Multinationals, Monopsony and Local Development:
Evidence from the United Fruit Company*

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Abstract

This paper studies the short- and long-run effects of large firms on economic development. We use evidence from one of the largest multinationals of the 20th Century: the United Fruit Company (UFCo). The firm was given a large land concession in Costa Rica—one of the so-called "Banana Republics"—from 1899 to 1984. Using administrative census data with census-block geo-references from 1973 to 2011, we implement a geographic regression discontinuity (RD) design that exploits a quasi-random assignment of land. We find that the firm had a positive and persistent effect on living standards. Regions within the UFCo were 29% less likely to be poor than nearby counterfactual locations in 1973, with only 56% of the gap closing over the following four decades. Company documents explain that a key concern at the time was to attract and maintain a sizable workforce, which induced the firm to invest heavily in local amenities that likely account for our result. We then build a spatial model in which a firm's labor market power *within* a region depends on how mobile workers are *across* locations and run counterfactual exercises. The model is consistent with observable spatial frictions and the RD estimates. The model shows that the firm increased aggregate welfare by 3.7%, and that this effect is increasing in worker mobility.

Keywords: multinational firms, economic development, monopsony power
JEL Classification: F23, J42, N16, O43.

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1 Introduction

The top 1% of the largest firms in emerging economies account for more than one-half of local exports and are primarily foreign-owned (Freund and Pierola, 2015). Despite their central role in developing countries, the extent to which host economies benefit from these enterprises is widely debated. On the one hand, monopsony power and the extractive activities of these foreign companies may explain why some places remain persistently poorer than others (Aitken and Harrison, 1999; Alfaro et al., 2003; Alfaro and Charlton, 2007; Borensztein et al., 1995; Xu, 2000). On the other hand, new technologies and capital injections associated with these firms can positively affect long-run growth (Blomstrom, 1986; Blomstrom and Wolff, 1989; Harrison and Rodríguez-Clare, 2009; Lipsey, 2002; Smarzynska Javorcik, 2004). The empirical evidence, however, remains scarce. In fact, it is challenging to estimate the causal effects of these firms on local development and follow their evolution over time.

This paper studies the short- and long-run effects of large foreign investment projects on local economic development. We also explore the role of monopsony power and of the spatial structure of the labor market in determining the direction and persistence of these effects. To do so, we use evidence from one of the largest multinationals of the 20th Century: the United Fruit Company (UFCo), the infamous firm hosted by the so-called "Banana Republics." This American firm was given a large land concession in Costa Rica, and was the only employer in this region—where it required workers to live—from 1899 to 1984. In this sense, the firm appeared to function as a *local* monopsonist.[1]

The concession had a well-defined boundary, and we identify a segment of this boundary that was redrawn quasi-randomly.[2] This quasi-random variation, along with detailed census micro-data geo-referenced at the census-block level, allows us to use a geographic regression discontinuity design to identify the effect of being under the company's *direct* influence. Specifically, we compare units located within a close distance from, but on different sides of, the UFCo boundary. Our data spans over a decade before the company stops operating, and almost three decades after its closure (1973-2011), which allows us to document how the UFCo effect evolves.

We find that households living within the former UFCo regions have had better economic outcomes (housing, sanitation, education, and consumption capacity), and were 29% less likely to be poor than households living outside. This effect is persistent over time: Since 1973 the treated and untreated regions have converged slowly, with only 56% of the income gap closing over the

[1] This concession was equivalent to 9% of the national territory and 458,800 hectares (ha). For reference, since 2000, over 30 land acquisitions by transnational companies in Africa, Central and Southeast Asia, Eastern Europe, and Latin America have been *larger* than the UFCo's concession in Costa Rica, accounting for over 26 million ha (Cotula and Vermeulen, 2009).

[2] This segment of the boundary was redrawn in 1904 and jointly shaped by a river and how this river intersected preexisting land plots, leading to a border with balanced geographic attributes and uncorrelated with ex-ante determinants of growth.

following four decades.[3]

Historical data collected from primary sources suggests that investments in local amenities carried out by the UFCo—hospitals, schools, roads—are the main drivers of our results. For instance, we document that investments per student and per patient in UFCo-operated schools and hospitals were significantly larger than in local schools and hospitals run by the government, and sometimes even twice as large. Access to these investments was restricted, for the most part, to UFCo workers who were required to live within the plantation. This might explain the sharp discontinuity in outcomes right at the boundary. We do not find evidence of other channels, such as selective migration or negative spillovers on the control group, being the main mechanisms behind our results.[4]

Why were these investments in local amenities higher than in the rest of the country? While the company might have invested in hospitals to have healthier workers, it is less clear why it would incur in other investments such as schooling. Evidence from archival company annual reports suggests that these investments were induced by the need to attract and maintain a sizable workforce, given the initially high levels of worker turnover.[5] For instance, a 1922 Annual Report highlights the constant overturn of labor and describes that "[the workers'] migratory habits do not permit them to remain on one plantation from year to year, but *as soon as they become physically efficient and acquire a little money they either return to their homes or migrate elsewhere and must be replaced by new laborers* [emphasis added]" (UFCo, 1923, p. 74). As a solution to retain workers, the UFCo increased its investments in local amenities beyond medical measures. A 1925 Annual Report pointed out that "an endeavor should be made to stabilize the population.... We must not only build and maintain attractive and comfortable camps, but we must also provide measures for taking care of the families of married men, by furnishing them with *garden facilities, schools and some forms of entertainment. In other words, we must take an interest in our people if we may hope to retain their services indefinitely* [emphasis added]" (UFCo, 1926, p. 185).

Quantitative evidence is consistent with the qualitative evidence from the company reports. Empirically, there is a causal relationship between the intensity of UFCo's investments in a location and the degree of competition for labor faced by the company. Using suitability to grow coffee (the main outside option for agricultural workers at the time) to instrument for wages, we find that locations where workers had higher outside options in 1973 also had higher living standards in 2000 and 2011, on average. For instance, a one percentage point increase in the average outside option of an UFCo region in 1973 is associated with a 7% lower likelihood of households being poor in this

[3]Robustness checks include: a falsification test, in which we draw placebo borders and re-run our analysis; estimations using different bandwidths and considering different sub-samples of the population, such as only non-migrants; and estimations using the entire boundary, among others.

[4]Our analysis—using census micro-data dating as far back as 1927—actually suggests that migrants to the UFCo were consistently *negatively* selected.

[5]High turnover was a result of the workers' main outside option: coffee. Unlike bananas, coffee is a seasonal crop, and workers could earn relatively high wages during the coffee harvesting season.

location in 2000 and 2011.

Our mechanisms suggest that the relationship between labor mobility, monopsony power, and investments was crucial in determining the firm's effect. Motivated by this evidence and the growing literature on the effects of market power, and to account for spillover and run a counterfactual analysis, we build a dynamic model of economic geography. This framework allows us to have a better understanding of the company's aggregate effect after accounting for general equilibrium effects, and to run counterfactuals to shed light on how the firm's impact changes in scenarios with less worker mobility or with a more competitive labor market.

In our model, the company is a local monopsony in one location, while workers are mobile across locations. Thus, *the less mobile workers are, the more inelastic the labor supply that the firm faces is.* In other words, the degree of monopsony power of the firm *within* its region depends on how mobile workers are *across* locations. To incorporate the investment patterns that we documented empirically, we assume that the local monopsonist can choose workers' compensation bundle: a combination of wages and local amenities. These local amenities are costly for the firm, but increase workers' utility and makes them more productive. The model is consistent with local estimates from our empirical analysis and moments of the historical data, and captures observable spatial frictions. We also use a migration gravity equation, along with an instrumental variables strategy, to obtain an estimate of the migration elasticity.

We find that after accounting for general equilibrium effects, the company increased the country's welfare by 3.66%. This welfare effect depends crucially on worker mobility. For instance, the aggregate welfare effect of the firm would have *decreased* by 46% if workers were half as mobile. The intuition behind this result is that if workers are less mobile their outside option decreases, and the company can reduce their compensation. In the extreme case of immobile workers, the company could potentially not pay for the labor input, thereby negatively affecting worker's welfare.

The result of this counterfactual analysis—that the firm could have had a large negative impact on welfare if workers were relatively immobile—allows us to reconcile our results with findings from a growing body of literature that analyzes the long-run impact of colonial and historical institutions on economic development. Most prior literature has considered settings in which labor was coerced and relatively immobile, such as the slave trade (Nunn, 2008), the *mita* system in Peru (Dell, 2010), forced coffee cultivation in Puerto Rico (Bobonis and Morrow, 2013), forced rubber cultivation in what is today the Democratic Republic of Congo (Lowes and Montero, 2016), or the Dutch Cultivation System (Dell and Olken, 2019). This literature consistently finds that companies tend to underprovide public goods within their concessions and that exposure to these regimes can lead to negative and persistent effects on development.[6] We thereby complement these studies by

[6] An exception being Dell and Olken (2019), who find that villages forced to grow sugar cane have better long-run outcomes as a result of sugar factories and industrial structures promoting economic activity, with locations close to former factories in the mid-19th century being more industrialized today.

shedding light on the importance of workers' outside options in determining the direction of this effect.

Our work also contributes to three strands of the literature on the consequences of firms exercising market power. First, we explore theoretically and quantitatively how the degree of labor market power of a firm *within* a location depends on the mobility of workers *across* locations. This idea was explored by early literature describing the market for college professors, in which some employers are geographically isolated and pay low wages to professors with high moving costs (Black and Loewenstein, 1991; Ransom, 1993), and more recently by recent literature on labor economics that studies the effects of local labor market power and how this affects the spatial distribution of employment (Holmes, 2011; Neumark et al., 2008; Pope and Pope, 2015).[7] Second, we explore how this local monopsony power affects a firm's incentive to invest in local amenities, and consider a compensation that does not focus only on wages as in Gutiérrez and Philippon (2017) and Autor et al. (2020), who document an increase in market power associated with declines in the labor share across many industries. More recently, Berger et al. (2018) build a model to study labor market power and the declining labor share in the US. Third, we study long-run outcomes and how persistent these effects can be.

Finally, the paper is related to the literature on the effects and spillovers of foreign direct investment (FDI). Our paper contributes to this literature by providing novel micro-evidence of the benefits of large-scale FDI through a natural experiment. Empirical studies on the effects of FDI have produced mixed evidence. While some studies find evidence of FDI being beneficial using macro- and micro-data (e.g., Alfaro-Ureña et al., 2019; Blomstrom, 1986; Blomstrom and Wolff, 1989; Harrison and Rodríguez-Clare, 2009; Lipsey, 2006; Smarzynska Javorcik, 2004), others are not so optimistic about these benefits, especially for developing countries (e.g., Aitken and Harrison, 1999; Alfaro et al., 2003; Alfaro and Charlton, 2007; Borensztein et al., 1995; Xu, 2000). We show how in a context with high labor mobility, FDI had positive local and aggregate effects due to the need to compete for labor, while in cases with low labor mobility, both local and aggregate effects can be negative.

The rest of the paper is organized as follows. Section 2 provides an overview of the historical background. Section 3 includes details of the data used in our analysis. We describe our estimation framework in Section 4. Section 5 presents our results. We discuss evidence on the potential mechanisms behind our findings in Section 6. Section 7 develops the model and presents the counterfactual exercises, and Section 8 concludes.

[7] Recent work by Kahn and Tracy (2019), which was developed in parallel with ours, also explores how local monopsony power affects the spatial distribution of wages and rents across cities.

2 Historical Background

2.1 Historical Overview

The history of banana plantations in Costa Rica dates back to the construction of a railroad from the capital city to the Caribbean Coast. In 1884, in exchange for completing the railroad, the government gave Minor C. Keith—an American contractor—a large concession of undeveloped land (Casey, 1979). After completing the railroad's construction, Keith experimented with exporting the bananas he had planted along the railroad tracks to feed workers (Bucheli, 2005). The experiment was successful, and the UFCo was founded in 1899.

With its headquarters in Boston, the company eventually had operations in Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Nicaragua, and Panama (May and Lasso, 1958). According to the UFCo's Annual Reports to the Shareholders, by 1930, the company landholdings in Latin America reached 1,333,912 ha.

The UFCo transformed the acquired lowlands into plantations and towns, where it provided healthcare, housing, schooling, and sanitation to its workers and their families. The UFCo also invested in infrastructure, such as wireless communication systems to coordinate the whole process, and railroads to carry the bananas from the plantations to the ports where the bananas were shipped to the United States and Europe in company vessels. However, the firm was also infamous for its extractive practices in many of the "Banana Republics" where it operated.

In Costa Rica, the UFCo significantly transformed the local economy. The UFCo's landholdings in the country represented roughly 8.51% of the national territory (as shown in Figure 1). By 1950, it was responsible for 58% of the country's total exports. Moreover, the UFCo employed approximately 7% of the country's total labor force and 12% of its agricultural labor force, on average throughout its tenure.

In 1984 the UFCo began a general corporate strategy to stabilize profits that divested in the production process to focus on marketing. The corporate strategy was the consequence of challenges faced by the UFCo during the 1970s, which caused severe losses. These challenges included an exportation tax on bananas levied by a cartel formed by the host countries, the Hurricane Fifi that destroyed 70% of the company's plantations in Honduras, and scandals of corruption that significantly affected the firm's stock price. As a consequence, the UFCo abandoned banana production in Costa Rica. More historical details are discussed in Appendix A.

2.2 Land Assignment

Understanding why some land was assigned to the company is key in identifying its long-run impact. It is documented that the firm took into consideration geographic characteristics when negotiating which areas were going to be part of their land concession (Casey, 1979; Cerdas Albertazzi, 1993).

Thus, it is not surprising that geographical features change discretely along many segments of the UFCo boundary, as shown in Figure 1.

However, on the Caribbean Coast, we identified an area where land was assigned quasi-randomly. Initially, due to ambiguities in the concession's contract, the UFCo and the government had some discrepancies regarding the limits of the concession. In 1904, a legislative decree resolved these differences in criterion. The modification declared some land—that the UFCo considered as part of the original concessions—as state property. Officially, this area was called Astúa-Pirie (Soley, 1940), and the decree specified that the property rights over these lands could not be sold back to the company(Viales, 2012).

Because the Caribbean Coast was very scarcely populated, the boundaries of the Astúa-Pirie region were chosen using features of the landscape as a reference so that they would be easy to enforce for the local authorities. The legislative decree declared that the southern boundary of the Astúa-Pirie region would "follow the Reventazón River, from La Junta to the Caribbean Sea"; its eastern boundary adjoins the Atlantic Ocean; its northern boundary would "follow an imaginary line drawn from the intersection between Toro Amarillo River with the old railroad up to a point in the coast located five miles northeast from the mouth of Tortuguero River;" finally, the western boundary would "follow the main railroad, from La Junta to the point where the railroad crosses Toro Amarillo River"(ANCR, 1904, p. 44).[8]

However, this southern boundary—that defines the limit between the Astúa-Pirie region and the UFCo—ended up following the Reventazón River *closely but not exactly*. The reason being that expropriation was a very costly process, and preexisting plots of land that overlapped with the river were not broken apart. Instead, plots were allocated either as UFCo property or government property to follow the river as closely as possible. Figure C.3 in Appendix C shows an example of how the boundary follows this natural landmark (the river)—closely but not exactly—as it was jointly determined by the river and the preexisting plots. In 1904 the government also forbid, by law, to sell the plots within the Astúa-Pirie region to the company (or any foreigner); therefore, this boundary was kept constant during the company's tenure.

2.3 Commuting Between Regions

People who lived in regions near UFCo plantations, in general, did not commute and work for the company or used its services. Unlike other types of agricultural activities with seasonal demand for labor, the UFCo needed a permanent labor supply of around 150 workers per 324-ha farm, and there were several incentives to keep people from commuting in and out of the plantation.

First, due to the extension of the plantations and to reduce transportation costs, the UFCo

[8]La Junta was the point where the railroad from the capital intersected the railroad from Limón. The "old railroad" was the name given to the railroad to Guápiles because it was the remains of an unsuccessful previous attempt to build a railroad to the Central Valley.

created camps within their farms for its workers (Cerdas Albertazzi, 1993). The typical farm consisted of 324 ha of land, with about 8 ha devoted to campsite and buildings, and 61 ha to pasture land (Jones and Morrison, 1952). Besides houses and administrative buildings, special facilities were also present, such as commissaries, schools, electric plants, sewage systems, and recreational facilities (Wiley, 2008). The wide range of services and facilities provided by the company converted plantations into communities that allowed people to live and work full time within them.[9] Second, given concerns about malaria spreading from outside the plantation, only workers were allowed to live within the UFCo, and flows of people were discouraged. Finally, people living in areas around the UFCo had restricted access to services provided by the company. For example, as we describe in Section 6.1.1, data on patients at UFCo hospitals suggests that most of them were workers or part of a workers' family. For the few non-workers in the hospitals' records, we observe average spending per patient was lower relative to workers and their families, suggesting that commuters could not enjoy the amenities the company provided in the same way as locals.

2.4 Other Historical Examples

Historically, it has been relatively common for one or a few large companies—often foreign ones—to dominate a local economy in a developing region. In colonial and quasi-colonial arrangements, labor was sometimes coerced into working for a major producer; examples like the *mita* mining system in Peru (Dell, 2010), coffee farms in Puerto Rico (Bobonis and Morrow, 2013), or rubber cultivation in what is today the Democratic Republic of Congo (Lowes and Montero, 2016) have been studied in detail. Another example is the Dutch East India Company, which used both coerced and paid labor while being a monopsony in many of the regions where it operated (Lucassen, 2004). Other case which involved coerced labor is the 1891 charters from the Portuguese to the Mozambique Company and the British Nyassa Company to administer the southern part of Mozambique for 50 years and the northern part of the country for 35 years, respectively (Vail, 1976). A more current example is the entrance of Firestone into Liberia in 1928, when rubber became crucial to the local economy. For instance, in 1972, Firestone produced 57% of the Liberian agricultural output and 6% of its GDP (McCoskey, 2011).

Finally, it is worth mentioning that these large investment projects are not only in the past. A recent wave of large-scale land acquisitions in developing countries—the so-called "land grabs"—has been a subject of great debate. Driven mostly by a concern over food security and the bio-fuels boom, these projects consist of large leases (of up to 99 years) or purchases of farmland for agricultural investment in Africa, Central and Southeast Asia, Eastern Europe, and Latin America;

[9]For people within the plantations, the company was omnipresent in their lives. Harpelle (2001, p. 67) mentions that typical residents "were likely born in the company hospital, educated in the company school, lived in company housing, obtained household supplies and clothing from the company commissaries, and, if they could afford it, looked forward to being carried to their final resting places in the Northern Railway's [a subsidiary of the UFCo] funeral car."

some of them involving hundreds of thousands of acres (Cotula and Vermeulen, 2009; Cotula et al., 2009). In fact, since 2006, over 64 million acres of land were assigned to foreigners to develop agricultural activities in developing countries, and more than 30 of these concessions were larger than the UFCo's concession in Costa Rica.

3 Data

3.1 Outcome Data

We examine the UFCo's long-run impact on economic development by testing whether it affects living standards today. To measure living standards, we obtained restricted-access microdata from Costa Rican Population and Housing Censuses collected by the National Institute of Statistics and Census (*Instituto Nacional de Estadística y Censos*) for years 1973, 1984, 2000, and 2011. As the UFCo stopped operations in 1984, the range covered by these censuses allows us to analyze the outcomes during and after the company's tenure. For ease of exposition, Figure 2 shows how the available data fits into a time line of main events.

The data is recorded at the census-block level, the smallest territorial division of the country. Both the size and borders of a census-block change across censuses. For the 1973, 1984, and 2000 censuses, each census-block contains approximately 60 dwellings in urban areas and 40 dwellings in rural areas. They also tend to coincide with one or two city blocks in urban areas (Bonilla and Rosero, 2008). For the 2011 census, in most cases, the census-block coincides with a city-block (Fallas-Paniagua, 2013). For all years, the data include each census-block centroid's coordinates. The level of spatial disaggregation provided by the census-block data allows us to compare observations within close proximity of each other.

Except for the 1973 census, which includes information on wages, later censuses do not contain direct measures of income or consumption. Therefore, we follow the "Unsatisfied Basic Needs" (UBN) method to generate variables that measure economic outcomes. The UBN method was introduced by the Economic Commission for Latin America and the Caribbean, to identify households in poverty without relying on income data (Feres and Mancero, 2001). The method requires specifying a set of basic needs and a threshold to consider those needs as "satisfied" (Armendáriz and Larraín B., 2017). Méndez and Trejos (2004) propose a set of unsatisfied basic needs for Costa Rica using data from the 2000 census, and that can be applied straightforwardly to the 2011 census (Méndez and Bravo, 2014). This methodology defines four basic needs dimensions: housing, sanitation, education, and consumption. Each dimension consists of components selected by its explanatory power for income in household surveys.

To adapt this methodology to the 1973 and 1984 Census, we focus on components that can be constructed across all the four censuses. In the end, we also have the same four basic needs

dimensions for these two earlier years. Appendix B includes details on the components that constitute each of our dimensions, and the specific variables from the censuses that we use. A general description of each dimension is the following: (i) housing: refers to the quality of the household dwelling's material and household overcrowding; (ii) sanitation: refers to the method for disposal of human excreta that the household uses; (iii) education: refers to school attendance and academic achievement for household members from 7 to 17 years old; and (iv) consumption: refers to the relationship between the number of income recipients (employed, pensioned, or renter), their years of schooling, and the total number of household members. We construct each dimension as an indicator variable equal to one if the household does not meet the threshold to attain a need in some component, and zero otherwise.

We consider a household as poor if it has at least one unsatisfied need. Moreover, we estimate the severity of poverty through the total number of UBN. Namely, the total number of UBN is an index that ranges from 0 to 4, where each unsatisfied basic need adds one point to the index.

3.2 Historical Data

To understand which census-blocks were directly affected by the UFCo, we collected and digitized maps of the company's properties, which were published by the UFCo Engineering Department and are available in the Costa Rican National Archive (*Archivo Nacional de Costa Rica*).[10] We also collected, digitized and geo-referenced maps of the administrative divisions of Costa Rica in order to geo-reference censuses from 1927-2011.

For a better understanding of living standards and investments during UFCo's tenure, we collected and digitized documents published by the company. From 1912 to 1931, the Medical Department of the UFCo issued an annual report describing the sanitation and health programs carried out by the company as well as the living conditions within the UFCo plantations. Moreover, the company regularly circulated reports with information about the number of employees, production, and investments in areas such as education, housing, and health. We obtained primary print copies of these documents from collections held by Cornell University, the University of Kansas, and the Center for Central American Historical Studies at the University of Costa Rica (*Centro de Investigaciones Históricas de América Central de la Universidad de Costa Rica*).

We also use data from 1864, 1892, 1927, 1950, and 1963 Costa Rican Population Censuses. Although these censuses do not contain enough spatial detail to be considered in our regression discontinuity design, the information allows us to analyze aggregated population patterns, such as migration before and during the UFCo apogee, or the size and occupation of the country's labor

[10] Although the Map Library of the National University of Costa Rica (*Mapoteca Virtual de la Universidad Nacional de Costa Rica*) has digitized part of the collection, collecting all available maps required in-person visits to the archives, taking high-quality pictures of the original maps, and digitizing them. Figure C.4 in Appendix C provides an example of a map showing the UFCo landholdings in the Costa Rican Pacific Coast.

force.

Moreover, we also collected data from Costa Rican Statistic Yearbooks, which contain information on the number of patients and health expenses carried out by hospitals in Costa Rica from 1907 to 1917, including the ones ran by the UFCo. We obtained export data from Costa Rican Statistic Yearbooks as well as Export Bulletins. Finally, 19 agricultural censuses conducted between 1900 and 1984 provide information to track changes in land use in the country and agricultural output.

4 Impact of the Company

4.1 Empirical Strategy

To estimate the causal effect of the UFCo, we use well-defined boundaries based on historical records and compare observations located just inside former UFCo plantations to observations located just outside them. Our estimation of the *average* UFCo effect uses the following regression discontinuity specification:

$$y_{igt} = \gamma\, UFCo_g + f(\text{geographic location}_g) + \mathbf{X}_{igt}\beta + \mathbf{X}_g\Gamma + \alpha_t + \varepsilon_{igt}, \tag{1}$$

where y_{igt} is an outcome of individual or household i in census-block g and year t; and $UFCo_g$ is an indicator variable equal to one if the census-block g's centroid was inside a UFCo plantation, and equal to zero otherwise. $f(\text{geographic location}_g)$ is a RD polynomial, which is a smooth function on latitude and longitude that controls for the geographic location of census-block g. This multidimensional discontinuity in a longitude–latitude space allows us to compare units, not only on different sides of the boundary, but in a comparable position. Following Gelman and Imbens (2017), and in line with recent work whose estimation framework relies on a geographical RD design (Dell et al., 2015; Dell and Olken, 2019; Lowes and Montero, 2016), we use a linear polynomial in longitude–latitude and test for robustness to a variety of specifications. $\mathbf{X}_{igt}$ is a vector of covariates for individual or household i. $\mathbf{X}_g$ is a vector of geographic characteristics for census-block g, and α_t is a year fixed effect.

Furthermore, to analyze a *time-varying* UFCo effect, we allow for a different UFCo coefficient in every census, by estimating the following RD specification:

$$\begin{aligned} y_{igt} =& \gamma_{1973}\, UFCo_{g,1973} + \gamma_{1984}\, UFCo_{g,1984} + \gamma_{2000}\, UFCo_{g,2000} + \gamma_{2011}\, UFCo_{g,2011} + \\ & f(\text{geographic location}_g) + \mathbf{X}_{igt}\beta + \mathbf{X}_g\Gamma + \alpha_t + \varepsilon_{igt}, \end{aligned} \tag{2}$$

where the indicator variable $UFCo_{g,t}$ is equal to one if at time t individual or household unit i is in census-block g, whose centroid was inside a UFCo plantation; and equal to zero otherwise.

4.2 Pre-Characteristic Balance

We begin by examining whether geographic characteristics are similar along the re-drawn boundary that was described in Section 2.2. Namely, we test a null hypothesis of no geographical differences on both sides of this segment of the UFCo boundary. We fail to reject this null in the segment shown in Figure 3. In this area, the border was redrawn arbitrarily and geographic characteristics are balanced. Table 1 shows that elevation, slope, and temperature do not change discretely across this segment of the UFCo boundary, thus fail to reject our null.[11] Following Conley (1999), we allow for spatial dependence of an unknown form (reported in brackets). For comparison, we also report robust standard errors (in parentheses).[12] This table also shows that as we move far away from this segment of the boundary, the differences in elevation, slope, and temperature become significant.

Therefore, exploiting the level of disaggregation of our data—which includes close to 9,000 households even within this subregion—and not to contaminate the analysis that might be very sensitive to changes in the landscape (most economic activities were related to agriculture), our main results will include only observations whose census-block's centroid is located within 5 kilometers (km) from this segment of the UFCo boundary; where we know the border was arbitrary and observable geographic features are balanced.

In terms of pre-existing social and economic characteristics, the study area was close to being uninhabited before the UFCo's arrival, thus having no pre-trends on either side of the boundary. According to the 1864 Costa Rican Census, only 545 people lived in the entire Caribbean Coast, a 0.45% of the Costa Rican population at that time (Oficina Central de Estadística, 1868). Company officials wrote that when they first arrived "with the exception of the little village of Matina, which contained fifty or sixty inhabitants, not one individual was settled anywhere on the line. In fact, the route had not even been explored, and the rivers were first named when the engineers crossed them"(Keith, 1886, p. 8).

5 Results

5.1 Average Effect Pooling Across Years

Table 2 explores whether households living in areas that were directly exposed to the UFCo are on average better off than those living just across the border. The table includes the results of

[11] The unit of analysis to examine the geographic characteristics is a 1x1 km grid cell. Results are statistically equal if we use census-blocks as the unit of analysis. Elevation and temperature data were obtained from the Global Climate Database created by Hijmans et al. (2005). The spatial resolution is 30 arc-seconds. Elevation above sea level is in meters and was constructed using NASA's Shuttle Radar Topography Mission data. From the elevation information, we calculate the slope (in degrees). Hijmans et al. also compiled monthly averages of temperature measured by weather stations from 1960 to 1990. We measure temperature in Celsius and take an annual average.

[12] We compute Conley Standard errors at the cutoff distance of 2 km. However, the results are robust to alternative cutoffs.

estimating equation (1) using the probability of having an unsatisfied basic need (UBN) in each dimension (housing, sanitation, education, and consumption), the probability of being poor, and the total number of UBNs as dependent variables. All regressions include geographic controls, demographic controls for the number of household members aged 0-4 (infants), 5-14 (children), and 15 and older (adults), census fixed effects, and a linear polynomial in latitude and longitude. We report standard errors clustered at the census-block level and Conley standard errors.

The estimates suggest that the households located in the former UFCo region are in general better off. Columns (1) to (4) of Table 2 show that UFCo households have had higher living standards in every dimension considered. Note that, although some coefficients might seem somewhat small, the percentage variation of these probabilities with respect to their sample mean (last row) is sizable. For instance, the first coefficient of Column (1) implies that households within former UFCo areas had 9.5 percentage points (pp) lower probability of having an unsatisfied housing need than their neighbors outside UFCo lands between 1973 and 2011; a 54 percent decrease with respect to the sample's mean. These households also had 1.6 pp, 5.7 pp, and 5.9 pp lower probability of having an unsatisfied need in sanitation, education, and consumption, respectively.

Households in former UFCo areas also had a 12.4 pp lower probability of being poor (Column 5); a 26 percent variation with respect to the sample's mean. Column (6)—the number of UBN—should be read differently than other columns, as it takes values that range from 0 to 4, and implies that the severity of poverty was lower within former UFCo areas, where the households had, on average, 0.228 fewer unsatisfied needs than the households in the non-UFCo control region.

Figure D.5 in Appendix D summarizes these results in three-dimensional plots. The figure shows the spatial distribution of the centroids of the census-blocks and the study boundary across space. The sharp discontinuity at the UFCo boundary is noticeable for each of our outcomes, with better outcomes coinciding with former UFCo regions in every case.

For completeness, we also present results using the entire boundary—which are contaminated by unbalanced ex-ante geographic characteristics—in Appendix D. Results in the entire boundary are consistent with our results in the balanced subsample, and magnitudes in both estimations are overall close to each other.

5.2 Time-Varying Effect

The company stopped operations in 1984, and we examine census data from 1973-2011. Therefore, we can disentangle the differentiated effects of the company's presence during its tenure, and also at different points in time after it stopped operating. Figure 4 documents how the UFCo effect changed over time.[13] The probability of being poor and the total number of UBN are quite persistent over time, being significant during every year of our study. The probability of an unsatisfied housing need

[13]Table D.4 in Appendix D contains the estimates that Figure 4 plots.

is also very persistent across years. In 2011, approximately 30 years after the UFCo left, households within UFCo former lands are 9.3 percentage points less likely of having a UBN in housing relative to households outside. The magnitude of the UFCo effect in this dimension is high, given the mean probability for the entire region (0.124). The effect on sanitation rapidly vanishes and is insignificant after 1973. Finally, education and consumption are always worse outside the UFCo, but the significance of the coefficients disappears after 2000.

Figure 4 also shows how, since 1973, the treated and untreated regions have converged slowly, with only 56% of the poverty gap closing over the following four decades. More generally, the *severity* of poverty—measured by the number of UBN—has decreased over time: while in 1973 a household within the UFCo landholdings had 0.668 less UBN than a household outside, in 2011 this difference was, albeit significant, down to 0.126.

5.3 Robustness

Falsification Test: As a falsification test, we re-run the analysis using placebo borders. In particular, we draw fake borders at a distance of 2 km both inwards and outwards of the actual UFCo border, so the analysis compares households on the same side of the boundary. Appendix E presents the results, showing that our placebo tests deliver insignificant results in every case, both economically and statistically. Hence, our results are capturing an effect that only appears as we cross the actual UFCo boundary and not spatial autocorrelation, as warned by Kelly (2019).

Effect of the River: A possible concern is that the presence of a river close to our boundary is driving our result. To address this issue, we run our main specification restricting the sample to units "on the wrong side" of the river (1,937 units), that is, units that are above the river and belong to the UFCo, and units that are below the river and did not belong to the company. Appendix F.1 presents the results. In this limited sample, we are comparing only households located very close to each other (1 km from the boundary, at most), and we still find estimates that are consistent with our main results. As with the falsification test results, this finding is also reassuring that what we are capturing is an effect that shows up precisely as we cross the boundary and not spatial autocorrelation.

Different Bandwidth and Polynomials: As an additional robustness check, we eliminate observations close to the boundary in case there might have been some negative spillover from the company to the outside. Note that when exploring the river's effect, we do the opposite, we limit the analysis to observations close to the boundary. Appendix F.2 shows the results. Overall, the coefficients are very similar to the ones of our main regression.

Moreover, although in Tables 2 and D.4 we use a linear polynomial in latitude and longitude, our main message is robust to alternative specifications of the RD polynomial. Appendix F.3.1

documents that a quadratic polynomial leads to similar conclusions. Appendix F.3.2 shows that estimates are almost identical when we use a linear polynomial in latitude, longitude, and distance to the boundary.

Different Control Variables: Besides the specification of the RD polynomial, we also analyze how the results change to varying the control variables. Appendix F.4.1 shows that results are robust to excluding demographic controls, Appendix F.4.2 to excluding geographic controls, and Appendix F.4.3 to excluding both demographic and geographic controls. Our results are also robust to controlling for distance to a railroad, which we do in Appendix K.

Income and Nighttime Lights Data: We use nighttime lights data as a proxy of income to confirm our findings through an alternative measure of economic development. Figure G.6 in Appendix G shows a satellite image in which areas inside the former UFCo landholdings display higher luminosity. Results in Table G.21 in Appendix G confirm this difference in luminosity, by showing that nighttime light intensity is 21% higher in the former UFCo plantations (statistically significant at the 1% level). Assuming an elasticity between nighttime light intensity and GDP of 0.3 (consistent with the findings in Henderson et al. (2012) and Hodler and Raschky (2014)), the 21% difference in nighttime light intensity implies that the output in the former UFCo plantations is about 6.37% higher.

Alternative Index of UBN: Our Unsatisfied Basic Needs (UBN) are a modified version of the ones proposed by Méndez and Trejos (2004). Because Méndez and Trejos constructed the index using information from the 2000 and 2011 census, our modification consists of selecting the variables whose information is available in each of the 1973, 1984, 2000, and 2011 censuses. Therefore, as a robustness test, we re-run the estimation restricting the analysis to the 2000 and 2011 census and using the Unsatisfied Basic Needs (UBN) as proposed by Méndez and Trejos. Table H.22 in Appendix H shows that our main message is robust to this alternative definition of UBN.

6 Evidence on the Mechanism

To understand the channels that led to the difference between regions that we found with our empirical strategy, we collected and digitized data on different outcomes from 1907-1984. In Section 6.1, we use this data to provide evidence on investments in local amenities (such as schools and hospitals) being much larger within the UFCo landholdings than in nearby regions. Studying company reports, we show in Section 6.1.4 how evidence suggests that these investments were at least partially motivated by the need to attract and maintain a sizable workforce. Finally, Section 6.2 considers other plausible mechanisms (like selective migration and negative spillovers from the

company to neighboring regions), finding no evidence in support of these being the main drivers behind our results.

6.1 Investments in Local Amenities

6.1.1 Investment in Healthcare and Sanitation

Approximately five thousand workers died constructing the railroad to the Caribbean Coast in Costa Rica, due to the unhealthy and dangerous conditions of the tropical forest (Bucheli, 2005). This experience, along with lessons from the Panama Canal's construction, taught managers about the importance of sanitation and healthcare to sustain a large workforce in an environment threatened by tropical diseases. As a consequence, the UFCo invested in sanitation infrastructure, launched health programs, and provided medical attention to its employees.

Infrastructure investments included pipes, drinking water systems, sewage systems, street lighting, macadamized roads, and dikes (Sanou and Quesada, 1998). In 1905 the UFCo established a Medical Department in Costa Rica to carry out sanitation programs and medical research on tropical diseases. By 1942 three company hospitals operated in the country. Their staff included doctors, sanitary inspectors, and nurses from the United States and other Central American countries (Morgan, 1993). Each hospital had an up-to-date surgical and X-ray equipment, laboratory, outpatient department, and steam laundry (Deeks, 1924).

Employees and their dependents had access to medical and surgical treatment, including medicines in the case of employees, without any additional charge (UFCo, 1917).[14] Moreover, neighbors from non-UFCo regions could not commute and get access to the same quality of healthcare. As Figure 5b shows, between 1907 and 1917 workers or their families who were classified as payroll and attended a UFCo hospital (dashed line) received more than twice the spending per patient than people who attended UFCo hospitals but were *not* in its the payroll (dotted line). Although a higher level of spending does not necessarily imply a higher quality of health care, UFCo's medical services were known of being among the best in the country (Casey, 1979). For reference, we also show expenditure per patient in the most modern *public* hospital at the time (San Juan de Dios); which suggests a non-worker would have been on average better-off attending this government-run hospital than commuting to the UFCo's hospital.[15]

Despite the positive impact of the UFCo programs, its benefits were restricted to employees and their immediate families (Chomsky, 1996; Kepner, 1936). The general manager of the Medical Department explained that given the size of the UFCo landholdings, it was impossible from a commercial standpoint to sanitate completely all areas and therefore their efforts were "mainly

[14] To cover healthcare for employees and their dependents, the UFCo deducted a mandatory fee equivalent to 2% from their salary.

[15] Moreover, although non-employees could receive medical attention in the UFCo healthcare network, they had to pay high fees.

directed to protecting the larger communities and camps where our employees are located" (UFCo, 1922, p. 6). In fact, to increase sanitary benefits, company doctors suggested preventing workers from traveling between plantations and surrounding villages, which were unscreened.

6.1.2 Investments in Housing Infrastructure

Given the remoteness of the plantations and to reduce transportation costs, the UFCo provided the majority of its workers with free housing *within* the company's land. This was partially motivated by concerns with diseases like malaria and yellow fever, which spread easily if the population is constantly commuting from outside the plantation. Each of the UFCo's divisions consisted of farms, and each farm had a camp where workers lived.

Usually, houses for plantation laborers were laid out around a soccer field. By 1958 the majority of laborers lived in barracks-type structures. Single families occupied the majority of barracks, and there were buildings for unmarried workers (May and Lasso, 1958). These barrack structures exceeded the standards of many surrounding communities (Wiley, 2008).

Related to the sanitary programs impulsed by the UFCo, a squad cleaned the grounds, collected trash, systematically sprayed with DDT to control for mosquitos and insects, and scrubbed out public toilets and bathing facilities. Moreover, the water supplied to the taps was safe for drinking. Besides housing, the UFCo provided basic services *for its employees* within each camp, such as schools, commissaries, dispensaries, and recreational facilities. May and Lasso (1958, p. 209) claim that "the places of worship, recreational facilities, and athletic fields and equipment provided for United's workers are upon a scale matched by few, if any, locally owned agricultural enterprises."

6.1.3 Investments in Human Capital

One of the services that the company provided within its camps was primary education to the children of its employees. The curriculum in the schools included vocational training and before the 1940s, was taught mostly in English. The emphasis on primary education was significant, and child labor became uncommon in the banana regions (Viales, 1998). By 1955, the company had constructed 62 primary schools within its landholdings in Costa Rica (May and Lasso, 1958). As shown in Figure 5a,[16] spending per student in schools operated by the UFCo was consistently higher than public spending in primary education between 1947 and 1963.[17] On average, the company's yearly spending was 23% higher than the government's spending during this period.

[16] In Figure 5a, the amounts were converted to constant 2015 Costa Rican Colones (CRC) by splicing four price indexes: (i) Cost of Living Index Base 1936 = 100 (*Índice de costo de la vida Base 1936 =100*); (ii) Consumer Price Index for Middle Income and Low-Income Citizens in the Metropolitan Area Base 1964 = 100 (*Índice de precios al consumidor de ingresos medios y bajos del Área Metropolitana Base 1964=100*); (iii) Consumer Price Index Base January 1995 = 100 (*Índice de precios al consumidor Base Enero 1995 = 100*); and (iv) Consumer Price Index Base June 2015 = 100 (*Índice de precios al consumidor Base Junio 2015 = 100*).

[17] Data is only available for this subset of years.

By the time children completed primary education, they were old enough to work. Although the UFCo did not provide directly secondary education, it subsidized it in some cases.[18] Despite this subsidy, however, secondary and tertiary education were costly and out of reach for most children.

To assess the impact of UFCo's educational investments on current human capital accumulation, we estimate equation (1) using educational attainment as the outcome variable and restricting the sample to non-migrants in Appendix I. We find a positive and statistically significant UFCo effect on human capital accumulation and primary education attainment. In particular, we document that individuals within the former UFCo landholdings had 0.269 more years of schooling and were 5.3 pp more likely to have completed primary education.

6.1.4 Why So Much Investment? Outside Options and Worker Turnover

While it is easier to conceive the benefits that the company could derive from investing in hospitals and having healthy workers, it is less clear why it would benefit from more educated children or from other local amenities it provided, such as churches and recreational facilities. In general, the UFCo gave prominent consideration to its employee's family life and leisure time. An article describing the activities of the company states:

> "The welfare work of the Company in the Tropics has assumed large proportions and has a direct bearing on the health and contentment of the employees. The Company has built and maintains churches and schools ..., and has erected and equipped club houses and amusement halls to provide entertainment for employees. It has also provided baseball grounds, and tennis courts" (Deeks, 1924, p. 1008).

A series of company publications suggest that the welfare program of the company was motivated by the need to attract and maintain a sizable workforce. High turnover was common, given the workers' outside option: coffee. Unlike bananas, coffee is a seasonal crop and offered high wages during the harvesting season. During the 1920s, the United Fruit Company Medical Department Annual Reports consistently recognized worker turnover as being an important problem to address. For instance, the 1923 Annual report states:

> "The greatest difficulty encountered in our work among employees is attributable to the fact that a large percentage of the labor, particularly in new land-cultivations, is migratory. The Superintendent of Agriculture in one of the divisions estimates that a laborer's length of stay in that division averages less than two months." (UFCo, 1924, p. 45)

[18] If the parents could afford the first two years of secondary education of their children in the United States, the UFCo paid for the last two years and provided free transportation to and from the United States. Moreover, if the parents organized secondary schools by themselves and paid a private tuition fee for the teachers, the UFCo provided a building and furniture (May and Lasso, 1958).

The 1922 Annual Report also states:

> "The inhabitants in stable communities can be kept under more strict control, and can be educated to take better care of themselves and to observe more closely the necessary precautions for maintaining health than is possible with the mixed and fluctuating populations on our plantations. .... There is a constant overturn of labor and we are periodically importing new laborers ... Their innate migratory habits do not permit them to remain on one plantation from year to year, but *as soon as they become physically efficient and acquire a little money they either return to their homes or migrate elsewhere and must be replaced* [emphasis added]." (UFCo, 1923, pp. 74-75)

As a solution to the high turnover rates, the reports recommend to increase investments in local amenities beyond medical measures. According to the 1925 Annual Report:

> "An endeavor should be made to stabilize the population.... We must not only build and maintain attractive and comfortable camps, but we must also provide measures for taking care of the families of married men, by furnishing them with *garden facilities, schools and some forms of entertainment. In other words, we must take an interest in our people if we may hope to retain their services indefinitely* [emphasis added]." (UFCo, 1926, p. 185)

Consequently, the company intensified investments in local amenities in the mid-1920s. These investments proved to be successful at decreasing turnover. In 1929 a farm superintendent wrote: "sanitary measures have helped to stabilize labor and increase their ability to perform work [...] during recent years with little or no influx of labor we have not experienced the recurrent shortages of labor that used to occur in previous years" (UFCo, 1930, p. 10). Although the Great Depression constrained the investments, the UFCo continued them in the late 1930s.

This sheds new light on a potential mechanism behind our positive results: Given the workers' outside options and initially high levels of turnover, there was a need to retain workers, which led to an increase in investments in "welfare" (local amenities), which could explain the positive effect on development we previously documented.

We explore the mechanism described in these reports empirically. Namely, we test the existence of a positive relationship between better long-term outcomes and workers' outside options during the UFCo times. Intuitively, higher outside options while the UFCo was still operating would have lead to higher UFCo investments to retain workers, and consequently, to more favorable economic outcomes in the long term.[19]

[19] We take this indirect approach, instead of comparing outside options with investments, as data on UFCo investments is too aggregated to exploit spatial variation.

To proxy for the outside option of workers *within* an UFCo district j, we propose to use the sum of the average agricultural real wage in each district k *outside* the UFCo region weighted by the inverse of the distance between j and k. Specifically, we consider the following specification:

$$y_{ijt} = \beta \sum_k \frac{wage_{k,1973}}{price_{k,1973}} \frac{(dist_{jk})^{-1}}{\sum_n (dist_{jn})^{-1}} + \varepsilon_{ijt},$$

where y_{ijt} denotes the outcome of household i in district j (within the UFCo region) and t will stand for outcomes years after the UFCo stopped operations; in particular, we will consider $t \in \{2000, 2011\}$.

We consider data on real agricultural wages that dates back to 1973, while the UFCo was still operating. However, using these wages as regressors creates a potential endogeneity concern: UFCo investments might have increased real wages in relatively close regions. Thus, we proceed in two stages. First, we use suitability to grow coffee as an instrument for real agricultural wages. Along with banana production, coffee was the main economic activity in Costa Rica, and the main alternative source of employment for agricultural workers. Moreover, coffee and bananas grow optimally under different geographic and climatic conditions: While coffee is grown in highlands because higher elevation increases coffee's acidity and its commercial value, bananas slow down their growth rate as the elevation increases (Viales and Montero, 2015).

The idea behind this instrument is then that regions more suitable to grow coffee in 1973 —which grows in a different climate and altitude than banana—should offer higher wages for agricultural workers. Thus, the closest an UFCo region is to a place suitable to grow coffee, the higher the outside option will be for UFCo workers in this area, which in turn, would have led to more UFCo investments and hence better outcomes in 2000 and 2011. The exclusion restriction of this IV strategy would then be that the land suitability to grow coffee in 1973 in non-UFCo regions affects outcomes in 2000 and 2011 *within* former UFCo regions only through its effect on wages during UFCo times.

We measure suitability to grow coffee by regressing coffee intensity in district j—defined as the fraction of agricultural land used for cultivating coffee in district j—in 1973, during UFCo times, on geographic characteristics (slope, temperature, elevation) and a linear polynomial in latitude and longitude, to obtain a proxy of each region's suitability to grow coffee.

Second, we regress economic outcomes in 2000 and 2011 for household i in region j on a weighted average measure of suitability to grow coffee in nearby regions in 1973. We consider

$$y_{ijt} = \hat{\beta}\ \textit{Outside option in 1973}_j + \hat{\varepsilon}_{ijt},$$

where $\textit{Outside option in 1973}_j = \sum_k \textit{Coffee intensity in 1973}_k \frac{(dist_{jk})^{-1}}{\sum_k (dist_{jk})^{-1}}$ and $\hat{\beta}$ captures how the outside option of an UFCo region in 1973 affects economic outcomes in that region in 2000 and

2011.

Data on agricultural wages comes from the 1973 Population Census, while data on coffee production is obtained from the 1973 Agricultural Census. Appendix J presents the first stage results. We find a positive relationship between the suitability to grow coffee and agricultural wages. A one percentage point increase in the suitability to grow coffee in a region is associated with 0.23% higher wages. The effect is statistically significant at the 1% level. Moreover, the first-stage F-statistic is in the order of 33, reducing concerns that coffee suitability is a weak instrument at predicting variation in agricultural wages (Stock et al., 2002).

Table 3 displays the results of our second stage. We find that a higher outside option in 1973 is associated with better contemporary outcomes in all cases. For instance, according to the coefficient in Column (5), an increase in one pp in the average outside option of an UFCo region in 1973 is associated with a 2.8 pp lower probability of being poor in the long term (2000 and 2011). This represents a 7.2 percent variation with respect to the sample mean. These results are shown graphically in Figure 6, in which locations where workers had better outside options during the UFCo's tenure are consistently associated with higher living standards in 2000 and 2011.

We consider this heroic calculation as suggestive evidence in support of our mechanism. Later on, we will assess the potential of this mechanism relating labor mobility to market power and investments to generate our results on economic outcomes through the lens of a model, and examine its implications.

Institutions and Labor Mobility Why didn't the UFCo take the approach of destroying workers' outside options? Work by Acemoglu and Wolitzky (2011) on labor coercion suggests an alternative approach to retain workers: preventing them from leaving or reducing their mobility. Several reasons prevented this from happening in our setting. First, throughout the 20th century, democratic institutions in Costa Rica were much stronger than in other developing countries, which possibly played a role in protecting workers' rights.[20] Second, the Costa Rican elite included many coffee producers who needed labor during the coffee harvesting season, which gave them an incentive to protect workers' mobility. Third, given the larger political competition in Costa Rica, there was an effort by particular political groups to enlarge their winning coalition by protecting UFCo workers (Bucheli and Kim, 2012). These circumstances were not present in other Latin American countries were the UFCo operated, like Colombia, where armed forces prevented workers from forming unions and leaving the plantations in Santa Marta and Ciénaga.[21] Today, these cities are among the poorest in the country, which does not contradict our findings: as our mechanism—labor market dynamics as an incentive for the company to invest—did not seem to be present in these

[20]See Bucheli and Kim (2012) for a detailed comparison of political institutions between countries in Central America.

[21]See Bucheli (2005) for more details on this coercion and the "Banana Massacre". Bucheli refers to the Colombian authorities as a "business-friendly government". The Costa Rican army, on its part, was abolished on 1948.

other cases.

6.2 Ruling-Out Other Plausible Mechanisms as Main Drivers

Positively Selected Migration During UFCo's Tenure It might have been the case that outcomes are better within the UFCo because it attracted positively selected migrants. To consider if selective migration is generating the differences in living standards between the two regions, we take three different approaches. In our first approach, we re-estimate equations (1) and (2) using a restricted sample of the full dataset in which we drop all migrant households. We classify a household as migrant if any household member lived in a different place of residence five years before the census took place.[22] Appendix L.0.1 document that the results are similar to the estimates in Tables 2 and D.4, and we cannot reject that the estimates are the same at the 10% significance level.

In our second approach, we look at observables of migrants to the UFCo sub-region where we ran our regressions, and compare them to observables of migrants to our control group in 1973 (while the UFCo is still operating). As documented in Appendix M, we find that, on average, migrants to the UFCo have 4.2 months less years of schooling than migrants to the control group. This suggests that, if anything, migrants to the UFCo were negatively selected; they had on average fewer years of schooling and a lower probability of completing primary school.

While the 1973 Census data is detailed and geo-referenced at the census-block level, it captures migrant patterns many years after the company began operations. To explore earlier waves of migration, we resort to earlier census data. Namely, we compare observable characteristics of migrants to UFCo regions with those of migrants to other Costa Rican regions in 1927, the earliest census for which micro-data is available.[23] Consistent with the results from 1973, we find that migrants to the UFCo were negatively selected in terms of schooling. Compared to migrants to other Costa Rican regions, migrants to the UFCo were on average 5.2 pp less likely of having primary education, 1.5 pp less likely of having secondary education, and 6.8 pp more likely of having no schooling. Moreover, the results from the 1927 Census also show that migrants to the UFCo regions were on average 10.3 pp less likely to own real state than migrants that moved to other Costa Rican regions. This negative selection aligns with more current findings like those of Lagakos et al. (2018), and is robust to restricting our sample and comparing migrants to UFCo cantons with migrants to neighboring cantons around UFCo plantations only. The results of this analysis are available in Appendix N.

Our third approach complements the second one by ruling-out that, maybe, although migrants to the UFCo accumulated less human capital than other migrants at the time, they might have

[22] Our results remain unchanged if we instead classify a household as migrant if the head of household lived in a different place of residence five years before the census took place (see Appendix L.0.2)

[23] For 1927, the census micro-data is a representative sample geo-referenced at the canton level.

been exceptional farmers (a measure that is not captured by education attainment). To explore this, we compare the UFCo effect for households engaged in the agricultural sector versus other economic sectors.[24] If ability in agriculture production is highly inheritable and selection in these abilities is driving our results, then the UFCo effect should be stronger for households engaged in the agricultural sector relative to households in other economic activities. Nevertheless, Table O.34 in Appendix O shows that this is not the case: For each outcome we consider, we cannot reject at the 10% level that the estimates are the same across both groups (further, the coefficients themselves are extremely similar).

In summary, all three approaches suggest that selective migration is unlikely to generate the observed differences between regions, and if anything, it appears that migrants to the UFCo were negatively selected.

Positively Selected Migration at the Time of Each Census Differential rates of migration at the time of each census are relevant for our long-run analysis. Each census contains information about individuals' place of residence five years before the census took place. In census-blocks located in UFCo areas, 9.29% of individuals migrated from a former non-UFCo canton, while in the non-UFCo areas, 11.90% of individuals migrated from a UFCo canton. Table 4 shows that the migration rates are decreasing over time, and their difference is not statistically significant.

Negative Spillovers from the UFCo to Neighboring Regions Another possible concern is that negative spillovers from the UFCo to our control group generate the gap in outcomes between the regions. However, it is unlikely to be the case. First, in Appendix P.1, we document that in 1973, while the company was still operating, the economic outcomes for the counterfactual region were better than in nearby rural regions outside the UFCo control. Households in the counterfactual region had a lower probability of a UBN in housing, sanitation, and consumption; and in general, had a lower probability of being poor and a lower number of total UBN.

Second, in Appendix P.2, we show that, also in 1973, the accumulation of human capital was higher for individuals in the control group than in individuals in other nearby regions outside the UFCo. Individuals in the counterfactual region had 1.453 more years of schooling, were 25.9 pp more likely of completing primary education, and 2.9 pp more likely of completing secondary education.

Third, in Appendix Q, we document how public investment per capita in the region outside the UFCo boundary during the company's tenure was not significantly different from that on average Costa Rican rural areas. In particular, we gathered data on government spending per municipality from annual reports from the Comptroller General of the Republic of Costa Rica (*Contraloría*

[24] We consider a household as an agricultural household if any of its members work in agriculture. Our results remain unchanged if we instead consider a household as an agricultural household if its head works in agriculture (see Table O.35 in Appendix O).

General de la República de Costa Rica), and we compare the spending per capita between UFCo municipalities and other rural municipalities.

Thus, our control region seems like an average location—if anything, a relatively strong one within the country. Finally, given Costa Rica was considered a poster child of good governance at the time, and income per capita was among the highest in the area, in this sense the control region is particularly strong within Latin America.

6.3 Discussion

In summary, levels of investment in local amenities such as hospitals and schools inside the UFCo were significantly higher than public investments undertaken by the government in comparable regions. Company reports suggest that these strong investments were at least partially driven by the need to attract and maintain a sizable workforce. The latter is supported by a positive correlation between the intensity of company investments and the levels of outside options for workers in regions near the UFCo. Our hypothesis is that these investments are likely to be the main drivers behind the gaps in living standards that we found empirically. Moreover, as maximizing profits was the UFCo's main objective, the level of their investments in physical and human capital would likely have been lower in the absence of competition for labor. It is worth mentioning that this mechanism would allow us to reconcile our results with findings on the effects of colonial concessions, like Nunn (2008), Dell (2010), and Lowes and Montero (2016). In these cases, labor was coerced, highly immobile, and with a very low outside option. Thus, potentially, the producer extracting resources had little or no incentive to invest in local amenities or "public goods" to retain workers, and this under-provision might be partially explaining the persistent negative effects found by these studies. We also find no evidence in support of selective migration or negative spillovers from the company to neighboring regions being the main channels behind the observed difference in outcomes.

These findings motivate the general equilibrium model we develop in the next section: a spatial model in which the degree of local monopsony power of a firm *within* a location depends on how mobile workers are *across* locations, and where we allow the firm to invest in local amenities.

7 Spatial Model

The evidence on the mechanism behind our results suggests a relationship between labor mobility, monopsony, and investments that was crucial in determining the firm's effect. In light of this evidence, we now lay out a general equilibrium framework that incorporates these new channels, and in which labor market power relates to worker mobility. The model captures observable spatial frictions, and is consistent with local estimates from our empirical analysis. This framework allows us to quantify the difference between the firm's local and country-level effects, and run several

counterfactual exercises to understand the relevance of labor mobility and of the local labor market structure.

In what follows, we outline the theoretical framework. Section 7.2 describes the model's calibration and Section 7.3 presents the results of our counterfactual exercises. Appendix R provides additional historical evidence that supports the model's assumptions.

7.1 Theoretical Framework

There are $j \in \{1, ..., N\}$ locations, and time is discrete. Throughout, we use a prime to denote next-period values. Each individual lives for one period. First, each agent is born in the location where her parent lives. Then, she chooses whether to live and work in this location, or to move to a different location. Once the location is chosen, the individual supplies a unit of labor inelastically to produce a differentiated variety in the location she lives, and she consumes. The period ends with the agent having one offspring. The total number of workers is normalized in each period and the initial population is exogenous.

7.1.1 Household Preferences and Consumption

Following their location choice, agents consume and derive utility. Workers living in region j have constant elasticity of substitution (CES) preference with elasticity σ across differentiated domestic goods (c). Additionally, they derive utility from the per capita local amenities of the region where they live.

The deterministic component of welfare—defined as welfare up to an idiosyncratic shock that we will introduce below—of a worker residing in location j is given by $\mathcal{U}(c_{jk}, \tilde{a}_j) = \tilde{a}_j[\sum_{k=1}^{N} c_{jk}^{\frac{\sigma-1}{\sigma}}]^{\frac{\alpha\sigma}{\sigma-1}}$, where $\tilde{a}_j = (A_j/L_j)^{1-\alpha}$ captures the utility derived from per capita local amenities.[25] Each worker supplies one unit of labor inelastically and earns a nominal wage (w_j). Let P_j be the CES price index.[26] The *equilibrium* deterministic utility of a worker in location j can be expressed as

$$W_j = \tilde{a}_j \left(\frac{w_j}{P_j}\right)^{\alpha}. \tag{3}$$

7.1.2 Migration, Shocks and Location Choice

As previously stated, the utility of a worker in region j has a deterministic component given by W_j in equilibrium. Further, we allow for bilateral moving costs $\lambda_{jk} \geq 1$, where any value larger than

[25] We assume there is perfect congestion in local amenities (i.e., $\tilde{a}_i = \bar{a_j}(A_j/L_j^{\rho})^{1-\alpha}$ with $\rho = 1$). As will become clear in the next subsection, a model with imperfect congestion ($\rho < 1$), would lead to larger investments in local amenities from the UFCo (given the increasing returns to investment) and stronger welfare effects. However, to abstract from this additional agglomeration force and focus on mobility frictions and productivity spillovers, we set $\rho = 1$ and, in this sense, take the effects we find as a lower bound.

[26] As is standard, the CES price index is given by $P_j = \left(\sum_{n=1}^{N-1} (\tau_{nj} p_n)^{1-\sigma}\right)^{1/(1+\sigma)}$, where p_n denotes the price of the variety produced in region $n \neq U$ and τ_{nj} represents bilateral iceberg trade costs (as described below).

one implies there are migration frictions. Thus, the deterministic utility of a worker who migrates from location j to location k is given by $\frac{W_k}{\lambda_{jk}}$.

Finally, the last component of the utility function is given by idiosyncratic taste differences, denoted by vector $\vec{\omega}$. Therefore, the ultimate utility of a worker living in location j who is *not moving* will depend on the idiosyncratic shock ω_k, and is given by $W_j\omega_j$, while the utility of a resident of location j *moving* to location k is denoted as

$$W_{jk}(\vec{\omega}) = \frac{W_k\omega_k}{\lambda_{jk}}. \tag{4}$$

Thus, each period, a worker in location j chooses his location solving

$$\max_k \left\{ W_{jk}(\vec{\omega}) \right\} = \max_k \left\{ \frac{W_k\omega_k}{\lambda_{jk}} \right\}. \tag{5}$$

We further assume that the idiosyncratic utility shifter, $\vec{\omega}$, follows a Frechet extreme value distribution with shape parameter θ. Letting L_j denote the number of workers who live in location j at time t, it follows that the outflow of individuals born in region j who will choose to work in region k (L'_{jk}) can be described as

$$\frac{L'_{jk}}{L_j} = \frac{\left(\frac{W'_k}{\lambda'_{jk}}\right)^\theta}{\sum_{n=1}^N \left(\frac{W'_n}{\lambda'_{jn}}\right)^\theta}. \tag{6}$$

Finally, we can derive the gravity equation describing bilateral migration flows from location j as a function of its current population, expected utility in j and utility in other locations, as follows:

$$L'_{jk} = (\lambda'_{jk}\Omega'_j)^{-\theta}(W'_k)^\theta L_j, \tag{7}$$

where $\Omega'_j = \left[\sum_{n=1}^N \left(\frac{W'_n}{\lambda'_{jn}}\right)^\theta\right]^{\frac{1}{\theta}}$ denotes the expected utility of an individual born in location j.

Trade Local bilateral trade flows from region j to region k incur an iceberg trade cost, $\tau_{jk} \geq 1$, where $\tau_{jk} = 1$ corresponds to frictionless trade. Thus, the bilateral trade flows of domestic goods are governed by a standard gravity equation: $X_{jk} = \tau_{jk}^{1-\sigma}\left(\frac{w_j}{A_j^X}\right)^{1-\sigma}\frac{w_k L_k}{P_k^{1-\sigma}}$.

7.1.3 Producers

The country has N regions: one producing "bananas," where the UFCo operates (denoted 'U'), and the other $N-1$ locations ($j \in \{1, 2, ..., N-1\}$) produce a domestic homogeneous good. We assume bananas are a pure export good, while domestic goods are consumed locally. We proceed by describing these regions and their production schemes.

The UFCo's Region (U) The UFCo is a profit maximizer and the sole employer within its location. Besides wage, the firm may also provide local amenities as part of the worker's compensation bundle, and solves the following problem

$$\max_{\{A_U, L_U\}} \Pi_U = \max_{\{A_U, L_U\}} P_U \left(\frac{A_U}{L_U}\right)^{\chi} L_U^{\phi} - w_U(L_U)L_U - P_A A_U$$

such that

$$L_U = L_{U,-1} - \sum_{j=1}^{N-1} L_{Uj} + \sum_{j=1}^{N-1} L_{jU} \tag{8}$$

where L_{Uj} and L_{jU} satisfy equation (7), and χ measures the strength with which the level of amenities (like hospitals or schools) increases productivity.[27]

This means that the firm will provide workers with utility as compared with their "outside option" to attract enough people to meet their optimal labor demand, given bilateral migration flows. *In this sense, the firm is a local monopsonist, whose degree of monopsony power will depend on workers' mobility, which is governed by θ.* High values of θ imply higher worker mobility and less monopsony power for the firm; thus, attracting the same number of workers (L'_U) would be more costly: The firm would have to provide workers with a higher utility level, either through higher wages or more local amenities. Conversely, in a hypothetic case where workers are immobile ($L' = L = L_{-1}$) would lead to a perfectly inelastic labor supply and a case of pure monopsony within this region.[28]

Firms in the Rest of the Country Each of the $N-1$ regions in the rest of the country produce domestic tradable goods.[29] Producers in location $j \in \{1, ..., N-1\}$ maximize profits in a competitive market and pay taxes to the government, solving

$$\max_{\{L_j\}} \Pi_j(L_j) = \max_{\{L_j\}} p_j \left(\frac{A_j}{L_j}\right)^{\chi} L_j^{\gamma} - w_j L_j - T_j.$$

Local Amenities For simplicity, we assume that local amenities can be purchased at an exogenous price P_A in all regions.

[27] Costa Rican banana production represented, on average, less than 2 percent of the total world banana production from 1956-1984 (sample used in our calibration), which is why we are not considering p_U—the world banana price—as a function of q_U—bananas produced in Costa Rica. This also allows us to focus on monopsony forces that seemed to have been key, as explained in our empirical analysis.

[28] Note that the curvature of workers' utility function, which is concave in amenities and consumption will guarantee that the compensation bundle chosen by the company will be a combination of both amenities and wages.

[29] Note that these goods are homogeneous in the sense that they have the same production function, however, they will be traded given the CES structure of the utility function.

7.1.4 Government

The government collects taxes T from firms in the "Rest of the Country," and provides local amenities to this region so that

$$P_A A_j = \frac{L_j}{\bar{L} - L_U} \sum_{j=1}^{N-1} T_j = \frac{L_j}{\bar{L} - L_U} \sum_{j=1}^{N-1} t P_j (A_j)^{\chi} L_j^{\gamma},$$

where $\bar{L}$ is the total adult population in the country. As shown, we assume the government has no access to borrowing in foreign capital markets, and is therefore its provision of amenities is constrained at every point in time by $\sum_{j=1}^{N-1} T_j$, where each T_j is a fixed proportion t of the sales in region j, which is consistent with severe historical borrowing constraints. We also assume that revenue is spent on local amenities according to the labor share in each region, which is consistent with the observed public spending shares in our data: From 1955 to 1984, public spending on local amenities per capita across cantons was very similar, so much so that the dispersion index of this data is only 0.008.[30]

7.1.5 Equilibrium

A competitive equilibrium in this economy consists of prices $\{w_j, p_j\}_{j=1}^{N}$, and $\{P_A\}$; company decisions $\{A_U, L_U\}$; and labor supply $\{L_j\}_{j=1}^{N}$ such that: All firms and households optimize; trade is balanced; labor flows are consistent across regions $L'_j = \sum_k L'_{kj}$ and $L_j = \sum_k L'_{jk}$; and the labor, domestic good, and UFCo fruit market clear. The solution of the system of equations implied by this equilibrium, and the proof of its uniqueness closely follows Allen and Donaldson (2018), who in turn use techniques derived from Allen et al. (2015).

7.2 Estimation

We calibrate the model to the historical reference equilibrium corresponding to the observed annual levels of economic activity at the canton-level, with 59 locations in total, for years 1950-1973, in which all the data required for the estimation is available.

Our strategy to recover the parameters in the model has several steps. Our first step assumes migration costs of the standard form $\ln(\lambda_{jk}) = \mu \ln(dist_{jk})$.[31] We substitute these into equation (6), and obtain

[30] The dispersion index is a normalized measure of the dispersion of a probability distribution, and it is defined as the ratio of the variance to the mean. A constant random variable would have a dispersion index of zero. An under-dispersed random variable would have dispersion between zero and 1 (for example, points spread uniformly), while if the dispersion index is larger than 1, a dataset is considered over-dispersed.

[31] We approximate intra-unit trade costs based on the average distance traveled to the center of a circular unit of the same area from evenly-distributed points within it (e.g., Redding and Venables (2004)).

$$\ln\left(L_{jkt}\right) = -\theta\mu\ln(dist_{jk}) + \theta\alpha\ln(w_{jt}) + \theta(1-\alpha)\ln\left(\frac{A_{jt}}{L_{jt}}\right) + \rho_{jt} + \pi_{kt} + \varepsilon_{jkt}, \tag{9}$$

where $j \in R$, $k \in U$ and ρ_{jt}, π_{kt} are origin and destination fixed-effects. From these equations, we can estimate θ, μ and α using data on distances and migration of individuals working in the agricultural sector across locations.

When estimating equation (9), endogeneity is a concern. Therefore, we use an instrumental variables (IV) strategy. For our IV strategy, we focus on agricultural workers who migrate from any region to a non-UFCo location. For them, their main outside option at the time was working in coffee plantations. Thus, as in Section 6.1.4, we use the suitability to grow coffee in a location to instrument for wages. For amenities, while still focusing on migration to non-UFCo locations only, we use a "Bartik"-type instrument (Bartik, 1991). Along the lines of Nakamura and Steinsson (2014), the instrument is constructed using national changes in population interacted with the population share in each location according to the 1927 Population Census (more than two decades before the data to calibrate our model begins).[32]

We find that $\{\mu, \alpha, \theta\} = \{0.23, 0.75, 5.96\}$. These values are reassuring. While μ is in line with standard elasticities found in the literature (Redding and Rossi-Hansberg, 2017), α aligns with values of the income share spent on consumption goods obtained after collecting data from household income and expenditure surveys conducted in Costa Rica between 1949 and 1961, which imply a value of $\alpha = 0.8$.[33] Finally, our migration elasticity for agricultural workers of mid-20th Century Costa Rica, θ, is in line with findings from Allen and Donaldson (2018), who estimate a migration elasticity of 8.45 for the United States in 1850, which decreased consistently over time (5.58 in 1950) until reaching a value of 4.5 in 2000.[34] Given the importance of this key elasticity, in the next section, we show how our results change for a wide range of values of θ. More details on data sources, this estimation strategy, and its results are available in Appendix S.1.

Based on data we collected from the Annual Report of the Ministry of Economy and Finance (*Memoria Anual del Ministerio de Economía y Hacienda*) and the Central Bank of Costa Rica's data on historical national accounts, we set the share of tax revenues over non-UFCo-related GDP, T, equal to 0.1318. We assume costless trade and set $\sigma = 5$ as in Allen and Donaldson (2018), while conducting a sensitivity analysis. We recover other parameters using a simulated method of

[32]Note that, given the historical setting, both of these instruments only make sense when the destination of a migrant is *outside* the UFCo.

[33]These are the "Family Income and Expenditure for San José. Survey 1949" (*"Ingresos y gastos de las familias de la ciudad de San José. Encuesta 1949"*) and the "Survey of Family Income and Expenditures 1961" (*"Encuesta de ingresos y gastos familiares 1961"*). The data record the goods and services with a high level of detail, consisting of 149 categories on average. We classify each good and service as an amenity if, according to the company's reports, the UFCo provided them to its workers for at no extra cost. More details in Appendix S.1.

[34]This elasticity might have been larger for agricultural workers in Costa Rica, as compared with modern-day estimates, due to the aggressive expansion of the agricultural frontier at the time.

moments (SMM). The targets for the SMM mainly exploit variation between labor shares, prices, and levels of investment in amenities between the UFCo region and the rest of the country, where the main economic activity for agricultural workers was coffee production. We also incorporate a novel target that is informed by the results of our RD design. Table 5 reports the results of our SMM along with the data sources, targets, and resulting values from the estimation. We proceed by explaining these targets and data sources in more detail.

We gathered data on the number of employees hired by the UFCo from company reports. The number of workers in coffee production comes from the 1950 and 1963 Agricultural Censuses. We obtained data on coffee and banana prices from Costa Rican Statistic Yearbooks. Finally, data on spending per capita on amenities by the UFCo and the government corresponds with the one described in Section 6.1.3.

Finally, we create a model-based version of the RD design we conducted empirically. To obtain the RD estimate, we first construct a projection of the probability of being poor—an index that does not have a model-equivalent—on real wages and investments in amenities per capita in each location—which are observable both in the data and in the model. To do so, we use real wages of agricultural workers from the 1973 Population Census and data we collected on government spending per municipality, while controlling for the geographic and demographic characteristics of each location. The result of this regression along with more details are available in Appendix S. Next, we use this result to generate predicted probabilities of being poor for the UFCo region and for the rest of the country. The estimate for $\gamma = \widehat{P(poor_{UFCo})} - \widehat{P(poor_R)}$ is -0.06, and we run the SMM to minimize the difference between the empirical and model-based γ.

The SMM targeted moments from the model closely match the data. Our calibrated parameters are, first, the price of amenities (P_A) with a value of 5.91, then, we obtain a value of χ, which measures the effect of amenities in productivity, of 0.06. In general, it is extremely difficult to measure the effect that amenities like schools have on productivity, as the decision to provide them is disconnected from the decisions of firms. In our case, the UFCo was, in some sense, a "profit-maximizing public goods producer," which internalized the effect of amenities on productivity. Thus, the setting provides a rare opportunity to estimate a value of χ from the levels of investment that the company chose. The SMM results in a value of 0.18 and 0.07 for the labor share of output in the UFCo (ϕ) and the rest of the country (γ), respectively.[35]

7.3 Labor Mobility as a Key Determinant of the UFCo's Effect on Welfare

In our empirical analysis, we determined the UFCo's effect on several local economic outcomes. In this section, we estimate the firm's aggregate impact on welfare, where we account for general equilibrium effects, and conduct a counterfactual exercise to understand how this aggregate welfare

[35] Historically, the coffee plantations suffered from low productivity (Sáenz, 2012).

effect depends on workers' outside options and the firm's degree of monopsony power.

Under our baseline calibration, the UFCo increases aggregate welfare by 3.66% as compared with a scenario where region U looks exactly any other location.[36]

In line with the mechanism we documented in Section 3, and in particular in Figure 6, in our model the UFCo's effect on welfare is decreasing on labor mobility, which in turn is directly related to workers' outside options. If the elasticity of labor mobility (θ) is low (high), workers are relatively insensitive (sensitive) to differences in utility across regions, perceiving their outside option as relatively low (high).

Figure 7 displays a counterfactual exercise where we change the value of the labor mobility elasticity (θ). The UFCo's effect is sensitive to the value of the labor mobility elasticity, and importantly, *low values of this elasticity can flip the sign of the UFCo's effect*, such that the company's presence might harm locals. As we discussed in Section 6.1.4, this might have been the case in other Latin American countries where the company operated that are very poor today and where mobility seems to have been extremely low, or in cases documented by the literature where labor was coerced (e.g., Nunn (2008), Dell (2010), Lowes and Montero (2016)). In line with this narrative, Figure S.7 shows how, as workers' outside option increases (i.e., with larger values of θ), their compensation represents a larger share of the UFCo's total profits.

This exercise highlights the importance of the local labor market dynamics in determining how much the domestic economy might benefit (or be hurt) by large investment projects like this one.

8 Concluding Remarks

Understanding the implications of large-scale foreign investments is particularly relevant today. In the last 20 years, foreign private investors have acquired more than 64 million acres of land in over 80 countries of Africa, Central and Southeast Asia, Eastern Europe, and Latin America via leases (of up to 99 years) or purchases of farmland for agricultural investment (Cotula and Vermeulen, 2009; Cotula et al., 2009). More than 30 of these concessions have been *larger* than the UFCo's concession in Costa Rica. This recent wave of large-scale land acquisitions by foreigners in developing countries—known as "land grabs"—is devoted to growing food crops and mainly driven by concerns about food security and by the biofuels boom. Consequently, a better comprehension of the effect of such projects is a matter of first-order importance.

This paper studies the impact of large private investment projects on local economic development, while analyzing how these effects interact with conditions in the local economy using evidence

[36]It produces a domestic good using the same technology as the locals, and the government is the provider of amenities. Note that this means we have a conservative estimate as (i) the UFCo's land required a lot of investment before becoming productive (initially swampy and prone to mosquitoes and diseases), but we assume it is as productive as coffee regions, and (ii) in the scenario where the UFCo's region starts producing a local good, there is a new variety entering the CES utility function.

from the United Fruit Company in Costa Rica. In particular, we use a regression discontinuity design and find a positive and persistent effect on economic outcomes in areas where the company operated. Households in the former UFCo areas have a better satisfaction of basic needs (housing, sanitation, education, and consumption capacity) and are less likely to be poor than households in comparable locations that were not under the firm's direct influence.

Data that we collected from primary sources allowed us to test different potential mechanisms, and to find evidence that investments in physical and human capital carried out by the UFCo were likely the drivers of the positive "UFCo effect." Studying company reports, we documented that these high levels of investment were motivated by the need to attract and maintain a sizable workforce. An estimated general equilibrium model highlights how labor mobility is key in determining the sign and magnitude of the company's effect. Indeed, for relatively low elasticities, the aggregate effect of the company becomes negative, which is in line with the negative effects found by the literature studying arrangements where labor was coerced (and relatively immobile).

Finally, many of the economic forces we studied apply to a broader set of arrangements beyond multinational corporations. However, we note that the case of multinational enterprises—where most profits do not stay domestically, especially in cases where firms pay little or no taxes like in our setting—is a scenario in which it is particularly hard to think of domestic aggregate positive effects. We highlight how, even in this situation, the mechanism we describe is strong enough that it can lead to positive and very persistent effects on domestic living standards.

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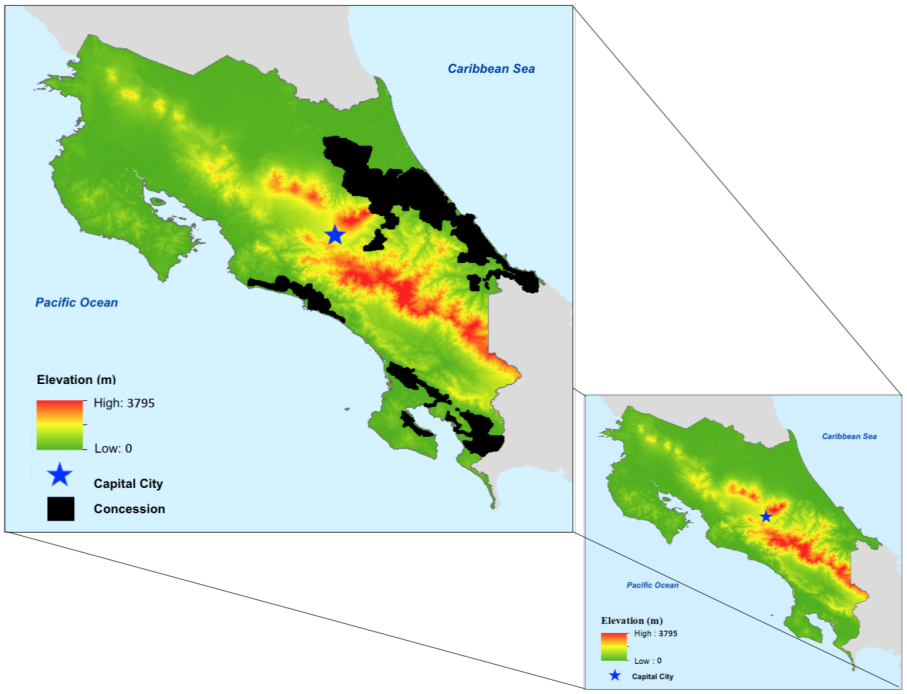
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Figures

Figure 1: Costa Rica and the UFCo's boundary



Notes: The UFCo's land concession appears in black in this map of Costa Rica. Elevation is shown in the background. The concession area represents 8.51% of the national territory, and predominantly consists of flatlands near coastal areas.

Figure 2: Main Events and Data Availability

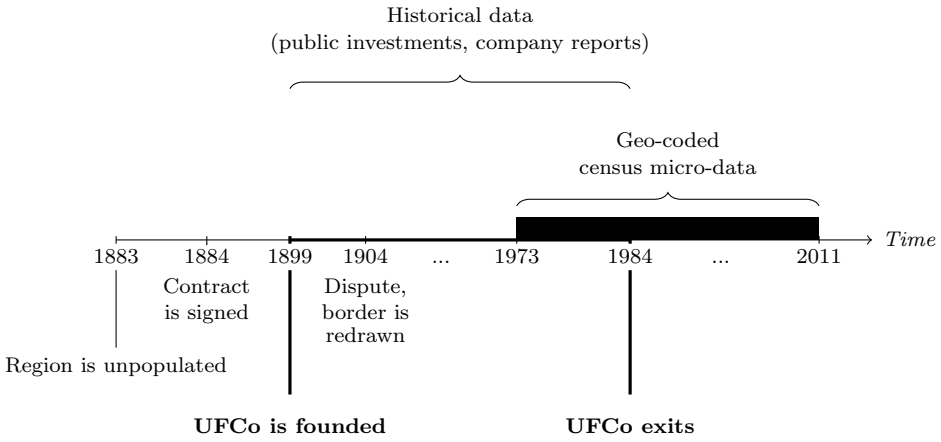
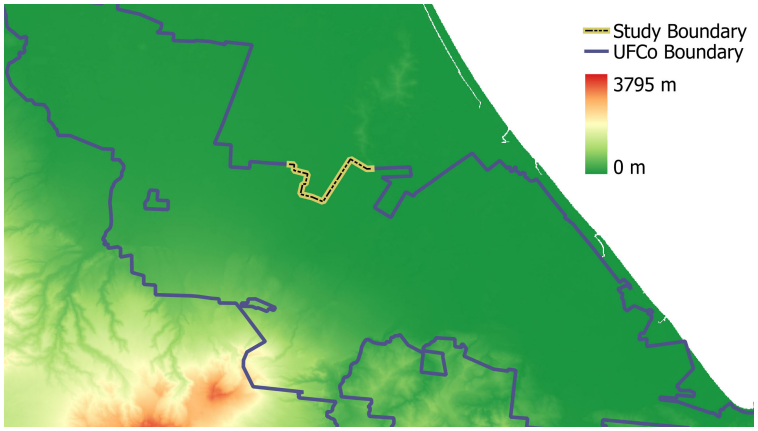
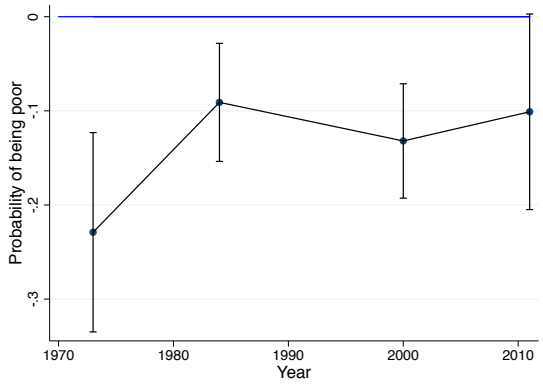


Figure 3: Study Boundary

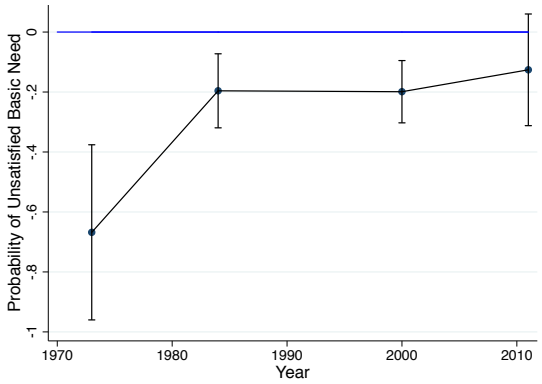


Notes: Elevation is shown in the background. The figure shows the boundary segment along which (i) there is evidence of a quasi-random land assignment and (ii) geographic characteristics balance.

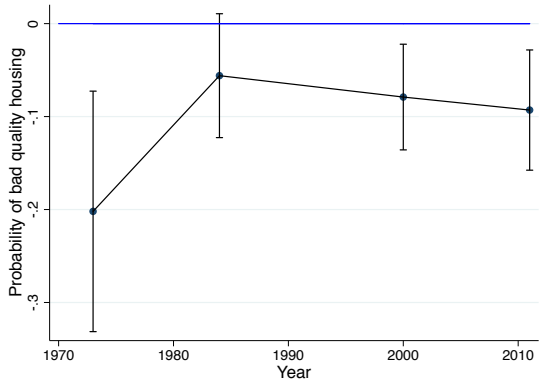
Figure 4: Time-Varying UFCo Effect (1973-2011)



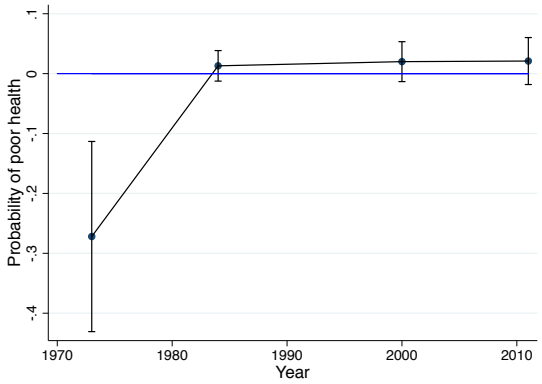
(a) Probability of Being Poor



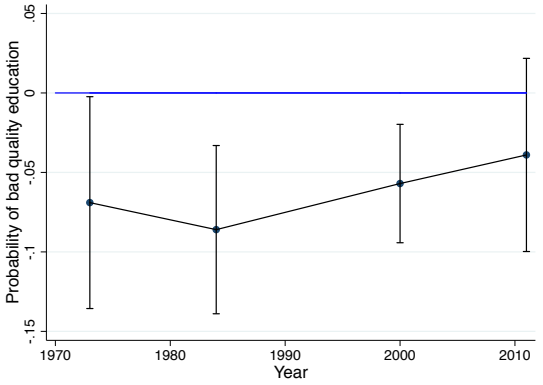
(b) Total Number of UBN



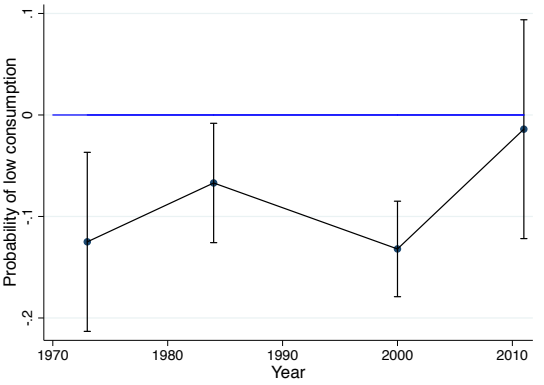
(c) Housing Dimension



(d) Sanitation Dimension



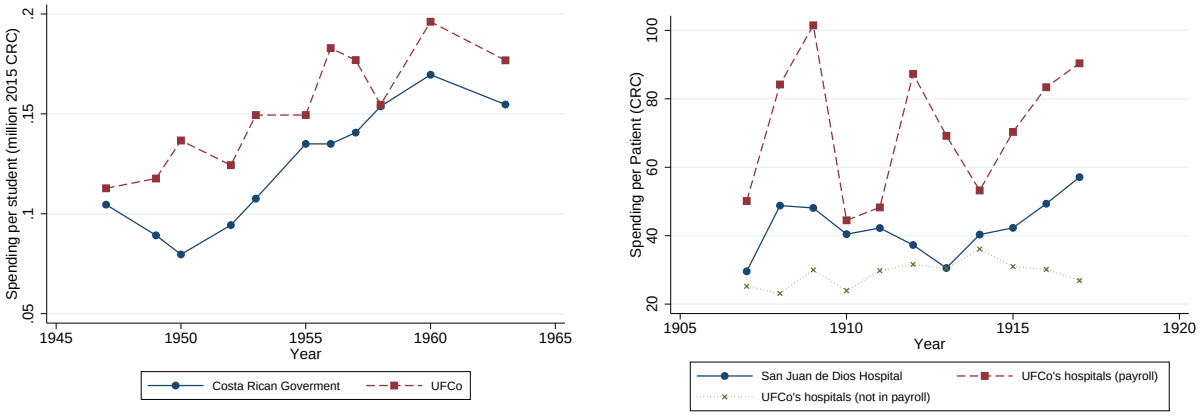
(e) Education Dimension



(f) Consumption Dimension

Notes: The figure shows the evolution of the UFCo effect across years for several outcome variables. The absolute effect is decreasing over time in all cases. 95% Confidence intervals are based on the Conley standard errors. Table D.4 in Appendix D shows further details regarding these regressions' output.

Figure 5: Differences in Spending UFCo vs Government

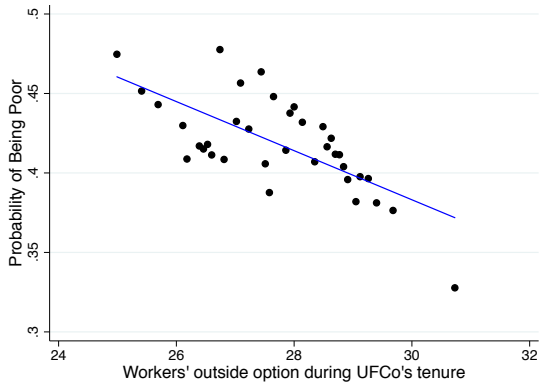


(a) Spending per Student

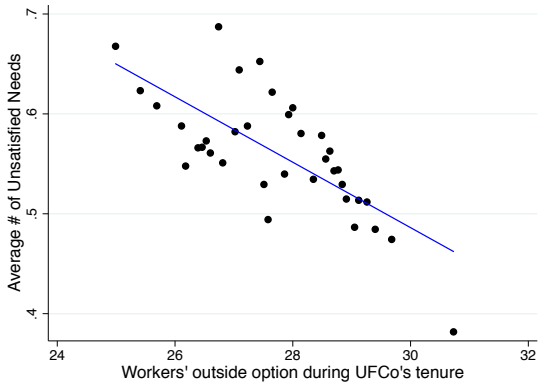
(b) Spending per Patient

Notes: Panel (a) shows data on spending per student (in 2015 Costa Rican Colones) in UFCo schools vs local schools run by the government, between 1947-1963. Data results from authors' calculations based on company reports "*Compañia Bananera de Costa Rica. Algunos datos sobre sus actividades*" and Molina (2017). Panel (b) shows data on spending per patient (in Costa Rican Colones), between 1907-1917 in UFCo hospitals, and compares it with spending per patient in the San Juan de Dios Hospital; the largest Costa Rican hospital at the time. Data was calculated based on 1907-1917 Costa Rican Statistic Yearbooks.

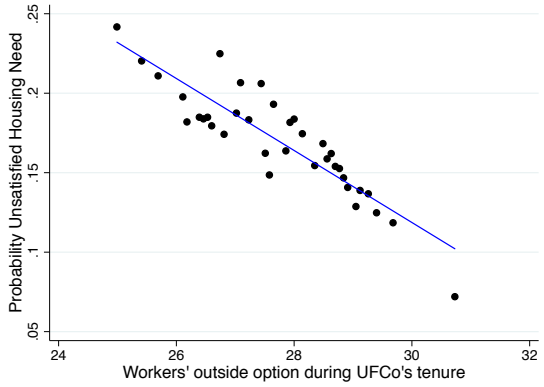
Figure 6: Outside Options during UFCo's Tenure and Current Outcomes



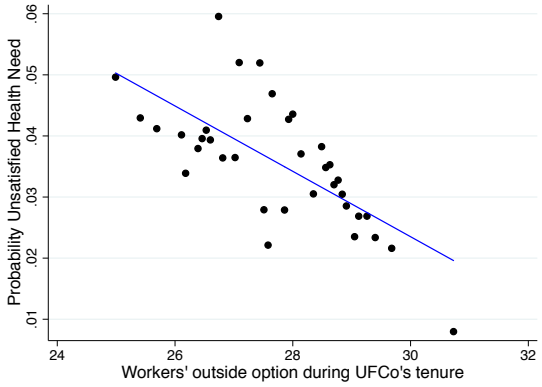
(a) Probability of Being Poor



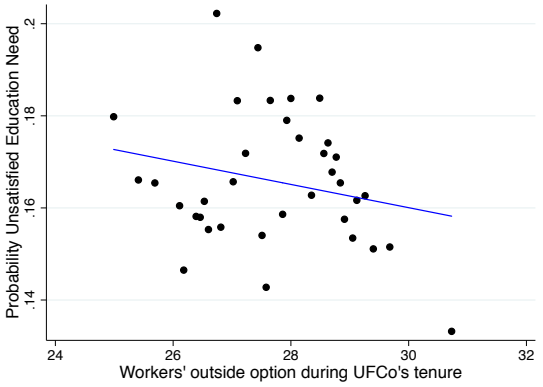
(b) Total Number of Unsatisfied Needs



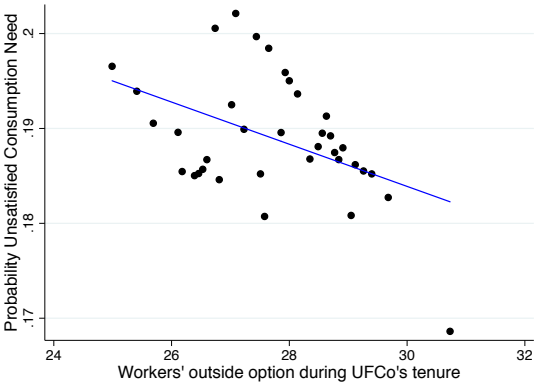
(c) Housing Dimension



(d) Sanitation Dimension



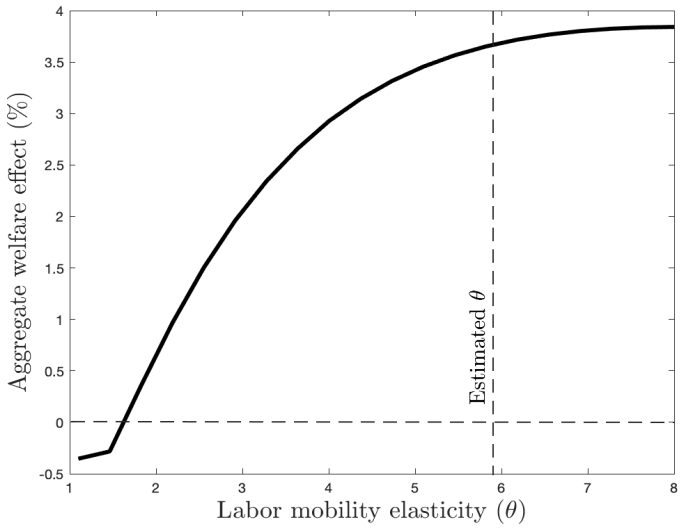
(e) Education Dimension



(f) Consumption Dimension

Notes: The figure shows that locations where workers had better outside options while the UFCo operated have better contemporary outcomes.

Figure 7: Changes in Aggregate Welfare and Labor Mobility



Notes: The figure shows how the percentage aggregate welfare of the UFCo changes as labor mobility changes. The company's aggregate welfare effect is computed by comparing the scenario with UFCo with a one where the UFCo's location has exactly the same characteristics as the rest of the country.

Tables

Table 1: Balance on Geographic Characteristics

	Sample falls within					
	<5 km of UFCo boundary			<10 km of UFCo boundary		
	Inside	Outside	s.e	Inside	Outside	s.e
Elevation	38.552	38.235	(1.330)	50.893	37.759	(2.273)***
			[3.530]			[6.514]**
Slope	0.256	0.312	(0.072)	0.493	0.328	(0.063)***
			[0.140]			[0.154]
Temperature	26.087	26.097	(0.006)	26.028	26.097	(0.011)***
			[0.014]			[0.031]**
Observations	96	85		168	141	

Notes: The unit of observation is 1x1 km grid cells. Robust standard errors for the difference in means between UFCo and non-UFCo observations are in parentheses. Conley standard errors for the difference in means are in brackets. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2: Average UFCo Effect

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
UFCo	-0.095	-0.016	-0.057	-0.059	-0.124	-0.228
	(0.026)***	(0.017)	(0.022)**	(0.025)**	(0.031)***	(0.057)***
	[0.029]***	[0.015]	[0.019]***	[0.025]**	[0.026]***	[0.051]***
Adjusted R^2	0.102	0.173	0.241	0.015	0.115	0.200
Observations	8,786	8,786	8,786	8,786	8,786	8,786
Clusters	200	200	200	200	200	200
Mean	0.176	0.060	0.235	0.200	0.481	0.670
% Variation w.r.t. Mean	**-54.0**	**-26.7**	**-24.3**	**-30.0**	**-25.8**	**-34.0**

Notes: UBN=Unsatisfied Basic Need. The last row shows the percentage variation in each coefficient with respect to the sample's mean. The unit of observation is the household. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Second Stage: Outside Option in 1973 and Outcomes in 2000 and 2011

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
Outside option	-0.028	-0.009	-0.011	-0.005	-0.028	-0.053
in 1973	(0.006)***	(0.003)***	(0.006)**	(0.006)	(0.012)**	(0.018)***
Adjusted R^2	0.032	0.011	0.151	0.013	0.053	0.084
Observations	341,665	341,665	341,665	341,665	341,665	341,665
Clusters	114	114	114	114	114	114
Mean	0.152	0.034	0.153	0.178	0.391	0.518
% Variation w.r.t. Mean	**-18.5**	**-26.4**	**-7.2**	**-2.9**	**-7.2**	**-10.3**

Notes: UBN = Unsatisfied Basic Need. The unit of observation is the household. Robust standard errors, adjusted for clustering by district-year, are in parentheses. All regressions include demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Migration Rates in UFCo and Non-UFCo Census-Blocks (Percentage)

Census	UFCo	Non-UFCo	P-value of the difference
	(1)	(2)	(3)
1973	16.58	32.74	0.36
1984	14.46	13.48	0.82
2000	7.45	10.25	0.24
2011	6.20	6.73	0.69
All	9.29	11.90	0.29

Notes: The p-values in the third column are for the test of the hypothesis that the rates of migration in the UFCo and non-UFCo areas are equal. The p-values are clustered at the census-block level.

Table 5: Jointly Calibrated Values in Steady State (SMM)

Target	Data	Model
Local effect (RD)	-0.06	-0.06
Agricultural labor share UFCo	0.09	0.09
Price per ton UFCo/RoC	0.13	0.13
Investment per cap UFCo/government	1.27	1.27

Online Appendix for

Multinationals, Monopsony and Local Development: Evidence from the United Fruit Company

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Esteban Méndez-Chacón

Central Bank of Costa Rica

Diana Van Patten

Princeton University & Yale University

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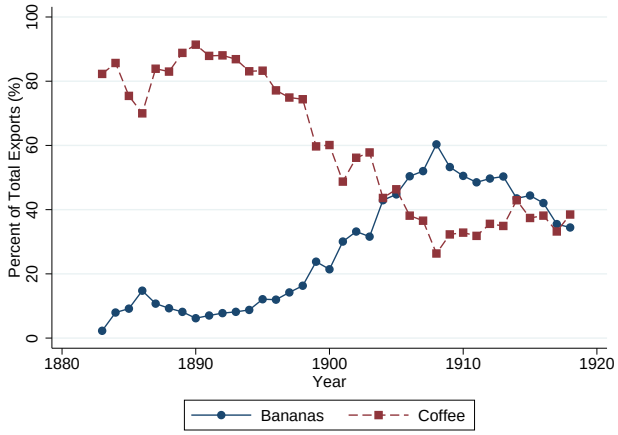
A Historical Details

A.1 The UFCo in Costa Rica

This subsection provides more details on the role and decay of the UFCo in Costa Rica and complements the historical background presented in Section 2.

Figure A.1 shows how, after 1880, banana production in Costa Rica increased in volume and importance. By 1905 bananas had reached the same place in Costa Rica's exporting value than coffee (Costa Rica's main export product at the time).

Figure A.1: Banana and Coffee as a Percentage of Total Costa Rican Exports, 1883-1918



Source: Authors' calculations based on the "Statistical Summary, years 1883 to 1910: trade, agriculture, industry" and 1911 to 1918 Costa Rican Statistic Yearbooks.

The railroad construction and the banana activity stimulated population growth in Limón, the province where our paper restricts attention. Table A.1 shows the dynamics of population growth in Limón using census data from 1883 to 1963, while Table A.2 shows the role of foreigners in these population dynamics.

Table A.1: Population and Growth Rates

	Census									
	1883		1892		1927		1950		1963	
	Pop.	G.R	Pop.	G.R	Pop.	G.R	Pop.	G.R	Pop.	G.R
Limón Province	1,858	-	7,484	16.74	32,278	4.26	41,360	1.08	68,385	3.94
Rest of Costa Rica	180,215	-	235,721	3.03	439,246	1.79	759,515	2.41	1,267,889	4.02

Source: Authors' calculations based on 1883, 1892, 1927, 1950, and 1963 Costa Rican Population Censuses.
Notes: Pop= Population. G.R= Annual population growth rate (percentage).

Figure A.2 illustrates the evolution of UFCo employment in Costa Rica. On average, between 1912 and 1931 the UFCo employee around 7.96% of the total agricultural workers in the country

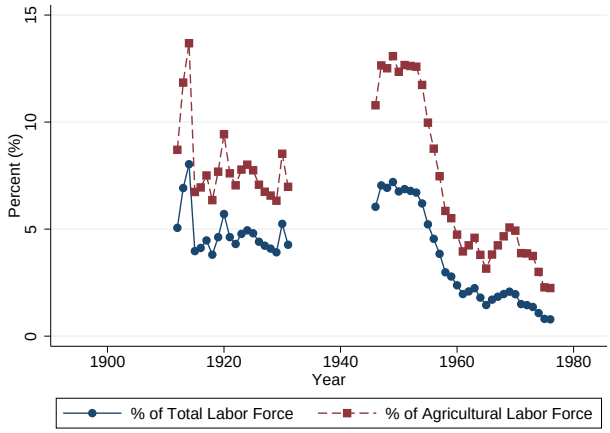
Table A.2: Percentage of Foreigners in the Population

	Census				
	1883	1892	1927	1950	1963
Limón Province	68.51	14.04	68.75	26.84	7.53
Rest of Costa Rica	1.80	2.15	4.67	2.96	2.25

Source: Authors' calculations based on 1883, 1892, 1927, 1950, and 1963 Costa Rican Population Censuses.

and 4.82% of the entire labor force. Between 1946 and 1976, the numbers were 6.93% and 3.50% respectively. However, due to a series of hurricanes that destroyed the plantations in several countries along with expropriations and scandals of corruption that lowered the price of the UFCo's stock (none of these natural disasters or scandals in Costa Rica, but in other Latin American countries), the company went bankrupt. Further, as it's sucessor, today known as Chiquita, followed a corporate strategy that divested in the production process to focus on marketing, the UFCo abandoned banana production in Costa Rica in 1984.

Figure A.2: UFCo Employees as Percentage of Costa Rican Labor Force, 1912-1976



Source: Authors' calculations based on United Fruit Company Medical Department Annual Report for 1912-1931, Ellis (1983) for 1946-1976, and 1892, 1927, 1950, 1963, 1973, and 1984 Costa Rican Population Censuses.

B Unsatisfied Basic Needs (UBN) Index Construction

To specify the set of basic needs that we consider in the paper and the threshold for attaining those needs, we follow the methodology proposed by Méndez and Trejos (2004) for Costa Rica. Méndez and Trejos constructed the index based on information from the 2000 Population Census. The method can be applied straightforwardly to the 2011 Census, given the similarity of the questions between the 2000 and 2011 censuses (Méndez and Bravo, 2014). To adapt the method to the 1973 and 1984 Census, we use only the subset of the components for which similar variables are available in all four censuses. Table B shows which census variables constitute each basic need, and describes the standards under which the need is considered unsatisfied.

Appendix H shows that if we use the index proposed by Méndez and Trejos only for the census where it can be directly applied (2000 and 2011 Census) and including all its original components (we used only the ones for which similar variables are available in all four censuses), the main results of the paper are preserved.

Table B.3: Definition and Classification of Basic Needs

Dimension	Component	Variable from Census
Housing	House Quality	Household living in a temporary shelter or slum. Household living in a dwelling with waste material in wall, roof or dirt floor. Household living in a dwelling with bad conditions in roof, wall, and floor simultaneously.
	Overcrowding	Household with more than two persons per room.
Sanitation		Urban household where the sanitary service is connected to ditch, trench, river, estuary, cesspit, or latrine, or without sanitary service. Rural household where the sanitary service is connected to direct connection to ditch, trench, river, estuary, or without sanitary service.
Education	School Attendance	Household with at least one member from 7 to 17 years old not attending school.
	School Achievement	Household with at least one member from 7 to 17 years old attending school regularly, but with a school backwardness higher than 2 years.
Consumption	Consumption Capacity	Household without regular income recipients (employed, pensioners or rentiers) and whose head is 50 years old or older and with: • 3.59 years of schooling or less for Census 1973. • 5 years of schooling or less for Census 1984. • 6 years of schooling or less for Census 2000. • 6.39 years of schooling or less for Census 2011.

Continued on next page

Table B.3 – continued from previous page

Dimension	Component	Variable from Census
		Urban household with three or more dependents and one income recipient with less than: • 3.59 years of schooling for Census 1973. • 5 years of schooling for Census 1984. • 6 years of schooling for Census 2000. • 6.39 years of schooling for Census 2011. Urban household with three or more dependents and two income recipients whose on average have less than: • 2.59 years of schooling for Census 1973. • 4 years of schooling for Census 1984. • 5 years of schooling for Census 2000. • 5.39 years of schooling for Census 2011. Urban household with three or more dependents and three or more income recipients whose on average have less than: • 1.59 years of schooling for Census 1973. • 3 years of schooling for Census 1984. • 4 years of schooling for Census 2000. • 4.39 years of schooling for Census 2011. Rural household with three or more dependents and one income recipient with less than: • 1.59 years of schooling for Census 1973. • 3 years of schooling for Census 1984. • 4 years of schooling for Census 2000. • 4.39 years of schooling for Census 2011. Rural household with three or more dependents and two income recipients whose on average have less than: • 0.59 years of schooling for Census 1973. • 2 years of schooling for Census 1984. • 3 years of schooling for Census 2000. • 3.39 years of schooling for Census 2011.

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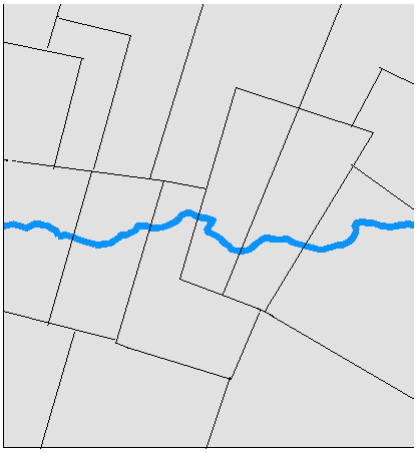
Table B.3 – continued from previous page

Dimension	Component	Variable from Census
		Rural household with three or more dependents and three or more income recipients whose on average have: • 0 years of schooling for Census 1973. • Less than 1 years of schooling for Census 1984. • Less than 2 years of schooling for Census 2000. • Less than 2.39 years of schooling for Census 2011.

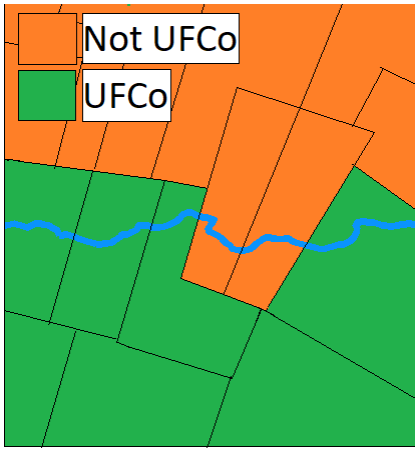
C Additional Figures

Figure C.3 shows an example of how the study boundary follows a natural landmark (the river) closely, but not exactly, as it was jointly determined by the river and preexisting plots. In 1904 the government forbid, by law, to sell the plots in orange back to the company (or any foreigner), therefore this boundary was kept constant during the company's tenure.

Figure C.3: The UFCo Boundary Follows the River Closely but not Exactly



(a) River and Pre-existing Plots in 1904



(b) Final Boundary

Notes: The figure shows an example of how the boundary follows a natural landmark (the river) closely, but not exactly, as it was jointly determined by the river and preexisting plots.

Figure C.4 provides an example of one of the original maps from the Costa Rican National Archive (*Archivo Nacional de Costa Rica [ANCR]*) that we collected, scanned, and digitized.

Figure C.4: One of the Original Maps from the Costa Rican National Archive.



Notes: One of the maps collected form the national archives. *Source*: Costa Rican National Archive. Fondo: Mapa. Signatura: 17849.

D Additional Results

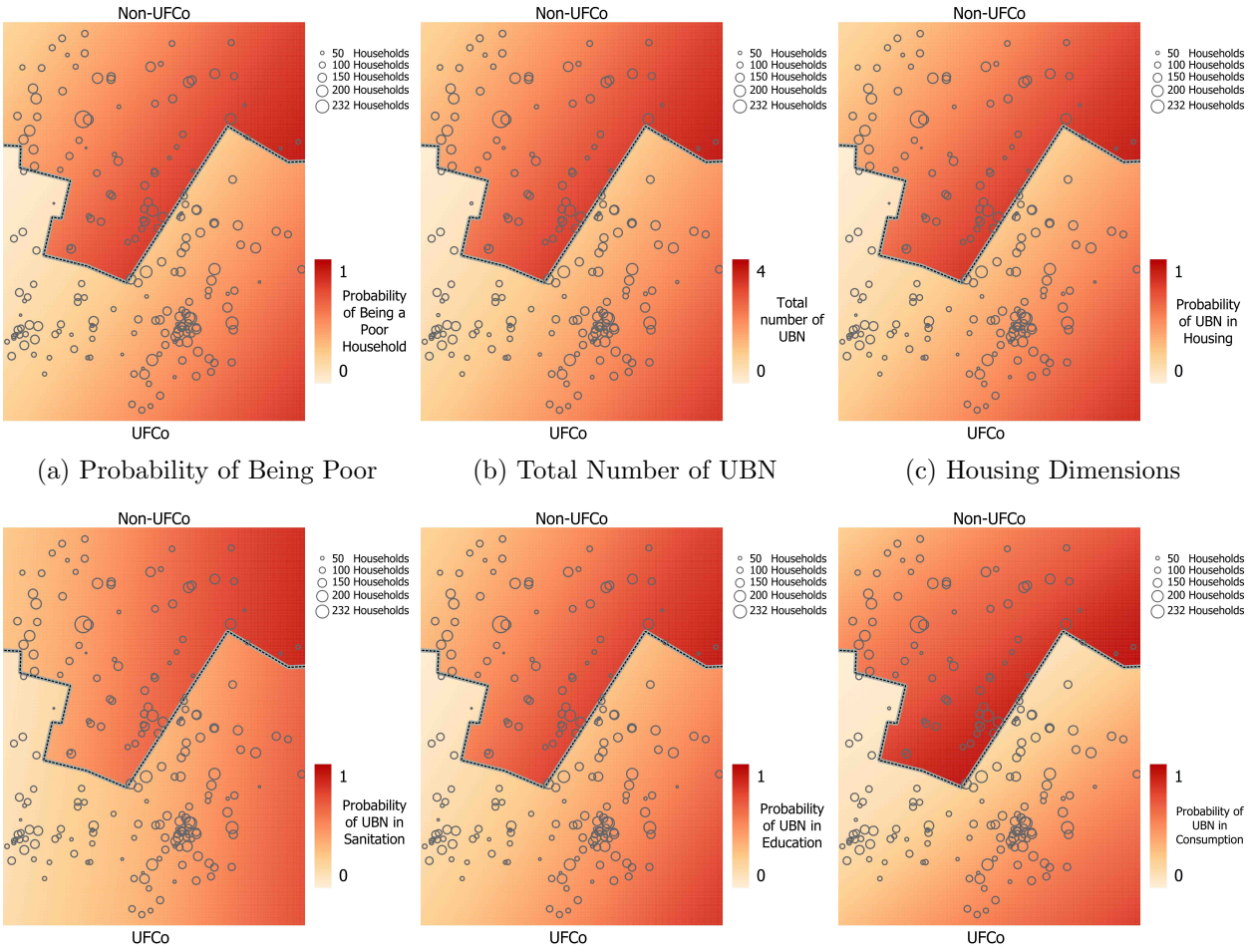
Figure D.5 shows the study boundary, with UFCo territories being south, along with the distribution of the census-block centroids across space. Each dot represents a census-block's centroid. Dot-size indicates the number of households in each census-block. As shown, lighter colors stand for better economic outcomes. The background in each sub-figure shows predicted values, for a finely spaced grid of longitude-latitude coordinates, from a regression of the outcome variable under consideration on the UFCo dummy and a linear polynomial in latitude and longitude. Panels D.5c, D.5d, D.5e, and D.5f present the probability of having a UBN in housing, sanitation, education, and consumption respectively. Panel D.5a shows the probability of being classified as a poor household and Panel D.5b shows the total number of UBN. The predicted jump across the UFCo boundary is clear in all the sub-figures. Moreover, the lighter areas (better outcomes) coincide with the former UFCo regions.

As a robustness test, we also calculate the effects of the UFCo using the entire border, obtained by estimating equation (1), using all four censuses data. For this regression, we consider that a household is located in a former UFCo region following two criteria. First, an extensive margin of the UFCo presence is provided by a dummy variable equal to one if the UFCo had any landholding in the district where the household is located, and zero otherwise. Second, an extensive margin of the UFCo presence is provided by using the fraction of total district land that was part of UFCo landholdings.[37]

The results in Table D.5 suggest that in both cases, households located in a district where the UFCo operated, have better living standards, with similar magnitudes that the ones in our main regression. In Table D.6, we also show that the results are robust after restricting the sample to directly neighboring districts (districts sharing a border), with and without UFCo landholdings. Although these results are in line with the conclusions draw from our analysis of the areas where the UFCo presence was exogenous, this naive approach only provides suggestive evidence of a positive UFCo effect, as they are contaminated by the ex-ante differences in the regions before the treatment.

[37] We perform the analysis at the district-level as our confidential data with the census-block level reference pertains only to the subset of households in our main specification.

Figure D.5: Plots of the UFCo Effect on Contemporary Household Outcomes



(a) Probability of Being Poor (b) Total Number of UBN (c) Housing Dimensions

(d) Sanitation Dimension (e) Education Dimension (f) Consumption Dimension

Notes: The figure shows the study boundary, with UFCo territories being south. Each dot represents a census-block's centroid. Dot-color indicates the average outcome value for households, and dot-size represents the number of households in each census-block. As shown, lighter colors stand for better economic outcomes.

Table D.4: Contemporary Household Outcomes: Dynamics Across Years

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
$UFCo_{1973}$	-0.202	-0.272	-0.069	-0.125	-0.229	-0.668
	(0.064)***	(0.081)***	(0.043)	(0.048)***	(0.070)***	(0.164)***
	[0.066]***	[0.081]***	[0.034]**	[0.045]***	[0.054]***	[0.149]***
$UFCo_{1984}$	-0.056	0.013	-0.086	-0.067	-0.081	-0.196
	(0.048)	(0.028)	(0.028)***	(0.049)*	(0.046)**	(0.093)**
	[0.034]*	[0.013]	[0.027]***	[0.030]**	[0.032]**	[0.063]***
$UFCo_{2000}$	-0.079	0.020	-0.057	-0.132	-0.132	-0.199
	(0.032)**	(0.017)	(0.022)**	(0.036)***	(0.036)***	(0.059)***
	[0.029]***	[0.017]	[0.019]***	[0.024]***	[0.031]***	[0.053]***
$UFCo_{2011}$	-0.093	0.021	-0.039	-0.014	-0.101	-0.126
	(0.030)***	(0.016)	(0.030)	(0.037)	(0.038)***	(0.064)**
	[0.033]***	[0.020]	[0.031]	[0.055]	[0.053]*	[0.095]
Adjusted R^2	0.103	0.199	0.241	0.017	0.116	0.206
Observations	8,786	8,786	8,786	8,786	8,786	8,786
Clusters	200	200	200	200	200	200
$Mean_{1973}$	0.462	0.353	0.393	0.208	0.777	1.416
$Mean_{1984}$	0.209	0.060	0.362	0.201	0.579	0.832
$Mean_{2000}$	0.145	0.031	0.230	0.178	0.452	0.584
$Mean_{2011}$	0.124	0.018	0.156	0.215	0.402	0.512

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table D.5: Contemporary Household Outcomes: Average UFCo Effect in the Entire Border

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
Intensive Margin: Fraction of the district's area that belonged to the UFCo						
UFCo	-0.070	-0.023	-0.046	-0.060	-0.089	-0.199
	(0.014)***	(0.012)*	(0.013)***	(0.012)***	(0.019)***	(0.036)***
% Variation w.r.t. Mean	**-48.5**	**-41.1**	**-29.5**	**-45.3**	**-25.4**	**-40.7**
Adjusted R^2	0.100	0.083	0.211	0.027	0.125	0.184
Extensive Margin: The UFCo had landholdings in the district						
UFCo	-0.022	-0.005	-0.017	-0.027	-0.036	-0.068
	(0.010)**	(0.008)	(0.008)**	(0.008)***	(0.013)***	(0.026)***
% Variation w.r.t. Mean	**-15.5**	**-9.9**	**-10.7**	**-20.1**	**-10.4**	**-13.9**
Adjusted R^2	0.100	0.082	0.211	0.027	0.124	0.183
Observations	3,039,654	3,039,654	3,039,654	3,039,654	3,039,654	3,039,654
Clusters	1,757	1,757	1,757	1,757	1,757	1,757
Mean	0.144	0.055	0.155	0.133	0.352	0.488

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. Robust standard errors, adjusted for clustering by district-year, are in parentheses. All regressions include geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table D.6: Contemporary Household Outcomes: Average UFCo Effect in the Entire Border for Directly Neighboring Districts

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
Intensive Margin: Fraction of the district's area that belonged to the UFCo						
UFCo	-0.063	0.000	-0.046	-0.046	-0.101	-0.154
	(0.024)***	(0.006)	(0.011)***	(0.019)**	(0.027)***	(0.043)***
% Variation w.r.t. Mean	**-51.4**	**1.9**	**-41.4**	**-24.5**	**-28.7**	**-35.0**
Adjusted R^2	0.027	0.006	0.102	0.018	0.116	0.071
Extensive Margin: The UFCo had landholdings in the district						
UFCo	-0.016	-0.003	-0.011	-0.013	-0.030	-0.043
	(0.021)	(0.004)	(0.012)	(0.015)	(0.026)	(0.044)
% Variation w.r.t. Mean	**-12.9**	**-14.6**	**-10.3**	**-7.0**	**-8.6**	**-9.8**
Adjusted R^2	0.025	0.006	0.101	0.018	0.046	0.069
Observations	267,315	267,315	267,315	267,315	267,315	267,315
Clusters	107	107	107	107	107	107
Mean	0.122	0.021	0.112	0.187	0.350	0.459

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. The sample is restricted to directly neighboring districts (districts sharing a border), with and without UFCo landholdings. Robust standard errors, adjusted for clustering by district-year, are in parentheses. All regressions include geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

E Falsification Test

In this section we present the results of a falsification test, where we shift our study boundary 2 km up, and re-run all our estimations within 2 km of the placebo boundary (so that all observations lie above the true border), and then do the same shifting the boundary 2 km down. All our estimated are not significant in this placebo test, providing additional evidence that the effect we are capturing is indeed driven by the UFCo.

Table E.7: Average UFCo Effect: Placebo Test

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Placebo at +2 km					
UFCo	0.022	-0.009	0.027	-0.010	0.008	0.031
	(0.034)	(0.019)	(0.018)	(0.030)	(0.040)	(0.066)
	[0.039]	[0.017]	[0.021]	[0.020]	[0.031]	[0.067]
Adjusted R^2	0.098	0.173	0.240	0.014	0.111	0.195
Observations	8,786	8,786	8,786	8,786	8,786	8,786
Clusters	200	200	200	200	200	200
	Panel B: Placebo at -2 km					
UFCo	-0.030	0.008	-0.006	0.005	-0.008	-0.023
	(0.025)	(0.019)	(0.019)	(0.024)	(0.030)	(0.056)
	[0.031]	[0.019]	[0.019]	[0.027]	[0.029]	[0.054]
Adjusted R^2	0.098	0.173	0.239	0.014	0.111	0.195
Observations	8,786	8,786	8,786	8,786	8,786	8,786
Clusters	200	200	200	200	200	200

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude and longitude.We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

F Additional Robustness Checks

Our additional robustness checks presented in this section include: running our regressions at different distances from the boundary, changing the specifications of the latitude-longitude polynomial, and varying the control variables.

F.1 The River vs. the Boundary

In this subsection we present our average and yearly results restricting our observations to units on the "wrong side" of the river that closely follows our boundary. Our results hold even within these narrower neighborhoods.

Table F.8: Average UFCo Effect–River Test: Restricted 1 km

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
UFCo	-0.100	-0.014	-0.085	-0.084	-0.149	-0.284
	(0.034)***	(0.030)	(0.030)***	(0.024)***	(0.046)***	(0.074)***
	[0.022]***	[0.010]	[0.018]***	[0.019]***	[0.024]***	[0.027]***
Adjusted R^2	0.144	0.224	0.274	0.031	0.157	0.269
Observations	1,937	1,937	1,937	1,937	1,937	1,937
Clusters	44	44	44	44	44	44
Mean	0.176	0.060	0.235	0.200	0.481	0.670

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. The sample is restricted to census block located within 1 km of the UFCo boundary. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude and longitude.

Table F.9: Dynamics of the UFCo-Effect Across Years-River Test: Restricted 1 km

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
$UFCo_{1973}$	-0.123	-0.226	-0.058	-0.089	-0.132	-0.496
	(0.066)*	(0.059)***	(0.053)	(0.033)***	(0.069)*	(0.103)***
	[0.047]***	[0.061]***	[0.048]	[0.029]***	[0.054]**	[0.084]***
$UFCo_{1984}$	0.027	0.025	-0.092	-0.103	-0.063	-0.142
	(0.082)	(0.038)	(0.061)	(0.042)**	(0.072)	(0.129)
	[0.080]	[0.025]	[0.065]	[0.038]***	[0.054]	[0.109]
$UFCo_{2000}$	-0.103	0.002	-0.085	-0.042	-0.121	-0.229
	(0.044)**	(0.030)	(0.029)***	(0.027)	(0.059)**	(0.089)**
	[0.030]***	[0.025]	[0.017]***	[0.034]	[0.043]***	[0.059]***
$UFCo_{2011}$	-0.104	-0.000	-0.089	-0.117	-0.181	-0.310
	(0.039)**	(0.028)	(0.042)**	(0.032)***	(0.054)***	(0.086)***
	[0.023]***	[0.013]	[0.042]**	[0.020]***	[0.052]***	[0.061]***
Adjusted R^2	0.146	0.238	0.273	0.030	0.157	0.270
Observations	1,937	1,937	1,937	1,937	1,937	1,937
Clusters	44	44	44	44	44	44
$Mean_{1973}$	0.491	0.396	0.455	0.252	0.829	1.595
$Mean_{1984}$	0.265	0.053	0.357	0.186	0.563	0.861
$Mean_{2000}$	0.150	0.037	0.255	0.208	0.497	0.650
$Mean_{2011}$	0.134	0.018	0.164	0.197	0.405	0.513

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. The sample is restricted to census block located within 1 km of the UFCo boundary. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

F.2 Different Bandwidth: Eliminating Observations Close to the Boundary

In this subsection, we present our results of eliminating all observations that are relatively close to the boundary and run our regressions in the remaining ones. We omit the top 5% and 10% observations closest to the study boundary on each side.

Table F.10: Average UFCo Effect– Eliminating Observations Close to the Boundary

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
			Omitting the Top 5%			
UFCo	-0.093	-0.015	-0.054	-0.058	-0.115	-0.219
	(0.030)***	(0.019)	(0.026)**	(0.030)*	(0.036)***	(0.064)***
	[0.037]**	[0.017]	[0.021]***	[0.026]**	[0.026]***	[0.059]***
Adjusted R^2	0.105	0.181	0.240	0.015	0.117	0.205
Observations	8,267	8,267	8,267	8,267	8,267	8,267
Clusters	186	186	186	186	186	186
Mean	0.177	0.061	0.235	0.199	0.482	0.672
			Omitting the Top 10%			
UFCo	-0.087	-0.003	-0.056	-0.048	-0.105	-0.194
	(0.030)***	(0.021)	(0.028)**	(0.030)	(0.036)***	(0.067)***
	[0.036]**	[0.022]	[0.022]**	[0.022]**	[0.016]***	[0.050]***
Adjusted R^2	0.136	0.186	0.235	0.015	0.111	0.200
Observations	7,834	7,834	7,834	7,834	7,834	7,834
Clusters	177	177	177	177	177	177
Mean	0.176	0.062	0.234	0.200	0.483	0.673

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. The sample omits the top 5% and 10% observations closest to the study boundary on each side, respectively. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

F.3 Varying Specifications for the Latitude-Longitude Polynomial

In our original results, we used a linear polynomial in latitude and longitude. In this section, we test the robustness of our results to different specifications for the RD polynomial. In particular, we use a quadratic polynomial and a linear polynomial in latitude, longitude, and distance to the boundary.

F.3.1 Quadratic Latitude-Longitude Polynomial

Table F.11: Average UFCo Effect-Quadratic Latitude-Longitude Polynomial

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
UFCo	-0.097	-0.013	-0.058	-0.059	-0.122	-0.226
	(0.028)***	(0.019)	(0.022)**	(0.025)**	(0.032)***	(0.060)***
	[0.033]***	[0.015]	[0.012]***	[0.025]**	[0.027]***	[0.055]***
Adjusted R^2	0.102	0.173	0.241	0.015	0.115	0.200
Observations	8,786	8,786	8,786	8,786	8,786	8,786
Clusters	200	200	200	200	200	200
Mean	0.176	0.060	0.235	0.200	0.481	0.670

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a quadratic polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table F.12: Dynamics Across Years-Quadratic Latitude-Longitude Polynomial

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
$UFCo_{1973}$	-0.204	-0.277	-0.064	-0.127	-0.225	-0.672
	(0.068)***	(0.080)***	(0.041)	(0.046)***	(0.070)***	(0.164)***
	[0.071]***	[0.078]***	[0.031]**	[0.050]**	[0.054]***	[0.148]***
$UFCo_{1984}$	-0.059	0.016	-0.087	-0.065	-0.079	-0.194
	(0.050)	(0.027)	(0.028)***	(0.036)*	(0.049)	(0.095)**
	[0.035]*	[0.010]*	[0.022]***	[0.030]**	[0.032]**	[0.060]***
$UFCo_{2000}$	-0.084	0.020	-0.062	-0.085	-0.136	-0.210
	(0.033)**	(0.019)	(0.022)***	(0.027)***	(0.038)***	(0.062)***
	[0.032]***	[0.019]	[0.012]***	[0.024]***	[0.032]***	[0.054]***
$UFCo_{2011}$	-0.095	0.021	-0.039	-0.013	-0.099	-0.126
	(0.031)***	(0.017)	(0.036)	(0.037)	(0.039)**	(0.064)*
	[0.034]***	[0.021]	[0.027]	[0.054]	[0.052]*	[0.093]
Adjusted R^2	0.103	0.199	0.241	0.017	0.116	0.207
Observations	8,786	8,786	8,786	8,786	8,786	8,786
Clusters	200	200	200	200	200	200
$Mean_{1973}$	0.462	0.353	0.393	0.208	0.777	1.416
$Mean_{1984}$	0.209	0.060	0.362	0.201	0.579	0.832
$Mean_{2000}$	0.145	0.031	0.230	0.178	0.452	0.584
$Mean_{2011}$	0.124	0.018	0.156	0.215	0.402	0.512

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a quadratic polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

F.3.2 Linear Polynomial in Latitude, Longitude and Distance to the Boundary

Table F.13: Contemporary Household Outcomes: Average UFCo Effect-Linear polynomial in latitude, longitude and distance to the boundary

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
UFCo	-0.095	-0.016	-0.055	-0.060	-0.123	-0.226
	(0.026)***	(0.017)	(0.022)**	(0.025)**	(0.030)***	(0.056)***
	[0.029]***	[0.014]	[0.018]***	[0.026]**	[0.026]***	[0.051]***
Adjusted R^2	0.102	0.173	0.241	0.015	0.115	0.200
Observations	8,786	8,786	8,786	8,786	8,786	8,786
Clusters	200	200	200	200	200	200
Mean	0.176	0.060	0.235	0.200	0.481	0.670

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude, longitude, and distance to the UFCo boundary.We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table F.14: Contemporary Household Outcomes: Dynamics Across Years-Linear polynomial in latitude, longitude and distance to the boundary

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
$UFCo_{1973}$	-0.200	-0.275	-0.064	-0.127	-0.227	-0.666
	(0.066)***	(0.080)***	(0.041)	(0.048)***	(0.071)***	(0.165)***
	[0.069]***	[0.081]***	[0.034]*	[0.045]***	[0.057]***	[0.153]***
$UFCo_{1984}$	-0.055	0.013	-0.084	-0.068	-0.080	-0.195
	(0.048)	(0.028)	(0.028)***	(0.036)*	(0.049)	(0.093)**
	[0.033]*	[0.014]	[0.026]***	[0.030]**	[0.032]**	[0.063]***
$UFCo_{2000}$	-0.079	0.020	-0.057	-0.082	-0.132	-0.199
	(0.032)**	(0.017)	(0.058)***	(0.026)***	(0.036)***	(0.062)***
	[0.029]***	[0.017]	[0.018]***	[0.024]***	[0.031]***	[0.053]***
$UFCo_{2011}$	-0.093	0.020	-0.038	-0.015	-0.101	-0.125
	(0.030)***	(0.016)	(0.030)	(0.037)	(0.038)**	(0.063)**
	[0.033]***	[0.020]	[0.031]	[0.056]	[0.053]*	[0.095]
Adjusted R^2	0.103	0.199	0.241	0.017	0.116	0.206
Observations	8,786	8,786	8,786	8,786	8,786	8,786
Clusters	200	200	200	200	200	200
$Mean_{1973}$	0.462	0.353	0.393	0.208	0.777	1.416
$Mean_{1984}$	0.209	0.060	0.362	0.201	0.579	0.832
$Mean_{2000}$	0.145	0.031	0.230	0.178	0.452	0.584
$Mean_{2011}$	0.124	0.018	0.156	0.215	0.402	0.512

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude, longitude, and distance to the UFCo boundary.

We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

F.4 Varying the Controls

F.4.1 No Demographic Controls

Table F.15: Average UFCo Effect-No Demographic Controls

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
UFCo	-0.102	-0.014	-0.086	-0.062	-0.142	-0.264
	(0.027)***	(0.017)	(0.025)***	(0.025)**	(0.033)***	(0.063)***
	[0.032]***	[0.014]	[0.014]***	[0.023]***	[0.025]***	[0.055]***
Adjusted R^2	0.071	0.166	0.044	0.003	0.057	0.111
Observations	8,786	8,786	8,786	8,786	8,786	8,786
Clusters	200	200	200	200	200	200
Mean	0.176	0.060	0.235	0.200	0.481	0.670

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table F.16: Contemporary Household Outcomes: Dynamics Across Years-No Demographic Controls

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
$UFCo_{1973}$	-0.209	-0.269	-0.098	-0.127	-0.247	-0.703
	(0.066)***	(0.081)***	(0.055)*	(0.052)**	(0.073)***	(0.175)***
	[0.067]***	[0.081]***	[0.052]*	[0.049]**	[0.058]***	[0.160]***
$UFCo_{1984}$	-0.056	0.013	-0.089	-0.068	-0.082	-0.200
	(0.051)	(0.027)	(0.034)***	(0.037)*	(0.057)	(0.109)*
	[0.040]	[0.014]	[0.027]***	[0.030]**	[0.035]**	[0.074]***
$UFCo_{2000}$	-0.089	0.023	-0.092	-0.085	-0.155	-0.244
	(0.031)***	(0.018)	(0.027)***	(0.026)***	(0.039)***	(0.062)***
	[0.032]***	[0.017]	[0.017]***	[0.022]***	[0.034]***	[0.059]***
$UFCo_{2011}$	-0.099	0.023	-0.075	-0.017	-0.123	-0.168
	(0.031)***	(0.016)	(0.030)**	(0.037)	(0.039)***	(0.064)***
	[0.035]***	[0.020]	[0.021]***	[0.053]	[0.047]***	[0.083]**
Adjusted R^2	0.072	0.192	0.044	0.005	0.059	0.117
Observations	8,786	8,786	8,786	8,786	8,786	8,786
Clusters	200	200	200	200	200	200
$Mean_{1973}$	0.462	0.353	0.393	0.208	0.777	1.416
$Mean_{1984}$	0.209	0.060	0.362	0.201	0.579	0.832
$Mean_{2000}$	0.145	0.031	0.230	0.178	0.452	0.584
$Mean_{2011}$	0.124	0.018	0.156	0.215	0.402	0.512

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

F.4.2 No Geographic Controls

Table F.17: Average UFCo Effect-No Geographic Control

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
UFCo	-0.103	-0.021	-0.052	-0.062	-0.131	-0.238
	(0.026)***	(0.017)	(0.023)**	(0.024)**	(0.030)***	(0.057)***
	[0.031]***	[0.017]	[0.018]***	[0.024]***	[0.025]***	[0.052]***
Adjusted R^2	0.101	0.168	0.240	0.015	0.115	0.199
Observations	8,786	8,786	8,786	8,786	8,786	8,786
Clusters	200	200	200	200	200	200
Mean	0.176	0.060	0.235	0.200	0.481	0.670

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table F.18: Contemporary Household Outcomes: Dynamics Across Years-No Geographic Controls

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
$UFCo_{1973}$	-0.219	-0.288	-0.054	-0.132	-0.247	-0.693
	(0.062)***	(0.079)***	(0.045)	(0.047)***	(0.067)***	(0.158)***
	[0.066]***	[0.078]***	[0.035]	[0.048]***	[0.053]***	[0.146]***
$UFCo_{1984}$	-0.062	0.010	-0.083	-0.088	-0.082	-0.207
	(0.048)	(0.028)	(0.027)***	(0.035)**	(0.046)*	(0.092)**
	[0.035]*	[0.016]	[0.023]***	[0.031]**	[0.033]***	[0.068]***
$UFCo_{2000}$	-0.082	0.018	-0.055	-0.085	-0.136	-0.204
	(0.031)***	(0.018)	(0.023)**	(0.026)***	(0.036)***	(0.059)***
	[0.029]***	[0.017]	[0.018]***	[0.025]***	[0.030]***	[0.051]***
$UFCo_{2011}$	-0.101	0.017	-0.036	-0.020	-0.110	-0.140
	(0.030)***	(0.017)	(0.030)	(0.035)	(0.037)***	(0.062)**
	[0.032]***	[0.020]	[0.031]	[0.050]	[0.049]**	[0.087]
Adjusted R^2	0.103	0.198	0.240	0.017	0.116	0.206
Observations	8,786	8,786	8,786	8,786	8,786	8,786
Clusters	200	200	200	200	200	200
$Mean_{1973}$	0.462	0.353	0.393	0.208	0.777	1.416
$Mean_{1984}$	0.209	0.060	0.362	0.201	0.579	0.832
$Mean_{2000}$	0.145	0.031	0.230	0.178	0.452	0.584
$Mean_{2011}$	0.124	0.018	0.156	0.215	0.402	0.512

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

F.4.3 No Demographic or Geographic Controls

Table F.19: Average UFCo Effect-No Demographic or Geographic Controls

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
UFCo	-0.108	-0.018	-0.080	-0.064	-0.148	-0.271
	(0.027)***	(0.017)	(0.025)***	(0.025)**	(0.033)***	(0.064)***
	[0.034]***	[0.016]	[0.012]***	[0.023]***	[0.025]***	[0.057]***
Adjusted R^2	0.070	0.161	0.044	0.003	0.057	0.110
Observations	8,786	8,786	8,786	8,786	8,786	8,786
Clusters	200	200	200	200	200	200
Mean	0.176	0.060	0.235	0.200	0.481	0.670

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table F.20: Dynamics Across Years-No Demographic or Geographic Controls

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
$UFCo_{1973}$	-0.225	-0.285	-0.080	-0.133	-0.263	-0.722
	(0.064)***	(0.079)***	(0.058)	(0.050)***	(0.071)***	(0.170)***
	[0.068]***	[0.078]***	[0.050]	[0.051]***	[0.059]***	[0.158]***
$UFCo_{1984}$	-0.062	0.010	-0.085	-0.072	-0.089	-0.209
	(0.051)	(0.028)	(0.035)**	(0.036)**	(0.055)	(0.108)*
	[0.042]	[0.017]	[0.026]***	[0.031]**	[0.037]**	[0.079]***
$UFCo_{2000}$	-0.092	0.022	-0.090	-0.088	-0.159	-0.248
	(0.031)***	(0.018)	(0.028)**	(0.026)***	(0.039)***	(0.062)***
	[0.032]***	[0.017]	[0.016]***	[0.023]***	[0.034]***	[0.057]***
$UFCo_{2011}$	-0.106	0.020	-0.071	-0.022	-0.131	-0.179
	(0.031)***	(0.017)	(0.030)**	(0.034)	(0.038)***	(0.062)***
	[0.034]***	[0.020]	[0.021]***	[0.048]	[0.043]***	[0.075]**
Adjusted R^2	0.072	0.191	0.043	0.005	0.058	0.117
Observations	8,786	8,786	8,786	8,786	8,786	8,786
Clusters	200	200	200	200	200	200
$Mean_{1973}$	0.462	0.353	0.393	0.208	0.777	1.416
$Mean_{1984}$	0.209	0.060	0.362	0.201	0.579	0.832
$Mean_{2000}$	0.145	0.031	0.230	0.178	0.452	0.584
$Mean_{2011}$	0.124	0.018	0.156	0.215	0.402	0.512

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

G Luminosity Data

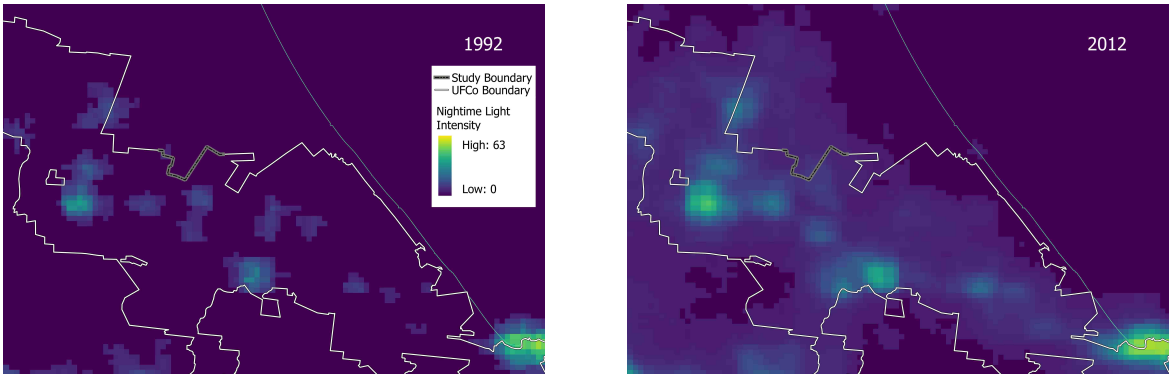
We use nighttime lights data as a robustness check of our main results, treating satellite-recorded data on nighttime lights as a proxy for income and economic activity. This approach is based on the findings of a series of papers that have documented a strong correlation between nighttime lights and economic activity. (e.g., Chen and Nordhaus, 2011; Henderson et al., 2012; Hodler and Raschky, 2014; Michalopoulos and Papaioannou, 2014). The data on nighttime light is collected by the US Air Force Defense Meteorological Satellite Program's Operational Linescan System (DMSP-OLS) and is processed by the National Oceanic and Atmospheric Agency's (NOAA) National Geophysical Data Center (NGDC). The data covers the years 1992 to 2013 at a spatial resolution of 30 arc-seconds. For each grid cell, an integer between 0 (no light) and 63 represents its light intensity.

Figure G.6 presents the satellite image near the study boundary in 1992 and 2012 and suggests higher luminosity in areas inside the former UFCo landholdings. Column (1) in Table G.21 confirms this difference in luminosity, by showing that nighttime light intensity is 21% (exp(0.193)-1=0.212) higher in the former UFCo plantations. To give a sense of the economic significance of this estimate, if we assume an elasticity between nighttime light intensity and GDP of 0.3 (consistent with the findings in Henderson et al. 2012 and Hodler and Raschky 2014), the 21% difference in nighttime light intensity implies that the output in the former UFCo plantations is about 6.37% higher. Column (2) shows that luminosity per capita is 18% (exp(0.165)-1=0.18) higher in the former UFCo plantations. Column (3) shows that the annual growth rate of luminosity per capita is 2.064 percentage points higher in the former UFCo areas.

A total of 9.2% observations in our luminosity data have a value equal to zero. The zero value can be due to a light that is too low for detection by the satellite, or because it corresponds to a sparsely populated area. Columns (4) and (5) in Table G.21 presents the results after we account for the zero observations by adding 0.01 to the luminosity data (or luminosity per capita) before taking the logarithm. Our main message remains unchanged. All estimates are significant at least at the 5% significance level.

In general, the nighttime lights results are consistent with the estimates from our main specification by providing evidence that suggests significantly higher levels of income and economic activity in the former UFCo areas.

Figure G.6: Nighttime Lights and the Study Boundary



Notes: The figure shows the UFCo's concession's boundary and how satellite nighttime lights data shows a much higher luminosity inside the former UFCo, both in 1992 and 2012.

Table G.21: Luminosity Data

	ln Light	ln Per Capita Light	Annual Growth Rate of Per Capita Light	ln (.01+Light)	ln (.01+Light per Capita)
	(1)	(2)	(3)	(4)	(5)
UFCo	0.193	0.165	2.064	0.342	0.215
	(0.006)***	(0.051)***	(0.781)***	(0.035)***	(0.046)***
	[0.017]***	[0.065]**	[0.953]**	[0.072]***	[0.059]***
Adjusted R^2	0.377	0.036	0.282	0.463	0.122
Observations	5,588	2,061	1,679	6,154	2,210

Notes: The unit of observation is 1x1 km grid cells located within 5 km of UFCo boundary. Robust standard errors are in parentheses. Conley standard errors are in brackets. All regressions include year fixed effects. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

H Méndez & Trejos Index

In this section, we re-estimate equations (1) and (2) using the Unsatisfied Basic Needs (UBN) originally proposed by Méndez and Trejos (2004) for the 2000 and 2011 censuses. We find that our main message is unchanged.

Table H.22: Average UFCo Effect-Méndez & Trejos Index

	Probability of UBN in				Probability	Total number
	Housing	Health	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
UFCo	-0.088	-0.031	-0.057	-0.020	-0.109	-0.197
	(0.030)***	(0.051)	(0.026)**	(0.019)	(0.043)**	(0.077)**
	[0.033]***	[0.034]	[0.028]**	[0.014]	[0.034]***	[0.069]***
Adjusted R^2	0.020	0.025	0.044	0.025	0.075	0.090
Observations	6,623	6,623	6,623	6,623	6,623	6,623
Clusters	160	160	160	160	160	160
Mean	0.178	0.132	0.180	0.132	0.433	0.622

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table H.23: Dynamics Across Years-Méndez & Trejos Index

	Probability of UBN in				Probability	Total number
	Housing	Health	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
$UFCo_{2000}$	-0.081	-0.022	-0.069	-0.038	-0.110	-0.210
	(0.036)**	(0.067)	(0.025)***	(0.022)*	(0.052)**	(0.102)**
	[0.035]**	[0.053]	[0.025]***	[0.016]**	[0.044]**	[0.084]**
$UFCo_{2011}$	-0.094	-0.039	-0.047	-0.005	-0.109	-0.186
	(0.032)***	(0.052)	(0.033)	(0.022)	(0.045)**	(0.074)**
	[0.037]***	[0.035]	[0.035]	[0.020]	[0.039]***	[0.076]**
Adjusted R^2	0.020	0.025	0.146	0.025	0.075	0.090
Observations	6,623	6,623	6,623	6,623	6,623	6,623
Clusters	160	160	160	160	160	160
$Mean_{2000}$	0.164	0.172	0.230	0.178	0.511	0.744
$Mean_{2011}$	0.128	0.101	0.156	0.099	0.365	0.484

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

I The UFCo and its Differential Effect on Human Capital Accumulation

To assess the impact of the UFCo educational investments in current human capital accumulation, we estimate equation (1) using educational attainment as the outcome variable. The results are presented in Table I.24, restricting the sample to non-migrants. Column (1) shows a positive UFCo effect on human capital accumulation. Consistent with the emphasis on primary education by the company, column (2) shows a positive UFCo effect on primary education attainment. Individuals in the former UFCo areas are 5.3 percentage points more likely of completing primary education. On the other hand, in column (3) the effect of the UFCo presence on secondary education attainment is zero, in line with the higher costs of completing higher education levels.

Table I.24: Human Capital Accumulation

	Years of schooling	Primary	Secondary
	(1)	(2)	(3)
UFCo	0.269	0.053	0.003
	(0.130)**	(0.018)***	(0.009)
	[0.143]*	[0.020]**	[0.007]
Adjusted R^2	0.240	0.204	0.042
Observations	24,587	24,587	24,587
Clusters	198	198	198
Mean	4.595	0.462	0.056

Notes: The unit of observation is the individual. The sample is restricted to non-migrants. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; individual controls for age, age squared, and gender; census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

J Outside Option in 1973 and Outcomes in 2000 and 2011

This section presents the first-stage results for our analysis of how areas of the UFCo where workers had better outside options in 1973, have better contemporary outcomes. We proxy the outside option for workers within the UFCo using a weighted average of the agricultural wages in districts outside the UFCo region. The inverse of the distance between each UFCo district and the non-UFCo districts defines the weight. To avoid endogeneity issues, we instrument for wages using suitability to grow coffee. Coffee was the main outside option for agricultural workers at the time and grows in a very different environment than bananas (UFCo's main product).

Table J.25 shows our result of the first stage of this instrumental variable approach. The result indicates a positive relationship between suitability to grow coffee and agricultural wages. The point estimate implies that a one percentage point increase in the suitability to grow coffee in a region is associated with a 0.23% increase in wages. The effect is statistically significant at the 1% level. Moreover, the first-stage F-statistic is 33.068, above the benchmark for weak instruments of 10 suggested by Stock et al. (2002).

Table J.25: First Stage: Suitability to Grow Coffee and Agricultural Wages in 1973

	ln Wages in 1973
	(1)
Coffee Intensity in 1973	0.208
	(0.068)***
Adjusted R^2	0.110
Observations	86,946
Mean	0.354
F-statistic (excluded instruments)	33.068

Notes: The unit of observation is the individual. Robust standard error, adjusted for clustering by district, is in parentheses. Coffee Intensity refers to the fraction of agricultural land used for cultivating coffee in the district in 1973. The regression includes individual controls for age, age squared, gender, and years of schooling. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

K Distance to a Railroad

In this section, we include as a control variable the nearest distance of each census block centroid to a railroad. Our results suggest that the UFCo effect is not exclusively a product of the provision of railroads.

Table K.26: Average UFCo Effect-Distance to a Railroad

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
UFCo	-0.096	-0.017	-0.057	-0.059	-0.123	-0.228
	(0.026)***	(0.017)	(0.022)**	(0.025)**	(0.031)***	(0.057)***
	[0.029]***	[0.014]	[0.019]***	[0.025]**	[0.027]***	[0.052]***
Adjusted R^2	0.101	0.173	0.240	0.015	0.115	0.200
Observations	8,786	8,786	8,786	8,786	8,786	8,786
Clusters	200	200	200	200	200	200
Mean	0.176	0.060	0.235	0.200	0.481	0.670

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include a control for distance to a railroad; geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table K.27: Dynamics Across Years-Distance to a Railroad

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
$UFCo_{1973}$	-0.206	-0.277	-0.067	-0.126	-0.227	-0.676
	(0.064)***	(0.080)***	(0.043)	(0.048)***	(0.070)***	(0.163)***
	[0.069]***	[0.079]***	[0.034]**	[0.047]***	[0.055]***	[0.148]***
$UFCo_{1984}$	-0.055	0.014	-0.086	-0.067	-0.081	-0.194
	(0.048)	(0.027)	(0.028)***	(0.036)*	(0.049)*	(0.093)**
	[0.033]*	[0.012]	[0.028]***	[0.029]**	[0.033]**	[0.060]***
$UFCo_{2000}$	-0.080	0.019	-0.057	-0.082	-0.132	-0.200
	(0.032)**	(0.018)	(0.022)**	(0.026)***	(0.036)***	(0.059)***
	[0.028]***	[0.018]	[0.019]***	[0.024]***	[0.031]***	[0.052]***
$UFCo_{2011}$	-0.092	0.021	-0.039	-0.014	-0.102	-0.125
	(0.030)***	(0.017)	(0.030)	(0.037)	(0.038)***	(0.064)*
	[0.031]***	[0.021]	[0.031]	[0.055]	[0.053]*	[0.096]
Adjusted R^2	0.103	0.199	0.241	0.017	0.116	0.206
Observations	8,786	8,786	8,786	8,786	8,786	8,786
Clusters	200	200	200	200	200	200
$Mean_{1973}$	0.462	0.353	0.393	0.208	0.777	1.416
$Mean_{1984}$	0.209	0.060	0.362	0.201	0.579	0.832
$Mean_{2000}$	0.145	0.031	0.230	0.178	0.452	0.584
$Mean_{2011}$	0.124	0.018	0.156	0.215	0.402	0.512

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include a control for distance to a railroad; geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

L Assessing the Impact of Migration

In this section we run our regressions on subsamples of households where (i) nobody migrated, and (ii) the head of household did not migrate; both within 5 years of each census. Our results persist, indicating that migration is not driving our estimations.

L.0.1 No member migrated within 5 years of the census.

Table L.28: Average UFCo Effect-Any Migrant

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
UFCo	-0.104	-0.004	-0.062	-0.055	-0.135	-0.225
	(0.027)***	(0.015)	(0.025)**	(0.025)**	(0.030)***	(0.052)***
	[0.031]***	[0.015]	[0.023]***	[0.028]**	[0.027]***	[0.049]***
Adjusted R^2	0.077	0.145	0.226	0.012	0.102	0.165
Observations	6,451	6,451	6,451	6,451	6,451	6,451
Clusters	198	198	198	198	198	198
Mean	0.158	0.050	0.220	0.205	0.466	0.632
P-value for difference	0.49	0.19	0.64	0.78	0.43	0.94

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. The sample is restricted to households whose members are all non-migrants. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude and longitude. The p-values in the last row are for the test of the hypothesis that the UFCo coefficient is the same than the corresponding in Table 2. The p-values are clustered at the census block level. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table L.29: Dynamics of the UFCo-Effect Across Years-Any Migrant

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
$UFCo_{1973}$	-0.252	-0.301	-0.070	-0.144	-0.285	-0.767
	(0.067)***	(0.100)***	(0.042)*	(0.035)***	(0.093)***	(0.191)***
	[0.080]***	[0.102]***	[0.031]**	[0.040]***	[0.080]***	[0.183]***
$UFCo_{1984}$	-0.084	-0.000	-0.107	-0.084	-0.131	-0.275
	(0.048)*	(0.029)	(0.033)***	(0.043)*	(0.050)***	(0.094)***
	[0.044]**	[0.019]	[0.026]***	[0.036]**	[0.031]***	[0.062]***
$UFCo_{2000}$	-0.085	0.008	-0.052	-0.098	-0.144	-0.226
	(0.031)***	(0.017)	(0.026)**	(0.030)***	(0.036)***	(0.057)***
	[0.029]***	[0.017]	[0.026]**	[0.028]***	[0.031]***	[0.051]***
$UFCo_{2011}$	-0.110	0.019	-0.053	0.001	-0.113	-0.143
	(0.031)***	(0.016)	(0.033)	(0.035)	(0.037)***	(0.061)**
	[0.036]***	[0.016]	[0.033]	[0.051]	[0.044]**	[0.077]*
Adjusted R^2	0.079	0.168	0.227	0.016	0.102	0.171
Observations	6,451	6,451	6,451	6,451	6,451	6,451
Clusters	198	198	198	198	198	198
$Mean_{1973}$	0.434	0.360	0.342	0.204	0.758	1.339
$Mean_{1984}$	0.212	0.061	0.369	0.232	0.604	0.875
$Mean_{2000}$	0.135	0.033	0.224	0.179	0.446	0.571
$Mean_{2011}$	0.121	0.018	0.154	0.216	0.400	0.509

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. The sample is restricted to households whose members are all non-migrants. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table L.30: Average UFCo Effect-Head Migrant

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
UFCo	-0.107	-0.006	-0.066	-0.062	-0.142	-0.241
	(0.026)***	(0.015)	(0.025)***	(0.025)**	(0.029)***	(0.050)***
	[0.028]***	[0.014]	[0.025]***	[0.031]**	[0.028]***	[0.051]***
Adjusted R^2	0.082	0.157	0.224	0.013	0.104	0.168
Observations	7,102	7,102	7,102	7,102	7,102	7,102
Clusters	198	198	198	198	198	198
Mean	0.163	0.050	0.227	0.201	0.472	0.641
P-value for difference	0.25	0.22	0.37	0.86	0.18	0.69

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. The sample is restricted to households whose head of household is non-migrant. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude and longitude. The p-values in the last row are for the test of the hypothesis that the UFCo coefficient is the same than the corresponding in Table 2. The p-values are clustered at the census block level. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

L.0.2 Head-of-household did not migrate within 5 years of the census

Table L.31: Dynamics of the UFCo-Effect Across Years-Head Migrant

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
$UFCo_{1973}$	-0.250	-0.315	-0.076	-0.141	-0.308	-0.782
	(0.075)***	(0.102)***	(0.036)**	(0.041)***	(0.086)***	(0.180)***
	[0.087]***	[0.104]***	[0.026]***	[0.048]***	[0.075]***	[0.177]***
$UFCo_{1984}$	-0.087	-0.002	-0.106	-0.094	-0.133	-0.290
	(0.048)*	(0.027)	(0.033)***	(0.041)**	(0.047)***	(0.092)***
	[0.038]**	[0.018]	[0.024]***	[0.038]**	[0.031]***	[0.062]***
$UFCo_{2000}$	-0.089	0.010	-0.060	-0.104	-0.150	-0.242
	(0.030)***	(0.017)	(0.025)**	(0.028)***	(0.035)***	(0.055)***
	[0.028]***	[0.017]	[0.025]**	[0.027]***	[0.030]***	[0.052]***
$UFCo_{2011}$	-0.112	0.018	-0.055	-0.005	-0.118	-0.155
	(0.030)***	(0.015)	(0.033)*	(0.035)	(0.036)***	(0.061)**
	[0.032]***	[0.015]	[0.036]	[0.055]	[0.047]**	[0.082]*
Adjusted R^2	0.084	0.183	0.224	0.017	0.106	0.174
$Mean_{1973}$	0.440	0.360	0.351	0.185	0.770	1.336
$Mean_{1984}$	0.213	0.057	0.379	0.219	0.603	0.868
$Mean_{2000}$	0.141	0.031	0.231	0.176	0.451	0.579
$Mean_{2011}$	0.124	0.018	0.158	0.216	0.404	0.515

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. The sample is restricted to households whose head of household is non-migrant. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

M Migrant Comparison using the 1973 Population Census data

Table M.32: Human Capital Accumulation: Migrants to UFCo region vs. Counterfactual region, in 1973

	Years of schooling	Primary	Secondary
	(1)	(2)	(3)
UFCo	-0.117	0.017	-0.015
	(1.103)	(0.175)	(0.021)
	[0.655]	[0.114]	[0.016]
Adjusted R^2	0.099	0.063	0.015
Observations	1,551	1,551	1,551
Clusters	14	14	14
Mean	2.928	0.195	0.016

Notes: The unit of observation is the individual. The sample is restricted to migrants in 1973. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; individual controls for age, age squared, and gender; census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

N Migrant comparison using the 1927 Population Census data

We use the 1927 Population Census microdata to analyze early waves of migration to the UFCo regions. The microdata is available for a representative sample. The cantons are the strata, and households are the primary sample units (PSU). Within a household, the data record all members. We estimate a variant of equation (1) because the smallest geographic area where the data is representative is the canton. Moreover, taking into consideration that the extension of a canton might be relatively large compared to the UFCo's concession in that canton, we proxy the company's presence as the fraction of canton's land that was part of UFCo landholdings. As outcome variables, we consider the probability of owning private property (real state), of having any primary education, of having any secondary education, and of having no schooling. We use survey weights to estimate population regression parameters.

Table N.33 shows that migrants to the UFCo were negatively selected in education and property ownership, as compared with migrants to other Costa Rican regions. The top panel of Table N.33 shows the difference in outcomes for migrants to UFCo cantons compared to migrants in all the remaining Costa Rican cantons. To gauge their magnitude, consider the average UFCo landholding fraction in a canton where the company was present (0.27). The migrants in the UFCo regions were on average 10.3 percentage points (pp) less likely to own real state, 5.2 pp less likely of having any primary education, 1.5 pp less likely of having any secondary education, and 6.8 pp more likely of having no schooling. All the estimates are significant at the 1% level. The bottom panel of Table N.33 shows that the results are robust after comparing outcomes of migrants to UFCo cantons with outcomes of migrants to cantons neighboring UFCo locations (meaning they share at least one boundary).

Table N.33: Negatively Selected Migrants to UFCo Regions: 1927 Population Census

	Probability of			
	Owning property	Primary education	Secondary education	No schooling
	(1)	(2)	(3)	(4)
Migrants to UFCo canton compared with migrants to any canton				
UFCo	-0.380	-0.192	-0.055	0.253
	(0.033)***	(0.043)***	(0.020)***	(0.044)***
Adjusted R^2	0.30	0.02	0.02	0.08
Observations	6,431	18,851	18,851	18,851
Mean	0.369	0.872	0.061	0.054
Migrants to UFCo canton compared with migrants to neighboring cantons				
UFCo	-0.488	-0.260	-0.000	0.252
	(0.033)***	(0.047)***	(0.022)	(0.048)***
Adjusted R^2	0.36	0.05	0.01	0.13
Observations	2,939	6,087	6,087	6,087
Mean	0.251	0.878	0.047	0.064

Notes: The unit of observation is the individual. Regressions are weighted using sample weights. Robust standard errors, adjusted for clustering by PSUs and stratification at the canton level, in parentheses. UFCo corresponds to the fraction of canton's area that belonged to the UFCo landholdings. All regressions include individual controls for age, age squared, and gender, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

O Verifying that Results are not Driven by Persistence of Better Agricultural Abilities

A concern might be that the higher productivity and better infrastructure in the UFCo attracted people who were ex-ante better at growing crops; and that what we are capturing is the persistence of these abilities across generations. Therefore, in this subsection, we compare the UFCo effect in households that worked in agricultural activities with the effect on households devoted to other non-agricultural enterprises, and find no significant difference in the UFCo effect.

Table O.34 compares our results for households where a member is employed in agricultural activities against all other households. Table O.35 shows how households whose head works in agricultural activities deliver equivalent estimates to households where the head is employed in other activities.

Table O.34: Average UFCo Effect-Comparison of households where any member is engaged in the agriculture sector versus other economic sectors

		Probability of UBN in				Probability	Total number
		Housing	Sanitation	Education	Consumption	of being poor	of UBN
		(1)	(2)	(3)	(4)	(5)	(6)
Agricultural Sector	UFCo	-0.097	-0.022	-0.052	-0.055	-0.123	-0.225
		(0.028)***	(0.018)	(0.024)**	(0.027)**	(0.033)***	(0.059)***
		[0.027]***	[0.014]	[0.023]**	[0.025]**	[0.024]***	[0.048]***
	Adjusted R^2	0.122	0.192	0.248	0.045	0.152	0.247
	Observations	6,190	6,190	6,190	6,190	6,190	6,190
	Clusters	200	200	200	200	200	200
	Mean	0.185	0.070	0.267	0.187	0.495	0.709
Non-Agricultural Sector	UFCo	-0.094	0.002	-0.076	-0.065	-0.122	-0.233
		(0.037)**	(0.024)	(0.031)**	(0.049)	(0.052)**	(0.091)**
		[0.044]**	[0.026]	[0.023]***	[0.018]***	[0.034]***	[0.072]***
	Adjusted R^2	0.052	0.091	0.171	0.020	0.043	0.069
	Observations	2,596	2,596	2,596	2,596	2,596	2,596
	Clusters	193	193	193	193	193	193
	Mean	0.153	0.037	0.159	0.229	0.449	0.578
P-value for difference		0.94	0.32	0.48	0.85	0.98	0.93

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude and longitude. The p-values in the last row are for the test of the hypothesis that the UFCo coefficient is the same between the two groups. The p-values are clustered at the census block level. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table O.35: Average UFCo Effect-Comparison of households where head of household is engaged in the agriculture sector versus other economic sectors

		Probability of UBN in				Probability	Total number
		Housing	Sanitation	Education	Consumption	of being poor	of UBN
		(1)	(2)	(3)	(4)	(5)	(6)
Agricultural Sector	UFCo	-0.083	-0.025	-0.043	-0.039	-0.103	-0.191
		(0.030)***	(0.021)	(0.027)	(0.030)	(0.036)***	(0.065)***
		[0.025]***	[0.015]*	[0.029]	[0.025]	[0.030]***	[0.061]***
	Adjusted R^2	0.128	0.200	0.255	0.045	0.065	0.255
	Observations	5,337	5,337	5,337	5,337	5,337	5,337
	Clusters	200	200	200	200	200	200
	Mean	0.182	0.073	0.258	0.194	0.490	0.708
Non-Agricultural Sector	UFCo	-0.120	0.000	-0.086	-0.092	-0.161	-0.299
		(0.033)***	(0.017)	(0.029)***	(0.040)**	(0.039)***	(0.064)***
		[0.044]***	[0.020]	[0.021]***	[0.025]***	[0.019]***	[0.054]***
	Adjusted R^2	0.066	0.091	0.209	0.013	0.066	0.104
	Observations	3,449	3,449	3,449	3,449	3,449	3,449
	Clusters	197	197	197	197	197	197
	Mean	0.166	0.039	0.200	0.208	0.467	0.612
P-value for difference		0.31	0.21	0.24	0.27	0.23	0.15

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude and longitude. The p-values in the last row are for the test of the hypothesis that the UFCo coefficient is the same between the two groups. The p-values are clustered at the census block level. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

P Comparison: Control Group vs. Other Rural Regions

In this section, we compare the control group with nearby regions outside the UFCo to grasp what is the direction of the spillovers from the company to the control group. Namely, we compare the control group with other non-UFCO regions on a belt around it. The choice of this belt's bandwidth is constrained by data availability, as the National Institute of Statistics and Census (*Instituto Nacional de Estadística y Censos*) only gave us clearance for the census-block geo-reference of households that are approximately 22 km from the UFCo border. Thus, we use all the households in the control group and compare them with non-UFCo households within 17 km of our control group, therefore using a belt as wide as possible.

P.1 Main Outcomes

We run the following regression for a belt of non-UFCo regions around our control group for the year 1973, while the company was still operating:

$$y_{ig1973} = \gamma counterfactual_g + f(\text{geographic location}_g) + \mathbf{X}_{ig1973}\beta + \mathbf{X}_g\Gamma + \varepsilon_{ig1973}, \qquad (10)$$

where y_{ig1973} is an outcome of individual or household i in census-block g in 1973; and $counterfactual_g$ is a dummy that is equal to 1 if census-block g's centroid lies within the counterfactual region (within 5 km from the boundary shown in Figure 3), and equal to zero otherwise. Other variables follow a similar notation as in equation (1). $f(\text{geographic location}_g)$ is a RD polynomial, which is a smooth function on latitude and longitude that controls for the geographic location of census-block g. $\mathbf{X}_{ig1973}$ is a vector of covariates for individual or household i. $\mathbf{X}_g$ is a vector of geographic characteristics (slope, elevation, temperature) for census-block g.

Table P.36 displays the results and shows that all outcomes are better within the control group, except education. Due to concerns about having few clusters that also are unbalanced; we follow the results from Cameron and Miller (2015) and use the bias-adjusted cluster-robust standard errors, and the data determined degrees of freedom adjustment presented in Imbens and Kolesár (2016). The effects are statistically significant and suggest that direct negative spillovers from the UFCo to the control group are unlikely.

P.2 Human Capital Accumulation

Comparing Migrants' Human Capital Accumulation in Control Group vs. in Nearby Non-UFCo Rural Region We compare the human capital accumulation of migrants to our control group with the migrants to other nearby rural regions, to examine if the counterfactual region attracted a particular type of migrant and if this selection is driving our result. We estimate equation (10) using educational attainment as the outcome variable restricting the sample to mi-

Table P.36: Main Outcomes:Counterfactual Region vs. Other Rural Regions

	Probability of UBN in				Probability	Total number
	Housing	Sanitation	Education	Consumption	of being poor	of UBN
	(1)	(2)	(3)	(4)	(5)	(6)
Counterfactual	-0.514	-0.612	0.124	-0.221	-0.420	-1.222
	(0.136)**	(0.188)**	(0.041)*	(0.197)	(0.010)***	(0.165)***
	[0.025]***	[0.026]***	[0.028]**	[0.027]***	[0.006]***	[0.053]***
Adjusted R^2	0.098	0.198	0.415	0.072	0.076	0.166
Observations	494	494	494	494	494	494
Clusters	7	7	7	7	7	7
Mean	0.672	0.656	0.437	0.235	0.923	2.00

Notes: UBN= Unsatisfied Basic Need. The unit of observation is the household. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; demographic controls for the number of adults, children, and infants in the household; census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

grants. Table P.37 shows that the control group attracted relatively high skilled migrants, having more years of schooling and a higher likelihood of completing primary and secondary education, compared to migrants to other nearby regions.

Table P.37: Human Capital Accumulation: Migrants in Control Group vs. Migrants in Nearby Non-UFCo Rural Regions

	Years of schooling	Primary	Secondary
	(1)	(2)	(3)
Counterfactual	1.208	0.171	0.016
	(0.024)***	(0.003)***	(0.001)***
	[0.033]***	[0.003]**	[0.000]***
Adjusted R^2	0.081	0.013	0.012
Observations	1,091	1,091	1,091
Clusters	7	7	7
Mean	2.448	0.111	0.007

Notes: The unit of observation is the individual. The sample is restricted to migrants. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; individual controls for age, age squared, and gender; census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Human Capital Accumulation of the Control vs. Other Regions To explore possible spillovers from the UFCo to this counterfactual region in terms of human capital accumulation, we estimate equation (10) using educational attainment as the outcome variable. Table P.38 shows significant differences in terms of human capital accumulation between the counterfactual region

than other nearby non-UFCo regions. In particular, people within the control group have more years of schooling and a higher probability of completing primary and secondary education. Although the finding might seem contradictory with the results in Table P.36 that suggests a higher unsatisfied need in the education dimension in the counterfactual group, the outcomes measure different aspects. While the education dimension in the Unsatisfied Basic Need index refers to attendance and school backwardness, the human capital aspects measure achievement.

Table P.38: Human Capital Accumulation: Control Group vs. Nearby Non-UFCo Rural Regions

	Years of schooling	Primary	Secondary
	(1)	(2)	(3)
Counterfactual	1.453	0.259	0.029
	$(0.206)^{*}$	$(0.014)^{**}$	$(0.002)^{**}$
	$[0.033]^{***}$	$[0.003]^{**}$	$[0.000]^{***}$
Adjusted R^2	0.083	0.033	0.012
Observations	2,067	2,067	2,067
Clusters	7	7	7
Mean	2.425	0.107	0.006

Notes: The unit of observation is the individual. Robust standard errors, adjusted for clustering by census block, are in parentheses. Conley standard errors are in brackets. All regressions include geographic controls for slope, elevation, and temperature; individual controls for age, age squared, and gender; census fixed effects, and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Q Details on Government Expenditures

In this section, we discuss in more detail how government spending in regions around the UFCo was not different from the spending in the rest of the country. We gathered data on government spending per municipality from annual reports from the Comptroller General of the Republic of Costa Rica (*Contraloría General de la República de Costa Rica*) published between 1955 and 1984,[38] and estimate spending per capita. Table Q.39 compares government spending per capita between UFCo municipalities and all other rural municipalities in the country, and do not find significant differences.

Table Q.39: Comparison of Government Spending per Capita across Municipalities

	ln Government Spending per Capita	
	(1)	(2)
UFCo	0.007	-0.008
	(0.078)	(0.082)
Year FE	No	Yes
Adjusted R^2	-0.001	0.316
Observations	690	690
Clusters	50	50

Notes: The unit of observation is the municipality. Robust standard errors, clustering by municipality, in parentheses.

[38] Although the publication was annual, the records on government spending per canton appear for 15 years between 1951 (the first publication year) and 1984 (when the UFCo ended operations).

R Historical Details to Support the Assumptions in the Dynamic General Equilibrium Model

Monopsony in the UFCo Region: Between 1912 and 1976, the UFCo employed, on average, 7% of the Costa Rican total agricultural labor force. The UFCo was also the only employer within its landholdings. To measure the degree of monopsony of the UFCo, we analyze how changes in the company's employment correlate with changes in world banana prices during the period 1912 to 1976. Namely, we consider the following regression

$$\ln(\textit{UFCo employment}_t) = \alpha + \beta \ln(P_{Bt}^W) + \varepsilon_t, \tag{11}$$

where P_{Bt}^W stands for the world banana price at year t. The coefficient β measures the degree of monopsony. Assuming decreasing returns to scale, under perfect competition $\beta > 1$, while under monopsony $\beta < 1$.[39]

We estimate $\beta = 0.397$ with a robust standard error of 0.089 (thus, the coefficient is significant at the 1% level). The result implies that the company indeed faced an upward-sloping labor supply, i.e., the firm could influence the price of labor. Therefore, it provides support to the assumption that the UFCo was a monopolist, the sole employer within its concession.

Perfect Competition in the Rest of the Country: Aside from bananas, most of the agricultural production during the 20th Century in Costa Rica consisted of coffee. Coffee was produced predominantly in small farms, owned by many producers. According to the 1935 Coffee Census, there were 25,477 farms producing coffee and 21,731 producers, on average, 1.17 farms per owner. The coffee plantations were mostly small: 93.81% had an extension below five hectares. We use the Herfindahl-Hirschman Index (HHI) to measure coffee production concentration. The HHI is 39.03, suggesting a competitive industry (HHI below 100). Moreover, the 1935 Coffee Census reported 25,472 persons permanently employed in coffee production (on average, one worker per farm), approximately 23% of the Costa Rican total agricultural labor force. This historical evidence supports our assumption of perfect competition in the rest of the country.

Local Government Budget Constraints: The Costa Rican government during the first half of the 20th Century had very limited access to capital markets. In the 1870s, the government entered into $15 million of external debt with an 18% interest rate (sovereign bonds sold in England and France). At the time, the service of this external debt represented between 20% and 50% of the

[39] For the intuition behind this result, consider the case of an increase in the price of the final product. The increase in the price of the final product increases the value of the marginal product of labor. Therefore, the optimal response for the firm is to adjust by increasing employment. Under perfect competition, the firm cannot influence wages, and because of the decreasing returns to scale, the change in employment must be more than proportional to the change in the price of the final product. Under monopsony, the firm influences wages, then the increase in labor demand will increase wages, which offsets the initial increase in prices. Therefore, the change in labor is less than proportional to the change in price. The result holds regardless if the firm has market power in the final product market or does not.

value of exports (Marichal, 1988). This burden proved to be too large, and in 1874 the first default on payments occurred. At this time, debt was restructured with a longer maturity and a higher interest rate. A similar story repeated itself in 1901 and 1933. By this time, the debt had increased to $21 million of external debt, as new debt emitted to cover delayed interest payments. The country then entered a moratorium that lasted more than a decade (1935-1946), with payments being defaulted throughout the period. Therefore, the very high loan in the late 1800s and the local inability to serve the interest of this debt, incurred a penalty on the interest rates and borrowing ability.

According to data from Reinhart and Rogoff (2009), between 1899 and 1984 (UFCo tenure), Costa Rica had four episodes of external and domestic debt default or restructuring.[40] The country was in a state of default or restructuring during 37 of the 86 years that cover the period. In particular, for the period that we calibrate our model (1950 to 1973), the country went through two episodes of default, being in a state of default during four of the 24 years. Therefore, we assume that the government has to finance local amenities using collected taxes and is intertemporally constrained.

[40]The year when each episode began is 1901, 1932, 1962, and 1981.

S Model Calibration and Additional Details

In this section, we present the output from the estimation of the model's parameters, and describe the data sources more in detail.

S.1 Estimation of Elasticities

Table S.40 shows the first and second stages of the estimation of equation (9). As explained in Section 7.2, we instrument for agricultural wages in non-UFCo locations using their suitability to grow coffee—the main economic activity for agricultural workers at the time. In particular, we obtain a proxy of each region's suitability to grow coffee as in Section 6.1.4: We regress the fraction of agricultural land used for cultivating coffee in a location during UFCo times, on geographic characteristics (slope, temperature, elevation) and a linear polynomial in latitude and longitude. To construct an instrument for amenities, we use a "Bartik" approach (Bartik, 1991). The instrument is formed by interacting national changes in population and the population share in each location according to the 1927 Population Census (more than two decades before the data to calibrate our model begins), and it is inspired by the Bartik type-instrument in Nakamura and Steinsson (2014).

Table S.40: Estimation of Model Elasticities

First Stage		
	ln Wages	ln Amenities per Capita
	(1)	(2)
Coffee Intensity	0.227	
	(0.089)**	
ln Population share		1.114
		(0.104)***
Adjusted R^2	0.580	0.600
F-statistic (excluded instruments)	21.197	113.777
Second Stage (Dependent variable: L_{kj})		
ln Distance between Locations k and j	-1.378	
	(0.104)***	
ln Wages in Location j	4.466	
	(0.714)***	
ln Amenities per Capita in Location j	1.490	
	(0.363)***	
Adjusted R^2	0.632	

Notes: For the First Stage regressions: the unit of observation is the individual in column (1) and the canton in column (2). Robust standard errors, adjusted for clustering by canton, are in parentheses. For the Second Stage regression: the unit of observation is the migration flow between location k (origin) and j (destiny). We consider only flows of agricultural workers from any location to agriculture-intensive locations, as our instruments are only valid for this type of flows. Robust standard errors, adjusted for clustering by each k and j pair, are in parentheses. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

From equation (9), these results imply that $\{\mu, \alpha, \theta\} = \{0.23, 0.75, 5.96\}$. While Section 7.2

exposes arguments for why μ and θ are robust, we now discuss the robustness of α. To obtain an alternative measure of this weight of consumption in workers' utility and give robustness to this estimate, we followed several steps. First, we collected data from two household income and expenditure surveys conducted in 1949 and 1961.[41] The surveys asked a representative sample of Costa Rican households about the share of their income spent on different goods and services, including food, clothes, housing, education, and healthcare. The data record the goods and services with a high level of detail, consisting of 144 categories in 1949 and 153 in 1961. We classify each good and service as an amenity if, according to the company's reports, the UFCo provided them to its workers. Then, we calculate the share of income spent on amenities and "consumption." Finally, we set the weight of consumption in workers' utility (α) to correspond with the share of income spent in non-UFCo provided goods and services (a value of 0.80).[42]

S.2 RD Estimate for the Simulated Method of Moments

This section details the steps to obtain the regression discontinuity (RD) ratio we use in the dynamic model. To obtain the RD estimate, we first determine how the probability of being poor correlates with wages and investments in amenities in each location. We use the 1973 Population Census and the data we gathered on government spending per municipality. We restrict attention to households with at least one member in the agricultural sector and estimate the following specification:

$$P(poor_j) = \beta_1 \ln(w_j) + \beta_2 \ln\left(\frac{P_A A_j}{L_j}\right) + \mathbf{X}_j\Gamma + \varepsilon_j, \tag{12}$$

where $P(poor_j)$ is the probability of being poor in location j, $\ln(w_j)$ is the logarithm of the average wage for members in households working in the agricultural sector in location j, $\ln\left(\frac{P_A A_j}{L_n}\right)$ is the logarithm of the government spending per capita in location j. In particular, given our data is in flows of spending while A_j represents a stock, we build a stock using flows of spending across time and a depreciation rate of 0.03.[43] We control for demographic and geographic characteristics for location j ($\mathbf{X}_j$). Table S.41 shows the results of the estimation.

[41] "Family Income and Expenditure for San José. Survey 1949" (*"Ingresos y gastos de las familias de la ciudad de San José. Encuesta 1949"*) and "Survey of Family Income and Expenditures 1961" (*"Encuesta de ingresos y gastos familiares 1961"*).

[42] Several UFCo-provided utilities were provided by the government and did not come directly from households' income. Therefore, we could be overestimating the value of α. As the magnitude of our effects is decreasing in α (i.e., the more valuable amenities are, the more valuable the UFCo is for the domestic economy), our estimates of the company's effect are conservative and, in this sense, could be considered a lower bound.

[43] We choose this depreciation parameter, in order to match the speed of convergence between regions post-UFCo that we documented empirically. Although this value might seem low, the depreciation rates that are usually used by the literature (of around 7%) are more well-suited when thinking about machinery. In our case, this depreciation is associated with infrastructure (like hospitals), which has a much longer useful life. In fact, the average useful life for buildings for tax purposes is between 2% and 5% in most countries, implying an useful life of between 20 and 50 years. More details are available in EY's Worldwide Capital and Fixed Assets Guide, 2019. It is worth noting that our estimation is robust to using a wide range of values.

Table S.41: RD Estimate for the Estimated Model

	Probability of being poor in 1973
	(1)
ln Wages	-0.077
	$(0.033)^{***}$
ln Government Spending per Capita	-0.055
	$(0.024)^{**}$
Adjusted R^2	0.632

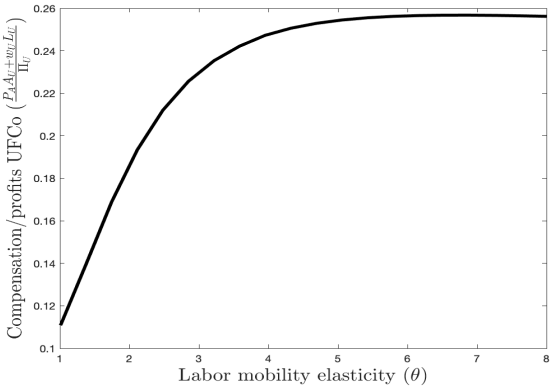
Notes: The unit of observation is the canton. Robust standard errors, adjusted for clustering by canton, are in parentheses. The regression includes geographic controls for slope, elevation, and temperature; demographic controls for the average years of schooling; and a linear polynomial in latitude and longitude. We denote: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

According to the result in Table S.41, the average fitted probability of being poor for the UFCo region (U) is $P(\widehat{poor_{UFCo}}) = 0.721$, and for the rest of the country (R) is $P(\widehat{poor_R})$=0.776. Therefore, $\gamma = P(\widehat{poor_{UFCo}}) - P(\widehat{poor_R})$=-0.056 (robust standard error adjusted for clustering by location: 0.015). This value is statistically different from zero at the 1% level.

S.3 Workers' Compensation and Outside Options

In this section, we explore the model's mechanism further. In particular, the one behind the results of Section 7.3. To do so, we examine how the share of total profits that the company uses to compensate workers evolves as the labor mobility elasticity, θ, changes. As Figure S.7 shows, higher values of θ—associated with better outside options for workers—are associated with workers' compensation representing a larger share of the UFCo's profits. This aligns with the results in Figure 7, where the higher the labor mobility elasticity, the larger and more positive the firm's welfare effect becomes.

Figure S.7: Workers' Compensation as a Percentage of UFCo's Profits and Labor Mobility



Notes: The figure shows how the relationship between workers' total compensation and UFCo's profits changes as labor mobility changes.