care	Pension	Cash Assistance	
Panel (a): Immigrants by group					
Returnees	0.011* (0.006)	0.016** (0.006)	− 0.067*** (0.009)	− 0.047*** (0.002)	− 108.1*** (38.53)
Venezuelan-born	− 0.273*** (0.004)	− 0.265*** (0.004)	− 0.066*** (0.010)	− 0.036*** (0.001)	− 134.9 (178.9)
Other	− 0.158*** (0.012)	− 0.151*** (0.012)	− 0.110*** (0.017)	− 0.026*** (0.003)	413.5 (300.1)
Panel (b): Venezuelan-born immigrants by cohort					
Arrived in or before 2015	− 0.053*** (0.011)	− 0.051*** (0.011)	− 0.034 (0.022)	− 0.017*** (0.004)	183.2*** (194.2)
Arrived after 2015	− 0.353** (0.004)	− 0.344*** (0.004)	− 0.083*** (0.010)	− 0.043*** (0.001)	− 299.8 (213.8)
Predicted probability of welfare take-up for permanent natives	0.465	0.454	0.163	0.080	−
Fraction of predicted prob. in the (0,1) interval	0.995	0.994	0.875	0.802	−
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Individual covariates	Yes	Yes	Yes	Yes	Yes
Sample size	3,942,593	3,942,593	405,522	3,942,593	257,596

Notes. The unit of analysis is the individual. We consider all persons 10 years of age or older except for pension benefits in which case we consider all female age 54 or older and males aged 59 or older. Panel (a) considers all immigrant groups in fiscal years 2013–2018, while panel (b) focuses on Venezuelan immigrants (including returnees) by cohort. Cash assistance includes *Más Familias en Acción*, *Jóvenes en Acción*, unemployment benefits, *Colombia Mayor*, social housing programs, and other cash transfers from National and local governments. The level of receipts is the self-reported value for cash assistance excluding unemployment for which we don't have information. We drop observations with no reported value or values below ten thousand pesos and discount them using the 2018 CPI. Controls include age, a dummy variable for females, family size, monthly wage, annual nonlabor and nontransfer income, and a dummy variable for those living in an urban area. Estimates are weighted by sampling weights reported in the GEIH. Robust standard errors in parentheses. *** Denotes significance at 1%, ** significance at 5% and * significance at 10%.

One limitation of our data is that we are not able to directly identify the status of immigrants in the country. In other words, we cannot directly observe those immigrants that are eligible to register in the SISBEN and therefore receive welfare. Not accounting for immigrants' eligibility status will underestimate the welfare take-up probability as irregular immigrants will not take-up welfare not because they don't need it or want to, but because they are not legally allowed. To provide robustness to

our results, we re-estimate equation (5) using a subsample where we restrict our analysis only to those individuals that report being affiliated to any regime within the General Health Care Social Security System (SGSSS). Affiliation to the SGSSS, either by being a direct contributor or as beneficiary, is an indication that the immigrant has a regular status. According to official estimates, by the end of 2018 around 60% of all Venezuelan-born immigrants had a regular status. However, only 25% of all Venezuelans in the sample were affiliated to the SGSSS. Because we are missing a large fraction of regular immigrants not affiliated when we use this restricted sample, these results are likely to be overestimated and should be interpreted as an upper bound.

Table A1 in the Online Appendix reports all estimates using the restricted sample. Our qualitative results remain unchanged for native-born returnees and other foreign-born immigrants. However, in the case of Venezuelan-born immigrants we see some difference to those presented in Table 5. While migrants are less likely to receive any type of cash assistance, including pension-related benefits, they are about 7.4 percentage points more likely than natives to be enrolled in subsidized health care. This difference drives the change in sign in our estimate of the probability of taking-up any type of welfare. This pattern is similar when we split the sample by cohort. As in the case of returnees, a higher enrollment in subsidized healthcare is consistent with higher unemployment and larger shares of workers in informal jobs and earning below the minimum wage.

6. Fiscal impact of immigration by level of government

In this section we report the net fiscal contributions by level of government for the different immigrant groups defined in Section 3. In each case we present estimates using both the average effect and marginal effect scenarios, following Dustmann and Frattini (2014). Allocating the cost of all public goods proportionally to the size of each group, as in the average effect scenario, is likely to overestimate the fiscal effect of immigrants as their marginal cost to ‘pure’ public goods is close to zero. Therefore, by including in our estimates both scenarios we present an upper and lower bound for the effect of immigrants on public finances.

Revenues and expenditures for the General Government are presented disaggregated by level of government: National and regional and local. We include revenues and expenditures for social security as part of the National government. Revenues that are allocated using the General System of Transfers (*Sistema General de Participaciones*, SGP) are assigned to regional and local governments. The SGP is a revenue-sharing system between the central and subnational governments as part

of the process of fiscal decentralization mandated by the Constitution. However, since these transfers are allocated as a share of National tax and non-tax revenues, we distribute all receipts proportionately and allocate these using the criteria described in Table 1.

6.1. Net fiscal contributions for all groups

Table 6 summarizes the main findings of the net fiscal impact by scenario and level of government, cumulated over fiscal years 2013–2018. Overall, our estimates indicate that while the native-born population had a negative fiscal contribution of just over 3.6% of GDP, all foreign-born groups combined provided an overall net fiscal benefit of 0.02% of GDP. These results, however, differ when we disaggregate between groups and levels of government. Results allocating receipts and outlays using the average effect scenario (panel (a), Table 6) show that Venezuelan immigrants, plus their dependents, had negative contributions both at the National and the regional and local level of about 0.05% of GDP. To some extent, these sharp differences are driven by an older and more educated foreign-born population (excluding those born in Venezuela), which also has a lower unemployment rate and higher wages, as described in Table 4. In addition, across groups, the fiscal cost tends to be higher at the National level than at the regional and local level. This is consistent with the fact that the National government runs larger fiscal imbalances.

Since these numbers reflect not only the net fiscal position of each group but their relative size, a much clearer comparison can be made if we look at estimates of the ratio of real revenues to real expenditures during the same period. Over the six years considered, total expenditures allocated to natives and Venezuelan-born migrants exceed their respective contributions to total revenues. This is not the case for other immigrants, which contributed more to revenues than what they received in benefits from the government. The estimates reveal that Venezuelan-born immigrants and their dependent children have a lower fiscal ratio at the National level than permanent natives and slightly higher than returnees, but a lower ratio than every other group at the regional and local level. In fact, in contrast to the other groups, Venezuelan-born had a fiscal ratio below one, meaning that expenditures allocated to them were higher than their contributions to revenues, mainly through tax payments. Note that at the regional and local level, apart from indirect and excise taxes, the two main sources of revenues are the property tax and the industry and commerce tax. Since Venezuelan-born immigrants are less likely than natives to own property and own a business, their contribution to local budgets is lower.

Table 6
Net fiscal impact by scenario and level of government, 2013-2018

	Panel (a): average effect			
	<i>Natives</i>		<i>Venezuelan-born</i>	<i>Other</i>
	<i>Permanent</i>	<i>Returnees</i>		
<i>(1) Overall net fiscal contributions (COP\$ million, 2018 equivalent)</i>				
National	-275,720,784	-1,056,913	-1,737,454	1,239,813
Regional and Local	73,579,475	3,099	-1,146,539	2,498,614
Total	-202,141,310	-1,053,814	-2,883,993	3,738,426
Percent of GDP (%)	-3.61	-0.02	-0.05	0.07
	[-3.63, -3.60]	[-0.02, -0.02]	[-0.06, -0.04]	[0.06, 0.07]
<i>(2) Ratio of real revenues to real expenditures</i>				
National	0.762	0.685	0.702	1.223
	[0.762, 0.762]	[0.664, 0.708]	[0.672, 0.736]	[1.196, 1.252]
Regional and Local	1.129	1.001	0.731	2.620
	[1.128, 1.129]	[0.968, 1.037]	[0.704, 0.762]	[2.508, 2.745]
Total	0.883	0.809	0.715	1.527
	[0.883, 0.884]	[0.783, 0.837]	[0.686, 0.747]	[1.485, 1.570]
<i>(3) Revenues/expenditures ratio, relative to permanent natives</i>				
National	—	0.899	0.922	1.605
		[0.870, 0.929]	[0.882, 0.966]	[1.568, 1.644]
Regional and Local	—	0.887	0.648	2.322
		[0.857, 0.920]	[0.623, 0.675]	[2.221, 2.433]
Total	—	0.916	0.809	1.729
		[0.886, 0.948]	[0.776, 0.846]	[1.681, 1.779]

	Panel (b): marginal effect			
	<i>Natives</i>		<i>Venezuelan-born</i>	<i>Other</i>
	<i>Permanent</i>	<i>Returnees</i>		
<i>(1) Overall net fiscal contributions (COP\$ million, 2018 equivalent)</i>				
National	-276,349,413	-1,002,083	-1,270,554	1,346,713
Regional and Local	73,344,155	-81,464	-826,982	2,498,939
Total	-203,005,258	-1,083,548	-2,097,537	3,845,652
Percent of GDP (%)	-3.63	-0.02	-0.04	0.07
	[-3.64, -3.62]	[-0.02, -0.02]	[-0.04, -0.03]	[0.07, 0.07]
<i>(2) Ratio of real revenues to real expenditures</i>				
National	0.762	0.649	0.739	1.258
	[0.762, 0.762]	[0.633, 0.665]	[0.713, 0.767]	[1.236, 1.281]
Regional and Local	1.128	0.954	0.753	2.901
	[1.127, 1.128]	[0.927, 0.983]	[0.728, 0.781]	[2.799, 3.012]
Total	0.883	0.765	0.745	1.589
	[0.883, 0.883]	[0.746, 0.786]	[0.719, 0.773]	[1.556, 1.624]
<i>(3) Revenues/expenditures ratio, relative to permanent natives</i>				
National	—	0.852	0.970	1.652
		[0.831, 0.874]	[0.936, 1.007]	[1.623, 1.682]
Regional and Local	—	0.846	0.668	2.572
		[0.822, 0.871]	[0.645, 0.693]	[2.481, 2.671]
Total	—	0.867	0.844	1.800
		[0.844, 0.891]	[0.814, 0.876]	[1.762, 1.840]

Notes. Panel (a) reports estimates when we impute to immigrants the average cost of public goods provision. Panel (b) reports the estimates under the assumption that immigrants pay the marginal cost, assumed to be zero. In each case we report at different levels of government for permanent natives, returnees, Venezuelan-born and other immigrants, cumulated over fiscal years 2013–2018: (1) their overall net fiscal contribution, expressed in 2018 equivalent COP, (2) the ratio of revenues to expenditures accrued in real terms, and (3) the revenues/expenditures ratio for each immigrant group relative to permanent natives. We include revenues and expenditures for social security as part of the national government. We use gross domestic product implicit price deflator to estimate equivalent COP. We present 95% confidence intervals in brackets.

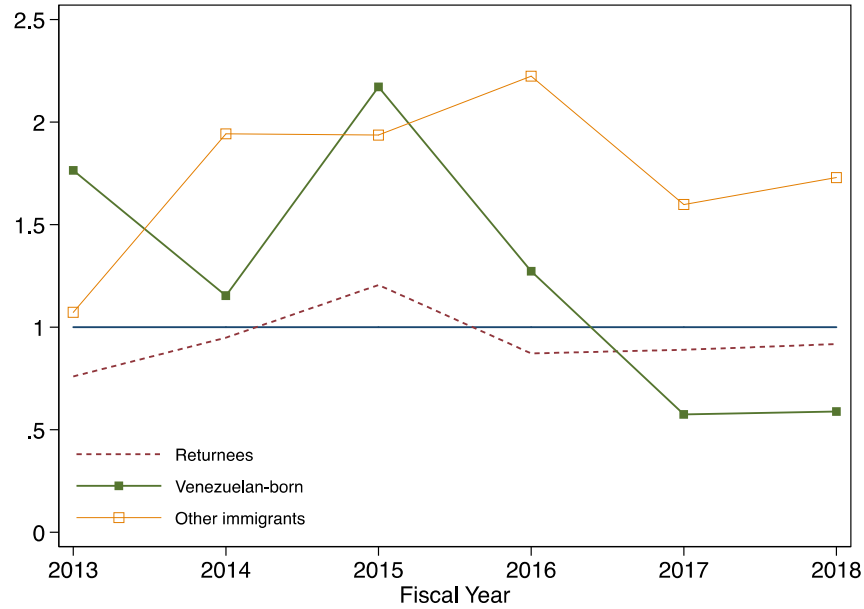
As we discussed in Section 3.1, these negative contributions are mainly driven by the fiscal imbalances seen between 2013 and 2018. Therefore, the fiscal impact of immigrants is better understood using the relative contributions of immigrants and comparing them to those of permanent natives. Both Venezuelan-born immigrants and native-born returnees have a worse relative fiscal position when compared to permanent natives. Differences between Venezuelan-born immigrants and permanent natives originate from the considerably lower fiscal ratio at the regional and local level for the former group. While Venezuelan-born immigrants have more or less a similar revenue to expenditure ratio relative to natives at the national level, the larger gap at the regional and local level makes average contributions of Venezuelans almost 20% lower than those of natives.

When we turn our attention to the results from the marginal effect scenario (panel (b), Table 6), we clearly see that the net fiscal contributions of all immigrant groups improve relative to natives. By attributing the additional cost of providing public goods only to immigrants, resulting from their arrival to the country, the implicit savings natives experienced from sharing the fiscal burden of these goods among a larger population (under the ‘average effect’ scenario) are substantially reduced. For example, the results show a reduction of about 27% in the overall cost of Venezuelan-born immigrants and an increase of about 3% in the contributions of other foreign-born groups. However, the increase in expenditures allocated to natives after assigning the cost of ‘pure’ public goods entirely to them is compensated by an increase in revenues from their participation in capital income. In addition, the ratio of revenues to expenditures relative to permanent natives is very close to the unit for Venezuelans at the national level, but lower for returnees. This suggests that Venezuelan-born immigrants are not significantly imposing a higher burden to public finances relative to natives at the national level. Nevertheless, while Venezuelan-born immigrants may have a less favorable net fiscal position than the native-born population overall, their overall fiscal effect seems small and in line with other results found in the literature for different countries.

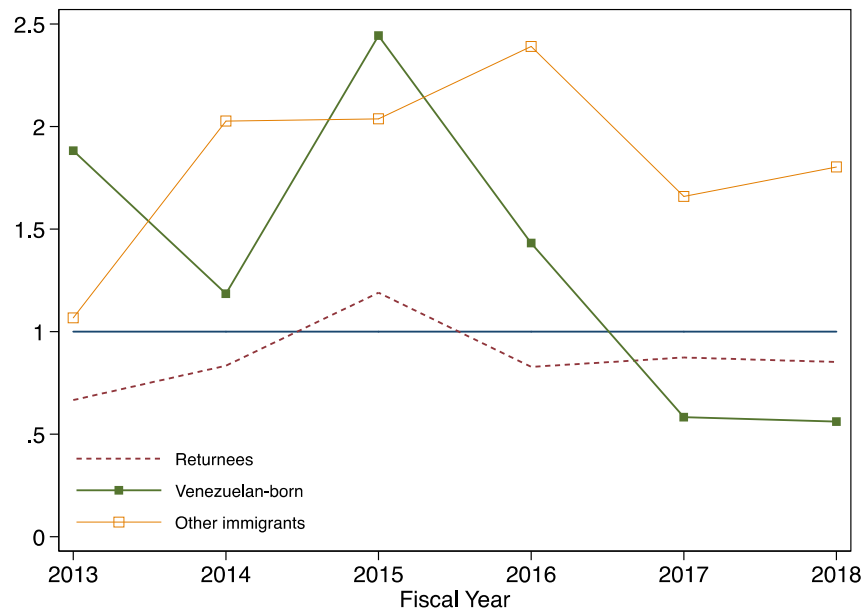
In Table A2 in the Online Appendix we estimate the net fiscal impact for all groups excluding royalties from the budget. Since royalties from the exploitation of natural resources are part of regional and local government budgets, we don’t see changes in results at the national level. Although the new estimates show an improvement in the overall net contributions of all immigrant groups to regional and local governments and an increase in the ratio of revenues to expenditures—relative to natives, our main takeaways from the results discussed so far do not change.

Figure 2
Relative net contributions over time

(a) Average effect



(b) Marginal effect



Notes. The Figure displays for each fiscal year between 2013 and 2018 the revenues/expenditures ratio for each immigrant group, relative to permanent natives. Figure 2(a) shows the fiscal effect when we impute to immigrants the average cost of public goods provision. Figure 2(b) shows the fiscal effect under the assumption that immigrants pay the marginal cost, assumed to be zero.

However, as shown in Figure 2, which displays the evolution of the relative net contributions over time for the three immigrant groups using both the average (Figure 2(a)) and marginal effect scenario (Figure 2(b)), the results vary substantially over time. In general, the results from both scenarios show a similar portrait with levels adjusting upward in the marginal effect scenario to show the improvement in the relative position. Over the six fiscal years considered, the net fiscal contributions of other foreign-born immigrants exceed those of permanent natives. Colombian returnees, on the other hand, present a pattern that moves more closely to permanent natives. Our results show that their relative fiscal position increased between 2013 and 2015, to the point of having higher net contributions than permanent natives, but declined subsequently and stabilized just below the unit level.

In the case of Venezuelan-born immigrants, while they had higher fiscal contributions relative to permanent natives between 2013 and 2015, their relative fiscal position plummeted thereafter. In fact, their relative ratio went from nearly 1.3 to just shy of 0.6. Yet, the difference between their net contributions and that of natives seems to stabilize between 2017 and 2018. These two facts suggest that as immigrant inflows to Colombia have increase exponentially in recent years, the weight of all contributions by earlier cohorts has been reduced substantially in the aggregate. As a reminder, immigrants that were living in Colombia in 2013 represented less than a quarter of that group's size by 2018. If one combines this with the fact that there has been an increase in the share of dependents over time (as described in Figure 1(b)), one might expect a deterioration of their fiscal position.

6.2. Sensitivity analysis

The results presented so far are based on a set of criteria chosen to estimate apportioning coefficients for government revenues and expenditures. To assess the robustness of our estimates, we conduct a sensitivity analysis by using alternative allocation criteria. Following broadly the approach used by Dustmann and Frattini (2014) and the National Academies of Sciences, Engineering and Medicine (2017), we consider five variations as presented in rows (a-e) in Table 7.

The first variation, scenario (a), assigns corporate and capital taxes, including corporate shares of wealth tax, indirect taxes, property tax and industry and commerce tax to long-term residents with individual dividend and interest income. Long-term residents are defined as all native-born and immigrants who have lived in Colombia for at least five years. In our second variation, scenario (b), we follow the literature and assume a 20% reduction in total payment of indirect taxes paid by immigrants relative to the average for the general population. As we have discussed, immigrants and natives may have different consumption patterns, particularly, as

immigrants tend to send remittances back to their home countries at levels that may affect their total consumption.

Table 7

Net fiscal impact using alternative allocation criteria, 2013-2018

	Panel (a): average effect			
	<i>Natives</i>		<i>Venezuelan-born</i>	<i>Other</i>
	<i>Permanent</i>	<i>Returnees</i>		
<i>(1) Ratio of real revenues to real expenditures</i>				
(a) Assigning corporate taxation to long-term residents	0.884	0.645	0.674	1.451
(b) Immigrants' consumption is 20% less than natives'	0.883	0.809	0.694	1.500
(c) Accounting for number of children in family benefits	0.883	0.809	0.708	1.523
(d) Assigning job training benefits to those in pub. inst.	0.883	0.810	0.715	1.536
(e) All of the above	0.885	0.648	0.644	1.413
<i>(2) Revenues/expenditures ratio, relative to permanent natives</i>				
(a) Assigning corporate taxation to long-term residents	–	0.730	0.762	1.641
(b) Immigrants' consumption is 20% less than natives'	–	0.916	0.785	1.698
(c) Accounting for number of children in family benefits	–	0.916	0.802	1.725
(d) Assigning job training benefits to those in pub. inst.	–	0.917	0.810	1.739
(e) All of the above	–	0.732	0.728	1.597
	Panel (b): marginal effect			
	<i>Natives</i>		<i>Venezuelan-born</i>	<i>Other</i>
	<i>Permanent</i>	<i>Returnees</i>		
<i>(1) Ratio of real revenues to real expenditures</i>				
(a) Assigning corporate taxation to long-term residents	0.884	0.570	0.695	1.507
(b) Immigrants' consumption is 20% less than natives'	0.883	0.766	0.719	1.561
(c) Accounting for number of children in family benefits	0.883	0.766	0.737	1.585
(d) Assigning job training benefits to those in pub. inst.	0.883	0.767	0.746	1.600
(e) All of the above	0.884	0.572	0.658	1.465
<i>(2) Revenues/expenditures ratio, relative to permanent natives</i>				
(a) Assigning corporate taxation to long-term residents	–	0.645	0.786	1.705
(b) Immigrants' consumption is 20% less than natives'	–	0.867	0.814	1.767
(c) Accounting for number of children in family benefits	–	0.867	0.835	1.795
(d) Assigning job training benefits to those in pub. inst.	–	0.868	0.845	1.812
(e) All of the above	–	0.647	0.744	1.657

Notes. Panel (a) reports estimates when we impute to immigrants the average cost of public goods provision. Panel (b) reports the estimates under the assumption that immigrants pay the marginal cost, assumed to be zero. In each case we report, for permanent natives, returnees, Venezuelan-born and other immigrants, cumulated over fiscal years 2013–2018: (1) the ratio of revenues to expenditures accrued in real terms and (2) the revenues/expenditures ratio for each immigrant group relative to natives. Under each heading, we report estimates when we use each alternative allocation criteria (a–f) as defined in Tables 1 and 2.

In scenarios (c) and (d), we assign family-related benefits using the share of dependent children for all benefit recipients and allocate job training benefits to those studying in public institutions, respectively. In the first case, we account for the fact that the amount of family and children benefits depend on number of dependent

children in the household. In the case of job training programs, we don't include the alternative criteria as our baseline scenario because the Colombian government also finances with public resources the private provision of job training through public-private programs such as *Jóvenes en Acción*, or direct subsidies and loans to students. Finally, in scenario (e) we explore the effect from including at the same time all the alternative allocation criteria discussed.

Although the estimates of natives' contributions remain unaffected, those for immigrants fluctuate across the different scenarios. Our qualitative results remain unchanged for immigrants born in countries other than Venezuela, displaying higher net contributions than those of natives in all scenarios. In the case of native-born returnees, their net fiscal position is lower when we include corporate taxation of long-term residents but remain unaffected in the rest. Since native-born returnees are by construction residents with less than five years in the country, their contribution to corporate taxation is zero, as described in scenarios (a) and (e), substantially reducing their overall net fiscal position. A similar issue arises with Venezuelan-born immigrants, in which only 14% of the population is classified as long-term resident in 2018, highly affecting their relative contributions. Furthermore, their fiscal position is slightly reduced when we assume a lower consumption by immigrants, but virtually unchanged when we account for the share of dependent children in family-related benefit recipients and those attending job training programs in public institutions.

6.3. Decomposing net contribution differences among groups

So far, we have not considered the effect that demographic characteristics play in explaining the differences in net fiscal contributions among groups. Not only are groups very different in size, creating large variation in the aggregate fiscal impacts, but immigrants differ from natives in most of their observable characteristics, especially when it comes to the age structure. Large differences in immigrants' age structure relative to natives, or among immigrant cohorts, is particularly relevant when looking at the short-term impact. As mentioned by the National Academies of Sciences, Engineering and Medicine (2017), "a group that is concentrated at working ages when tax contributions are high will be more positive than that of a group that is, at that time, either relatively young or elderly or both, because the latter age ranges typically receive more transfers than they contribute in taxes" (p. 284).

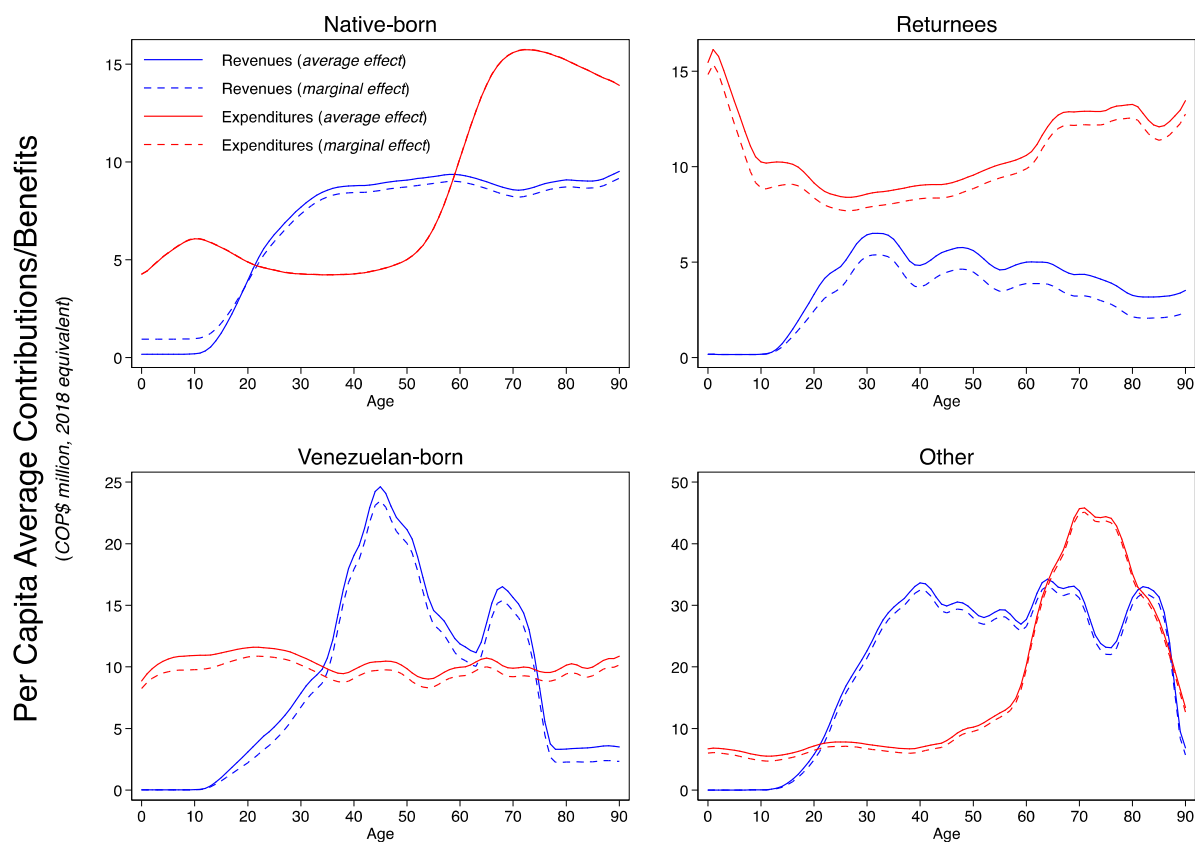
Figure 3 shows the distribution of individual contributions and benefits along the age structure for each group using the average cost scenario and averaging over fiscal years 2013-2018. We see evidence of systematically different combinations of revenue contribution and benefits received, both in levels and in the shape of the

distribution between and within groups. For example, Venezuelan-born immigrants and other immigrants at working age make consistently higher average per capita contributions to the tax system relative to natives, but at the same time receive a larger sum of benefits on average in the form of associated expenditures. By contrast, native-born returnees have lower per capita contributions and receive more benefits.

Overall, revenue contributions display a hump-shaped distribution, consistent with higher income and consumption tax contributions at working ages. In the case of expenditures, the inverted U-shape displayed is consistent with high family and children benefits at lower ages and higher pension benefits upon retirement. The latter drives the large increase in expenditures assigned to other foreign-born, as a considerable share of this group has been living in the country for a longer period of time. This is not the case for Venezuelan-born immigrants and returnees.

Figure 3

Distribution of contributions and benefits by age and group, 2013-2018.



Notes. The Figure reports the distribution of per capita contributions in the form of revenues and expenditures by age and immigrant group, using both cost scenarios (*average* vs. *marginal*), and averaged over fiscal years 2013–2018. Data are based on our own fiscal estimates following Tables 1 and 2 and GEIH data, smoothed and adjusted by a single multiplicative factor so that the population-weighted aggregate is consistent with totals of our budget estimates of government receipts and

expenditures. All public spending is included in benefits. See the Online Appendix for a detail recount of the allocation of revenues and expenditures to each observation in the GEIH.

In summary, while children and family benefits (including compulsory education) drive fiscal flows early in the life cycle, income and consumption taxes drive fiscal flows at working ages, and the cost of pension benefits and health care drives the later years. This is consistent with findings in the literature, especially those reported by the National Academies of Sciences, Engineering and Medicine (2017) for the US.

Given the above patterns, controlling for a group's age structure could potentially change our analysis of the differences in net fiscal contributions between groups. In Table 8 we show the results of different regression specifications in which we control for the effect of the calendar year, age, sex, education level, number of dependents and employment status. Coefficients denote the marginal per capita net fiscal impact, in 2018 million pesos, that is associated with that immigrant group or cohort relative to permanent natives. A positive coefficient indicates a lower net fiscal impact—i.e., a lower cost, as the government runs a budget deficit. On the other hand, a negative coefficient indicates a higher cost to the government, relative to the native group.

The first two specifications (columns 1 and 2) use as unit of analysis the individual observation, while the last three specifications (columns 3 to 5) exclude dependents from the unit of analysis, defined as any person (*i*) under the age of 18, (*ii*) from 18 to 22 years old and enrolled full time in secondary education, or (*iii*) from 18 to 22 years old in higher education or not, and who is working less than half time; if a person is married, they are considered independent, regardless of their age. Each dependent's fiscal flows are assigned equally to all independent person(s) to whom they are linked.

The impact of differences in the demographic distribution can be seen by comparing the coefficients for each group/cohort in the first two columns for both the complete sample and the independent person sample. Results indicate that the marginal fiscal impact of Venezuelan immigrants (including returnees) after controlling for the age and sex structure does not change significantly. Overall, Venezuelan immigrants pose an additional per capita pressure on public finances—relative to permanent natives—in the range of \$6 to \$8 million pesos when we use the whole sample, and of roughly \$12 million pesos when considering only independent persons as the unit of analysis.

However, results reported in panel (*b*) indicate that the higher marginal fiscal cost is driven by Venezuelan immigrants arriving after 2015. This larger fiscal effect of recent arrivals is associated with large social protection expenditures in the form

of vulnerable population benefits. Strikingly, Venezuelan immigrants who have been in the country longer have a lower marginal fiscal cost relative to natives. In other words, immigrants that arrived in 2015 or before have on average a better fiscal position. Results for the marginal cost scenario are similar and are presented in Table A3 in the Online Appendix.

Table 8
Marginal per capita fiscal impact by group and cohort
(COP\$ million, 2018 equivalent)

	<i>Full sample</i>		<i>Independent person unit</i>		
	(1)	(2)	(3)	(4)	(5)
<i>Panel (a): Immigrants by group</i>					
All immigrants	- 5.133*** (0.322)	- 4.762*** (0.322)	- 7.076*** (0.534)	- 7.648*** (0.534)	- 7.756*** (0.521)
Returnees	- 6.325*** (0.242)	- 6.528*** (0.242)	- 11.51*** (0.364)	- 11.89*** (0.362)	- 9.452*** (0.352)
Venezuelan-born	- 8.392*** (0.291)	- 7.646*** (0.290)	- 11.05*** (0.549)	- 11.94*** (0.551)	- 11.98*** (0.535)
Other	5.302*** (1.378)	5.476*** (1.376)	13.38*** (2.569)	13.20*** (2.562)	7.366*** (2.530)
<i>Panel (b): Venezuelan-born immigrants by cohort</i>					
Arrived in or before 2015	1.086 (0.718)	1.977*** (0.715)	6.078*** (1.735)	5.486*** (1.739)	4.479*** (1.686)
Arrived after 2015	- 12.99*** (0.231)	- 12.31*** (0.229)	- 16.68*** (0.403)	- 17.68*** (0.404)	- 17.39*** (0.396)
Controls:					
Age	-	Yes	-	Yes	Yes
Sex	-	Yes	-	Yes	Yes
Education	-	-	-	-	Yes
Number of dependents	-	-	-	-	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Sample size	4,681,880	4,681,880	3,243,056	3,243,056	3,243,056

Notes. The Table reports OLS regression coefficients of the net fiscal impact (dependent variable) on dummy variables for immigrant's group/cohort after controlling for demographic characteristics. Panel (a) considers all immigrant groups, while panel (b) focuses on Venezuelan-born immigrants by cohort. Coefficients indicate the marginal per capita fiscal impact that is associated with each group/cohort relative to the net contributions of permanent natives. We report results for the average cost scenario over fiscal years 2013–2018. The data is based on our own fiscal estimates following Tables 1 and 2 and information from the GEIH, adjusted by a single multiplicative factor so that the population-weighted aggregate is consistent with totals of our budget estimates of government receipts and expenditures. All public spending is included in benefits. See the Online Appendix for a detail recount of the allocation of revenues and expenditures to each observation in the GEIH.

Columns 1 and 2 take as the unit of analysis all individual observations. Columns 3 to 5 exclude dependents from the unit of analysis, defined as any person (i) under the age of 18, (ii) from 18 to 22 years old and enrolled full time in secondary education, or (iii) from 18 to 22 years old in higher education or not, and who is working less than half time; if a person is married, they are considered independent, regardless of their age. However, each dependent's fiscal flows are assigned equally to all independent person(s) to whom they are linked.

Education groups are: (i) less than HS, (ii) HS graduate, (iii) some college, (iv) bachelor's degree, (v) any post bachelors.

Estimates are weighted by sampling weights reported in the GEIH. Robust standard errors in parentheses. *** Denotes significance at 1%, ** significance at 5% and * significance at 10%.

Our results suggest that controlling for both the age structure and educational attainment accounts for a small part of the difference in the net fiscal contribution of foreign- and native-born individuals, but most of the difference is explained by Venezuelan immigrants. The small (positive) adjustment, however, is consistent with the fact that per capita net fiscal contributions of Venezuelan immigrants tend to increase with the level of education. In addition, Venezuelan immigrants with more time in Colombia have a larger and more favorable net fiscal contribution relative to native-born individuals after adjusting for personal characteristics. These results seem to suggest that the main driver of the gap in fiscal contributions between native- and Venezuelan-born immigrants has to do with access to the labor market, particularly access to ‘good’ jobs. If the human capital composition of the immigrant population were driving most of the effects, once we adjust for the age structure and education profile of individuals, we would have expected the gap between the per-capita net fiscal contributions of the two groups to be much lower than it currently is, especially for recent cohorts of Venezuelan immigrants.

Cohorts with less time in the country are frequently not fully incorporated in the labor market which creates a higher dependence for benefits assigned based on group membership and less based on individual-specific characteristics. In addition, recent cohorts contribute on average less in terms of income taxes and social security contributions as they are more likely to be under irregular status and are therefore more likely to be either unemployed or employed in informal jobs.

6.4. Immigrants’ effect on tax expenditures

An issue that has not been addressed in the literature is the effect of immigration on tax expenditures. A tax expenditure is defined as a loss in revenue for the Government that is attributable to special tax deductions, exemptions, and treatments present in the tax legislation. This implies that tax expenditures are in a way a direct transfer from the Government to economic agents by decreasing the tax obligation for taxpayers. Excluding tax expenditures from the analysis gives a one-sided look on the effect of immigration on public finances since in principle tax expenditures substitute for Government spending programs. We can think of two arguments against the inclusion of tax expenditures in other studies. First, these resources do not go through the Treasury and so are not conceived as a fiscal income. Second, these resources in any case would have reduce the rate at which the public debt accumulates and consequently the payment of interest. However, we believe this is misleading because the allocation of resources would have been different as these

tax expenditures weight more on some economic agents. Therefore, not considering tax expenditures creates a distorted view of total contributions made by natives and immigrants.

We focus on tax expenditures in three categories: income tax (including CREE), value-added tax and fuel tax (including surcharge). We use the estimates reported by the Ministry of Finance in its annual Medium-Term Fiscal Framework for the fiscal cost of tax expenditures in each category. We do not consider VAT exclusions as they do not generate an effective loss of revenue.¹⁷ These estimates do not necessarily explain behavioral responses due to changes in taxation as generally they are computed using the ‘foregone income’ approach. Thus, estimates of contributions to tax expenditures do not reflect the effective amount of revenues that would be raised from each group if these tax deductions, exemptions, and treatments present in the tax code were eliminated, as taxpayers will be likely to adjust in response.

Table 9 reports the fiscal impact on tax expenditures for each group, cumulated over fiscal years 2013–2018.¹⁸ In panel (a) we report estimates of each group’s overall contribution to each type of tax expenditure, expressed in 2018 equivalent COP. Over that six-year period the benefits from tax expenditures for the foreign-born population accounted for more than COP\$1.4 billion or 0.026% of GDP, compared to an overall contribution of COP\$100 billion for natives or 1.79% of GDP (in 2018 equivalency). Of the total loss in revenue attributable to special tax benefits to immigrants, 35% were allocated towards Venezuelan-born immigrants and 65% to other foreign-born groups.

In panel (b) we present estimates of the average per capita fiscal impact on tax expenditures during all fiscal years. Per capita tax expenditures associated with Venezuelan-born immigrants were higher for personal income tax and fuel tax, relative to those perceived by permanent natives, but were lower for corporate income tax and value-added tax. The value of tax exceptions for other foreign-born groups, however, were higher across all categories. In the case of native-born returnees, per capita tax exemptions were higher for value-added tax but were lower for all other receipts.

Finally, in panel (c) we report estimates of tax expenditures as a share of each group’s contribution to each specific tax—as computed for Table 6. For natives,

¹⁷ On average, fiscal costs associated with tax expenditures accounted for 1.9% of GDP between 2013 and 2018. Of these, over 40% represent VAT exemptions and tariffs differentials.

¹⁸ To apportion households’ tax expenditure on income tax we use each group’s share of the total exempt income and tax discounts estimated after applying the tax schedule to GEIH earnings. We allocate tax expenditure on fuel and firms’ income tax using the same procedure as describe in motor vehicle tax and corporate and capital taxes, respectively. Finally, we apportion tax expenditures from VAT using each group’s share of total benefits, net of nonresident direct purchases share. We estimate total benefits using effective subsidy rates by household income decile from IMF (2011).

results show that tax expenditures on personal income tax represented almost half of each group's total contribution to personal income tax. This share is nearly twice as large compared to that for both Venezuelan-born immigrants and other immigrants. The relative weight of tax expenditures on corporate income tax and fuel tax is similar for all groups, while tax expenditures on value-added tax weights more on returnees and somewhat similar among permanent natives and Venezuelan-born immigrants. These results are driven by differences in the income distribution between groups.

Table 9
Fiscal impact on tax expenditures, 2013-2018

	<div>Natives</div> <div>PermanentReturnees</div>		Venezuelan-born	Other
Panel (a): overall fiscal impact (COP\$ million, 2018 equivalent)				
(1) Income tax (households)	25,852,407	31,937	243,945	607,203
(2) Income tax (corporations)	27,298,454	56,900	68,191	204,030
(3) Value-added tax	44,486,899	196,828	193,930	127,308
(4) Fuel tax	2,157,130	5,705	10,506	17,702
Percent of GDP (%)	1.784	0.005	0.009	0.017
Panel (b): average per capita fiscal impact (COP\$ 2018 equivalent)				
(1) Income tax (households)	92,503	34,554	195,438	767,944
(2) Income tax (corporations)	97,978	54,782	82,048	255,908
(3) Value-added tax	159,645	167,654	91,477	166,171
(4) Fuel tax	7,757	6,268	9,894	23,390
Panel (c): fiscal impact as share of each group's contributions (revenues)				
(1) Income tax (households)	46.9	50.2	27.6	26.4
(2) Income tax (corporations)	10.4	10.5	10.4	10.4
(3) Value-added tax	16.5	26.0	16.9	6.6
(4) Fuel tax	7.0	6.6	6.4	6.8

Notes. The table reports the fiscal impact on tax expenditures for permanent natives, returnees, Venezuelan-born and other immigrants, cumulated over fiscal years 2013–2018. Panel (a) shows estimates of each group's overall contribution to each type of tax expenditure, expressed in 2018 equivalent COP. Panel (b) shows the average per capita fiscal impact, expressed in 2018 equivalent Colombian pesos. Panel (c) report estimates of tax expenditures as share of each group's contribution to each specific tax, as computed for Table 6.

7. Extensions: the role of relative elasticities and indirect taxation

The results presented so far rely on several assumptions. This section explores the empirical support for those assumptions and, where applicable, the effect of relaxing them on our fiscal estimates.

7.1. Differences in the elasticity of labor supply

A key insight from public finance is that the economic incidence of taxation—the true burden of a tax—does not necessarily fall on the entity that formally pays it. Instead, the burden is distributed based on the relative elasticities of supply and demand. When a group of workers, such as Venezuelan immigrants under an irregular status, has highly inelastic labor supply—meaning they have few alternative employment options and are willing to work at almost any wage—the burden of payroll taxes, employer contributions, or even indirect taxation may be shifted onto them in the form of lower wages, even if they are not directly paying these taxes themselves.

This has important implications for the fiscal cost of immigration. If informal immigrant workers are bearing part of the tax burden through depressed wages, then a simple accounting exercise that only considers direct tax payments and direct government benefits received may be misleading. It underestimates their actual fiscal contribution, as it ignores the indirect ways in which taxation affects their earnings and purchasing power. Additionally, their lower wages mean that employers benefit from cheaper labor, which could translate into higher profits and potentially higher tax revenues from businesses. The standard accounting method therefore rules out any effects through changes in prices or productivity.

The literature has found substantial evidence of both wage and occupational downgrading among Venezuelan immigrants in Colombia (Castaño and Mesa-Guerra, 2023; Mesa-Guerra, 2024; Lebow, 2024). Upon arrival, many Venezuelan immigrants face barriers to formal employment, including work permits, recognition of qualifications and credentials, and labor market segmentation. As a result, they are more likely to accept jobs below their skill level, contributing to the observed wage downgrading. This labor supply inelasticity means that they are willing to accept lower wages, as exiting the labor market is not a viable option.

Estimates for Colombia indicate that if Venezuelan immigrants received the same returns to education and experience as native workers, their wage distribution would be more evenly spread across income levels, with greater representation in higher-paying jobs. However, the reality is that they are disproportionately concentrated in the lower end of the wage distribution, with a significant fraction of workers earning below the legal minimum wage. This pattern aligns with a downgrading narrative, where immigrants—despite their qualifications—are forced into lower-wage, lower-status jobs due to labor market constraints. A large informal sector, which operates with minimal regulation and weak enforcement of labor protections, exacerbates this issue by absorbing a large share of Venezuelan workers.

We use Predictive Mean Matching (Rubin 1986; Little, 1988) to estimate shadow labor income only for Venezuelan-born immigrants who are informal wage

workers (27% per cent of the sample). We match workers on gender, age and education groups, immigrant status and cohort, separated by survey year, based on 20 nearest neighbors. For wage workers, a log hourly wage is estimated from hours usually worked per week and assuming a total of 50 weeks of work per year. We exclude observation with zero wage. Observed average monthly wage for informal immigrant wage workers is COP\$840,758 (2018 pesos), and imputed average monthly wage is COP\$1,139,222. The aggregate imputed wage income over the period studied is 35 per cent higher than the actual wage income.

Using the imputed wages we re-estimate the net fiscal impact of Venezuelan-born immigrants. The aggregate fiscal impact over the period 2013-2018 increased 3 per cent. Since immigrants' benefits are greater than tax payments, this means that their fiscal position deteriorates once we include imputed wages for informal wage workers. However, the difference between tax contributions using the actual and imputed wage distributions cannot rule out zero. The larger deficit accrued to Venezuelan immigrants is completely explained by a drop in tax contributions in 2015 and 2016, where we see lower payments on income tax and excise taxes. Figure A2 in the Online Appendix compares the actual wage distribution for informal wage workers against the resulting one after the imputation.

7.2. Accounting for capital taxes paid by firms employing immigrant workers

Even assuming constant prices or productivity, there are other indirect effects induced by increasing immigrant inflows on tax revenues, particularly through capital taxation. When immigrants enter a labor market, they not only contribute directly through income and consumption taxes but also affect the returns on capital. With profit-maximizing firms, an increase in employment without consequently adjusting capital investment would imply that the firm is forgoing profits. With more workers, capital in each firm will be used more intensively and will be more productive, increasing the opportunity cost of that capital. So, to keep productivity constant, the firm must hire additional capital. If a firm buys the additional capital, it must earn extra income from the new investment; if it rents the additional capital needed, the owner of the capital will earn new income. In both cases, the additional capital income created by increasing employment is taxed.

Clemens (2022) shows that this effect is not trivial using data for the United States. The presence of immigrants can stimulate economic activity by increasing the demand for goods and services, leading to business expansion and new investments. This, in turn, raises the taxable base of capital income. If we only account for the direct taxes paid by immigrants without considering these second-order effects, it likely underestimates the fiscal contribution of immigrants to government revenue.

Cashflow fiscal accounting typically overlooks this source of tax revenue, resulting in an incomplete assessment of immigrants' net fiscal impact.

Clemens proposes an adjustment formula that estimates the additional capital tax revenue attributable to immigrant labor. Assuming that firms demand inputs as to maximize profits, the total fiscal effect of an additional immigrant worker is given by:

$$\left(1 + \frac{\tau_K}{\tau_L} \cdot \frac{\alpha}{1 - \alpha}\right) \tau_L \cdot w - b_L, \quad (6)$$

where α is the capital share of income in the economy, w is the price for each unit of labor, τ_L and τ_K are the effective (not statutory) tax rates for labor and capital income, and b_L correspond to government benefits paid to each unit of labor. If we assume no indirect capital income taxation, the total fiscal effect of an additional immigrant worker is $\tau_L \cdot w - b_L$, as in the standard accounting method.

Note that the adjustment formula for the fiscal impact of immigration in equation (6) relates tax revenues to immigrant's labor income ($\tau_L \cdot w$). Therefore, we follow Clemens (2022) and remove first all tax payments allocated based on capital income earned by immigrants. Some immigrant workers receive capital income in the form of rent from ownership of real estate, sale of assets, dividend income, interest, and other financial income or as business owners. They pay taxes on this income directly through income and capital gains taxes but also indirectly through excise taxes on consumption or taxes paid by firms they own—including property taxes.¹⁹ Some of these contributions are already included in estimates of total taxes paid by immigrants and should not be double counted. We follow a conservative approach and exclude all capital income from immigrants' taxable income.

Tax revenue per immigrant that omits double counting capital tax contributions is given by:

$$\left(1 + \frac{\tau_K}{\tau_L} \cdot \frac{\alpha}{1 - \alpha}\right) (1 - \theta) T, \quad (7)$$

where T is total taxes paid by immigrants, θ is the fraction of nontransfer income that comes from capital income (rent, interest, dividends, sale of assets, and profits), and tax revenue from immigrants' labor income ($\tau_L \cdot w$) is given by the term $(1 - \theta)T$.

Implementing the adjustment proposed by Clemens (2022) requires three additional pieces of information: (i) an estimate of the effective rate of taxation on

¹⁹ Immigrants can pay property taxes either directly, as owners of owner-occupied housing and through their ownership of other real estate, or indirectly, through housing rent payments and their ownership of businesses, which use commercial space. As mentioned before, property taxes make up 2.6 per cent of all government revenue and firms contribute on average 70 per cent of all property tax revenue.

capital relative to labor (τ_K/τ_L); (ii) an estimate of the capital share of income (α); and (iii) and an estimate of immigrants' share of capital income (θ).

- (i) Over the period studied, 2013 through 2018, Rincón-Castro (2021) estimates that the effective tax rate on capital was on average 15.6 per cent, while the effective tax rate on labor income was 18.1 per cent, implying the ratio $\frac{\tau_K}{\tau_L} = 0.864$.
- (ii) The share of labor compensation in national income averaged 0.485 per cent during the same period.²⁰ Thus, the capital share of income in the years considered is $\alpha = 0.515$.
- (iii) During the period 2013–2018, the fraction of capital income averaged 0.033 for native-born returnees and 0.015 for Venezuelan-born immigrants.

Results adjusting for indirect capital income taxation are shown in Table 10. The first column shows immigrant's labor tax revenue, while the second column presents our estimates of direct and indirect tax revenue after allowing capital to adjust, as detailed before. The ratio between both columns indicates that after the adjustment, tax revenue is 1.9 times higher for immigrants. In addition, the net fiscal impact of one immigrant worker is positive for both groups of migrants when we adjust for capital income taxation, and even changing signs in the case of native-born returnees. To scale the effects, the resulting net contributions, as a percentage of GDP per capita, are 13.7 per cent for returnees and 28.7 per cent for Venezuelans, respectively. These results show that omitting capital tax revenue from cashflow fiscal accounting methods create a significant bias.

Table 10

Net fiscal impact of the average immigrant adjusting for indirect capital taxation, millions of 2018 pesos

	Average per additional immigrant, 2013-2018						
	Tax revenue		Benefits	Net fiscal impact		% of per capita GDP	
	$(\tau_L \cdot w)$	<i>Adjusted</i>		$\tau_L \cdot w - b_L$	<i>Adjusted</i>	$\tau_L \cdot w - b_L$	<i>Adjusted</i>
<i>Returnees</i>	4.126	7.909	5.193	− 1.068	2.716	− 5.4	13.7
<i>Venezuelan-born</i>	5.585	10.707	5.019	0.565	5.685	2.9	28.7

Notes. The table reports the fiscal effect for the average returnee and Venezuelan-born immigrant after accounting for indirect capital taxes through immigrants' labor income. Estimates include immigrants and their descendants. Benefits are estimated using the average cost scenario, as computed for Table 6.

²⁰ Data retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/LABSHPCOA156NRUG>.

7.3. Accounting for labor displacement

While the analysis of net fiscal contributions often considers the direct employment of an additional immigrant worker, it does not always account for indirect labor market effects, such as wage adjustments or job displacement among natives (and other immigrants). The fiscal consequences of labor displacement arise through two primary channels. First, if native workers experience lower wages due to immigration, their taxable income declines, potentially reducing overall income tax revenues. Second, if immigration were to lead to job losses among natives, public expenditures could rise through unemployment benefits or other social assistance programs. In the case of Colombia, where formal unemployment benefits are limited, the fiscal cost may primarily manifest through increased demand for social programs.

Overall, the evidence for Colombia is somewhat in line to that in the U.S., where the admission of one immigrant worker has not showed to reduce overall employment. In the case of Venezuelan immigration to Colombia, the empirical evidence suggests a negative correlation between immigration and natives' wages, employment probabilities, and labor force participation. However, these effects are not statistically distinguishable from zero (see Castaño and Mesa-Guerra, 2023). When addressing endogeneity concerns through instrumental variable approaches, the evidence shows a negative impact on wages rather than employment levels. This suggests that Venezuelan immigration may not substantially displace native workers in terms of job availability, but it could contribute to downward wage pressures, particularly in sectors with high immigrant concentration.

8. Local fiscal effects of immigration

In the previous sections we focused on the effect immigrants have on the General Government's budget without providing much detail for the effects at lower levels of government. In this section, we examine the fiscal impact across local governments, paying particular attention to both native-born returnees and Venezuelan-born migrants. In what follows, we aggregate both groups and refer to them as Venezuelan immigrants.

Since migration is not distributed uniformly across space, the fiscal effects are not homogeneous at the local level. Roughly 60 percent of all migrants arriving from Venezuela were living in one of the 23 main cities and metropolitan areas as of 2018 (Table 11), with three quarters of these living in just five of those cities. In addition, local governments differ in their revenue-raising capacities. The provision of public goods and services at the local level is determined by the level of transfers from the central government and each local government's fiscal effort. This distinction is

particularly important because only a fraction of immigrant's direct contributions in the form of tax payments ends up being allocated to local governments, with a larger share going to the national government. Whereas education and health expenditures account for most of the resources local governments receive from the transfer system, own local revenue is allocated to complement expenditures for law enforcement, family-related programs, and infrastructure. A direct implication of this revenue sharing scheme is that, at least in the short-run, local governments will likely incur in net fiscal costs from the arrival of immigrants, with these costs differing across jurisdictions.

8.1. Spatial and demographic distribution of Venezuelan immigrants

The geographic dispersion of Venezuelan immigrants changed considerably between 2013 and 2018. Descriptive statistics presented in Table 11 for the 23 main cities with their metropolitan areas indicates that Venezuelan immigrants have chosen to locate in larger cities, usually inland, instead of remaining in smaller cities closed to the border. This pattern could be explained by support networks that migrants have raised over time, lowering the costs of moving from the border, as well as by an increase in job opportunities in larger cities (Reina *et al.*, 2018).

The seven cities with the highest percentages of Venezuelan immigrants in 2013 (Cúcuta, Bogotá, Barranquilla, Medellín, Bucaramanga, Cartagena, and Cali, in that order) were still the cities with the highest share of immigrants in 2018. These cities concentrate half of the total immigrant population from Venezuela. However, the distribution of immigrants across them also changed. The fraction of Venezuelan immigrants increased in the four largest cities—Bogotá, Medellín, Cali and Barranquilla, and declined in the rest, showing a particularly sharp decline in Cúcuta. It is not surprising that the geographic dispersion of Venezuelan immigrants changed between the two periods. As one might expect, border towns such as Cúcuta have always experienced high density of Venezuelan immigrants. However, with the size and speed of new inflows since 2013, Venezuelan immigrants have moved to larger cities.

The share of adult (18+) immigrants within each city has also changed during the five-year period, as indicated in the second panel. Yet, while the arrival of younger cohorts and the increase in the number of births from Venezuelan mothers has reduced the average age overall—as display in the third panel, the share of adults has varied as the age structure of Venezuelan immigrants has changed across cities. Apart from the five cities that experienced an increase in the adult immigrant population—Cúcuta, Ibagué, Medellín, Valledupar and Villavicencio—and Quibdó, which remained stable during the period, the rest saw a decline in the share of

population 18 years of age or older. The relative contribution or burden immigrants have on local finances is driven largely by the demographic distribution across cities, as we have been discussing in this paper.

In terms of labor market assimilation, the fourth panel shows a very different picture across cities. Although the employment rate among Venezuelan immigrants is similar to the native-born population country-wide, labor demand across cities ranges from 60 to 80 percent. In addition, the employment rate for Venezuelan immigrants declined in seven cities between 2013 and 2018. However, in five of these seven cities, the employment of Venezuelan immigrants was still above both the country's average and that experienced by natives. These estimates suggest that the labor market has been able to absorb a large share of working age Venezuelan immigrants, even with the exponential trend in total immigration during the same period. Furthermore, simple correlations with the information presented in the last three panels indicate that cities with lower employment rates among Venezuelan immigrants have higher shares of self-employment and lower wage and salary workers. The latter is not only a key factor in determining relative contributions at the national level, as this impacts income tax and social security contributions directly, but also contributions at the local level as higher self-employment shares might influence contributions to industry and commerce tax from business owners if part of the formal sector.

8.2. Selection of immigrants across time and space

There is sufficient evidence showing that immigrants tend to locate close to other immigrants from the same origin country. However, immigrants respond to economic conditions at the local level by moving to growing (high wage) areas and leaving those that are faring worse. The movement of immigrants across time and space may change the composition of the local population which has implications for the fiscal effects seen at the local level.

We find that internal migration in Colombia is quite similar for both permanent natives and Venezuelan immigrants. Considering only individuals living in the country 12 months before being surveyed, only 5.7% of Venezuelan immigrants moved to a different municipality within the previous year, on average. In the case of permanent natives, the number of internal migrants was 4.8%. These numbers are very stable over the years. Now, if we consider instead those living in the country 5 years before being served, the share of individuals who decided to move in the last five years is roughly the same (15%) for both groups.

Nonetheless, the areas that have the largest shares of Venezuelan immigrants are also those to where most immigrants are choosing to relocate to. In Table A4 in

the Online Appendix, we compare Venezuelan immigrants that changed their municipality of residence in the last year with those that did not move. Movers have a larger fraction of males and tend to be younger than those who decided not to move but are less likely to have a college degree.

Now, immigration can also induce natives to move away from immigrant-dense areas. Figure A2 in the Online Appendix shows a negative correlation between native in-migration rates and the share of total Venezuelan immigrants across areas.²¹ Areas with the highest inflows of Venezuelan immigrants were attracting lower numbers of native-born migrants, on average. Along the same line, Castaño and Mesa-Guerra (2025) find that an increase in the fraction of immigrants within an area reduces the inflow of natives to that area.

Selection of immigrants across areas is often positive, meaning those who locate to larger and more dynamic regions tend to be more skilled and wealthier. A different relationship is seen across time, as we have discussed, such that recent cohorts tend to consist of lower-educated workers. These patterns will shape the net fiscal contributions at the local level. In the short-run, one would expect to see an increasing pressure on the cost side on areas with the largest in-migration rates but faring better in the long-run as a result of having a more qualified population.

8.3. Net fiscal effects on local budgets

Before presenting our results at the local level we need to address the issue of small sample size for immigrants, particularly for 2013 and 2014. In the early period, the stock of Venezuelan immigrants as fraction of the total local population was small in some areas. Indeed, for a group of cities, small sample sizes results in estimates of immigrants' allocation of revenues and expenditures for different categories over time to have significant variation. To account for this, the results presented are averaged only over those years in which immigrants' sample size in each city/MSA is sufficiently large to be representative.²² Of all the cities included, only in Florencia we do not have enough sample size in at least one year to be able to compute the fiscal estimates.

²¹ We do not observe outflows at the municipal-level, so we compute in-migration inflows to a municipality as a share of permanent natives in the previous year.

²² Our sample size estimates are computed using the modified formula for smaller populations with a confidence level of 90 per cent. Our sample selection is based on estimates of the stock of immigrants in each city/MSA in each year. To define the reference group (total immigrant population) in each city, we use information on the stock of immigrants from the 2018 Population and Housing Census. To estimate the stock of immigrants in all other years (2013-2017) we use information from the immigration authority (*Migración Colombia*) on the city of destination reported by migrants at the border point when entering the country and construct the change in annual inflows for each city.

Table 11
Descriptive statistics of Venezuelan immigrants by city/MSA

City/MSA	Share of immigrant population (%)		Percent adult (18+)		Average age (years)		Employment rate		Percent wage and salary workers		Percent self-employed	
	2013	2018	2013	2018	2013	2018	2013	2018	2013	2018	2013	2018
Armenia	0.56	0.53	86.2	66.0	33.7	26.2	64.6	67.6	42.0	30.0	61.1	66.9
Barranquilla	7.80	9.57	68.7	67.3	26.6	25.9	53.2	72.3	54.8	40.6	45.2	57.6
Bogotá	12.54	17.93	84.0	70.5	33.3	25.4	83.6	77.6	56.2	63.8	38.6	35.1
Bucaramanga	4.47	2.63	72.4	70.1	29.1	26.6	81.3	75.9	45.3	50.8	49.6	44.7
Cali	2.98	3.97	85.1	67.9	36.0	24.7	64.7	74.4	58.3	63.2	41.7	35.8
Cartagena	4.15	2.77	62.9	61.2	26.6	24.3	57.7	62.5	43.9	25.7	56.1	71.5
Cúcuta	14.26	6.26	57.8	62.3	25.4	24.5	68.6	62.6	25.0	18.1	68.5	77.8
Florencia	—	0.03	—	66.3	—	25.8	—	69.4	—	49.1	—	50.9
Ibagué	0.47	0.30	59.1	70.4	27.4	26.8	61.2	77.7	70.1	58.4	29.9	41.6
Manizales	0.23	0.30	78.0	67.5	29.6	26.4	55.2	67.4	80.6	60.4	19.4	33.8
Medellín	5.95	6.57	67.2	73.9	27.0	26.6	74.2	74.0	63.6	68.1	31.1	31.0
Montería	0.48	0.48	74.5	66.7	29.0	26.0	75.9	71.3	41.2	47.0	58.8	50.8
Neiva	0.10	0.15	56.0	72.6	27.7	24.5	39.4	65.1	28.1	35.6	71.9	62.0
Pasto	—	0.12	—	75.8	—	27.3	—	80.1	—	55.1	—	46.8
Pereira	0.57	0.87	75.1	72.6	28.4	26.7	52.2	72.3	49.4	66.8	50.6	32.5
Popayán	—	0.10	—	86.5	—	31.6	—	64.1	—	26.8	—	73.2
Quibdó	0.05	0.01	69.4	69.4	38.0	28.8	62.0	69.8	53.3	56.4	46.7	37.6
Riohacha	1.17	1.75	66.7	55.5	24.8	21.3	69.6	65.0	32.8	21.9	63.4	74.2
Santa Marta	1.36	2.26	77.5	59.9	27.3	22.7	65.7	69.9	26.2	14.5	70.2	82.6
Sincelejo	0.96	0.63	65.4	64.0	24.8	25.4	56.9	74.1	30.3	33.9	66.4	60.6
Tunja	—	0.15	—	71.9	—	23.9	—	65.7	—	51.7	—	48.3
Valledupar	1.72	1.83	60.0	61.6	24.4	24.2	62.5	65.0	18.1	19.3	77.8	78.7
Villavicencio	0.46	0.47	61.8	72.1	24.0	25.8	80.2	73.4	59.7	56.8	29.8	41.3
Colombia	100	100	66.0	64.6	27.5	24.5	71.9	71.0	45.9	46.4	49.2	51.1

Notes. The Table reports descriptive statistics for Venezuelan immigrants (Venezuelan-born and native returnees) in the main metropolitan areas for fiscal years 2013 and 2018. Four cities do not present descriptive statistics in 2013 as they account individually for less than 0.01 percent of immigrants and hence the low frequency data is a problem. The first panel presents the distribution of Venezuelan immigrants across metropolitan areas. In the second, fifth and sixth panels we measure the proportion of adults (18+), wage and salary workers and self-employed. The employment rate is defined as the ratio of the employed (aged 15 or over) to the working age population (aged 15 to 64). Metropolitan areas include the following municipalities: Medellín (Barbosa, Girardota, Copacabana, Bello, Envigado, Itagüí, Sabaneta, La Estrella, Caldas), Cali (Yumbo), Barranquilla (Soledad), Bucaramanga (Floridablanca, Girón, Piedecuesta), Manizales (Villamaría), Pereira (Dosquebradas, La Virginia), Cúcuta (Villa del Rosario, Los Patios, El Zulia). *Source.* Authors' estimates using data from the 2013 and 2018 GEIH.

Table 12

Net fiscal impact for Venezuelan immigrants at the local level, 2013-2018

Panel (a): average per capita net fiscal contributions (<i>COP\$ 2018 equivalent</i>)					
	<i>Average Effect</i>	<i>Marginal Effect</i>		<i>Average Effect</i>	<i>Marginal Effect</i>
Armenia	567	393,032	Neiva†	719,563	879,718
Barranquilla	-306,409	42,588	Pasto†	-952,273	491,802
Bogotá	-825,242	-583,107	Pereira	-99,056	329,643
Bucaramanga	-408,662	-101,678	Popayán†	593,307	764,947
Cali	-833,907	115,542	Quibdó†	1,150,673	1,548,522
Cartagena	-262,052	77,357	Riohacha	716,497	725,282
Cúcuta	-1,065,594	60,306	Santa Marta	150,695	468,352
Florencia†	—	—	Sincelejo	50,161	265,210
Ibagué†	187,463	565,708	Tunja	-172,031	321,506
Manizales	-435,616	17,344	Valledupar	178,825	523,405
Medellín	-489,664	-346,809	Villavicencio	-39,120	282,309
Montería	440,508	829,963			
Panel (b): ratio of real revenues to real expenditures					
	<i>Average Effect</i>	<i>Marginal Effect</i>		<i>Average Effect</i>	<i>Marginal Effect</i>
Armenia	0.954	1.282	Neiva†	1.470	1.805
Barranquilla	0.801	0.950	Pasto†	0.706	1.314
Bogotá	0.597	0.617	Pereira	1.016	1.376
Bucaramanga	0.771	0.928	Popayán†	1.398	1.638
Cali	0.625	1.025	Quibdó†	1.490	1.862
Cartagena	0.969	1.188	Riohacha	1.444	1.488
Cúcuta	0.580	1.055	Santa Marta	1.081	1.310
Florencia†	—	—	Sincelejo	0.951	1.050
Ibagué†	1.117	1.468	Tunja	0.955	1.368
Manizales	0.788	1.082	Valledupar	1.061	1.263
Medellín	0.791	0.813	Villavicencio	1.023	1.260
Montería	1.210	1.467			
Panel (c): revenues/expenditures ratio, relative to permanent natives					
	<i>Average Effect</i>	<i>Marginal Effect</i>		<i>Average Effect</i>	<i>Marginal Effect</i>
Armenia	0.886	1.196	Neiva†	1.286	1.580
Barranquilla	0.860	1.026	Pasto†	1.018	1.898
Bogotá	0.504	0.522	Pereira	0.898	1.220
Bucaramanga	0.799	0.965	Popayán†	1.234	1.447
Cali	0.775	1.279	Quibdó†	1.479	1.849
Cartagena	0.850	1.047	Riohacha	1.327	1.366
Cúcuta	0.870	1.622	Santa Marta	0.902	1.098
Florencia†	—	—	Sincelejo	0.922	1.020
Ibagué†	0.997	1.312	Tunja	0.827	1.186
Manizales	0.734	1.010	Valledupar	1.007	1.203
Medellín	0.734	0.755	Villavicencio	0.938	1.157
Montería	1.110	1.347			

Notes. The Table reports the net fiscal impact for Venezuelan immigrants (native returnees and Venezuelan-born) at the local level averaged over fiscal years 2013–2018. Panel (a) reports the average per capita net fiscal contribution, expressed in 2018 equivalent Colombian pesos. Panel (b) reports the ratio of revenues to expenditures accrued in real terms over fiscal years 2013–2018. Panel (c) reports the revenues/expenditures ratio for Venezuelan-born immigrants relative to natives. We use gross domestic product implicit price deflator for each regional jurisdiction (Department) to estimate equivalent COP. Estimates are averaged over years with a minimum sample size as describe in the text. † Caution should be taken when interpreting the local-level estimates because of small immigrant population and subsample size.

Results presented in Table 12 indicate that, on average, between 2013 and 2018 Venezuelan immigrants' per capita net contributions varied considerably across cities. In addition, the net fiscal contribution of Venezuelan immigrants across cities differs based on whether fixed costs are distributed proportionately across groups or whether the burden is only shared by permanent natives. Under the 'average effect' assumption, Venezuelan immigrants tend to have a lower revenues/expenditures ratio relative to natives, particularly in cities that experienced a large increase in inflows. However, using a marginal cost allocation, under which we assume new immigrants do not increase the cost of public goods provision, leads to estimates of per capita fiscal contributions across cities that tend to be positive, such that in 20 out of the 22 cities considered, Venezuelan immigrants were net contributors to local budgets and had a higher net fiscal position when compared to natives.

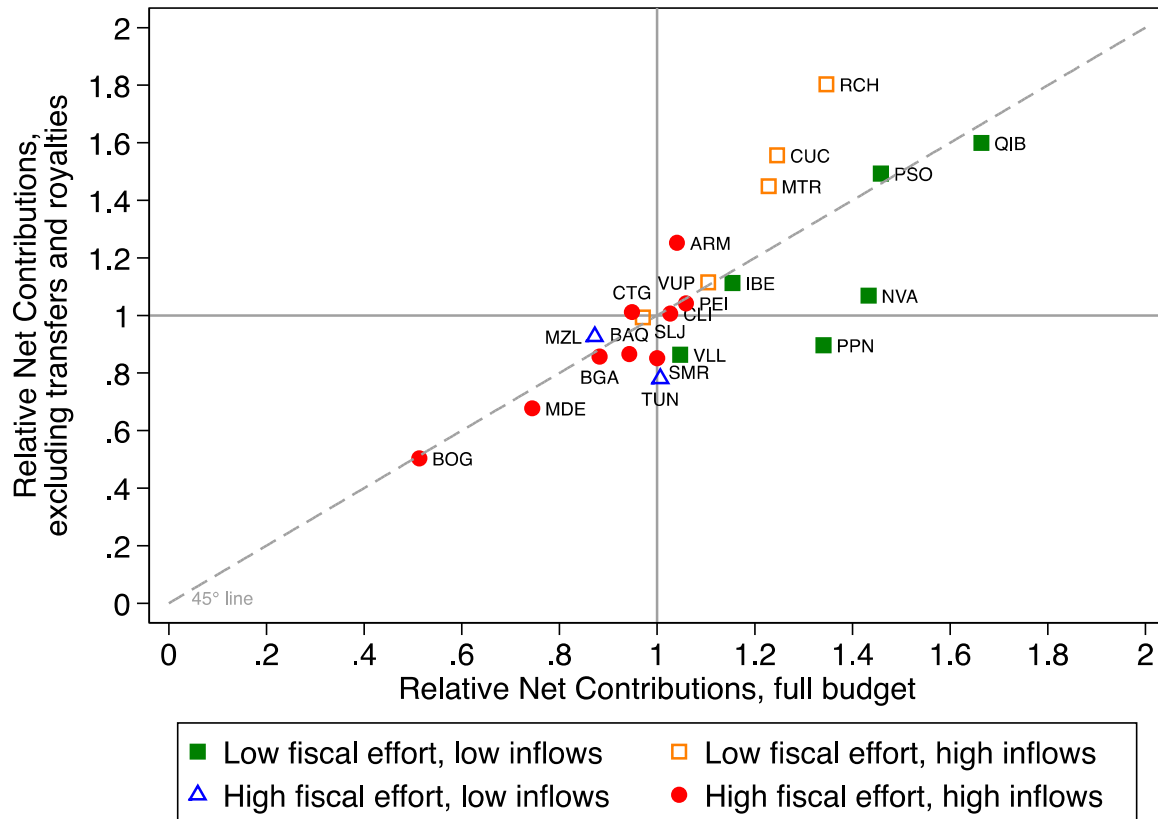
If one were to take the midpoint between the average and marginal cost allocation, considering these as the lower and upper bounds, we see that in most of the cities that experienced high inflows of Venezuelan immigrants during this period— such as Barranquilla, Bogotá, Bucaramanga, Cali, Cartagena, Cúcuta and Medellín—, Venezuelan immigrants had a negative average per capita fiscal effect. Nonetheless, in the rest—except for Manizales and Pasto, immigrants' contributions averaged between COP\$75,000 and COP\$1,350,00 in per capita terms (rounded to the nearest thousand). Finally, looking at the ratio of revenues to expenditures, relative to the estimate for natives, only six cities fall below. Of those cities, Bogotá and Medellín show a very large gap (0.5 and 0.74) with respect to natives' contributions. The larger increase in expenditures over revenues during the years is driven basically by two forces: an increase in access to compulsory education for immigrants' dependents and the fiscal effort of governments, both in cash and in kind. To help in the assimilation of Venezuelan immigrants, local governments made use of expenditures marked as social protection for vulnerable population.

What is the effect of Venezuelan immigrants on local budgets when we exclude transfers from the national government and royalties? We address this question to examine the role played by local government's fiscal effort. To do so, we exclude revenues and expenditures from the SGP and the SGR. Other national transfers are not excluded as we are not able to particularly identify them in both sides of the budget (revenues and expenditures). However, transfers from SGP and SGR account on average for 40 per cent of revenues and expenditures of local governments, but range between 18 per cent for Bogotá and over 60 per cent for Quibdó. Estimates of Venezuelan immigrants' per capita contributions without transfers from the national government presented in

Table A5 in the Online Appendix slightly change across different cities from the ones presented in Table 12. Nonetheless, our qualitative results remain unaffected.

Figure 4

Net fiscal impact, aggregate inflows, and local fiscal effort



Notes. The Figure reports for each MSA the revenues/expenditures ratio for Venezuelan immigrants, relative to permanent natives for 2013-2018. The relative net contribution depicted corresponds to the mid-point between the average and the marginal effect. Fiscal effort is defined with respect to the degree of dependency of each MSA to transfers from the national government (transfers as share of total revenues).

1. Low fiscal effort: transfers from the national government represent 40% or more of total revenues.
2. High fiscal effort: transfers from the national government represent less than 40% of total revenues.
3. Low inflows: Venezuelan immigrants represent less than 2% of the MSA population (equivalent to two times Colombia's annual population growth rate in 2011).
4. High inflows: Venezuelan immigrants represent 2% or more of the MSA population.

To illustrate the differences among both sets of results, Figure 4 plots for each MSA the revenues/expenditures ratio for Venezuelan immigrants, relative to permanent natives. We plot the mid-point between the average and marginal effect. In addition, we group cities based on their fiscal effort, defined with

respect to the degree of dependency of each MSA to transfers from the national government (transfers as share of total revenues), and the fraction of Venezuelan immigrants in the local population. Three facts stand out: *(i)* cities with the largest inflows had an overall negative net fiscal impact; *(ii)* for cities with low fiscal effort but high inflows, excluding transfers from the national government improves the relative fiscal position of Venezuelan immigrants; and *(iii)* excluding transfers from the national government does not significantly change the relative net fiscal position of Venezuelan immigrants in cities with high fiscal effort.

Looking in greater detail at the results presented in Table 12 and Table 15, one can see that excluding transfers in cities in which Venezuelan immigrants started with a negative fiscal impact tends to improve immigrants average per capita net contribution by reducing the size of the burden, but reduces the relative position of immigrants with respect to permanent natives in most of these cities. Moreover, the relative net fiscal position declines in 13 out of the 22 cases when we exclude transfers.

These results suggest that Venezuelan immigrants' contributions to local government revenues have a larger drop than the reduction observed in total benefits received by immigrants when we exclude transfers and royalties. Therefore, as shown in Table 6, Venezuelan immigrants' contributions to total revenues tend to be more concentrated in receipts that go to the budget of the national government—such as consumption taxes and VAT—and less to local governments which rely heavily on property and industry and commerce tax. Finally, these results are being driven by the degree of enrollment in compulsory education, by immigrants' dependents, and the funds allocated to social protection for vulnerable populations by local governments.

9. Discussion

Our results have shown a detailed picture of Venezuelan immigrants' fiscal impact both at the level of the General Government and at the local level. However, as with any empirical study that estimates the fiscal impact of immigration, our work has some limitations. In this section we discuss their implications for our results.

Data quality As we have mentioned before, the GEIH remains the most complete source of information to determine both natives and immigrants' labor market status and their demographic and socio-economic characteristics. Despite this, one may have concerns over the quality of the wage or income information reported. Because we use wages and other sources of labor income

to estimate contributions to income tax, social insurance and payroll taxes, and indirect taxes, we need to be sure that the information reported in the GEIH is accurate.

A natural source of information we can use to assess the quality of the GEIH data is the matched employer-employee data from administrative record of payments to the social security system by both firms and workers, known as *Planilla Integrada de Liquidación de Aportes* (PILA). The matched employer-employee data has two shortcomings that explain why we do not use this information as our main source on wages. First, the data covers essentially the universe of workers within firms in the formal sector, excluding half of all employed that do not report contributions to the social security system. Second, information on wages can only be recovered using reported social security contributions. Therefore, the distribution of wages is both left and right censored at the minimum and maximum social security contribution.

Nonetheless, we can use the information in the PILA to check the consistency of the data in the GEIH. The National Department of Statistics conducted this exercise using data for 2018.²³ Their findings for the matched sample of workers show that both sources of information are highly consistent. Patterns for both men and women across the wage distribution are very similar between the two data sets.

While this is reassuring, because we use immigrants' labor and non-labor income information to derive indirect taxes paid from their consumption, a limitation in the GEIH for which we do not have additional information is that we do not observe remittances sent by immigrants to their home country. Following the literature, we have assumed in our sensibility analysis that 20% of immigrants' income is used as remittances. While this seems to be a reasonable number for immigrants living for a longer period in Colombia or those that have reunited with their families, we don't have information on the behavior of more recent arrivals. If recent arrivals send a larger share of their income back to their relatives, this will reduce even more their overall contributions to tax revenues.

Time coverage We like to stress out that our analysis is static and backward-looking in nature, capturing the short-run fiscal effects from a large increase in immigrant inflows. Assessing the complete fiscal impact of immigration requires that these estimates be complemented by studying these effects properly in a dynamic context. Long-term fiscal effects are not only driven

²³ The information is available at <https://www.dane.gov.co/files/investigaciones/notas-estadisticas/nov-2020-brecha-salarial-de-genero-colombia.pdf>.

by the demographic structure of immigrant inflows but also by the distinct life cycle characteristic of certain types of publicly provided services, such as health and education, requiring dynamic modeling of future fiscal impacts (Preston, 2014).

In addition, based on the fiscal information available our analysis looks only at the fiscal effects until 2018. We acknowledge the need to understand the fiscal impact since 2018 for two reasons. First, significant inflows of Venezuelan immigrant continued to arrive to Colombia in the following years. Between 2018 and 2020 the stock of Venezuelan-born immigrants in the country increased by roughly 50%. Understanding the demographic structure and socio-economic characteristics of these new waves is important to have a better understanding of the fiscal implications. Second, to facilitate the assimilation of this large population in the country, the Colombian government has implemented during the last few years different regularization programs. In addition to the expansion of the PEP in the second half of 2018, discussed in Section 4.2, the government has implemented two mechanisms that allow irregular immigrants to work legally in the country and apply to receive welfare assistance: the Special Permit for Permanence for the Promotion of Formalization (PEPFF) and the Temporary Legal Status (EPT). The latter encompasses all previous programs and is intended to grant eligibility to over one million undocumented Venezuelan migrants and those currently on temporary residence to a 10-year residence stay.

Local effects One of our main contributions in this paper is providing estimates of the fiscal effect of immigration at the local level. However, the issues of small sample size and the very nature of recent arrivals moving between cities until they find a more permanent location imposes some challenges to the results presented here. A valid concern is that doing this whole exercise for a population with a volatile spatial location may lead to inaccurate conclusions. Yet, we still think that since more than half of Venezuelan immigrants have chosen to locate in the largest cities, it is very unlikely that most of them will move in the short run. Furthermore, because our empirical approach estimates the fiscal impact for every fiscal year, we need to account for all immigrants living at that moment in every city in our sample, even if they keep moving between locations. We still believe that this exercise is of particular interest to fully understand the fiscal implications of immigration, providing as much detail as possible with the information available.

10. Conclusion

Using recent Venezuelan immigration to Colombia we have estimated the effect of immigration on public finances. Our findings show that Venezuelan immigrants have lower net fiscal contributions relative to permanent natives overall, which is driven by lower contributions to regional and local government budgets. However, their overall fiscal effect is small in terms of GDP—around -0.07% when we include native-born returnees as part of the Venezuelan immigrant group.

When we consider the effect that demographic characteristics play on explaining the differences in the net fiscal contributions among groups, our results suggest that the larger fiscal impact of Venezuelan-born immigrants is driven by recent immigrants (those that arrived after 2015), as they contribute on average less in terms of income and payroll taxes and have a higher reliance for group expenditures such as vulnerable population benefits. In contrast, Venezuelan immigrants that arrived in or before 2015 have a better per capita fiscal position compared to natives. The results from our analysis of the effect of Venezuelan immigration on local budgets indicate that immigrants' per capita net contributions vary considerably across cities. We show that the fiscal effect on local budgets is mediated by two forces: cities' fiscal effort (i.e. the ability to raise revenues from their own sources) and the fraction of immigrant inflows in the local population.

Finally, with the large fiscal imbalances experienced in many countries in Latin America, resulting from the commodity price shock in the late 2014 and with the Covid-19 pandemic, combined with the fiscal impact of ageing and spatial regional inequalities, addressing the fiscal impact of immigration is relevant from a policy perspective. From our analysis, and those in the literature, it is clear that as long as the barriers for immigrants to assimilate in the country of destination are kept (*e.g.*, access to formal employment, education and health care), fiscal cost will persist.

Complementing a static analysis as the one presented in this paper with the dynamic impact of immigration is important to have a complete understanding of the fiscal effects over the life cycle. The net contribution of immigrants to fiscal accounts is directly linked to the time that they will spend in Colombia, as this will also determine if an increasing number of immigrants are able to regularize their situation. In other words, it is expected that immigrants may induce more costs in the short-term, yet, as they are granted economic rights (such as labor rights) they will be able to contribute more by

paying taxes. Hence, the fiscal costs are expected to be lower in the medium to long-term.

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