

The Impact of U.S. Deportation of Criminals on Gang Development and Education in El Salvador

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Abstract

Exploiting a change in American immigration policy that increased deportations of criminals and introduced U.S.-based gangs to El Salvador, I study the impact of the expansion of U.S.-based gangs on gender-specific education accumulation in El Salvador. Regions with high U.S.-based gang presence are identified by locating areas exhibiting a large decline in homicides after a recent truce between two major U.S.-based gangs in El Salvador. I find that these areas became disproportionately more violent as more criminals were deported from the United States to El Salvador. Using variation in both timing of American immigration policy and gang intensity within a location, I estimate a difference-in-differences model to study the impact of increased gang exposure on children's education. I find that the establishment of gangs hinders basic education (comparable to U.S. grades 1-9) attainment for boys. The results for girls are weaker and mostly statistically indistinguishable from zero. Additionally, I show that trends in education only shift following the American deportation policy, or that, the effect is not explained by pre-existing education trends. I further argue that the results are not driven by selective domestic or international migration. Finally, the mechanism explaining the results in this paper appears to be exposure to gangs and not just high rates of violence. I do not find evidence suggesting that boys joining gangs explain the effects. Instead, I argue that boys in gang areas increase employment perhaps in response to gangs' extortion practices.

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1 Introduction

Within the last decade, El Salvador has consistently had some of the highest homicide rates in the world, only occasionally losing the first position to Honduras. Street gangs, a relatively new phenomenon in El Salvador, are responsible for a significant portion of the country's high crime and homicide rates. The growth of violent gangs in El Salvador has been attributed to the deportation of thousands of Salvadorans from the United States following the enactment of a harsh deportation law in 1996. Today, two major rival gangs of American origin, the Mara Salvatrucha-13 and the Barrio-18, are often involved in violent battles for control over neighborhoods across the nation. This paper establishes a link between the American deportation policy and the expansion of these gangs. The law change is further exploited to uncover the economic impact of gangs in El Salvador.

While economists have long identified conflict within a nation as an important deterrent to economic growth, analysis quantifying the role of gangs on economic outcomes remains limited. One difficulty with answering the question lies in the fact that gang membership is likely an outcome of a nation's economic well-being, and thus the relationship between gang membership and the state of the economy presents a classic case of endogeneity. In this paper, I take advantage of an American deportation policy as a potential exogenous shock to El Salvador's gang membership.¹ Several studies have argued that Salvadorans joined gangs as illegal immigrants in Los Angeles, and their deportation introduced these U.S.-based gangs to El Salvador.² These deportations are allegedly responsible for the growing gang problem in not just El Salvador but also in Honduras and Guatemala. In this paper, I present empirical evidence supporting the literature's claim that gang prominence in El Salvador is

¹Blake (2014) exploits the same changes in American immigration policy to show that criminal deportations increased homicides in a sample of 38 different countries. Blake (2014), however, does not distinguish between all homicides and gang-related homicides. This paper links the deportation of criminals from the United States to not just homicides but specifically to gang-related homicides.

²See Arana (2005), Brotherton and Ponce (2013), Donaldson (2012), and Fariña et al. (2010).

related to deportations from the United States. To the best of my knowledge, this is the first study to empirically test the claim that deportation of criminals from the United States contributed to the growth of gangs in El Salvador, making this one of the contributions of this paper. I then investigate whether the expansion of gangs also affects education accumulation in El Salvador. Using data from a time period in which El Salvador experienced growth in gang members of American origin following a change in United States' deportation policy, I show that an increased number of criminals and the establishment of gangs hinders basic education (comparable to U.S. grades 1 through 9) attainment of boys. The results for girls are weaker and mostly statistically indistinguishable from zero. Therefore, a second contribution of this paper is empirical evidence that gang exposure hinders education accumulation of boys.

To obtain a measure of geographical intensity of U.S.-based gangs in El Salvador, I rely on a recent truce between two of the largest gangs, both of American-origin, to stop killing. Areas with strong American-origin gang presence are identified by a large decline in homicides during the truce. I show that the identified gang areas became increasingly more violent with increased criminal deportations from the United States, verifying the claim that American deportation policy directly affected gang activity in El Salvador.

The empirical strategy employed to estimate the impact of introducing U.S.-based gangs on children's completed schooling is a difference-in-differences model. The first difference relies on geographical variation in gang intensity within El Salvador, while the second difference relies on variation in time before and after the change in American deportation policy. My findings are that boys, more so than girls, are negatively impacted by gang presence. Age-interacted regressions reveal that boys start lagging behind in their schooling when they turn 11 years of age, whereas girls do not experience a similar lag at that age.

For the validity of a difference-in-differences specification, it is important that high gang intensity areas and low gang intensity areas are on a similar education trend prior to the law change. In an alternative specification, I

test whether individuals in gang areas who are young at the time of increased criminal deportations are more strongly affected than individuals who are old enough to have completed schooling at the time of the policy change. Since individuals who were young at the time of the policy are exposed to gangs while still in school, they are expected to be impacted. Older cohorts, on the other hand, should have had the chance to complete their schooling before the composition of gangs changed, and thus should not be impacted. I find that boys who were young at the time of the law change have lower completed schooling, while schooling patterns for boys who were older at the time of the law change remain unchanged. This suggests that male education trends between the two areas shifted only after the law change. I find no effect for female cohorts, either young or old, at the time of the law change, further verifying the claim that female education was not affected by the changing composition of gangs.

The results of this paper are robust to several tests. I show that the results are not driven by selective domestic migration by finding no effect for individuals who have migrated within El Salvador before. That is, negative selection of those moving into gang-intensive areas, combined with positive selection of those moving into safer areas, does not explain the effect. Given that research has found that remittances from abroad and international migration to the United States can affect education completion in the home country (McKenzie, 2005; Edwards and Ureta, 2003), it is also important to show that the results are not driven by selective international migration. I show that the effects in this paper are not explained by a changing probability of children in gang-intensive areas, relative to those in safer areas, moving internationally.

Despite tests indicating that exposure to gangs is important in explaining the results, the findings of the paper are likely not driven by boys joining gangs. In one test, I show that boys who are from single parent homes and more likely to join gangs are not driving the effects found in this paper. Instead, I find that boys in gang areas increase employment while in school. This finding is more consistent with increased financial pressure in gang areas, perhaps due to gangs' extortion practices.

The rest of the paper is organized as follows. Section 2 discusses the related literature and section 3 discusses background information on Salvadoran gangs in the United States and the relevant deportation policy. Section 4 shows that American deportation of criminals was associated with increasing gang activity in El Salvador. Section 5 discusses the Salvadoran education system. Section 6 discusses the data and the methodologies, section 7 presents the results, and robustness checks follow in section 8. Section 9 discusses potential mechanisms and section 10 concludes.

2 Related Literature

While literature studying the effect of violence and conflict on economic outcomes is large and growing, research specifically studying the effect of the emergence of gangs on economic outcomes remains relatively unexplored. The existing literature has established that conflict hinders economic development. For example, Abadie and Gardeazabal (2003) finds that terrorist conflict in Basque Country in Spain lowered GDP per capita by 10 percentage points. They also find that a period of cease-fire in the affected area is associated with rising stock values of firms in the area. Similarly, Camacho and Rodriguez (2013) find that one-standard deviation increase in guerrilla and paramilitary attacks in a municipality increases the likelihood that a firm exits by 5.5 percentage points. Individuals have also been shown to adjust their labor supply by working in different sectors and by reducing their leisure time in response to increased violence (Fernández et al., 2014).

Research has even linked violent conflict to health outcomes. Akresh et al. (2012) finds that children exposed to the 1998 through 2000 Eritrea-Ethiopia war have lower height-for-age Z-scores in comparison to not exposed children. Similarly, Baez (2011) shows that exposure to a large population shock of refugees escaping the Burundi and Rwanda genocides worsened health and education outcomes of children in the host area of Northwestern Tanzania.

More closely related to this particular study is the literature that links conflict to education accumulation. In general, the existing literature shows that

increased levels of violence and conflict hinders education, and that girls and boys are often impacted differently. Justino et al. (2013) studies the impact of violence caused by the Indonesian invasion of Timor Leste on primary school completion and finds decreased primary school completion for boys but not for girls. The authors argue that boys were more likely to start working when violence grew in Timor Leste. Shemyakina (2011) uses geographical intensity of the 1998 armed conflict in Tajikistan to investigate its impact on gender-specific education attainment. Shemyakina (2011) finds a statistically significant decline in education attainment of girls, but not for boys. Similarly, Leon (2012) studies the impact of the Peruvian civil conflict on short and long-run educational achievement. The study shows that individuals exposed to violence during early childhood have lower completed years of schooling, while individuals experiencing the shock after starting schooling are able to catch up.

Recent studies have also focused on the impact of drug-related violence on economic outcomes in Mexico (Enamorado et al. (2014), Robels, Gustavo and Calderón, Gabriela and Mgaloni, Beatiz (2013), and Velasquéz (2014)). Brown and Velasquéz (2015) focus on the impact of growing violence in Mexico on education attainment. The findings are similar to Justino et al. (2013) and suggest that male children exposed to violence have reduced schooling while girls do not. This paper contributes to the literature by focusing on the expansion of violent gangs to El Salvador based on a policy based in the United States. Existing literature currently studies the impact of homegrown conflict and violence, and one of the contributions of this paper lies in the potential exogeneity introduced by American policy directly impacting the expansion of gangs in El Salvador.

3 Background

The Mara Salvatrucha 13 (MS-13), often deemed the “world’s most dangerous gang”, is believed to have originated in Los Angeles. To escape the nation’s civil war, thousands of Salvadorans fled to the United States in the 1980s, and

many of them ended up in streets of Los Angeles where Mexican and African American gangs already operated. The illegal immigrants from El Salvador remained in poverty and found the need to protect themselves from the existing Los Angeles gangs and thus formed the Mara Salvatrucha 13 or joined the existing Barrio-18, a rival gang of MS-13. By the 1990s, Los Angeles-based gangs grew more powerful and violent with the flourishing drug trafficking market (Lineberger, 2011). During this time period, American efforts to control immigration were strengthened. The Illegal Immigration Reform and Immigrant Responsibility Act (IIRIRA) of 1996 permitted the deportation of any non-citizen, including legal residents, serving a sentence longer than a year after completion of the prison term (Thale and Falkenburger, 2006). The law also redefined “aggravated felony” if a non-citizen committed it, further easing the removal of non-citizens. Failing to appear in court or having fraudulent papers, for example, were considered to be deportable crimes (The Economist, 2014). The IIRIRA was also applied retroactively allowing the deportation of U.S. citizens who committed a crime as non-citizens (Blake, 2014). As a result, 1996 marked the beginning of a large increase in the number of criminals and gang members extradited from the United States to El Salvador.³ While the exact number of gang members deported is unknown, it is believed that many young people who were deported after criminal convictions had become involved in gangs (Thale and Falkenburger, 2006).

Lacking a criminal record within El Salvador, the deportees were released from the police upon arrival (Lineberger, 2011). Freed on the streets of El Salvador, criminals extradited from the United States found a new home and reformed the Los Angeles-style gangs across borders (Lineberger, 2011). Studies have yet to analyze the impact of increased number of criminals from abroad and the expansion of U.S.-based gangs on economic outcomes within El Salvador. This paper provides empirical evidence linking deportation of criminals from the United States to reduced education attainment of boys in El Salvador. In the next section, I verify that gang-related violence in El

³Criminal deportations do not include individuals deported at the border without legal documents.

Salvador increased as deportations of criminals from the United States rose.

4 Deportations and criminal activity in El Salvador

The analysis in this paper relies on geographical intensity of gangs within El Salvador. First, I explain how areas are assigned a high gang intensity value, and then show that areas with high gang intensity experienced a greater growth in homicide rates as criminal deportations from the United States increased.

To deduce geographical variation in gang intensity within El Salvador, I make use of a recent truce reached between El Salvador's largest gangs, both U.S.-based, MS-3 and Barrio-18. In March of 2012, leaders of the two largest gangs in El Salvador instructed their members to stop murdering rival gang members as well as law enforcement members.⁴ The government brokered truce offered gang members assistance in finding employment and a move to medium security prisons with permitted cell phone use. At least, temporarily, the truce led to a steep decline in homicide rates within El Salvador.⁵ Since El Salvador had high homicide rates even before the expansion of U.S.-based gangs, the truce reached in 2012 provides a unique opportunity to disentangle gang-related crime from all other crime in El Salvador. Additionally, the truce was between two gangs of American origin, MS-13 and Barrio-18. Hence, I argue that areas exhibiting a sharp decline in homicide rates during the truce-period are those with highest density of U.S.-based gangs.

I use homicide rates from 2007 till 2011 for the pre-truce period, since this period is close to the timing of the truce and the 2007 sample used to study education outcomes in this paper. I assign a municipality as having high gang intensity if the municipality exhibits at least a 50% decline in homicide rates

⁴According to United Nations (2012), estimates of Salvadoran gang membership in gangs other than MS-13 or Barrio-18 are either unknown or consist of a handful of known members. Whereas, the estimate 2012 for MS-13 and Barrio-18 was 12,000 and 8,000 members in El Salvador, respectively (United Nations, 2012).

⁵The truce has since been broken, and homicides in El Salvador have spiked again.

from its pre-truce period (2007-2011) to its truce period (2012-2013).⁶ Figure 1 shows the location of the municipalities with high density of U.S.-based gangs using the method described above. The 2012 through 2013 truce reveals that although gang intensity of U.S.-based gangs is spread throughout El Salvador, the Western region of El Salvador is more strongly affected.⁷ It must be emphasized that these areas are identified using a recent truce, however, the analysis investigating the effects on education cover a period before the truce (1992 till 2007). It is then important to verify that these areas, which are identified as having high gang intensity near the truce period, are also the areas in which U.S.-based gangs originated and grew during the period of the study. In the following subsection, I investigate if the entrance of criminals from abroad more directly impacted the identified gang areas.

⁶There could be some gang areas in which the truce was not affective, in which case, their inclusion in safer areas should only bias estimates investigating differential education trends to zero.

⁷I also use the LAPOP 2006 El Salvador survey to check if the truce successfully identifies gang areas. The survey is small (1,729 total observations) with some municipalities with no observations and others with very few observations. Nonetheless, the survey asks “to what extent, do you think your neighborhood is affected by gangs”. In municipalities identified as gang-intensive using the truce, 30% of respondents state that it is either somewhat or a large problem, while the analogous number in other municipalities is 20%.

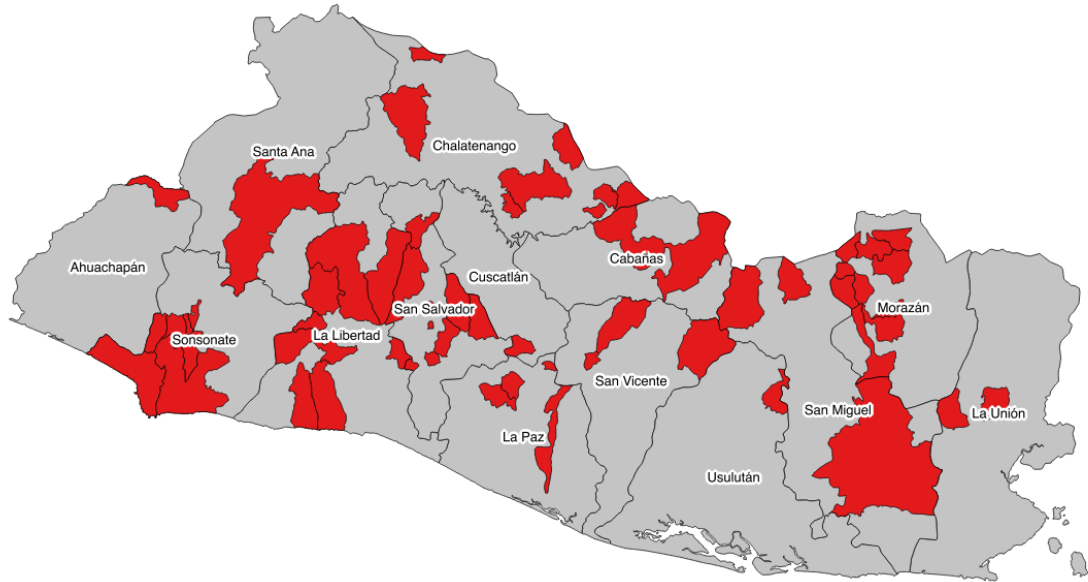


Figure 1: Municipalities with high U.S.-based gang prevalence. Figure uses municipality-level homicide data from The Institute of Legal Medicine.

4.1 Deportations and geographical variation in homicides

Here, I show that areas identified as high gang intensity became disproportionately more violent with an increasing population of criminal deportees from the United States. Figure 2 graphs lagged one year values of criminal deportations from the United States to El Salvador and shows trends in homicides in El Salvador. The trend of criminal deportations from the United States is shown in the dashed line. It can be seen that the 1996 law change is responsible for some increase in criminal deportations, but a dramatic shift in the criminal deportations trend is also seen after 2001. This is the result of increased funds that were made available to enforce the IIRIRA following the September 11th 2001 terrorist attacks in the United States (The Economist, 2014).

The homicide trends are depicted for both municipalities with high gang presence and also municipalities with relatively low gang presence. The data

shown in Figure 2 are from annual reports from The Institute of Legal Medicine in El Salvador. Unfortunately these data are not available for years prior to 1999, however deportation of criminals from the United States continued to rise over the time period for which homicide data are available.⁸ This allows me to investigate whether increasing criminal deportations played a role in increasing homicides in El Salvador, and whether this increase was higher in areas that are identified as having a high gang intensity.

In general, the graph suggests that homicides in all of El Salvador rise as more deported criminals enter the country. However, the rate of the increase in homicides is much greater in high gang intensity areas. The graph also shows that homicide rates in both areas were closer together between 1999 and 2001 and the gap widens as criminal deportations from the United States continue to rise. It also appears that the policy that became effective in 1996 did not directly increase gang violence until 2002 as indicated by the diverging trend in homicides in gang and safer areas starting in 2002. This observation, however, does not rule out the claim that gangs were an increasing problem starting in 1996; it simply suggests that the gang violence became a problem after the accumulations of some minimum threshold of gang members. It is also interesting to note that while increased criminal deportations from the United States is associated with increasing violence in both low gang intensity and high gang intensity areas, the truce reached by U.S.-based gangs does not decrease homicide rates in low gang intensity areas. Although gang areas exhibiting a sharp decline in homicides during the truce is mechanical (by definition), it is surprising that safer areas show no indication of even a small decline in homicides. This suggests that the trend in low gang intensity areas is a general trend in homicides in El Salvador and is not directly related to U.S.-based gang violence.

⁸Inquires with the National Police of El Salvador revealed that homicide data prior to 1999 were not available at the municipality level. Only aggregate yearly values of total homicides in all of El Salvador were available.

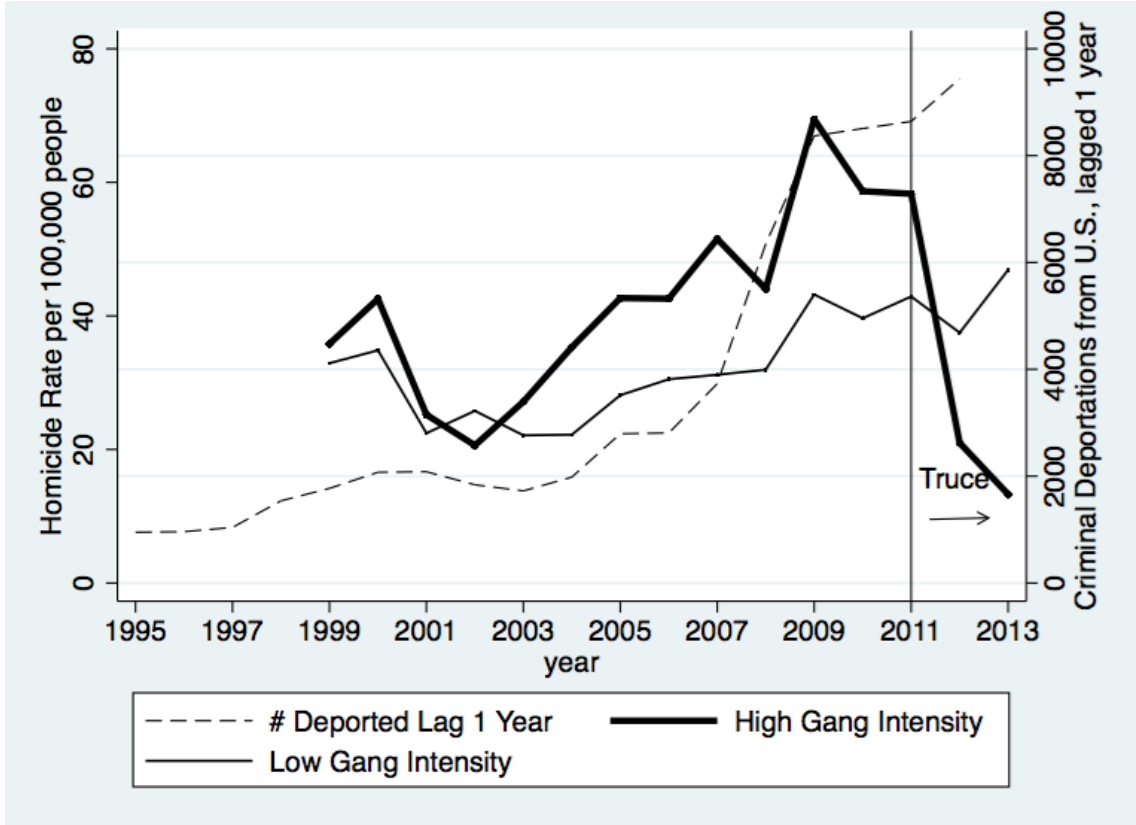


Figure 2: Geographical differences in homicide rates and criminal deportations from the United States to El Salvador. Deportation data from Yearbook Statistics of Immigration; homicide data from The Institute of Legal Medicine.

While figure 2 suggests that gang intensity grew with more criminal deportations, it fails to account for region-specific differences or trends in homicide over time. I empirically test whether the trends in homicide rates are dependent on deportations from abroad and investigate how the trends differ across regions identified as high versus low gang intensity. Equation 1 regresses the municipality’s homicide rate in year t on the number of lagged-one-year criminal deportations, $Criminal\ Deportations_{t-1}$, and on the interaction of lagged-one-year criminal deportations and high gang intensity, $High\ Intensity_m \times Criminal\ Deportations_{t-1}$. Also included in the regression are municipality fixed effects, which are perfectly correlated with $High\ Intensity_m$, and thus its main effect is not estimated when municipality

fixed effects are included. To account for geographical trends in homicides over time, I also include state-specific year fixed effects. I cluster standard errors at the municipality level.

$$\begin{aligned}
 \text{Homicide Rate}_{mt} = & \beta_1(\text{High Intensity}_m \times \text{Criminal Deportations}_{t-1}) \quad (1) \\
 & + \text{State} \times \text{Year}_t + \beta_2 \text{Criminal Deportations}_{t-1} + \text{Municipality}_m + \epsilon_{mt}
 \end{aligned}$$

Table 1 shows the results from estimating equation 1 with and without additional controls. The results in Table 1 are based on the available pre-truce municipality-level homicide data from 1999 till 2011. Column 1 includes no additional controls, column 2 adds municipality-level fixed effects and state-specific year fixed effects. The results in column 1 fail to reject the claim that, absent increased criminal deportations, gang areas and safer areas have similar homicide patterns, as a positive but statistically insignificant effect is seen for *High Intensity_m*. Overall the table confirms the visual evidence shown in Figure 2 that increased number of criminal deportations from the United States is associated with an increase in homicides in all of El Salvador, but the increase is much higher in areas identified as gang-intensive. The results imply that a 1,000 additional criminal deportations from the United States one year ago increased homicides in less-gang-intensive areas by 2.2 homicides per 100,000 people, but this result is not robust to the inclusion of state-year and municipality fixed effects. On the other hand, gang-intensive areas have *an additional 2.1* homicides per 100,000 people, suggesting that the total effect in these areas is double the effect in safer areas. A similar result is found with additional controls in column 2.

Table 1: The effect of criminal deportations on homicides in El Salvador

	(1)	(2)
$High\ Intensity_m \times Criminal\ Deport_{t-1}$	0.00211 (0.000803)	0.00147 (0.000710)
$Criminal\ Deport_{t-1}$	0.00217 (0.000270)	0.00189 (0.00160)
$High\ Intensity_m$	2.686 (3.602)	–
Constant	22.58 (1.443)	–
Municipality Fixed Effects	N	Y
State×Year Fixed Effects	N	Y
Observations	3,405	3,405

The dependent variable is homicide rates, measured in # homicides per 100,000 individuals. Standard errors clustered at the municipality level. Sample consists of years 1999 till 2011. Data source: The Institute of Legal Medicine.

The findings in this section can be summarized as follows. The change in American deportation policy directly impacted criminal activity in El Salvador. The claim that gang activity, specifically, worsened in El Salvador with an increase in criminal deportations is also investigated. I take advantage of a recent truce between two gangs of American origin to identify municipalities where American gang presence is likely high. After identifying these areas, I show that criminal deportations disproportionately increased homicides in the identified gang areas, suggesting that gangs of American origin became more violent over the period in which criminal deportations from the United States increased. Although not as robust of a finding, there is some indication that criminal deportations also determine all criminal activity in El Salvador, and not just gang activity. To the extent that violence increased in all of El Salvador with increased deportations of criminals, estimates comparing high gang intensity areas to low gang intensity areas will provide a lower bound estimate of the deportation policy on education accumulation in El Salvador.

These results also verify that using the truce, which happened after the IPUMS sample years, is a reasonable way to identify gang areas in 2007 (the period of the education study). Figure 2 shows that the divergence in homicides in gang versus safer areas began after 2001 and by 2007 the two areas were already very different in their violence levels. The next section discusses the education system in El Salvador.

5 Education in El Salvador

Education in El Salvador consists of three cycles of basic training consisting of grades one through nine, which is followed by 3 years of secondary training consisting of grades ten through twelve. Students may alternatively opt for vocational training instead of traditional high school, which is also three years of training. The ages with their respective grade levels are shown in Table 2. The Salvadoran Constitution, enacted in 1983, guaranteed the right to basic education and made public basic education free. Although basic training in El Salvador is mandatory, completion of basic education remains low. By 2005, only one in four of all children had completed all nine years of basic training (Rincon et al., 2005).

Table 2: Education System

Age	Target grade
4 - 6	Pre-school
7 - 9	I cycle of basic (1-3)
10 - 12	II cycle of basic (4-6)
13 - 15	III cycle of basic (7-9)
16 - 18	Secondary (10-12)

Historically, access to education in El Salvador has also experienced great inequality across the rural-urban divide. Rural areas were most directly impacted by the civil war in 1980's, and thus suffered great loss of education access. A struggle to increase educational access to these areas has led to several programs aimed to increase coverage in rural areas. Educacion con

Participacion de la Comunidad (EDUCO) is one of the first such programs, which allowed the creation of community-governed schools to help increase rural access. Given that majority of gang activity occurs in urban areas of El Salvador (my analysis reveals that 78% of the identified gang areas are urban), comparing trends in education in high gang activity areas to low gang activity areas would loosely compare trends in urban to rural towns. I argue the proper comparison group is within urban areas, and thus focus on education attainment in urban El Salvador. The results, however, are comparable if the entire country is included in the sample and a control for urban areas is included in the regressions.

6 Methodologies

6.1 Data

I use the 1992 and 2007 Salvadoran censuses obtained from IPUMS. The two survey years allow me to compare Salvadoran education trends before and after the change in American deportation policy. These data include detailed information on household members and their socioeconomic characteristics such as schooling and employment. The data also include detailed information on individual's migration patterns.

Table 3 shows individual-level characteristics across time and geography using the Salvadoran IPUMS samples. I focus my analysis on urban areas of El Salvador for reasons discussed above, and for consistency, Table 3 is also limited to urban areas. However, the data only identify urban areas in the 2007 period. I rely on the fact that access to piped water has been low in rural areas to create an urban variable for the 1992 period (Lewis et al., 1999). If the household reports as having no access to piped water nearby, I code the household as being in a rural area. This estimate produces a rural population rate within the 1992 sample of 47%, which is consistent with the 1992 rate of 50% given by World Bank Indicators. Keeping in mind that the focus of this paper is completion of basic education, which has a target age between 7

Table 3: Summary Statistics

	Not Gang Intensive		Gang Intensive	
	Mean	Obs	Mean	Obs
Panel A: 1992 Sample	Children between ages 7 - 15			
Attends School %	0.86	26,704	0.89	13,718
Years of Schooling	3.60	28,683	3.91	14,449
Has Electricity, %	0.83	28,716	0.94	14,473
# of Bedrooms	1.81	28,716	1.94	14,473
Owns Home %	0.73	28,716	0.73	14,473
Head Employed %	0.95	28,716	0.95	14,473
Panel B: 2007 Sample	Children between ages 7 - 15			
Attends School %	0.88	33,729	0.89	20,848
Years of Schooling	3.96	33,560	4.01	20,781
Has Electricity, %	0.93	33,729	0.96	20,848
# of Bedrooms	1.92	33,729	2.03	20,848
Owns Home %	0.73	33,729	0.71	20,848
Head Employed %	0.88	33,729	0.91	20,848
Panel C: 1992 Sample	Children age 18			
Attends School %	0.60	2,603	0.65	1,188
Years of Schooling	8.34	2,677	8.93	1,212
Panel D: 2007 Sample	Children age 18			
Attends School %	0.56	3,017	0.58	1,818
Years of Schooling	9.22	3,011	9.47	1,812

Data from El Salvador IPUMS samples in 1992 and 2007. Sample is restricted to urban areas.

and 15, panels A and focus on children between 7 and 15 in 1992 and 2007, respectively.

It can be seen that children in gang-intensive areas have completed slightly more years of schooling, have higher school attendance rates, and are from homes with higher rates of electricity and more bedrooms in 1992. Both areas are identical in the average likelihood of home ownership and have the same rate of household head employment rate in 1992. Overall, panel A suggests that the municipalities where gangs have emerged were positively selected in

1992. Panel B repeats the analysis of panel A for the 2007 period. It can be seen that children in gang areas continue to be positively selected in 2007; they still have higher school attendance rates, and are from homes with higher rates of electricity with more bedrooms. While home ownership is lower in 2007 in gang areas, employment rate for the household head is higher. These summary statistics show that there is clear positive selection of areas that eventually held gangs. Thus, the analysis in this paper controls for municipality-level fixed effects to account for the average differences in socioeconomic status at the municipality level and various variables of Table 3 to help further control for the household's socioeconomic status. I argue that selection of areas that eventually held gangs is not an issue in this paper. In specifications that control for municipality-level controls as well as various factors to estimate income, I find that only individuals who were young at the time of the policy change in 1996 exhibit an effect, while individuals who were old at the time of the policy change do not. This suggests that education trends, once controlling for various factors, only change in gang areas after the policy.

It is also useful to see the schooling completion rates of 18 year-olds who had time to fully complete basic education, or 9th grade. Panels C and D shows education statistics for 18 year-old children in 1992 and 2007, respectively. Interestingly, 18 year-old children have low school attendance rates, suggesting that many 18 year-old individuals have completed schooling. Furthermore, the average years of schooling in 1992 in both gang and non-gang-intensive areas are below 9. This implies that several 18-year-old children did not complete their basic schooling, which was designed to be finished by age 15. By 2007, a typical 18 year old has completed basic education, as the average completed years of schooling is larger than 9. Nonetheless, a similar pattern as in panels A and B is seen, where completed years of schooling of 18 year-old children is also higher in gang areas than in non-gang areas.

6.2 Estimating Equation: Difference-in-Differences Model

It remains of interest whether education trends in gang areas exhibited less growth than non-gang-intensive areas. I use geographical variation in gang intensity to estimate a difference-in-differences model that compares high gang intensity municipalities to low gang intensity municipalities, before and after American-origin gangs expanded to El Salvador. It is important to realize that the IPUMS data used in this analysis only identifies more densely populated municipalities, and smaller municipalities within a state are lumped together and identified as “rest of state”. Thus, an unidentified municipality is attached the average homicide rate for all municipalities that are included in “rest of state”.⁹

$$Y_{imt} = \beta_1(High\ Intensity_m \times Post_t) + State_d \times Year_t \quad (2) \\ + Municipality_m + Age_i + X_i + \epsilon_{imt}$$

Equation 2 estimates the impact of the expansion of U.S.-based gangs in El Salvador on schooling outcomes, Y_{imt} . The model regresses education variables of interest (years of schooling or a dummy variable indicating whether the child is currently attending school) on the interaction of high gang prevalence in the child’s municipality, $High\ Intensity_m$, and whether the child is observed after gangs expanded to El Salvador, $Post_t$. Here, $Post_t$ takes a value of 1 if the year of observation is 2007, and it takes a value of 0 if the year of observation is 1992. Also included in the regression are state-specific time fixed effects to control for regional trends in education. Since $Post_t$ is perfectly correlated with $State_d \times Year_t$ fixed effects, its main effect cannot be estimated with the inclusion of state-time fixed effects. The regression also includes municipality-level fixed effects to control for time invariant character-

⁹This changes the graph of high gang intensity areas. Specifically, smaller municipalities in La Libertad identified in the sample as “rest of state” are also picked up as having high gang intensity. Additionally, some high gang intensity municipalities are coded as safer when lumped together with “rest of state”. This type of miscoding, including safer municipalities in gang-intensive and gang-intensive municipalities in the safer group, should only bias the estimates towards zero. A map showing the identified high gang intensity areas using the IPUMS data is included in Figure A1 in the Appendix.

istics that affect schooling in a municipality. Since municipality fixed effects are perfectly correlated with *High Intensity_m*, its main effect is not included. It is important to control for income since it is likely that the child's education is strongly dependent on the family's socioeconomic status. Thus, I control for several variables that proxy for income in X_i , as income levels are not included in the IPUMS samples. These include fixed effects for whether the household head is employed, whether the household owns (instead of rents) the home, has access to electricity, and the number of bedrooms in the house. Note that household head employment fixed effects also help account for differential economic trends in gang versus safer areas. I cluster all standard errors at the municipality level.

The sample of interest consists of children who are between 7 and 15 years of age at the time of survey. I do this to keep the focus on attendance of basic education, which is free in El Salvador. As described earlier, education access has been greatly unequal in urban versus rural areas in El Salvador. Thus, I focus my attention on only urban areas of El Salvador. Additional sample restrictions are placed to ensure that the effects are not explained by selective migration across regions. Since changing number of criminals could induce migration within El Salvador, I further restrict the sample to individuals who are currently in the municipality of their birth. However the sample is young children and it is possible that they have not migrated but their parents have, and thus children in gang-intensive areas come from negatively selected families. To avoid this issue, the sample is also restricted to households in which the head of the household has also not moved. To ensure that the deported criminals themselves do not drive the effects, I further limit the sample to individuals who are born in El Salvador and belong to households with no international migrants. The difference-in-differences specification described above relies on the claim that education trends prior to the law change in gang and low-gang areas follow a similar trajectory. The next specification helps test this very claim.

6.3 Estimating Equation: Age at Exposure

One could make the argument that because the emergence of gangs in specific locations is not random, it is possible that these areas were experiencing a decreasing growth in education for reasons not related to gangs. It is possible to test this claim by investigating whether cohorts too old to be affected by the timing of the IIRIRA, or increased deportations of criminals from the United States, also experience an effect. Specification 3 follows the methodology of Duflo (2001) and Shemyakina (2011). In the specification, I focus on older individuals who have been given the opportunity to finish basic education and test whether the individual has completed all 9 years of basic education. The sample for estimation of equation 3 consists of children who are between 16 and 30 years old in 2007, and thus have been given a chance to complete 9 years of schooling which has a target age of 15. These individuals were between 5 to 19 years old in 1996 when the American immigration policy changed in the composition of deportees. In equation 3, education completion of cohorts who were young in 1996 in gang areas is compared to the education completion of cohorts who were old enough to have had the opportunity to finish basic education. I create four cohort bins for individuals who were young at the time of the policy; these consist of individuals who were between 5 and 7 years of age in 1996, 8 and 10 years of age in 1996, 11 and 13 years of age in 1996, and 14 and 16 years of age in 1996. The cohort bins for “young in 1996” are interacted with high gang intensity to investigate if young cohorts in gang areas, who are exposed to gang members at an early stage of their of their schooling, are worse off. The omitted category is children between 17 and 19 years of age in 1996. The model includes age in 1996 fixed effects, municipality fixed effects, and the same income variables as specification 2. Since the sample consists of older individuals, it is not limited to just children as in the sample for the estimation of equation 2. Instead of limiting the sample to children, the specification adds fixed effects for the individual’s relationship to the household head. In the following section, I present the results for the two specifications described above.

$$\begin{aligned}
Basic_{im} = & \beta_j \sum_{j=1}^4 (High\ Intensity_m \times Age\ in\ 1996_{i,j}) + Age\ in\ 1996_i \quad (3) \\
& + Municipality_m + X_i + \epsilon_{im}
\end{aligned}$$

7 Results

7.1 Difference-in-Differences

Table 4 presents the results from estimating the difference-in-differences model of Equation 2 with years of schooling and a dummy variable indicating child’s attendance as the dependent variables. Column 1 shows that in areas with high U.S.-based gang presence, boys between the ages 7 and 15 years old complete a 0.22 year less of schooling. The same effect for girls, shown in column 2, is much smaller in magnitude and statistically insignificant. Column 3 presents the effect of the emergence of gangs on whether a boy is currently attending school. Results imply that school-age boys in areas with strong gang presence are 3.8 percentage points less likely to be currently attending school. Once again, column 4 shows that the effect for girls’ attendance rates is much smaller in magnitude and statistically indistinguishable from zero.

The results in Table 4 include a sample of 7 to 15 year old children. It remains of interest whether there is a particular age when children are more susceptible to gangs exposure. Figures 3 and 4 graph the coefficient estimates of β_1 interacted with age and show age-specific effects of increased exposure to U.S.-based gangs on current school attendance and completed years of schooling, respectively. The two graphs tell a similar story and the negative impact on school attendance and completed years of schooling is stronger for boys than for girls. Figure 3 shows that attendance for boys in gang-intensive areas starts to lag behind at age 11, and the negative effect persists as boys get older. The estimated effects for boys are statistically significant at the 90% confidence level for ages 11, 13, and 15. Girls have a negative effect at very young ages,

Table 4: Exposure to high intensity gang locations on years of schooling and school attendance

Dependent variable	(1) Years Boys	(2) Years Girls	(3) Attending? Boys	(4) Attending? Girls
$High\ Intensity_m \times Post_t$	-0.222 (0.0741)	-0.0846 (0.0566)	-0.0379 (0.0127)	-0.0172 (0.0120)
Observations	26,110	24,283	25,230	23,621

Standard errors clustered at the municipality level. All specifications include state-specific year fixed effects, age fixed effects, municipality-level fixed effects, a control for whether the household owns the home, household head is employed, has access to electricity, and number of bedrooms in the home. Sample restricted to children between ages 7 and 15 in urban areas. Sample restricted to non-migrant children, families with non-migrant household head, and families with no international migrants. Data from El Salvador IPUMS samples in 1992 and 2007.

but they catch up to the education trends of girls in less-gang-intensive areas as they get older.

Figure 4 shows that boys and girls have similar schooling completion in high gang intensity areas until age 10. Young children from gang-intensive areas also have similar schooling completion as young children in less-gang-intensive areas until age 10, as the coefficient estimates are about zero. However, a lag for boys in high gang intensity areas is observed at age 12, after which the male lag in education persists and becomes larger until age 15. Negative impact on completed years of schooling for boys in gang areas is statistically significant at the 90% confidence level at ages 12, 14, and 15. On the other hand, the age-specific effects for girls completed years of schooling are close to zero and never statistically significant at a 90% confidence level. Overall, both graphs imply that boys start becoming susceptible to increased presence of gangs around age 11, while girls' schooling is largely not affected.

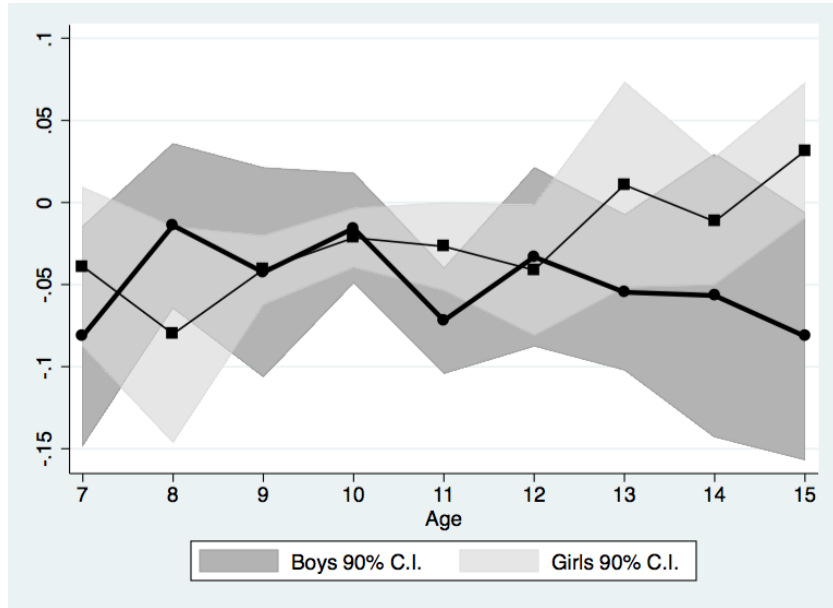


Figure 3: Age-interacted effect of increased gang prevalence on school attendance. Data from El Salvador IPUMS samples in 1992 and 2007.

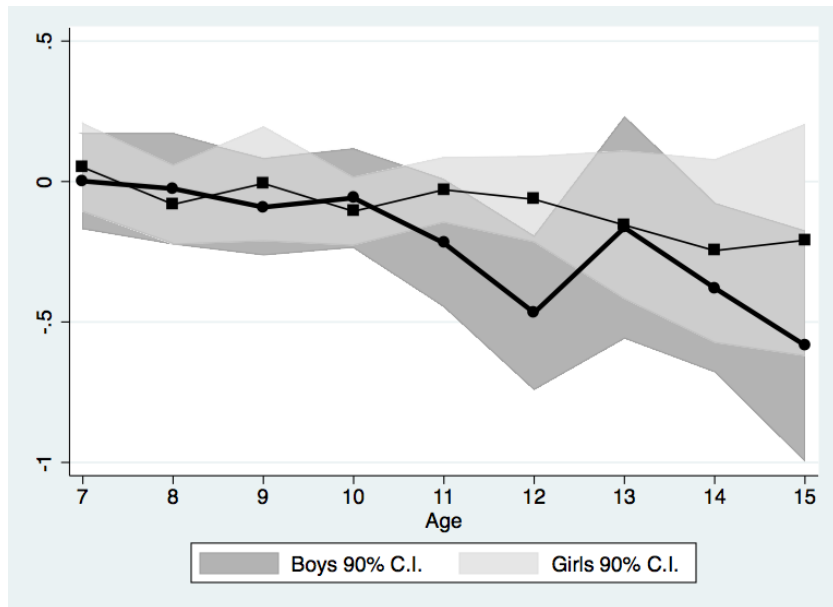


Figure 4: Age-interacted effect of increased gang prevalence on years of schooling. Data from El Salvador IPUMS samples in 1992 and 2007.

7.2 Age at Exposure Analysis

For the difference-in-differences specification to be valid, the underlying assumption of equal education trends in high and low gang intensity areas must hold. Specification 3 helps test this assumption. Table 5 presents results from estimating equation 3 on a population that is old enough, 16 through 30 years of age, to be given the appropriate time to complete their basic education. The data for the estimation of this particular specification only consists of the 2007 IPUMS sample, when individuals who were young at the time of the policy are observed at an older age. Column 1 shows the results from estimating equation 3 for boys and column 2 shows these results for girls. Boys who were between ages 5 and 10 in 1996 have lower completion rates of basic education by 2007 in gang-intensive areas in comparison to boys of the same age group in less-gang-intensive areas. The results become indistinguishable from zero for cohorts that were between 11 and 16 in 1996, suggesting that the increased number of criminals from abroad did not impact children who are closer to completion of basic training. Only boys who were in early stages of their schooling when gang members begin entering the country were impacted, while boys in gang areas who are older and have low exposure to the deportees while still in school were not. This is consistent with the timing of the IIRIRA policy being important in shifting education trends in gang areas. I also find a larger effect in magnitude for boys who were between 8 and 10 years old in 1996, a 6.4 percentage point decline in basic education completion rates, than for boys who were between 5 and 7, a 4.7 percentage point decrease in basic education completion. Since repetition of grades is not uncommon in El Salvador, it is possible that many children in the youngest cohort that was between 5 and 7 in 1996 have not actually been given the appropriate time to complete basic training by their observation period in 2007. Nevertheless, the two effects for the cohorts age 5 through 7 in 1996 and cohorts age 8 through 10 are not statistically different. On the other hand, the effects for girls from young cohorts that were arguably highly exposed to the deportees are smaller in magnitude and statistically indistinguishable from zero. These findings are

consistent with the timing of the IIRIRA being relevant in explaining the effects seen in high gang intensity areas and further validate the claim that emergence of gangs from abroad negatively impacted education completion of boys and not of girls.

Table 5: Cohort Analysis: Effects for cohorts most impacted by timing of IIRIRA

	(1)	(2)
Basic Completed by 2007?	Boys	Girls
<i>High Intensity_m</i> × <i>Age in</i> 1996 ∈ [5, 7]	-0.0477 (0.0258)	0.000125 (0.0255)
<i>High Intensity_m</i> × <i>Age in</i> 1996 ∈ [8, 10]	-0.0638 (0.0234)	0.00349 (0.0247)
<i>High Intensity_m</i> × <i>Age in</i> 1996 ∈ [11, 13]	-0.00873 (0.0154)	0.0118 (0.0161)
<i>High Intensity_m</i> × <i>Age in</i> 1996 ∈ [14, 16]	-0.0280 (0.0187)	0.0271 (0.0175)
Observations	23,643	24,875

Standard errors clustered at the municipality level. All specifications include age fixed effects, municipality-level fixed effects, a control for whether the household owns the home, household head is employed, has access to electricity, number of bedrooms in the home, and individual's relationship to the head. Sample restricted to 16 to 30 year olds in 2007. Sample restricted to urban areas. Sample restricted to non-migrant children, families with non-migrant household head, and families with no international migrants. Data from El Salvador IPUMS 2007 sample.

It is also possible to visualize the cohort-specific effects of the deportation policy in gang areas. Figures 5 and 6 graph income-demeaned years of schooling residuals by age in 1996 for boys and girls.¹⁰ I remove income effects because summary statistics of Table 3 show that gang areas are positively selected on socioeconomic status. These graphs also highlight the fact that children who were young in 1996 in gang areas suffered in education completion. Figure 5 shows that male years of schooling residuals in gang-intensive

¹⁰The residuals remove the effects of variables included in the specifications to proxy income. These include fixed effects for ownership of home, access to electricity, household head's employment status, and number of bedrooms in a house.

areas are less than or equal to male residuals in non-gang areas for cohorts who were 11 or younger in 1996, while cohorts who were older than 11 in 1996 exhibit the opposite pattern with boys in gang areas generally outperforming boys in safer areas. In other words, the effect of lowered completed years of schooling is only seen for children who were young in 1996, when American gangs first started entering El Salvador. These results verify that exposure to gangs in these areas is important in determining the effects. As before, the results for girls are less obvious. Figure 6 shows that even within young cohorts, education completion of girls in gang areas is generally equal to education completion of girls in non-gang areas. This pattern does not change for girls as it does for males who are young in 1996.

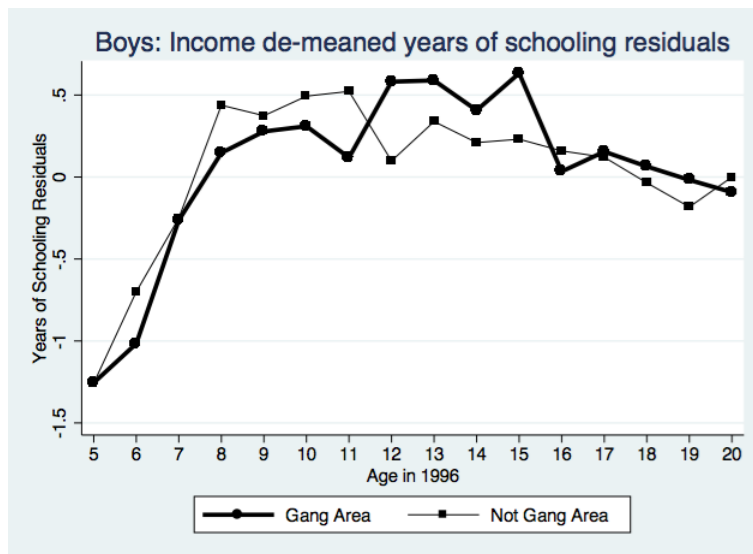


Figure 5: Years of schooling residuals by 2007. Data from El Salvador IPUMS 2007 sample.

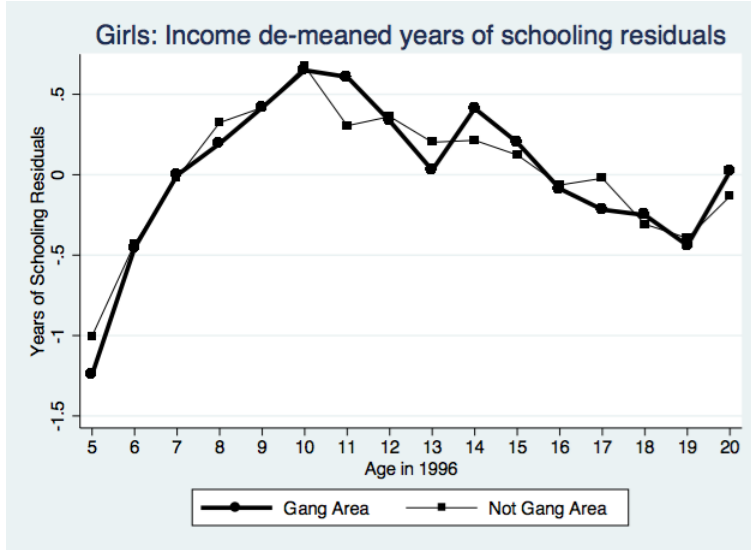


Figure 6: Years of schooling residuals by 2007. Data from El Salvador IPUMS 2007 sample.

8 Robustness Checks

8.1 Flexible Measure of Gang Intensity

The results presented thus far rely on a constructed measure of whether gang presence in an area was high or low. This measure is useful in producing results that are easy to interpret. However, a more flexible way to estimate the impact of U.S.-based gang presence in El Salvador would be to rely purely on the percentage drop in homicides within a municipality during the truce. If a municipality experiences a large decline in crime during the period of the truce, then gang activity was likely a major problem within the municipality prior to the truce. In Equation 4, I interact $Post_t$ with percent change in homicides from before the truce period from 2007 and 2011 to during the truce period between 2012 and 2013. All other controls are identical to the main difference-in-differences specification in equation 2.

$$Y_{imt} = \beta_1(\% \Delta Homicides_m \times Post_t) + State_d \times Year_t \quad (4)$$

$$+Municipality_m + Age_i + X_i + \epsilon_{imt}$$

Table 6: Main results with flexible measure of gang intensity

	(1)	(2)	(3)	(4)
Dependent variable:	Years Boys	Years Girls	Attending? Boys	Attending? Girls
$\% \Delta Homicides_m \times Post_t$	0.00460 (0.00138)	0.00293 (0.00114)	0.000778 (0.000212)	0.000213 (0.000281)
Observations	28,740	26,953	27,789	26,248

Standard errors clustered at the municipality level. All specifications include state-specific year fixed effects, age fixed effects, municipality-level fixed effects, a control for whether the household owns the home, household head is employed, has access to electricity, and number of bedrooms in the home. Sample restricted to children between ages 7 and 15 in urban areas. Sample restricted to non-migrant children, families with non-migrant household head, and families with no international migrants. Data from El Salvador IPUMS samples in 1992 and 2007.

Table 6 reports the results from estimating equation 4. The effect on completed years of schooling are comparable to the main results of Table 4 for boys. The estimate implies that boys' completed years of schooling decreased by 0.23 years (0.0046×-50) in areas where homicides fell by 50% during the truce period. The analogous result for girls implies that their completed years of schooling decreased by 0.147 years in areas where homicides fell by 50% during the truce period. Similarly, male current attendance rates are 3.9 percentage points lower in areas where the truce led to a 50% decline in the homicides. The effect on female attendance rates is much smaller in magnitude and statistically indistinguishable from zero. The results confirm the analysis of the paper thus far; the flexible measure of gang intensity also finds that areas where the truce was most effective, or where gangs were likely a bigger problem, have lower rates of male basic education completion.

8.2 The Comparison Group

One issue with using the IPUMS data is that it only identifies more populated municipalities and less dense municipalities are lumped together and identified as the “rest of state”. Thus, some gang-intensive municipalities are not individually identified and are grouped together in “rest of state”. If the average homicides in municipalities identified as “rest of state” do not exhibit a 50% decline in homicides during the period of the truce, then some municipalities in which the truce was effective are coded as safer areas. Similarly, some smaller municipalities, lumped in “rest of state”, get miscoded as being gang intensive even if they do not individually satisfy the condition of being affected by the truce. The inclusion of municipalities with gang presence in the control group, and vice-versa, should only bias the estimates towards zero. Nonetheless, an argument could be made that a proper comparison group for the identified municipalities, which are more densely populated, is also densely populated municipalities. Table 7 presents the results after limiting the sample to only IPUMS identified municipalities, and the results are very similar to the results of Table 4 which does not limit the data to dense municipalities.

Table 7: Main results with densely populated municipalities only

	(1)	(2)	(3)	(4)
Dependent variable	Years Boys	Years Girls	Attending? Boys	Attending? Girls
$High\ Intensity_m \times Post_t$	-0.200 (0.0769)	-0.0642 (0.0615)	-0.0326 (0.0123)	-0.0216 (0.0137)
Observations	20,828	19,592	20,273	19,164

Standard errors clustered at the municipality level. All specifications include state-specific year fixed effects, age fixed effects, municipality-level fixed effects, a control for whether the household owns the home, household head is employed, has access to electricity, and number of bedrooms in the home. Sample restricted to children between ages 7 and 15 in urban areas in dense municipalities. Sample restricted to non-migrant children, families with non-migrant household head, and families with no international migrants. Data from El Salvador IPUMS samples in 1992 and 2007.

8.3 Domestic Migration

A threat to this analysis is that positively selected households move away from dangerous areas, and that the effects are purely explained by negative selection of “stayers” in dangerous areas. This type of selection of migrants would also imply that individuals who moved into gang-intensive areas are negatively selected relative to those who stayed in safe areas. The IPUMS data include incomplete information on whether an individual has moved previously. While information on the individual’s previous state of residence is provided, individual’s previous municipality of residence is not identified. Given that gang areas are identified at the municipality level, I am not able to perfectly identify individuals who moved from a safer area to a gang area or individuals who moved from a gang area to a safer area. With the discussed limitation, I run the following test to study whether selective migration within El Salvador is important in explaining the effects.

One way to investigate whether selection of migrants explains the effects is to limit the sample to only children who have previously moved from a different municipality. Note that if the sample is limited to those who have moved into their current municipality, then selective migration after increasing gang activity would imply that positively selected individuals leave gang areas and enter safe areas. Individuals escaping the dangerous areas would be observed in low gang intensity areas and identify themselves as having previously moved from a different municipality. Then, the sample of individuals who have previously moved observed in safer areas, will become more positively selected in the post-period after increased gang activity. Similarly, the sample of movers would become more negatively selected in gang areas over time. Negative selection of in-migrants to gang areas, combined with positive selection of out-migrants from gang areas, after the law change implies that a differences-in-differences estimate should be negative amongst individuals who have moved from a different municipality to their current location of residence.

Table 8 presents the main results of equation 2 for a sample of children who have moved into their current municipality. I do not find a statistically

Table 8: Main results for migrant children only

	(1)	(2)	(3)	(4)
Dependent variable:	Years Boys	Years Girls	Attending? Boys	Attending? Girls
$High\ Intensity_m \times Post_t$	0.142 (0.143)	-0.127 (0.0801)	0.0400 (0.0268)	-0.00178 (0.0232)
Observations	7,437	6,861	7,233	6,735

Standard errors clustered at the municipality level. All specifications include state-specific year fixed effects, age fixed effects, municipality-level fixed effects, a control for whether the household owns the home, household head is employed, has access to electricity, and number of bedrooms in the home. Sample restricted to children between ages 7 and 15 in urban areas. Sample restricted to children who have previously migrated with no international migrants. Data from El Salvador IPUMS samples in 1992 and 2007.

significant effect of high gang activity on years of schooling or current school attendance for either boys or girls. Instead the coefficient estimates are positive for boys, suggesting that if anything the families with male children who migrated into gang areas are positively selected. Overall, these results suggest that negative selection of stayers in gang areas does not explain the effects. Furthermore, these results shed additional light on the effects reported in this paper. It is implied that exposure to gangs is important in determining the effects, as children who have moved from a different municipality have had fewer years of exposure to the gangs surrounding their community.

8.4 International Migration

McKenzie (2005) shows that education completion for Mexican children in international migrant households is lower than children in non-migrant households. The argument is that returns to schooling for Mexican children is much lower in the United States than in Mexico, and thus children who anticipate migrating to the United States complete less schooling. It is possible that gang areas are also areas with an increasing international migrant population, and the effects are purely determined increased international migration of boys in

gang areas. On the other hand, Edwards and Ureta (2003) has shown that remittances from abroad are associated with improved educational outcomes in El Salvador. Therefore, another explanation for the results is that gang areas have a declining international migration, and hence declining remittances from abroad.

To test these claims, I estimate equation 2 with whether a household has an international migrant as the dependent variable. Unlike the rest of the results in this paper, the sample is not limited to individuals from families with no migrants. Table 9 shows that the timing of increased gang activity is not associated with a changing likelihood of international migration within households in gang areas. Both effects for boys and girls are statistically indistinguishable from zero, suggesting that there is no evidence that the effect is explained by differential international migration patterns across the two regions. Moreover the magnitude of the effect for boys is close to zero, further refuting the claim that international migration from El Salvador explains the decreased education completion rates found for boys.

Table 9: The impact of high gang intensity on whether the household has an international migrant

	(1)	(2)
Household has international migrant?	Boys	Girls
$High\ Intensity_m \times Post_t$	-0.00195 (0.0101)	-0.0117 (0.00830)
Observations	50,233	46,907

Standard errors clustered at the municipality level. All specifications include state-specific year fixed effects, age fixed effects, municipality-level fixed effects, a control for whether the household owns the home, household head is employed, has access to electricity, and number of bedrooms in the home. Sample restricted to children between ages 7 and 15 in urban areas. Data from El Salvador IPUMS samples in 1992 and 2007.

8.5 Total Effect

Results presented thus far have focused on children between 7 and 15 years old because they enroll in free of cost basic education. This allows me to focus on a form of education that is most accessible in El Salvador. However, by limiting the sample to young children, I am unable to estimate a total effect, as children from gang areas are likely to continue lagging behind even in secondary forms of education. Here, I present results from limiting the sample to older children between 16 and 18 to understand the cumulative effect.

Table 10: Total Effect: Exposure to high intensity gang locations on education

	(1)	(2)	(3)	(4)
Dependent variable	Years Boys	Years Girls	Attending? Boys	Attending? Girls
$High\ Intensity_m \times Post_t$	-0.539 (0.292)	0.0707 (0.188)	-0.0607 (0.0248)	0.00836 (0.0277)
Observations	7,403	6,083	7,259	6,049

Standard errors clustered at the municipality level. All specifications include state-specific year fixed effects, age fixed effects, municipality-level fixed effects, a control for whether the household owns the home, household head is employed, has access to electricity, and number of bedrooms in the home. Sample restricted to children between ages 16 and 18 in urban areas with homicide rates greater than 50 per 100,000 inhabitants in the 2007-2011 period. Sample restricted to non-migrant children, families with non-migrant household head, and families with no international migrants. Data from El Salvador IPUMS samples in 1992 and 2007.

These results are provided in Table 10. Once again, the results consistently show that boys in gang areas have lower completed years of schooling, while girls are likely not impacted. These effects imply that boys in gang areas lost an average of half a year less of schooling. Girls in these areas, on the other hand, show a small increase in completed schooling, albeit the effect is statistically insignificant. By older ages, boys in gang areas are 6.07 percentage points less likely to attend school relative to older boys in safer areas. Overall, the estimated total impact of gang exposure on boys' education is large as they lose more than half a year of total schooling.

9 Mechanism

9.1 Gangs or Violence?

The paper aims to identify the effect of the growth of gangs following an American deportation policy on gender-specific education in El Salvador. Section 4 established that gang areas became disproportionately more violent as more criminals were deported from the United States. It is possible violence caused by deported criminals from the United States is responsible for the lowered schooling. To disentangle whether violence alone or something else related to gangs drives the findings in this paper, I estimate equation 2 while limiting the sample to violent areas. Specifically, I limit the sample to municipalities with high homicide rates in the 2007-2011 period (above 50 homicides per 100,000 inhabitants). Table 11 shows these results, and the findings are similar to the original results. Even within a sample of high homicide areas, boys between 7 and 15 in gang areas complete 0.25 year less of schooling and are more likely to drop out of school by 4.1 percentage points. Once again, the results for girls are both smaller in magnitude and statistically insignificant.

Table 11: Gangs or Violence? The effect for high homicide rate areas only

	(1)	(2)	(3)	(4)
Dependent variable	Years Boys	Years Girls	Attending? Boys	Attending? Girls
$High\ Intensity_m \times Post_t$	-0.246 (0.0704)	-0.0946 (0.0696)	-0.0413 (0.0143)	-0.0128 (0.0143)
Observations	19,057	17,922	18,565	17,582

Standard errors clustered at the municipality level. All specifications include state-specific year fixed effects, age fixed effects, municipality-level fixed effects, a control for whether the household owns the home, household head is employed, has access to electricity, and number of bedrooms in the home. Sample restricted to children between ages 7 and 15 in urban areas with homicide rates greater than 50 per 100,000 inhabitants in the 2007-2011 period. Sample restricted to non-migrant children, families with non-migrant household head, and families with no international migrants. Data from El Salvador IPUMS samples in 1992 and 2007.

Results in Table 11 highlight that exposure to gangs is different from general violence, with the males experiencing a larger loss of education in gang areas than in violent non-gang areas. The next subsections explore how exposure to gangs, specifically, could impact economic development. Intuitively, gang exposure could alter education completion for a multitude of reasons. For example, it is possible that gangs raise the opportunity cost of schooling and boys drop out of school because they view gangs as an alternative source of income. It is also possible that the practice of extortion in certain neighborhoods, such as a neighborhood protection tax, requires even young individuals to start working, and thus drop out of school. It is also known that youth who live in gang dominated areas are harassed or even physically assaulted (Fariña et al., 2010). Even if the youth are not members of the gangs, members often involve neighborhood children to give them small amounts of money or run errands (Fariña et al., 2010). Thus, it is possible that the neighborhood surroundings make attending school more difficult for children in gang areas. The next subsections aim to help disentangle the mechanism behind why young boys in gang areas complete fewer years of schooling.

9.2 Are Boys Joining Gangs?

A potential reason for why young boys in gang areas complete less schooling is that they join gangs. Studies have shown that individuals from single parent households are more susceptible to joining a gang (Olate et al., 2012).¹¹ One way to test if young boys joining gangs explain the results is to test if the effects are larger for the more susceptible group, children from single parent homes. Here, I repeat the results of Table 4 but limit the sample to a group more susceptible to joining a gang, children in households that do not have a father figure present. Table 12 presents the results separately for a sample of single mother households and households with at least one father figure.

¹¹Olate et al. (2012) presents results from surveys conducted on young gang members as well as high risk youth in San Salvador. The authors report that 63% of the sample of gang members lived in single parent households. My sample shows that 18% of children in the main sample are from households with either no father in a single family home or no fathers in multiple family homes.

Additionally, since the paper thus far has shown that the effect of expansion of gangs reducing education holds for males but not females, the results are only shown for boys. Analogous results for girls are included in Table A1 in the Appendix. Consistent with the findings throughout the paper, there are no statistically significant effects seen for girls even when studied in heterogeneous family types.

Table 12: Are boys joining more gangs? Heterogeneous effects for more susceptible groups.

	(1)	(2)	(3)	(4)
Dependent variable	Years	Years	Attending?	Attending?
At least 1 father figure in HH?	No	Yes	No	Yes
<i>High Intensity_m × Post_t</i>	-0.104 (0.145)	-0.247 (0.0663)	-0.0260 (0.0237)	-0.0408 (0.0138)
Observations	4,838	21,272	4,714	20,516

Standard errors clustered at the municipality level. All specifications include state-specific year fixed effects, age fixed effects, municipality-level fixed effects, a control for whether the household owns the home, household head is employed, has access to electricity, and number of bedrooms in the home. Sample restricted to male children between ages 7 and 15 in urban areas. Sample restricted to non-migrant children, families with non-migrant household head, and families with no international migrants. Data from El Salvador IPUMS samples in 1992 and 2007.

The results show that boys who are particularly vulnerable to joining gangs are not explaining the effect and education accumulation in gang areas is falling for all young boys. Boys from households with at least one father figure experience a statistically significant decline in both their completed years of schooling and in their attendance. Boys from households with a missing father figure, on the other hand, experience a similar in magnitude effect to those with a father figure present, but it is not statistically significant. However, the effects are not statistically different across the two groups. The results in Table 12 imply that boys are lagging behind in their education accumulation for a reason different from joining gangs, since the effect is not larger for groups known to be more susceptible to joining gangs. This also seems consistent with estimates of gang membership numbers in El Salvador, which vary from 10,500

to 39,000 (Fariña et al., 2010). These numbers are relatively small for a nation with a population over 6 million, making it seem unlikely to be the primary reason why *the average* schooling of young boys in gang areas decreased by almost one half of a year.

9.3 Are Young Boys More Likely to be Employed in Gang Areas?

As mentioned earlier, it is possible that extortion practices make families financially vulnerable and the extra need for income forces boys into the labor market and drop out of school. However, child employment could also increase if children drop out of school for reasons related to gang exposure like harassment and pressure to join gangs, after which they seek employment. In the former situation, boys start working and then have to drop out of school. In the latter situation, boys drop out of school and seek employment as an alternative use of their time.

I am able to investigate how gang exposure changes employment by estimating the difference-in-differences model with the dependent variable being whether the child is employed. Further, it is possible to study whether employment induces children to drop out of school or whether children who have dropped out are more likely to work by investigating a heterogeneous effect of gang expansion for children who have dropped out of school and those who are currently still in school.

Table 13 shows these results for boys.¹² Column 1 shows a total effect and includes boys currently in school as well as those who have dropped out, column 2 limits the sample to boys currently in school, and column 3 limits the sample to boys who have dropped out. The data include employment information for individuals 10 years of age or older, thus results in Table 13 are limited to children between the ages of 10 and 15. In total, it can be seen that employment for boys between the ages 10 and 15 has risen in gang-intensive areas,

¹²Analogous table for girls is Table A2 in the Appendix. There is no statistically significant change in young girls' employment rates in gang areas.

Table 13: Are boys working more in gang areas?

	(1)	(2)	(3)
Dependent variable	Employed? All	Employed? In School	Employed? Dropped Out
$High\ Intensity_m \times Post_t$	0.0593 (0.0249)	0.0413 (0.0170)	0.0140 (0.0856)
Observations	5,610	4,486	1,124

Standard errors clustered at the municipality level. All specifications include state-specific year fixed effects, age fixed effects, municipality-level fixed effects, a control for whether the household owns the home, household head is employed, has access to electricity, and number of bedrooms in the home. Sample restricted to male children between ages 10 and 15 in urban areas. Sample restricted to non-migrant children, families with non-migrant household head, and families with no international migrants. Data from El Salvador IPUMS samples in 1992 and 2007.

relative to less-gang-intensive areas, by about 6 percentage points. When studied separately, I find that male employment rates increased by 4.1 percentage points for children still in school. The effect for boys who have dropped out of school is smaller in magnitude and not individually statistically significant, but it is not statistically different from the effect for boys still in school. These findings suggest that boys completed fewer years of schooling in gang areas because they also worked while they were in school. The results are consistent with a need for a higher income once gangs enter surrounding areas. One reason for increased need for employment as gangs enter areas could be due to extortion practices by gangs. An additional possibility is that boys consider gang membership as an alternative to traditional employment, in which case their perceived return from schooling would decline. However, this would be more consistent with boys dropping out of school before beginning to work more.

10 Conclusion

Results in this paper show that the U.S. policy that increased deportation of criminals, which led to the expansion of U.S.-based gangs, had adverse effects on basic education attainment of boys in El Salvador. I find that U.S.-based gangs that first arrived in El Salvador following a harsh American deportation policy became violent as more criminals were deported from the United States. Taking advantage of a recent truce reached between two of the largest U.S.-based gangs, I identify the locations where U.S.-based gangs settled within El Salvador. Using this geographical variation in where the U.S.-based gangs settled, I am able to compare education trends between high gang intensity areas to low gang intensity areas. My findings suggest that male completion of schooling was hindered in high gang intensity areas, while female schooling is largely unaffected in these areas. Further analysis reveals that pre-teen and teenage boys are less likely to attend school in high gang intensity areas, while the same is not true for teenage girls. I verify that the timing of increasing criminal deportations is important in determining the effects and that male education was not on a decreasing trend in gang-intensive areas to begin with. I find that people from high gang intensity areas who were old at the time of increasing gang population from abroad do not experience a negative impact in basic education completion, while those who were young at the time of increased gang population do. I also show that that selective migration, domestic or international, out of gang areas does not explain the effects. Additional robustness check includes a flexible measure of gang intensity. Finally, it appears that there is something unique about gangs, different from violence itself, which affects male schooling. I argue that the effects are likely not explained by young boys actually joining gangs. Instead, I find that boys in gang areas are more likely to work while still in school which seems to explain their lower completed schooling. Consistent with extortion practices, my findings suggest that gangs make surroundings areas financially unstable.

This paper sheds important light on the transnational impact of American

deportation policy. Gangs that were introduced to El Salvador as a result of American deportation policy are now responsible for significant economic instability. Being surrounded by gang culture is shown to hinder young boys' schooling, even when the boys do not necessarily join gangs. Importantly, the study connects an American deportation policy to crime, gang development, and economic instability in El Salvador. A light is shed on the unintended consequences of an American policy in not just El Salvador, but also other gang-torn Central American nations that have experienced a rise in incoming criminal deportees from the United States.

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11 Appendix: A1

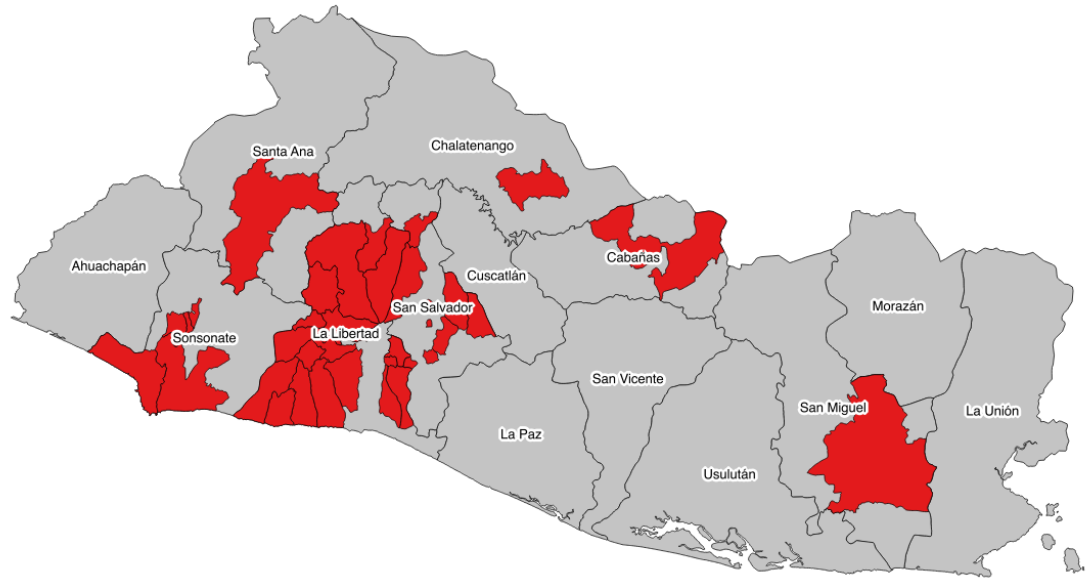


Figure A1: Municipalities with high U.S.-based gang prevalence using IPUMS samples.

Table A1: Are girls joining more gangs? Heterogenous effects for more susceptible groups.

	(1)	(2)	(3)	(4)
Dependent variable	Years	Years	Attending?	Attending?
At least 1 father figure in HH?	No	Yes	No	Yes
<i>High Intensity_m × Post_t</i>	-0.0786 (0.117)	-0.0697 (0.0559)	0.00210 (0.0257)	-0.0211 (0.0140)
Observations	4,778	19,505	4,669	18,952

Standard errors clustered at the municipality level. All specifications include state-specific year fixed effects, age fixed effects, municipality-level fixed effects, a control for whether the household owns the home, household head is employed, has access to electricity, and number of bedrooms in the home. Sample restricted to female children between ages 7 and 15 in urban areas. Sample restricted to non-migrant children, families with non-migrant household head, and families with no international migrants. Data from El Salvador IPUMS samples in 1992 and 2007.

Table A2: Are girls working more in gang areas?

	(1)	(2)	(3)
Dependent variable	Employed? All	Employed? In School	Employed? Dropped Out
<i>High Intensity_m × Post_t</i>	0.0126 (0.0146)	0.00328 (0.00994)	0.0816 (0.0884)
Observations	5,002	4,254	748

Standard errors clustered at the municipality level. All specifications include state-specific year fixed effects, age fixed effects, municipality-level fixed effects, a control for whether the household owns the home, household head is employed, has access to electricity, and number of bedrooms in the home. Sample restricted to female children between ages 10 and 15 in urban areas. Sample restricted to non-migrant children, families with non-migrant household head, and families with no international migrants. Data from El Salvador IPUMS samples in 1992 and 2007.