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Labor Market Effects of Migration-Related Supply Shocks: Evidence from Internal Refugees in Colombia

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December 4, 2009

Abstract

Massive migrations due to civil war have raised the number of unskilled workers in cities in developing countries. Not only does civil war negatively affect forced migrants, but it also appear to contribute to deteriorating labor market conditions for all low skilled workers in destination cities. The internal refugee-related supply shock reduces wages and employment quality for urban unskilled workers who compete for jobs with forced migrants. While the decision to leave their municipalities of origin is explained by conflict dynamics, the decision to relocate in a particular city can be associated with the economic conditions of these destinations. To address the possibility that these location decisions might positively correlated with demand conditions in destination cities, we use an instrumental variables strategy. The instrument estimates the share of displaced persons that arrive to a particular host city as a function of the massacres perpetrated by illegal armed groups in the counties of origin, weighted by distance to the city of destination. Our instrument appears to be correctly addressing the attenuation bias. Our results show that a 10 percent supply shock increases the likelihood of informal-sector employment by 5 percent; has no effect on wages in the formal sector; but reduces wages by 2.3 percent in the informal sector. Given the widespread problem of civilian displacement during civil wars in the developing world, and the robust relationship between poverty and civil wars, our results have broad implications for welfare and economic development.

Key words: Migration, Labor Markets, Developing Countries
JEL Classification: J22, J40, J41, J61.

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1 Efectos Laborales de Choques Migratiorios: Evidencia para la Población Desplazada en Colombia

Resumen

Este artículo estudia los efectos sobre los mercados laborales de un choque migratorio que expande la oferta laboral. El estudio usa la migración forzada, consecuencia del conflicto armado en Colombia, como un experimento natural para examinar el impacto de un desplazamiento exógeno de la oferta laboral sobre los salarios, el desempleo, la ocupación en cada sector. Aunque los flujos de migración son producidos de manera exógena por las dinámicas del conflicto, las decisiones de ubicación están correlacionadas positivamente con choques de demanda. El uso de variables instrumentales permite corregir por este sesgo. Los resultados sugieres que los flujos de migración producen un efecto sustancial y negativo sobre los sueldos y las oportunidades laborales de los trabajadores, efecto que es particularmente pronunciado para los trabajadores menos calificados. La migración, al producir altas pérdidas de bienestar sobre la población desplazada y deteriorar las condiciones laborales para la población nativa, produce un efecto redistributivo negativo sobre la sociedad colombiana.

Palabras Clave: Migración, mercados laborales, países en desarrollo
Clasificación JEL: J22, J40, J41, J61

2 Introduction

Armed civil conflicts impose tremendous costs on affected populations. In developing countries, they can exacerbate pre-existing problems of poverty. (Ibáñez and Moya, 2008, Matowu and Stewart, 2001; and André and Platteau, 1998). Beyond the direct effects of gunfire, however, civil conflicts may also affect populations not directly in harm's way (Cairns, 1997). In Colombia, for example, civil violence is largely a rural phenomenon, so the direct costs of conflict are suffered by residents of the countryside. At the same time, attacks by insurgents have led millions of rural dwellers to flee the countryside for the relative safety of the country's urban areas. In some cities, the resulting labor supply shocks have been sizeable. We analyze the effects of those labor supply shocks in this paper.

Our study contributes to two literatures. The first focuses on violence-related migrations in developing countries. Most studies on this topic concentrate on the conditions that lead civilians to flee their communities, rather than the consequences of such decisions (Ibáñez and Vélez, 2008; Deininger, 2003). We have found only one that estimates the effects of violence-related migrations on labor markets . Kondylis (2007) focuses on workers directly affected by violence, comparing workers in Bosnia who fled from violent areas to workers who remained in place. In contrast, we estimate what one might consider as the broader labor market effects of conflict, asking how migrations from directly affected areas influence labor markets not directly touched by conflict. Considering the prevalence of armed conflicts in developing countries, and the massive population dislocations they can cause, our results help broaden our understanding of the detrimental effects of civil conflict on the economic development process (Imai and Weinstein, 2000; Collier, 1999; Easterly and Levine, 1997).

The second literature to which our study contributes concerns the link between migration-related supply shocks and labor markets. The economic literature has extensively studied the effects of large inflows of unskilled economic migrants on labor markets. These studies

have found that migration negatively affects wages and employment outcomes for natives, especially the least skilled, yet they differ widely as to the magnitude of the effect.

One reason for the disparity in the estimates is that it is difficult to establish causality between migration flows and labor market conditions. Migrants generally choose when and where to move. They tend to migrate when the rewards to migrating are large, and may choose destinations with stronger demand for labor. The result may be biased estimates of the impact of migration on destination labor markets. Analysts have taken different approaches to the problem, analyzing national rather than regional labor markets (Borjas 2003); treating historical inflows of migrants as instruments for current migration (Altonji and Card, 1989; LaLonde and Topel, 1991; Card, 1989, Schoeni, 1997); and exploiting various natural experiments (Card, 1989; Hunt, 1992; Carrington and DeLima, 1996; Friedberg, 2001; Angrist and Kugler, 2003; Kugler and Yuksel, 2008; Lemos and Portes, 2008).

The case of Colombia offers a different type of instrument with which to study the effects of migration-related labor supply shocks. Detailed data on the location and timing of civil violence and violence-related migration let us establish several important facts. First, large migration flows in Colombia are tied directly to massacres of civilians in rural areas. This suggests that the timing of migrants' migration decisions is driven by the timing of violence rather than by the timing of favorable conditions in destination labor markets. Second, the timing of violence in rural areas is not related to conditions in nearby urban labor markets. Third, workers fleeing rural violence generally relocate nearby, most often to their provincial capital. These facts motivate our instrument for migration-related supply shocks. For each urban labor market in Colombia, the instrument is equal to the number of deaths due to civil violence in the previous year, weighted by the inverse of the distance between the urban labor market and the site of the violence.

However, the effects of supply shocks vary between the formal and informal sector. Like many developing countries, Colombia's formal sector is highly regulated, whereas its informal

sector is largely unregulated. Colombia's formal sector is characterized by a particularly high minimum wage. A simple model suggests that the effects of supply shocks should vary by sector. Our results show that a 10 percent supply shock increases the likelihood of informal-sector employment by 5 percent; has no effect on wages in the formal sector; but reduces wages by 2.3 percent in the informal sector.

The remainder of the paper is organized in five sections. Section two describes the background, giving an overview of violence in Colombia, and the regulation of labor markets. Section three describes the data. Section four presents the analytical framework; the theory, the estimation procedure and the instrument. Lastly, the results from the main analysis are discussed in section five with the conclusions presented in section six.

3 Background

3.1 Violence in Colombia

Civil conflict in Colombia was triggered by the emergence of several left wing guerrilla groups in the late 1960s. Violence from guerrilla groups intensified in the decades to follow with the appearance of illegal drug crops. The illicit drug trade provided massive resources to rebel groups, intensifying the conflict. Drug-trade resources also instigated the creation of right-wing paramilitary groups that are closely related to drug barons and land owners, and which, in most regions, have contested the power of guerrilla movements. The emergence of paramilitary groups, coupled with resources from the illegal drug trade, resulted in a much more intense and on-going conflict all over the country (Gaviria, 2000; Thoumi, 2002).

Attacks against the rural population, by both the guerrillas and the paramilitaries, have been the main driver behind civilian flight to urban areas . Tactics include death threats, massacres, conscription, temporary town take-overs, and selected homicides. All drive the civil population from their towns and villages in search of safety (Ibáñez and Vélez, 2008).

Massacres, defined as events that involve the murder of at least 4 persons, are a particularly effective tactic for generating a mass exodus from rural areas. Detailed data on massacres are available from the Center for Economic and Development Studies of the Universidad de los Andes (CEDE) and the Colombian Police. These data include information on victims for every massacre in the country from 2001 to 2005.

Table 1 shows the number of massacres from 1995 to 2005. For the period 2000 to 2005, a massacre occurs every other day on average. Figure 3 shows the geographical distribution of massacres, indicating that vast majority take place in the countryside.

Data on refugees who have fled the massacres are available from Acción Social, the presidential agency charged with collecting information on displaced populations. The objective of Acción Social is to legally recognize displaced households and thus quantify the demand for humanitarian aid. The resulting RUPD data (its Spanish acronym) is a demand-driven instrument, wherein displaced households approach government offices to declare, under oath, the circumstances of their displacement. After making such a declaration, government officials validate whether it is truthful and, if so, the legal status to be granted to the members of the displaced household. Data on displacement are available at the individual level and provide information on origin and destination site, age, as well as exact date of migration.

These data show that, between 1998 and 2008, nearly 4.2 million persons, equivalent to 10 percent of the country's population, fled the fighting (Ibáñez and Velásquez, 2008). More than half these displacements occurred within a time span of four years (2000-2004). Refugees originate from nearly 70 percent of Colombian counties (municipalities). Table 2 shows internal refugee shares and population by year and city of destination. All Colombian cities have received refugees, but some have received more than others. In Villavicencio, the displaced population is more than 10 percent of the native population.

Massacres generate immediate displacement. Figure 4 shows the average displacement generated 30 days before and after a massacre. Displacement is largest the day the massacre

occurs. After a massacre occurs, individuals will flee to the nearest city, most likely the provincial capital. Figure 5 shows where these refugees go in response to a massacre in Peque, Antioquia. While some of these refugees migrate to small towns in the vicinity of Peque, most migrate to the provincial capital, Medellín.

3.2 The Colombian Labor Market

Colombia has a high monthly national minimum wage which is indexed to inflation. Bell (1997) studies the effects of the minimum wage in Colombia and Mexico and finds that they have a large negative effect on employment in the formal sector. High minimum wages help explain why the formal sector employs a disproportionate share of skilled workers.

In addition to the minimum wage, non-wage costs are among the highest in Latin America. Clavijo (2002) calculates that these costs are equivalent to 20 percent of the wage in Colombia, whereas they are about three percent of the wage in Chile. The non wage costs make it costly for employers to hire in the formal sector.

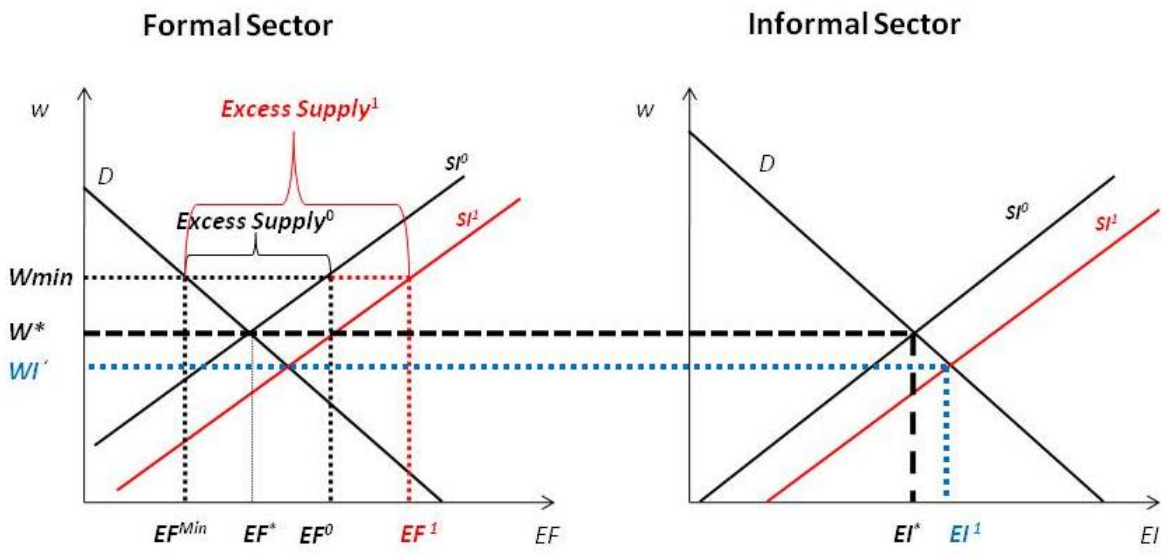
Minimum wage regulations, and large non-wage costs, in Colombian labor markets have contributed to a large informal sector and high unemployment rates (Kugler and Kugler, 2003; Maloney and Núñez, 2003; Bernal and Cárdenas, 2003). According to national labor market surveys, 60 percent of the Colombian work force is employed in the informal sector. As we explain in the next section, a simple model of a two-sector labor market suggests that the formal and informal sectors may be affected differently by migration-related labor supply shocks.

4 Analytical Framework

4.1 Theory

We draw on a two-sector model of labor markets. When the minimum wage in the formal sector is above the equilibrium wage, labor markets produce an excess supply of workers.

Figure 1: **Two Sector Model**



In Figure 1, the minimum wage (W^{min}) is set to be higher than the equilibrium wage (W^*) . As a consequence, employment in the formal sector falls from EF^* to EF^{min} .

With the minimum wage in place, unemployment may rise as much as EF^0 - EF^{min} . Some of the workers unable to find a job in the formal sector may get a job in the informal sector pushing down wages in the informal sector down to WI^* . The arrival to cities of internal refugees expands the supply of labor at destinations in both sectors. In Figure 1, migrants shift the labor supply curves to SF^1 and SI^1 in the formal and informal sectors, respectively.

In the informal sector, the supply of workers may also increase. The arrival of refugees will increase the number of workers in the informal sector, reducing the equilibrium wages from WI^* to WI^1 . Although precise changes in labor market equilibrium depend on how workers allocate themselves between formal and informal sectors, the illustration here suggests that any effects of supply shocks on wages should be limited to the informal sector.

5 Data

Three different sources of data are used in this paper. The first is the county-level data on massacres, which provide information about the timing and location of armed violence. The second is the data on internal refugees from Acion Social, which provides information on internal refugees, including their residence of origin and date of migration. Both of these sources are described above.

The final source is the National Household Survey 2001-2005 (ECH 2001-2005 for its acronym in Spanish), which is a repeated cross-section of household survey data collected quarterly by the National Statistics Department (DANE) in the 13 largest metropolitan areas. The surveys included in this paper cover the period from January 2001 to September 2005. This particular period was chosen because the conflict intensified and displacement soared during this time frame. In addition, data on internal displacement is believed to be consistent only from 1998 onwards, as the RUPD was launched in 1999 and only registered persons within one year of displacement. The National Household Survey collects information on household characteristics, education variables, and labor force information.

5.1 Employment and Wages by Sector and Skill

Hourly wages are from the national household surveys for the working age population (12-65 years of age) that have a complete report on all earnings and are not currently attending

school. To define skill groups, we rely on definitions of formal and informal workers. Informal workers are those employees and employers who work for firms with ten or fewer workers, independent workers except professionals and technicians, domestic workers, and household workers with no remuneration. In addition to this definition, we will also classify as informal workers, those who belong in the above mentioned group and do not have a written labor contract.

Formal workers are those who have a written work contract and for which the above definition of informality does not apply. For purposes of consistently estimating the number of informal workers, we restrict the sample to the second quarter of every year as the ECH only collects information on informality during that period. Table 3 shows some descriptive characteristics of the formal and informal workers, as well as internal refugees.

Wages were deflated by consumer price index March 1998=100 for each metropolitan area, and we control for cost of living across areas. Schoeni (1997) suggests that regional price differences are strongly positively correlated with migration intensity, thus adjusting for these differences should eliminate any positive bias. Information on the monthly consumer price index by Metropolitan Statistical Area (MSA) is available from DANE. Precise definitions of local labor markets are presented In Appendix A.

We calculate the share of internal refugees in each city using data from Acción Social. The share only considers individuals of working age (12-65 years of age), where the numerator is the cumulative number of internal refugees of working age that arrived to each city and the denominator is the labor force. The data on violence is used to create the instruments to explain destination choice after displacement. The instruments are functions of the total number of massacre victims at the origin municipality and the distance from origin to destination city.

We chose not to divide groups by education-experience profiles, but rather to study the effects of these migrations of both the formal and informal sectors. The fact that workers

in the informal sector appear to be excluded from the formal economy, will group most low-skilled and less productive workers in this sector. In addition we also carry out our estimations by gender, to test whether males or females labor market outcomes are affected differently by the refugee-related supply shock.

5.2 Estimation

In order to identify the impact of the inflow of forced migrants on labor market outcomes, we use the following reduced form specification:

$$lnw_{ict} = \beta_t + \beta_{ct} + X_{ict}\delta + \gamma lnS_{ct} + \epsilon_{ict} \tag{1}$$

where w_{ict} donote wage for individual i in city c at time t, X_{ict} are individual characteristics that influence labor outcomes such as potential experience, years of schooling completed, gender and marital status,

$$S_{ct} = \frac{\sum_{j=2001}^{t} M_{cj}}{Pop_{12-65ct}} \tag{2}$$

is the share of forced migrants at period t. The numerator M_{cj} is the number of internal refugees entering city c in time j, and the -denominator is the working age population in city c at time j. γ represents the impact of migration on labor market outcomes, and β_c and β_{ct} are time invariant and time varying locale effects respectively.We estimate the effects of the internal refugee related supply shock on hourly wages, employment, and probability of working in the informal and the formal sector. We allow migration-related supply shocks to have different effects on wages in the two sectors.

We cluster at the city level and include city fixed effects and a time trend to control for any potential positive demand shocks (Altonji and Card, 1989; LaLonde and Topel; 1991; Schoeni, 1997; Kugler and Yuksel, 2008).

Above we established that the timing of migration on the part of refugees is largely driven by the timing of massacres, rather than the timing of the business cycle in nearby urban areas. However, if refugees' destination decisions are influenced by relative labor market conditions across potential destinations, then S_{ct} may still be correlated with ϵ_{ict} in equation (1). This could be the case, for example, if insurgent attacks in the countryside were correlated with labor market conditions in nearby urban areas. To test this notion, we estimate the following regression:

$$Massacres_{st} = \alpha_0 + \alpha_1 Unemp\ Rate_{st} + \epsilon_{st} \tag{3}$$

These results suggest that the geographical distribution of massacres is not related to between-city variation in the performance of urban labor markets (Table 3).[1]

To provide a further safeguard against misspecification, we estimate equation (1) by instrumental variables, where the instrument for S_{ct} is the cumulative number of massacres in the country, weighted by the inverse of the distance from the site of the massacre and the c^{th} city. Algebraically, it is given by:

$$I_{ct} = ln\left(\frac{\sum_{AllOrigins_o}^{City_c} \frac{\sum_{t=Jan2001}^{T} MassacreVictims_{to}}{Distance_{oc}}}{Pop_{12-65ct}}\right) \tag{4}$$

The functional form of the instrument suggests that the number of migrants in labor market c will increase in the number of massacre victims, but decrease in the distance from the massacre to the labor market. Thus the urban labor markets most affected by civil violence would be those most geographically proximate to a large number of massacres.[2]

[1] $Unemp\ Rate_{st}$ indicates the one year lag unemployment rate in the provincial capital.

[2] Villavicencio and Monteria are in the vicinities of conflict areas, and have the largest labor force shares of internal refugees.

6 Results

This section turns to an analysis of the effects of the refugee related supply shock on labor market outcomes of the urban labor force, in particular the effects of these migrations on labor market outcomes of formal and informal workers.

Table 4 summarizes the characteristics of the urban labor force. Internal refugees are most similar to informal workers; however, on average they have less human capital and appear to have different experience profiles from both the average informal worker and the average city native worker. They are also younger, have larger families, and the head of the household has a larger number of economic dependents. In addition, they work a greater number of hours and earn on average about 0.7 the minimum wage. Figure 4, shows the distribution of wages of internal refugees relative to informal and formal workers. Because of the skill composition of internal refugees, they will most likely look for a job in the informal sector.

Our results suggest that inflows of forced migrants have statistically significant negative effects on the average city wages. Table 5 shows both the OLS and IV estimates for the effect of the log share of internal refugees on log hourly wages. Both OLS and IV results suggest a negative effect of these migrations on wages, with the results of the IV being systematically more negative than the coefficients reported in the OLS estimation. If the refugee share is correlated to the economic conditions in cities, then the OLS estimates will be attenuated. Our IV regression appears to be correctly addressing this problem. The IV estimates suggest that a 10 percent rise in the share of internal refugees (equivalent to the difference on the share of internal refugees in the labor force between Bogotá and Villavicencio) reduces average hourly wages in 1.08 percent.[3] Table 7 shows the first stage regression results.

[3]Our results are also similar across different specifications, controlling for year, and city time trend

As a result of these migrations, the urban labor force grew about 5 percent for the average Colombia city between 2001 and 2005. However, if we assume that all of these workers join the informal sector, then the expansion of the labor force in this sector will be about 9 percent, given that the informal sector accounts for 60 percent of total urban employment.[4]

This calculation suggests that if the vast majority of internal refugees seek for informal employment, then the effect of the supply shock will mostly affect local informal workers. Our simple theoretical model, predicts a large decline on average wages in this sector, if most of the refugees allocate in this sector upon arrival to cities.

Table 7 shows the results for the formal sector. The OLS estimates indicate that average formal wages decline about 5 percent for a 10 percent increase in the refugee share. Even though the IV estimates suggest an effect similar in magnitude to that of the OLS, the effect does not appear to be statistically different from zero. The presence of a high minimum wage explains why the formal sector employs a disproportional share of skilled workers. Table 8 shows the results for the informal sector. OLS and IV estimates indicate, a systematically more negative effect on wages in this sector. In particular, the IV estimate suggests that a 10 percent increase in the share of internal refugees will reduce the average hourly wage for an informal worker in 2.3 percent. This effect is statistically significant and 4 times in magnitude of the effect observed in the formal sector.

Our results indicate that an increase in the share of refugees increases the likelihood of employment in a small amount, and this is still plausible under our theoretical framework. Table 9 shows the results of the effects on employment; the total effect is only 0.2 percent for a 10 percent increase in the share of forced migrants.[5]

[4]Similarly, Card (1990) estimates that the increase in the labor force after the Mariel Boatlift was about 7 percent, further, he assumes that if three-quarters of the Marielitos were in laborer and less-skilled service occupations, the boat lift would have increased the relative population share of these occupations by about 25 percent.

[5]The coefficients of this regression need to be multiplied by 0.0953 to calculate the effect of a 10 percent increase in the refugee share.

We estimate the effects on the likelihood of employment by sector, and use a multinomial logit to describe the effects of the increase in the refugee share on the choice of working in the formal sector, the informal sector or being unemployed. Our theoretical model does not show a clear effect on total employment or allocation of workers by sector. The results from the multinomial logit, as shown in Table 10, indicate that the likelihood of working in informality increases in 3.3 percent for a 10 percent increase in the refugee share, and the likelihood of being unemployed increases by 2.3 percent for a 10 percent increase in the refugee share.[6] In addition, Table 11 shows that likelihood of working in the informal sector will increase by 5 percent with a 10 percent increase of the refugee share.

We also estimate all the wage regressions by gender. We report the effects of these migrations on wages by gender in Tables 12-14. We find that the magnitude of the effects on wages is similar for both genders.

The results show that the supply shock produces a large effect on labor market outcomes by affecting primarily the informal sector. This in turn implies deteriorating labor market conditions for a larger share of the urban labor force. Thus, forced displacement appears to be a contributing factor in the deteriorating labor conditions of low skill workers in Colombian cities. Not only are refugees affected by the increased competition and a the presence of a larger share of unskilled workers in cities, all informal workers will be negatively affected. Given the widespread problem of civilian displacement during civil wars in the developing world, and the robust relationship between poverty and civil wars, our results have broad implications for welfare and economic development.

[6]The coefficients of this regression need to be multiplied by 0.0953 to calculate the effect of a 10 percent increase in the refugee share.

7 Conclusions

This paper presents evidence on the effect of forced migrations on labor market outcomes. Our study builds on a group of papers that have studied similar questions; our approach contributes to this literature in three respects. First, we use forced displacement produced by the civil conflict in Colombia as a natural experiment. The large migration flows generated by forced migration are unrelated to labor conditions in the host city, but rather are the result of heightened attacks against the civilian population in the rural counties of origin.

Second, we use a robust instrument to predict the destination choices made by displaced persons using the size of massacres perpetuated by armed groups in each county weighted by distance to the destination city. While massacres explain the outflows of population from rural areas, distance to destination counties (municipalities) determines which city is selected as the displaced population's final destination. Third, this is the first paper to examine the impact of migration on local labor markets in a developing country. Contrary to labor markets in developed countries, the excessive regulations produce inflexibility in labor markets impeding a smooth adjustment when a shock arises. Our results suggest that a sizable inflow of less skilled workers has a large effect on labor market outcomes in cities.

We find that the burden of the increase in labor supply falls disproportionately on low-skill, informal workers, who are directly competing for jobs with internal refugees. Other papers in migration literature suggest that particular groups are at a disadvantage as they appear to be closer substitutes for migrants.[7] Our results suggest a great expansion of the informal economy, accompanied by a large decline in wages in this sector. The point estimates of the effects of migration on labor market outcomes appear to be similar to those found in the economic literature of migration. However, they appear to have stronger effects on a

[7] Borjas, Grogger and Hanson's (2006) findings suggest that the bulk of the effects of increasing immigration in the United states are borne by African-Americans, as increased immigration has not only reduced their wages but also employment opportunities in the legal economy.

larger share of the urban population, dramatically affecting informal wages and employment opportunities of low skilled workers.

Deteriorating urban labor market conditions appear to be one of the social and economic costs of civil war. Negative impacts of displacement are broadly distributed across the Colombian population, as not only do forced migrants face large welfare losses from the displacement process, but large inflows of displaced populations affect vulnerable groups within the urban population in destination cities. This paper contributes further evidence for the impact of exogenous labor supply shifts, as well as showing the detrimental impact of civil conflict on direct victims and on urban labor markets.

Beyond labor markets, these findings have important implications for development and civil wars. By one measure, nearly one-half of all states have experienced civil wars since World War II - the great majority of which are developing countries.[8] Losses related to household welfare and labor markets in these states can substantially complicate or hinder development. In addition, poverty is a robust link to the likelihood of civil war; further, countries that experience civil wars are much likelier to experience another conflict in the future. However, the relationship between these factors is not well understood. The impact of internal displacement on household welfare and labor markets is one possible, important link between poverty, civil wars, and civil war recurrence.

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8 Appendix

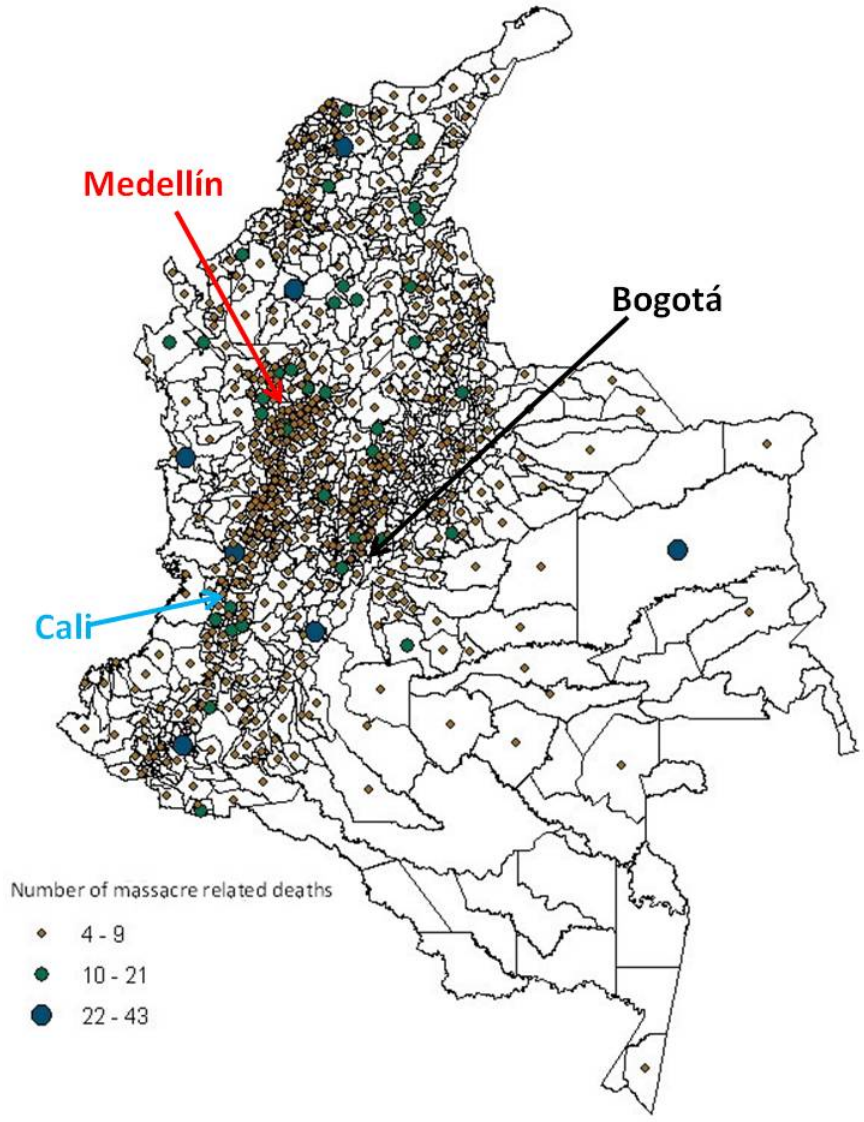
8.1 Definition of Metropolitan Statistical Areas MSA

1. **Medellín MSA:** Medellín, Bello, Barbosa, Copacabana, La Estrella, Girardota, Itagüí, Caldas and Sabaneta.
2. **Bucaramanga MSA:** Bucaramanga, Floridablanca, Girón, and Piedecuesta.
3. **Barranquilla MSA:** Barranquilla, Puerto Colombia, Soledad , Malambo and Galapa.
4. **Cúcuta MSA:** Cúcuta, Villa del Rosario, Los Patios and El Zulia.
5. **Pereira MSA:** Pereira, Dosquebradas, and La Virginia.
6. **Bogotá MSA:** Bogotá, Soacha, Mosquera, Funza, Madrid, Chía, Cajicá, Cota, La Calera, Tenjo, Tabio, Sibaté, Zipaquira, and Facatativa.
7. **Cali MSA:** Cali, Palmira, Yumbo, Jamundí, Candelaria, La Cumbre Vijes and Florida.
8. **Villavicencio MSA:** Villavicencio, Apiay, Acacías, Guamal, Restrepo and Cumaral.
9. **Cartagena MSA:** Cartagena, Arjona, Clemencia, Mahates, María la Baja, San Estanislao, Santa Catalina, Santa Rosa, Turbaco and Villanueva.
10. **Manizales MSA:** Manizales, Neira, Chinchiná and VillaMaría.
11. **Ibagué MSA:** Ibagué, el Salado, Buenos Aires, Cajamarca, Alvarado, Venadillo, Villa Restrepo, Piedras and Doima.
12. **Montería MSA:** Montería
13. **Pasto MSA:** Pasto

Figure 2: **Colombia**

Source: IGAC.

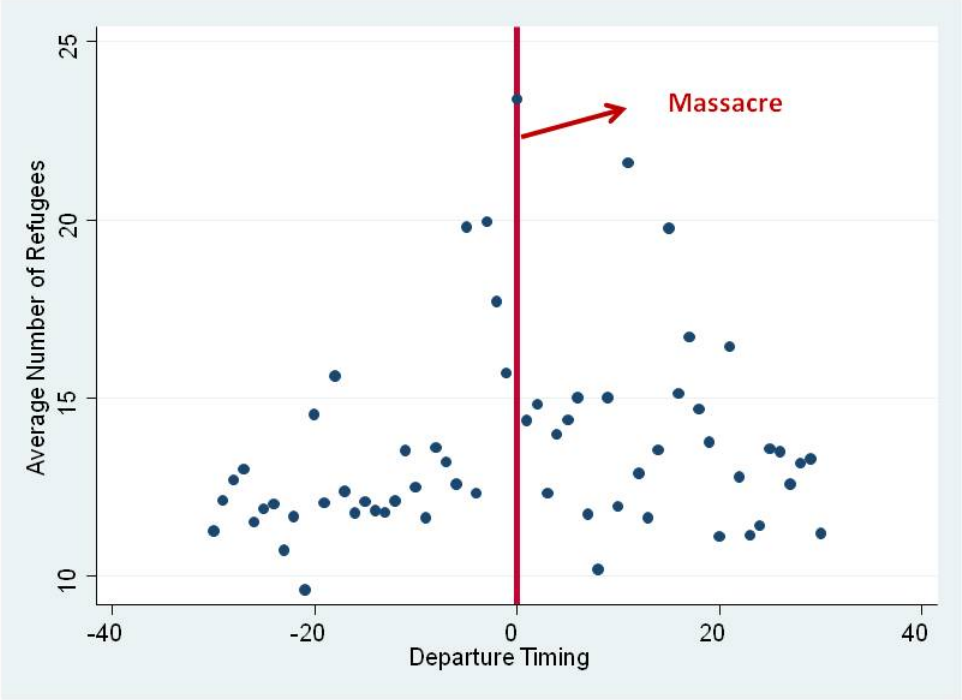
Figure 3: **Massacres 1988-2008**



Note: There were 783 massacres between 2001 and 2005.

Source: Authors' calculations based on CEDE.

Figure 4: **Massacres and Timing of Migration**



Source: Authors' calculations based on CEDE.

Note: The graph shows the average number of people that leave 30 days before and after a massacre. The x-axis indicates the departure timing in days.

Figure 5: **Displacement after a Massacre (Peque, Antioquia July 2001)**

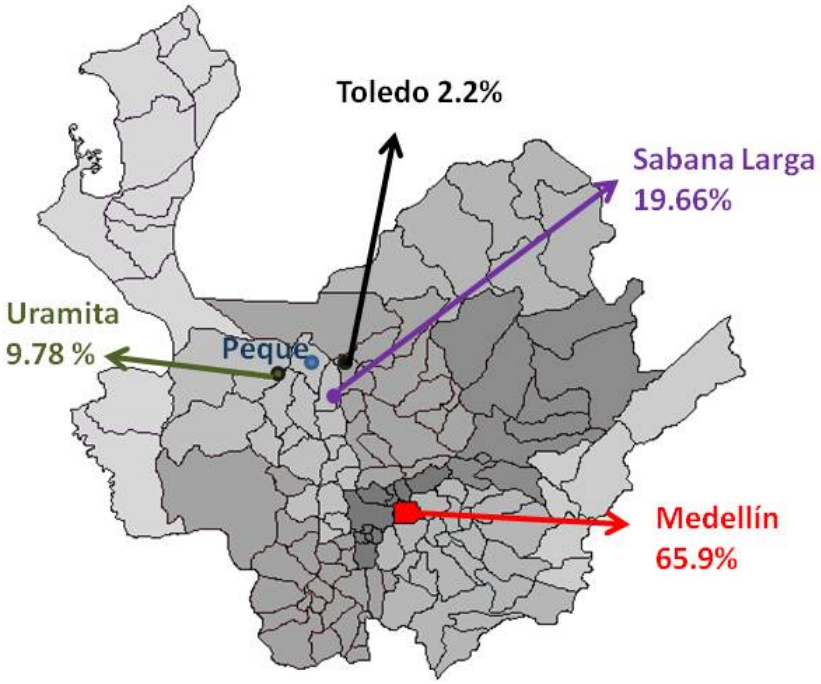
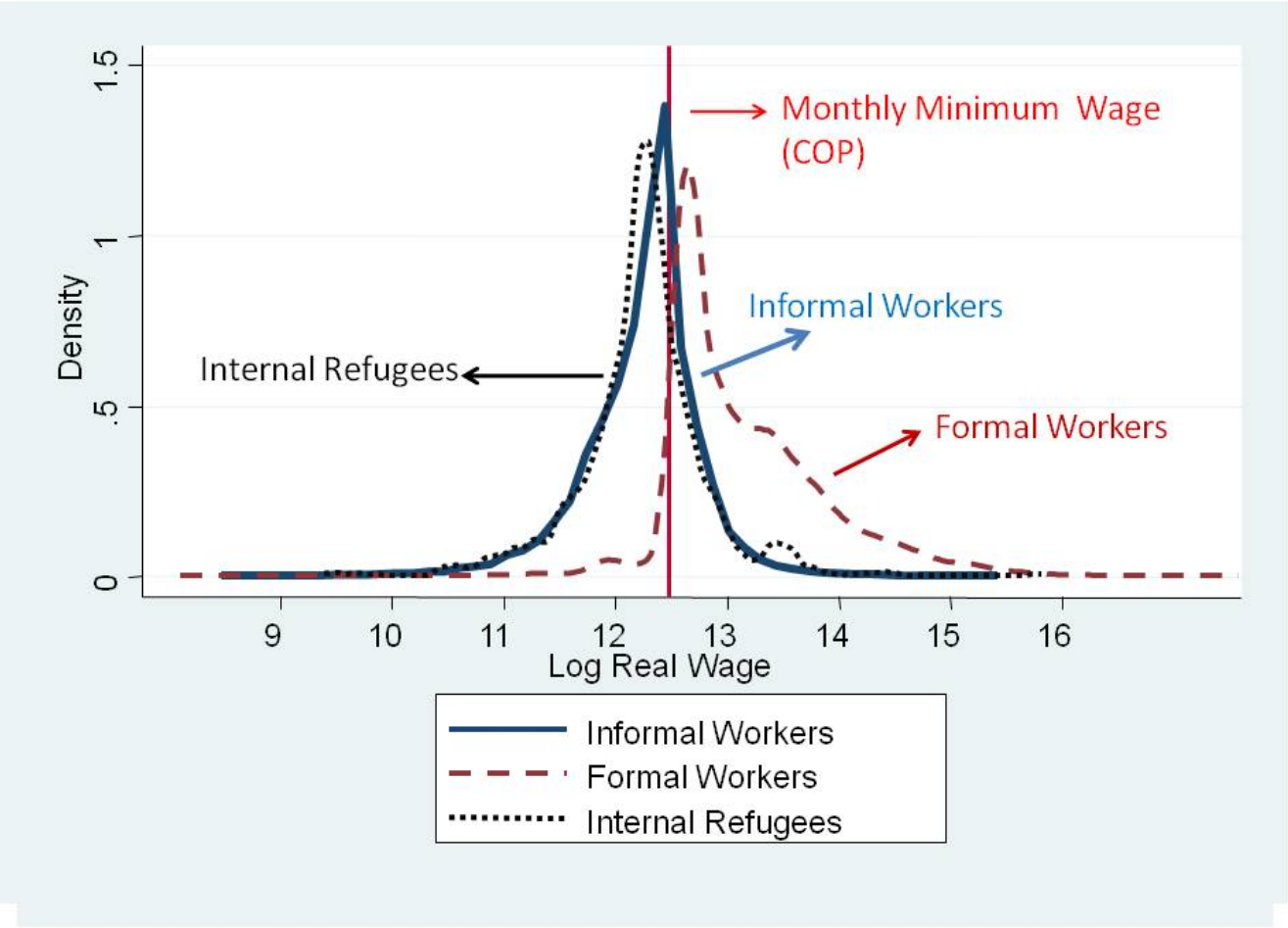


Figure 5 shows an example of a massacre in Peque, Antioquia in July 2001. This massacre displaced 1851 persons; with about 66 percent migrating to Medellín, the departmental capital, within a 20 day time frame.

Source: Authors' calculations based on CEDE.

Figure 6: **Distribution of Wages**



Source: Authors' Calculations based on ECH 2001-2005.

Table 1: Massacres per Year

Year	No. of Massacres
1995	72
1996	66
1997	74
1998	116
1999	199
2000	239
2001	259
2002	175
2003	163
2004	100
2005	86
Total	**1549**

Note: There were 783 massacres between 2001 and 2005.

Source: Authors' calculations based on CEDE.

Table 2: Refugee Shares by City 2001-2005

City	2001	2002	2003	2004	2005
Barranquilla	1.35	2.67	3.16	3.93	4.46
Bogotá	0.34	0.87	1.23	1.60	1.99
Bucaramanga	1.51	2.74	3.20	3.82	4.37
Cali	0.53	1.12	1.42	1.68	1.87
Cartagena	2.18	4.01	4.70	5.45	5.61
Cúcuta	1.31	2.94	3.55	4.09	4.56
Ibagué	1.53	3.19	4.14	5.20	6.09
Manizales	0.38	1.63	2.01	2.41	2.73
Medellín	1.18	1.93	2.18	2.55	2.96
Montería	2.71	4.78	5.39	5.91	6.61
Pasto	1.94	4.54	5.49	6.17	6.63
Pereira	0.92	1.95	2.83	3.65	4.09
Villavicencio	2.10	5.62	7.52	9.49	12.71

Source: Authors' Calculations based on Acción Social.

Table 3: Massacres and Economic Conditions in Cities

Dependent Variable Massacres per state	OLS	OLS	OLS
Lag Unemp Rate	-0.345		
	(1.434)		
Lag Employment Rate		0.257	
		(1.961)	
Lag LFP Rate			0.063
			(1.363)
Constant	0.324	0.129	0.224
	(0.248)	(1.059)	(0.893)
Observations	624	624	624
F-Stat	0.058	0.017	0.002
R^2	0.000	0.000	0.000

* p<0.10, ** p<0.05, *** p<0.01

Note: Clustered standard errors by state are reported in parenthesis.

The dependent variable is the number of massacres by state and month, as a function of the 1 year lag unemployment rate of the state capital. All 13 cities are state capitals. Source: Authors' calculations based on CEDE and DANE.

Table 4: Descriptive Statistics

	Formal Workers		Informal Workers		Internal Refugees	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Age	36.32	10.34	32.19	12.60	29.75	14.02
Sex (Female==1)	0.46	0.50	0.52	0.50	0.42	0.49
Married	0.59	0.49	0.39	0.49	0.45	0.50
Household Members	4.43	1.95	5.05	2.40	5.90	2.55
Years of Completed Education	12.20	3.82	7.36	3.61	6.49	3.82
Real Monthly Wage (COP)	581,815	632,899	217,070	155,539	127,142	205,894
Wage in terms of the Min.Wage	2.51	2.68	0.91	0.68	0.67	1.15

Source: Authors' calculations based on ECH 2001-2005

Table 5: Log Real Hourly Wage All Urban Workforce

	Model 1.1 OLS	Model 1.2 IV	Model 1.3 OLS	Model 1.4 IV	Model 1.5 OLS	Model 1.6 IV
Experience	0.030***	0.030***	0.030***	0.030***	0.030***	0.030***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Experience Squared	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Years of Schooling	0.124***	0.124***	0.124***	0.124***	0.125***	0.124***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Married	0.123***	0.124***	0.124***	0.127***	0.128***	0.129***
	(0.015)	(0.015)	(0.014)	(0.017)	(0.013)	(0.014)
Married*Sex	-0.167***	-0.168***	-0.168***	-0.170***	-0.170***	-0.171***
	(0.018)	(0.018)	(0.017)	(0.018)	(0.017)	(0.018)
Sex (Female=1)	-0.007	-0.006	-0.006	-0.005	-0.007	-0.006
	(0.015)	(0.016)	(0.015)	(0.016)	(0.015)	(0.015)
Log Refugee Share	-0.073***	-0.098***	-0.081**	-0.133**	-0.035*	-0.108**
	(0.021)	(0.025)	(0.030)	(0.054)	(0.019)	(0.043)
Constant	5.255***	5.154***	5.196***	4.947***	5.417***	5.059***
	(0.102)	(0.133)	(0.158)	(0.292)	(0.103)	(0.232)
Observations	747828	747828	747828	747828	747828	747828
F-Stat	747.353	1173.657	10900.343	3775.334	.	1.284e+307
R^2	0.335	0.334	0.335	0.333	0.343	0.342
Year			x	x	x	x
MSA*Year					x	x

* p<0.10, ** p<0.05, *** p<0.01

Note: The table reports OLS and IV Estimates for all the workforce. Clustered standard errors by MSA are reported in parenthesis. We report results with and without city-specific trends.

Table 6: First Stage Regression

	Model 1.2 First Stage	Model 1.4 First Stage	Model 1.6 First Stage
Experience	-0.002	0.000	0.000
	(0.002)	(0.000)	(0.000)
Experience Squared	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)
Years of Schooling	0.001	0.000*	0.000*
	(0.003)	(0.000)	(0.000)
Married	0.055**	-0.001**	-0.001**
	(0.024)	(0.000)	(0.000)
Married*Sex	-0.034*	0.000	0.000
	(0.016)	(0.000)	(0.000)
Sex (Female=1)	0.019	0.001	0.001
	(0.017)	(0.001)	(0.000)
Instrument	0.510***	0.497***	0.458***
	(0.098)	(0.036)	(0.036)
Constant	1.721	2.061***	1.436**
	(1.194)	(0.440)	(0.477)
Observations	747828	747828	747828
Partial F-Stat (IV)	27.082	190.593	161.854
R^2	0.454	0.988	0.989
Year		x	x
MSA*Year			x

* p<0.10, ** p<0.05, *** p<0.01

Note: The table reports the first stage estimates for the regression in Table 5. Clustered standard errors by MSA are reported in parenthesis. We report results with and without city-specific trends. We report the partial F-Statistic of the instrumental variable rather than the F-Statistic of the regression. The F-Statistic of the first stage is implausible large because given that the first and second stage are regressions at different levels.

Table 7: Log Real Hourly Wage Formal Sector

	Model 1.1 OLS	Model 1.2 IV	Model 1.3 OLS	Model 1.4 IV
Experience	0.023***	0.023***	0.023***	0.023***
	(0.001)	(0.001)	(0.001)	(0.001)
Experience Squared	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Years of Schooling	0.135***	0.135***	0.135***	0.135***
	(0.004)	(0.004)	(0.004)	(0.004)
Married	0.043***	0.044***	0.041***	0.042***
	(0.007)	(0.008)	(0.007)	(0.011)
Married*Sex	0.011	0.010	0.012	0.011
	(0.010)	(0.011)	(0.010)	(0.013)
Sex (Female=1)	-0.050***	-0.049***	-0.050***	-0.050***
	(0.008)	(0.009)	(0.008)	(0.009)
Log Refugee Share	-0.060***	-0.069***	-0.046*	-0.054
	(0.013)	(0.018)	(0.023)	(0.048)
Constant	5.468***	5.430***	5.536***	5.493***
	(0.067)	(0.099)	(0.140)	(0.282)
Observations	49541	49541	49541	49541
F-Stat	641.299	470.584	877.519	953.497
R^2	0.495	0.495	0.497	0.497
Year			x	x

* p<0.10, ** p<0.05, *** p<0.01

Note: The table reports OLS and IV Estimates for the informal sector. Clustered standard errors by MSA are reported in parenthesis. Information on formal and informal sectors is only available for the second quarter of the year, this regression uses data of these quarters only.

Table 8: Log Real Hourly Wage Informal Sector

	Model 1.1 OLS	Model 1.2 IV	Model 1.3 OLS	Model 1.4 IV
Experience	0.020***	0.019***	0.019***	0.018***
	(0.001)	(0.002)	(0.001)	(0.002)
Experience Squared	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Years of Schooling	0.059***	0.059***	0.059***	0.057***
	(0.002)	(0.002)	(0.002)	(0.003)
Married	0.071***	0.073***	0.073***	0.079***
	(0.020)	(0.020)	(0.020)	(0.022)
Married*Sex	-0.133***	-0.136***	-0.136***	-0.145***
	(0.027)	(0.027)	(0.026)	(0.029)
Sex (Female=1)	0.112***	0.115***	0.113***	0.119***
	(0.024)	(0.026)	(0.024)	(0.029)
Log Refugee Share	-0.098***	-0.150***	-0.112**	-0.235**
	(0.029)	(0.033)	(0.046)	(0.100)
Constant	5.720***	5.512***	5.610***	5.028***
	(0.142)	(0.156)	(0.247)	(0.518)
Observations	37996	37996	37996	37996
F-Stat	298.920	153.869	12992.979	847.021
R^2	0.107	0.102	0.109	0.093
Year			x	x

* p<0.10, ** p<0.05, *** p<0.01

Note: The table reports OLS and IV Estimates for the informal sector. Clustered standard errors by MSA are reported in parenthesis. Information on formal and informal sectors is only available for the second quarter of the year, this regression uses data of these quarters only.

Table 9: Employment All Urban Workforce

	Model 1.1 LPM	Model 1.2 IV	Model 1.3 LPM	Model 1.4 IV	Model 1.5 LPM	Model 1.6 IV
Experience	0.036***	0.036***	0.036***	0.036***	0.036***	0.036***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Experience Squared	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Years of Schooling	0.017***	0.017***	0.017***	0.017***	0.017***	0.017***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Married	0.102***	0.102***	0.102***	0.102***	0.101***	0.101***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Married*Sex	-0.055***	-0.055***	-0.055***	-0.055***	-0.056***	-0.056***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Sex (Female=1)	-0.019***	-0.019***	-0.019***	-0.019***	-0.019***	-0.019***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Log Refugee Share	0.003	0.001	0.006	0.002	0.010**	0.020**
	(0.005)	(0.008)	(0.008)	(0.013)	(0.003)	(0.007)
Constant	0.131***	0.119***	0.147***	0.129*	0.163***	0.216***
	(0.030)	(0.033)	(0.045)	(0.061)	(0.029)	(0.032)
Observations	1254295	1254295	1254295	1254295	1254295	1254295
F-Stat	470.122	403.868	2088.217	3694.019	.	1.284e+307
R^2	0.330	0.330	0.330	0.330	0.332	0.332
Year			x	x	x	x
MSA*Year					x	x

* p<0.10, ** p<0.05, *** p<0.01

Note: The table reports OLS and IV Estimates for all the workforce. Clustered standard errors by MSA are reported in parenthesis. We report results with and without city-specific trends. The coefficients need to be multiplied by 0.0953 in order to get the effect of 10 percent increase in the share of migrants.

Table 10: Multinomial Logit (Base=Formal Employment)

	Unemployed	Informal Emp.
Experience	-0.094***	-0.093***
	(0.005)	(0.004)
Experience Squared	0.001***	0.001***
	(0.000)	(0.000)
Years of Schooling	-0.255***	-0.396***
	(0.012)	(0.016)
Log Refugee Share	0.257***	0.336***
	(0.062)	(0.083)
Sex (Female=1)	-0.178***	0.133**
	(0.038)	(0.057)
Married	-1.079***	-0.852***
	(0.054)	(0.056)
Married*Sex	1.248***	0.446***
	(0.056)	(0.049)
Observations	117569	117569
Pseudo R^2	0.165	0.165
Year	x	x

* p<0.10, ** p<0.05, *** p<0.01

Note: The table reports the multinomial logit results. Clustered standard errors by MSA are reported in parenthesis. The probabilities reported are relative to being employed in the formal sector. Information on formal and informal sectors is only available for the second quarter of the year, this regression uses data of these quarters only.

Table 11: Probability of Working for the Informal Sector

	Model 1.1 LPM	Model 1.2 IV	Model 1.3 LPM	Model 1.4 IV
Experience	-0.014***	-0.013***	-0.014***	-0.013***
	(0.001)	(0.001)	(0.001)	(0.001)
Experience Squared	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Years of Schooling	-0.064***	-0.064***	-0.064***	-0.063***
	(0.002)	(0.002)	(0.002)	(0.002)
Married	-0.132***	-0.133***	-0.133***	-0.136***
	(0.008)	(0.007)	(0.007)	(0.008)
Married*Sex	0.085***	0.086***	0.086***	0.088***
	(0.007)	(0.007)	(0.007)	(0.007)
Sex (Female=1)	0.023**	0.022***	0.023**	0.021**
	(0.009)	(0.009)	(0.009)	(0.009)
Refugee Share	2.371***	3.150***	2.822***	4.711***
	(0.565)	(0.637)	(0.719)	(1.506)
Constant	1.218***	1.200***	1.227***	1.206***
	(0.048)	(0.047)	(0.050)	(0.050)
Observations	87097.000	87097.000	87097.000	87097.000
F-Stat	644.993	466.209	5178.261	1756.081
R^2	0.338	0.338	0.339	0.336
Year			x	x

* p<0.10, ** p<0.05, *** p<0.01

Note: The table reports OLS and IV Estimates for all the workforce. Clustered standard errors by MSA are reported in parenthesis. Information on formal and informal sectors is only available for the second quarter of the year, this regression uses data of these quarters only. In this regression we use the share of refugees rather than the log share of refugees.

Table 12: Log Real Hourly Wage All Urban Workforce by Gender

	OLS	IV	OLS	IV	OLS	IV
Females						
Log Refugee Share	-0.089***	-0.118***	-0.097***	-0.153***	-0.044**	-0.125**
	(0.018)	(0.021)	(0.028)	(0.049)	(0.018)	(0.048)
Observations	331925	331925	331925	331925	331925	331925
F-Stat	1163.339	1452.643	1604.536	1358.854	.	1.798e+307
R^2	0.303	0.302	0.304	0.302	0.311	0.310
Males						
Log Refugee Share	-0.059**	-0.082**	-0.065*	-0.115*	-0.026	-0.095**
	(0.024)	(0.030)	(0.035)	(0.060)	(0.022)	(0.041)
Observations	415903	415903	415903	415903	415903	415903
F-Stat	879.969	1625.360	1554.098	2519.664	.	1.798e+307
R^2	0.357	0.356	0.357	0.358	0.366	0.368
Year			x	x	x	x
MSA*Year					x	x

* p<0.10, ** p<0.05, *** p<0.01

Note: The table reports OLS and IV Estimates for all the workforce. Clustered standard errors by MSA are reported in parenthesis. We report results with and without city-specific trends.

Table 13: Log Real Hourly Wage in the Formal Sector by Gender

	OLS	IV	OLS	IV
Females				
Log Refugee Share	-0.063***	-0.064***	-0.043*	-0.032
	(0.013)	(0.016)	(0.022)	(0.046)
Observations	22574	22574	22574	22574
F-Stat	753.445	487.824	738.254	593.365
R^2	0.499	0.499	0.503	0.503
Males				
Log Refugee Share	-0.058***	-0.073***	-0.050*	-0.076
	(0.013)	(0.021)	(0.024)	(0.054)
Observations	26967	26967	26967	26967
F-Stat	373.448	387.001	1252.909	1343.417
R^2	0.492	0.492	0.493	0.493
Year			x	x

* p<0.10, ** p<0.05, *** p<0.01

Note: The table reports OLS and IV Estimates for all the workforce. Clustered standard errors by MSA are reported in parenthesis. Information on formal and informal sectors is only available for the second quarter of the year, this regression uses data of these quarters only.

Table 14: Log Real Hourly Wage in the Informal Sector by Gender

	OLS	IV	OLS	IV
Females				
Log Refugee Share	-0.114***	-0.147***	-0.131**	-0.210**
	(0.026)	(0.034)	(0.044)	(0.085)
Observations	20130	20130	20130	20130
F-Stat	88.045	79.685	72.450	62.220
R^2	0.076	0.074	0.079	0.072
Males				
Log Refugee Share	-0.079**	-0.150***	-0.093	-0.262*
	(0.035)	(0.039)	(0.054)	(0.128)
Observations	17866	17866	17866	17866
F-Stat	312.089	142.339	252.826	201.614
R^2	0.141	0.133	0.143	0.115
Year			x	x

* p<0.10, ** p<0.05, *** p<0.01

Note: The table reports OLS and IV Estimates for all the workforce. Clustered standard errors by MSA are reported in parenthesis. Information on formal and informal sectors is only available for the second quarter of the year, this regression uses data of these quarters only.