Irreplaceable Middlemen:
Evidence from the Expulsion of Indians from Uganda*

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Abstract

Can the majority take over the economic function of a middleman minority once it is expelled? I examine the 1972 expulsion of Indians from Uganda, which removed a minority of less than one percent of the population that dominated crop buying, processing, and wholesale trade. Using newly digitized census and road-network data and quasi-random variation from delays in a road-upgrading program, I find that households in localities more exposed to the loss of Indian middlemen obtain less crop value from their farmland four decades later. These losses are not explained by a differences in land use, a contraction of the local economy, a loss of credit and inputs, out-migration, or a loss of human capital. Instead, they operate through disintermediation: the decline is largest for the most marketed crops, which depend most on intermediation, and more-exposed households market a smaller share of their harvest and sell lesser to traders. Altogether, the results suggest that removing a middleman minority destroyed its economic function rather than transferring it to the majority.

Keywords: Middleman minorities, Ethnicity, Expulsion, Colonialism, Persistence

JEL: J15, J24, J44, N47, O12

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1 Introduction

Middleman minorities—ethnic minorities that occupy the commercial layer between producers and markets—are a recurring feature of economies across history (Blalock, 1967; Bonacich, 1973).[1] In settings where formal contract enforcement is weak, middleman minorities screen partners, extend credit, and sanction those who cheat at lower cost than outsiders can (Greif, 1993; Landa, 1981),[2] which gives them a commercial advantage that outsiders could not easily match. While we know much about how middleman minorities can complement the economic activities of the majority and thereby foster economic development (Artiles, 2026; Jha, 2013, 2014, 2018; Johnson and Koyama, 2017), much less is known about whether the economic function they perform is substitutable.

This paper asks: when a middleman minority is removed, can others take over the economic function it performed? If middleman minorities persist because barriers keep others out, removing them should open their activities to others and improve the allocation of talent. If instead their position rests on group-specific network capital that cannot be transferred, removing the group may destroy the services it provided. The answer to this question informs policies that expel or restrict trading minorities on the presumption that others can take over their function.

In this paper, I take a historical perspective to examine this question. I do so by leveraging the expulsion of the ethnic Indian minority from Uganda in 1972.[3] Indians made up less than one percent of Uganda's population, yet they occupied the intermediary layer of the country's agricultural value chain: the aggregation, processing, transport, and wholesale trade that connected African smallholders to distant markets. In 1959, more than half of economically active Indians worked in commerce (East African Statistical Department, 1960), while Africans were mostly smallholder farmers (De Haas, 2022). Although African traders outnumbered Indian traders by more than two to one in the early 1950s, they handled about a third as much business (Uganda Government Printer, 1955).

Indian intermediation ran on ethnic networks. Merchants recruited newcomers from their home districts in India, staffed their up-country stores with kin and co-religionists, and set new arrivals up in business with goods advanced on credit. The *dukawallah*, or shopkeeper, drew his stock on credit from a co-ethnic wholesaler and advanced crop finance to the farmers he bought from. The wholesaler extended that credit not on collateral but on the shopkeeper's standing within the community. The same exclusivity that made informal contracts enforceable

[1] Prominent examples of middleman minorities include Jewish moneylenders and merchants in medieval Europe (Becker and Pascali, 2019), Armenian and Greek traders in Anatolia (Arbatlı and Gokmen, 2023), Chinese merchants in Southeast Asia (Do et al., 2025), Lebanese traders in West Africa, and Indian traders in East Africa.

[2] Middleman minorities owe their position partly to the skills migrants bring from their places of origin and partly to ethnic networks. In some cases, an orientation toward eventual return further strengthens in-group solidarity and keeps the group apart from the host society (Bonacich, 1973).

[3] In colonial and early post-independence Uganda, this population was also commonly referred to as "Asian," the term used in official statistics and public debate. Throughout the paper, I use the term "Indian" to refer to people who migrated to East Africa from the Indian subcontinent and their descendants, whose origins lie in present-day India, Pakistan, and Bangladesh.

also raised the barriers to entry facing Africans. In August 1972, President Idi Amin ordered Uganda's Indian population of approximately 74,000 to leave within ninety days, justifying the measure as an "economic war" to return commerce to African hands (Jamal, 1976).

This paper exploits granular spatial variation in the sudden loss of Indian middlemen in the agricultural value chain induced by the Indian expulsion in 1972 to investigate its long-term impacts on African farmers. The outcome of interest is the crop value of farmland which captures the returns farmers obtain from their land. I measure it by summing each household's harvest of every crop and valuing it at the crop's national median sales price. I then explore channel behind these effects, why the effects persisted, and their downstream consequences for household consumption.

I construct a measure of exposure to the loss of middlemen, building on the fact that Indian settlement was largely concentrated in urban towns.[4] I digitize the 1959 non-African census, which records the Indian population of each of Uganda's 94 towns, and geocode the towns. I also collect data on the 1961–1974 road network, recording each segment's surface class in every year. Combining these two sources, I measure each locality's exposure to the expulsion as its Indian market access in 1971, the year before the expulsion. In the spirit of Donaldson and Hornbeck (2016), it is computed as the sum of the Indian populations of all towns, each discounted by the shortest-path travel cost between the locality and the town on the 1971 road network.

I compute this measure for two sets of locations, which correspond to the two levels of my analysis. The first consists of survey localities, the communities sampled in the 2011/12 Uganda National Panel Survey (UNPS), a nationally representative household survey that records crop output, input use, sales, and the type of buyer for 1,811 farming households in 417 localities. The second consists of historical settlements, the 3,429 populated places listed in the 1964 gazetteer of Uganda, which I digitize and geocode. I link these settlements to satellite measures of vegetation from 1981 to 2008 and trace the evolution of agricultural activity over the decades that followed. Throughout the analysis, I exclude households in localities that lie within these towns to remove the direct effect of the departure of the Indian population itself. I complement these data with individual records from the 1991 census and the 2002 round of the Afrobarometer survey.

A naive comparison of more- and less-exposed localities would be biased, because localities well connected to Indian-populated towns differ systematically from more remote ones in ways that independently affect long-term agricultural outcomes. For identification, I exploit the timing of a road upgrading program, following the recentering approach of Borusyak and Hull (2023). Upgrading a road lowered the cost of traveling to the Indian-populated towns it connected, and therefore raised a locality's exposure to the loss of Indian middlemen after 1972. Starting in 1963, 291 road segments were upgraded under a program designed by a World Bank mission,

[4]Colonial land law restricted non-African access to African land. Trading licenses were granted only in gazetted townships and trading centers, so Indian households and businesses clustered in towns from which they served the surrounding countryside. About 74 percent of Indians resided in towns in 1959 (East African Statistical Department, 1960).

which selected road segments with traffic above a given threshold and therefore favored roads serving major commercial centers (World Bank, 1962). However, which of these segments were completed before the expulsion is plausibly exogenous. The schedule was revised continuously, and engineering constraints delayed upgrades beyond 1972.

Following Borusyak and Hull (2023), I view the realized completion of upgrades by 1971 as one draw from this assignment process. I simulate 1,000 counterfactual draws by reshuffling which segments were completed by 1971 within strata defined by road class and centrality in the 1961 network, holding the number of completed segments fixed, and compute each locality's expected exposure across these draws. Controlling for expected exposure absorbs the variation that arises from a locality's position in the road network, so that the effect of exposure is identified only from which planned upgrades happened to be completed before the expulsion.

For identification checks, I show that geographic characteristics such as topography and climate are balanced across localities with different levels of recentered exposure. Crucially, important pre-existing economic development such as the density of populated settlements, distance to Kampala, and market access in 1961 are balanced. Moreover, I show that recentered exposure does not predict shocks that occurred after the expulsion and could independently affect long-term agricultural outcomes. This supports the assumption of the exclusion restriction. The timing of road upgrades affects outcomes only through exposure to the loss of middlemen rather than through other changes that followed it.

I use a simple conceptual framework to guide my empirical investigations. Farmers allocate land across crops according to the wedge between the price a crop commands in the market and what they receive at the farm gate. This wedge reflects the cost of the intermediation services that carry crops to buyers. Before 1972, these services were provided by Indian traders and, to a lesser extent, by African traders. Localities differed in how much they relied on each of them. The expulsion has an ambiguous effect on this wedge. On the one hand, localities that had depended more on the Indian commercial network may have been left with fewer providers of intermediation services once the Indians departed. On the other hand, the same localities may have found it easier to rebuild intermediation. If dependence dominates, more-exposed localities face a wider wedge today and should have a lower crop value of farmland, concentrated among the most marketed crops, with sales shifting away from traders. If replacement dominates, these predictions are reversed.

Main results. Four decades after the expulsion, households in localities more exposed to the loss of Indian middlemen obtain significantly less crop value from their farmland. In my preferred specification, which controls for agroclimatic conditions, location, and pre-expulsion development, a one-standard-deviation increase in recentered exposure lowers the crop value of farmland by about 17 percent. This effect corresponds to a locality whose road to the nearest Indian-populated town was upgraded before the expulsion, reducing travel costs by about 16 kilometer-equivalents more than its position in the road network would predict. For a median

household, the loss amounts to about UGX 123,000 a year, out of a crop value of about UGX 735,000.

These estimates are robust to a range of checks: alternative definitions of the counterfactual road networks, restricting the comparison to localities with similar geography, alternative measures of exposure (including exposure to the nearest Indian-populated town and decay parameters from 10 to 50 kilometers), alternative approaches to inference including different distance thresholds, and dropping each region or sub-region one at a time and dropping each Indian-populated town from the exposure measure in turn. They are also robust to excluding areas near Kenyan and Tanzanian borders, where expelled Indians may have continued to trade. The effect is specific to exposure to Indian commerce rather than to towns in general. Among households whose nearest town had few Indians, the timing of road upgrades has no effect on crop value of farmland.

Channels. To understand how the expulsion lowered crop value, I first rule out four other channels: (i) differences in land use, (ii) a general contraction of local economy, (iii) a loss of credit and inputs, (iv) selective out-migration, and (v) a loss of human capital. First, I find that the decline in crop value of farmland is not explained by farming less land or by cropping it less intensively. Second, I show that the estimates remain similar when I exclude localities at varying distances from these towns. Furthermore, there is no detectable effect on nighttime lights, a measure of non-farm economic activities, suggesting no broad impact on non-farm activity. Third, Indian traders may have supplied credit and inputs to farmers. I find no effect on farm equipment or on the use of purchased inputs. Fourth, recentered exposure does not predict out-migration. The results hold among household heads who have lived in their locality since before the expulsion. Lastly, using a Duflo-style cohort difference-in-differences, I find that cohorts of primary-school age or younger in 1972 completed less schooling in more-exposed districts of birth, but this did not translate into differences in employment sector, suggesting that the loss of human capital is unlikely to explain the main results.

I then show that the decline likely operates through disintermediation: the loss of the intermediation services that had connected farmers to markets. These intermediation services might have been difficult to replace because they rested on group-specific network capital. Linking farmers to distant markets requires a chain of buyers, transporters, processors, and wholesalers who extend credit to one another and trust each other. I test two implications of this hypothesis.

First, if the expulsion raised the cost of reaching distant markets, its effect should be concentrated among the crops that rely most on intermediation services. To test this, I rank crops by their total sales value at national median prices, as a proxy for their reliance on intermediation, and estimate the effect of exposure on the value of nested baskets of the most marketed crops. The three most marketed crops depend on the intermediation: coffee must be hulled and graded before it is sold to exporters, maize must be aggregated from many small producers and stored, and food bananas are bulky and perishable, so they need to be collected and transported to

towns. I show that an increase in exposure to the loss of Indian middlemen significantly lowers the value of every basket, and that the effect is largest for the three most marketed crops: coffee, maize, and food bananas.

Second, if fewer intermediaries operate, farmers who sell should rely less on traders. Households in more-exposed localities are less likely to sell to traders and more likely to sell to consumers, neighbors, and other buyers, and the share of their sales going to traders is lower. In contrast, the effects on whether households sell at all, and on the share of the harvest they sell, are imprecise once location is controlled for. As a result, the shift in buyers is unlikely to reflect a change in which households sell. Together, these results indicate that in more-exposed localities, farmers lose most on the crops whose value depends on reaching distant buyers, and sell more of their output through local channels that bypass traders.

Finally, I show that disintermediation has downstream consequences for household consumption. Lower crop value translates into lower household spending on durable goods such as education, clothing and footwear, and insurance. In contrast, I find no significant effect on food consumption or on total consumption. This pattern is consistent with households preserving their food consumption through home production, since they sell a smaller share of their harvest, while absorbing the loss in crop value by cutting back on durable purchases.

Related literature. This paper contributes to a literature in economics on the long-run economic consequences of expelling or persecuting minorities (Acemoglu et al., 2011; Arbatlı and Gokmen, 2023; Chaney and Hornbeck, 2016; Huber et al., 2021; Lin and Peri, 2025; Long et al., 2024; Testa, 2021). Whether and under what conditions the majority can take over the economic roles left by an expelled minority remains an open question. Lin and Peri (2025) highlight that the exclusion of Japanese farmers from the U.S. West Coast lowered farm value growth where their human capital was hard to replace. Grosfeld et al. (2020) show that large political shocks increase the vulnerability of middleman minorities by undermining their ability to sustain repeated interactions with other groups. Here, despite the small size of the Indian minority, my results suggest that their expulsion persistently lowered the crop value that farmers obtain from their land, because the intermediation they provided through kin-based networks was likely not rebuilt. I provide evidence of how the removal of even a small minority can impost lasting costs on the majority when its economic role likely rests on networks rather than individual skills.

I also contribute to the growing literature on intermediaries in agricultural markets, especially the work by Bergquist and Dinerstein (2020) and Chatterjee (2023) on the market power of traders in Kenya and India. Previous studies have highlighted the importance of the services that traders provide (e.g., Sitko and Jayne, 2014, Casaburi and Reed, 2022) and the costs of removing a layer of intermediaries, which can raise prices or push farmers back into subsistence (e.g., Emran et al., 2021), mostly using marginal changes in competition or the removal of a single regulated layer over a few years. This study shows that the removal of an entire trading class lowers farmers' crop value four decades later, shifts their sales from traders to consumers and neighbors. My

findings suggest that when the trading class is removed entirely, the services traders provide outweigh their market power, and that services built on kin-based credit and enforcement are not readily replaced by entry from outside the network.

The remainder of the paper is organized as follows. Section 2 provides historical background. Section 3 describes the data. Section 4 describes the identification strategy. Section 5 presents the main results. Section 6 presents evidence on the channel and section 7 asks why the losses persisted. Section 8 examines downstream impact. Finally, section 9 discusses and concludes.

2 Historical Background

2.1 Indians in Uganda

This section describes the population expelled in 1972, that is, the ethnic Indian minority. On the eve of the expulsion, Uganda's Indian population numbered 74,308 according to the 1969 census, less than one percent of the country's population, of whom 26,657 held Ugandan citizenship.[5]

Indian merchants had traded on the East African coast for centuries before colonial rule, but their large-scale settlement in the interior came in two major waves. The first consisted of indentured laborers recruited from British India to build the Uganda Railway, which linked the port of Mombasa to Lake Victoria between 1896 and 1901 (Mangat, 1969). Of the 31,983 Indian laborers brought to East Africa for its construction, 2,493 died and 6,454 were invalided home, while most of the remainder returned to India and 6,724 chose to stay in East Africa (Mangat, 1969).

From the early twentieth century, and especially between the 1920s and the 1950s, free, or "passenger," migrants paid their own passage to East Africa, drawn largely from Gujarat, Kutch, and Kathiawar, together with smaller numbers of Punjabis and Goans (Mangat, 1969; Morris, 1956). Many belonged to communities with long-established commercial networks, including Hindu Bhatias and Lohanas and Muslim Ismailis, Bohras, and Ithna'asheris (Oonk, 2013).[6] The Indian communities remained endogamous (Morris, 1956). Appendix Figure A1 shows that the Indian population grew rapidly from about 5,000 in 1921 to 35,215 in 1948 and to 71,933 by 1959. It then stabilized, reaching 74,308 in 1969.

Despite making up less than one percent of Uganda's population, the Indians came to dominate its commerce. According to the 1959 census of the non-African population, only about 87,000 of Uganda's residents were non-Africans, of which Indians were the largest group among

[5] In the census 1969, share of ethnic Indians (the sum of census "Indians", "Pakistanis", "Goans" categories) constituted 0.78% of the 9,535,051 total population in Uganda (Uganda. Ministry of Planning and Economic Development. Statistics Division, 1971). Estimates for the number of Indians in 1972 vary widely. Hundle (2013) estimates 55,000 at the time of the decree, while other accounts give about 80,000 (Jørgensen, 1981).

[6] The Bhatias and Lohanas are Hindu mercantile castes largely from Kutch, Kathiawar and Sindh, with long histories in Indian Ocean trade. The Ismaili and Ithna'asheri Khojas descend from Hindu trading groups that converted to Islam.

them, accounting for 82.6 percent, followed by Europeans (12.5 percent), Arabs (2.2 percent), people of mixed descent (1.5 percent), Somalis (0.5 percent), and others (0.6 percent) (East African Statistical Department, 1960). Among economically active and employed Indians, 53.3 percent worked in commerce, followed by manufacturing (10.9 percent) and agriculture and mining (10.4 percent), with smaller numbers in public service and the professions. The European workforce, by contrast, was concentrated in public service (39.9 percent), the professions (15.3 percent), and religious organizations (14.5 percent). Africans were overwhelmingly smallholder farmers, who grew the cotton and coffee on which the colonial economy depended (De Haas, 2022).[7]

Indians' position in Uganda's agricultural economy was concentrated in the segments of the value chain that connected African farmers to distant markets, that is, buying and aggregating crops, processing, transporting, and trading them wholesale.

These activities rested on the social organization of the Indian communities. First, Indian firms recruited and trained their staff through kinship. Indian traders who had settled in Uganda brought their relatives from India to help expand their businesses (Oonk, 2013). New arrivals often served an apprenticeship in a relative's shop before setting up on their own. Second, goods and credit flowed along chains of traders linked by these ties. For instance, import and wholesale houses in Mombasa and Kampala supplied up-country shops on credit and shopkeepers in turn advanced goods to farmers against the coming harvest and buying their crops in return. The kinship ties give the Indians an advantage in intermediation.

In settings where contract law is weak, an ethnically homogeneous middleman group is particularly effective at economizing on the costs of enforcing contracts (Landa, 1981). Shared kinship and ethnic codes act as a club, within which members can screen trading partners and sanctions those who cheat. Since middleman minorities are likely oriented toward eventual return rather than permanent settlement, this keeps them apart from the host society and strengthens their in-group identity and solidarity (Bonacich, 1973). These mechanisms are valuable in intermediation where transactions pass through several agents in different locations, payment is often deferred until goods have been resold, and the quality of goods is difficult to verify at each stage.

[7] Indians were considerably more successful than their African counterparts. Indian households earned on average fourteen times African household income (De Haas, 2022). In 1952, while licensed African traders outnumbered Indian traders by more than two to one ratio, they collectively handled only about a third as much business. The Land Transfer Ordinance of 1906 prohibited the transfer of African land to non-Africans without the Governor's consent, which prevented Indians from becoming smallholder or estate farmers, with the exceptions of Crown leases and freehold estates. Moreover, the rules governing crop marketing kept Africans out of processing. Cotton could only be bought at gazetted markets by licensed buyers. Since ginnery licenses were held in practice only by Europeans and Indians, Africans were not able to gin cotton until the reforms of the early 1950s. Together, these forces channelled Indians into the part of the agricultural economy that connected African farmers to markets.

2.2 The 1972 Expulsion

On 4 August 1972, President Idi Amin announced that Uganda's Indians had ninety days to leave the country. Although the order initially targeted non-citizens, it was applied in practice to the entire community, including those who held Ugandan citizenship. By 1973, no more than about 1,000 remained in Uganda (Oonk, 2013). President Amin presented the expulsion as the opening of an "economic war", whose purpose was to transfer the country's commerce from Indians into the hands of Africans. How the expulsion impacted agricultural economy depends on the role of Indians in the agricultural value chain. I describe below the services that this chain required and which of them remained in Indian hands prior to the expulsion.

A marketed crop needs to pass through three stages of value chain. First, upstream services that reach farmers before and during production, namely, credit, seeds, and tools, and the consumer goods that farmers buy on credit against the coming harvest. Intermediation services connect the farm to distant markets, including aggregation, processing, transport, and distribution. Finally, the downstream services are exports.

Before the 1950s, Indian firms operated at most every stage of this chain. The expulsion was, however, the culmination of a longer process of Africanization policies. For more than two decades before 1972, colonial and post-independence governments pursued Africanization polices that transferred the two ends of the chain from Indians to the state and to state-supported cooperatives. For instance, the Lint Marketing Board took over cotton exports from 1949 and the Coffee Marketing Board obtained a monopoly over coffee exports in 1969. Cooperative unions, supported by government loans and the purchase of Indian-owned ginneries after 1952, also took over cotton ginning, and by 1970 they handled essentially the entire cotton crop (Young et al., 1981). In terms of upstream services, the state created alternative sources of agricultural credit, beginning with the Uganda Credit and Savings Bank in 1950 and later through cooperative credit societies.

What remained in Indian hands on the eve of the expulsion was largely the intermediation—the services that transport crops and goods between rural areas and towns. Indian firms still dominated urban wholesale trade and import distribution, supplied African retailers on credit, ran road haulage, and owned many agro-processing and manufacturing firms. The marketing of food crops such as maize, beans, and groundnuts, continued to rely on private buyers and wholesalers.

2.3 Conceptual Framework

A farmer i in locality ℓ allocates each plot of land to one of several crops. A marketed crop k sells at price p_k, which is common across localities because marketed crops are traded nationally or exported. To sell it, the farmer pays a wedge, $\tau_{k\ell} = \theta_k \left(c_\ell + m_\ell\right)$, where c_ℓ is the cost of the intermediation services that carry the crop to its buyer (aggregation, processing, storage, trans-

port, and wholesale); m_ℓ is the margin that the providers of these services keep. The parameter $\theta_k \in [0,1]$ captures how much crop k relies on the intermediation. A plot is devoted to crop k if its net return $p_k - \tau_{k\ell}$ exceeds the value v_i of its best alternative use, which varies across plots with land quality.

Let E_ℓ denote a locality's pre-expulsion exposure to the Indian commercial network. The expulsion removed Indians from every town, but the impact differed across localities. To capture this, let S_ℓ denote the intermediation capacity available to farmers in locality ℓ after 1972. A greater intermediation capacity reduces both c_ℓ and m_ℓ.

The post-expulsion intermediation capacity therefore depends on exposure as follows: $S_\ell = S_0 - \delta E_\ell + \rho E_\ell$, where S_0 is the intermediation capacity that a locality would have had despite exposure to the Indian network (e.g., provided by African traders and cooperatives). δE_ℓ captures *dependence channel*, where fewer African providers fill the gap left by the departed Indians; ρE_ℓ captures *replacement channel*, where new African providers rebuild the intermediation after the expulsion. The expulsion may have left behind resources that new providers use to rebuild the intermediation such as physical assets. Moreover, Africans who had worked for or alongside Indians may have learned commercial practices and skills.

The net effect of exposure on intermediation capacity is $\frac{\partial S_\ell}{\partial E_\ell} = \rho - \delta$. The effect of exposure on wedge for crop k is $\frac{\partial \tau_{k\ell}}{\partial E_\ell} = \theta_k \underbrace{\left(\frac{\partial c}{\partial S} + \frac{\partial m}{\partial S}\right)}_{<0} (\rho - \delta)$. If dependence channel dominates ($\delta > \rho$), more exposed localities were left with less capacity after 1972 and face a wider wedge. If replacement channel dominates ($\rho > \delta$), they face a narrower one.

I use this framework to guide my empirical investigation. First, I conceptualize the 1972 expulsion as a shock to the intermediation capacity described above. By removing Indians from every towns, it changed the capacity available to farmers after 1972 in proportion to each locality's pre-expulsion exposure to the Indian commercial network. Second, I map the framework's core concepts to empirical measures. Third, my empirical analysis focuses on the following set of testable predictions:

Prediction 1 (Crop value of farmland): If dependence dominates, greater pre-expulsion exposure lowers the crop value of farmland. If replacement dominates, it raises the crop value of farmland.

Prediction 2 (Crop composition): Since the effect scales with θ_k, effects are stronger among the most marketed crops that rely more on the intermediation and weaker for crops that rely less on the intermediation.

Prediction 3 (Market participation): If dependence dominates, greater pre-expulsion exposure may reduce participation in crop markets, as farmers shift land toward crops consumed at home. If replacement dominates, the effect is opposite.

Prediction 4 (Composition of buyers): If dependence dominates, greater pre-expulsion ex-

posure shifts sales away from traders toward other buyers, such as consumers, neighbors, and relatives. If replacement dominates, the effect is opposite.

3 Data

The analysis relies on data constructed at two levels. The first is a household-level dataset on contemporary agricultural outcomes, drawn from the 2011/2012 wave of the Uganda National Panel Survey (UNPS), in which households are nested within survey localities. The second is a settlement-level dataset, which I digitized and geocoded from the 1964 gazetteer (Office of Geography, 1964). Below, I first describe the treatment variable and then each dataset.

3.1 Indian Market Access in 1971

I measure each locality's exposure to the loss of Indian middlemen as its market access to Indian-populated towns, in the spirit of Donaldson and Hornbeck (2016). Their measure sums the populations of all other locations, each discounted by the cost of reaching it. I adapt this measure in two ways: I weight towns by their Indian population rather than their total population and discount them exponentially in travel costs.

The town data come from the 1959 census of Uganda's non-African population (East African Statistical Department, 1960), which records the Indian population of each of Uganda's 94 towns. I digitize these records and geocode each town. About 74 percent of Indians lived in these towns in 1959.[8] The road data come from Jedwab and Storeygard (2022), which record the location of each road segment and its surface class (paved, improved, or earth) in every year.

Indian market access for locality l in 1971 is

$$IndianMA_{l,1971} = \sum_{j=1}^{N} \frac{IndPop_j}{\tau(Network_{1971}, Loc_l, Loc_j)} \tag{1}$$

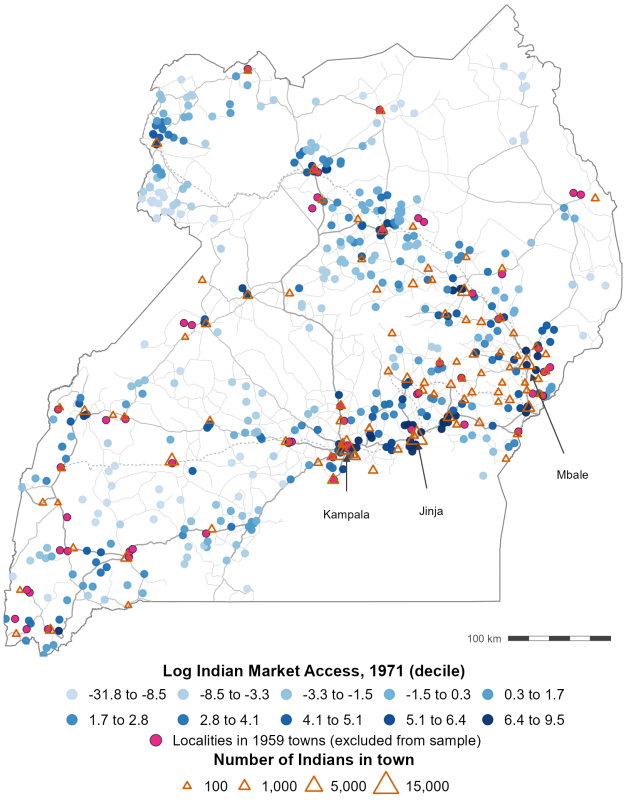
where N is the total number of Indian-populated towns in 1959, $IndPop_j$ is the size of Indian population in town j in 1959, $\tau(Network_{1971}, Loc_l, Loc_j)$ is a function of the travel cost between l and j based on the state of road network in 1971, which is $\exp(0.1\ \tau_{lj,1971})$.[9] $\tau_{lj,1971}$ is the travel cost using the shortest path between a locality and an Indian-populated town using Dijkstra's algorithm. I construct this measure for the two sets of locations in which I observe outcomes: the

[8] The 1969 census reports the Indian population by district but not by town. Across the 18 districts of 1959, the district Indian populations of 1959 and 1969 correlate at 0.970 in logs (see Appendix Figure A2). Moreover, the national total Indian population changed by only 3.4 percent (Appendix Figure A1).

[9] The specific functional form follows Borusyak and Hull (2023). The value 0.1 corresponds to a distance decay parameter of 10 kilometers. This implies that the weight an Indian-populated town receives falls by a factor of e for every additional 10 kilometer-equivalents of travel. I choose a steep decay because intermediation between Indian traders and African farmers was local. In robustness checks, I vary the distance decay parameters to 20km, 30km, 40km, and 50km. Results are not sensitive to the choice of distance decay parameters.

survey localities of the 2011/12 UNPS, used in the household-level analysis, and the historical settlements of the 1964 gazetteer, used in the settlement-level analysis. Figure 1 illustrates the variation across survey localities. I now describe these two datasets in turn.

Figure 1: Indian Market Access in 1971 at the Locality-Level



Notes: The figure maps log-transformed Indian market access in 1971, plotting the UNPS localities. Points are shaded by decile; grey lines show the 1971 road network. Magenta points lie inside a 1959 town and are excluded from the estimation sample. Orange triangles mark the 1959 towns, sized by their Indian population.

3.2 Household-level Data

My household data come from the 2011/12 wave of the Uganda National Panel Survey (UNPS), conducted by the Uganda Bureau of Statistics as part of the World Bank's LSMS-ISA program. The UNPS is nationally representative, and its agricultural module records, for each crop and cropping season, how much the household harvested and the land it cultivated, how much it sold, and to whom, as well as the use of chemical inputs. The richness of data allows me to study not only the crop value of farmland but also the channels through which exposure affects it. The estimation sample consists of 1,811 farming households in 417 localities. Appendix Table A3 reports summary statistics.

Farmland and crop value. I measure the size of farmland as the total area of parcels the

household cultivates or leaves fallow, using GPS measurements where available and farmer reports otherwise. To measure the crop value of farmland, I sum harvests over all crops and both seasons of 2011, valuing each crop at its national median sale price.

Cropped area and crop value per cropped acre. To decompose the crop value of farmland, I measure cropped area as the area of farmland planted, averaged over the two cropping seasons. Crop value per cropped acre is the crop value of farmland divided by cropped area.

Crop value and harvest by crop. To examine which crops drive the decline in crop value, I construct the crop value of nested brackets of the most marketed crops: the top 3, top 5, and top 10 crops by total sales value. For each basket, I sum the value of the harvest of the crops in the basket, valued at their national median prices. I also measure the quantity harvested of each of the main crops, in kilograms, summed over both seasons.[10]

Market participation. I measure participation in crop markets with two variables: an indicator for whether the household sold any crop in either season and the percentage of the value of its harvest that it sold.

Composition of buyers. To measure whom households sell their crops to, I use the survey question on who bought the largest part of each crop sold. I group the buyers into two types: traders, who are private traders in a local village or district market and non-traders who are consumers at market, neighbours and relatives, government and other buyers. Since the survey names only the main buyer, I assign the whole sale of a crop to that buyer's type. For each household that sold at least one crop, I construct two indicators, one for selling any output to a trader and one for selling any output to a non-trader. I also sum the value of sales to each type across crops and seasons, which gives the value of crops sold to traders and the value sold to non-traders.

Household consumption. I use the consumption aggregates constructed by the Uganda Bureau of Statistics, expressed as monthly consumption per adult equivalent and deflated to 2005/06 prices.

Household controls. I use three characteristics of the household from the roster and use them as household-level controls. They are whether the head is female, the head's age, and the number of members in the household.

3.3 Settlement-level Data

I use the 1964 gazetteer of Ugandan populated places (Office of Geography, 1964), which I digitize and geocode to obtain 3,429 historical populated settlements. Since these settlements are observed prior to the expulsion, this helps mitigate endogeneity concerns.

Agricultural activity. I measure agricultural activity using the normalized difference vege-

[10] Appendix Table A5 presents the ranking of crops. The top five crops are coffee, maize, food bananas, sugarcane, and beans, which account for about 60 percent of total sales value.

tation index (NDVI), which compares reflected near-infrared and visible red light and increases with the density of living vegetation. NDVI has been used as a proxy for agricultural production where direct measures are unavailable (Asher and Novosad, 2020). For each settlement, I take the annual mean index in the satellite cell containing each settlement and assign it to the settlement. I average those values within seven four-year periods spanning 1981 to 2008 to reduce measurement error from year-to-year fluctuations in weather. Since NDVI measures the density of vegetation rather than the quantity or value of crops, I interpret these estimates as evidence on the direction and persistence of the effect on agricultural activity.

Non-farm activity. I use nighttime lights from the Defense Meteorological Satellite Program's Operational Linescan System (DMSP-OLS) for 1992, 2000, and 2010. For each settlement, I construct an indicator for whether the mean digital number within 5 kilometers of the settlement is positive. As an alternative measure, I compute the share of lit cells within 5 kilometers of the settlement.

3.4 Other Controls

I include three sets of controls, which capture differences in agricultural potential, in location, and in pre-expulsion economic development that may have shaped Indian settlement patterns and agricultural outcomes today. I measure controls for both survey localities and historical settlements.

Agroclimatic controls. The first set captures the agricultural potential of the land. I control for terrain ruggedness from Nunn and Puga (2012), togethe with elevation from the Shuttle Radar Topography Mission and slope, since steep and high terrain may have raised the cost of cultivating land and of moving goods off it. I also control for cotton and coffee suitability from the FAO Global Agro-Ecological Zone (FAO and IIASA, 2021) because cotton and coffee were the dominant cash crops and may predict both agricultural potential and Indian settlement. Finally, I control for climate using mean annual temperature and annual rainfall over 1960–1969, both from Fick and Hijmans (2017) which is constructed by summing monthly totals within each year and then averaging over the pre-expulsion decade.

Location controls. The second set captures proximity to markets, administration, and transport. I control for the distance to the nearest Indian-populated town in 1959, which captures proximity to urban markets, and for the distances to Kampala, the capital, and to the nearest district capital in the 1960s, where colonial administration and public services were concentrated. I control for the distance to the railway, the main colonial transport artery, and for the distance to the Kenyan border, which captures proximity to the export route through Mombasa. Finally, I control for the distance to the nearest Christian mission station, using data from Nunn (2010).

Pre-expulsion development controls. The third set captures economic and social conditions before the expulsion. I control for the number of populated settlements within 10 kilometers from Office of Geography (1964), a proxy for pre-expulsion population density. I control for log market

access in 1961 based on the 1961 road network and weigh each town by its total population. This captures general access to markets before road upgrades. I control for the distance to the nearest cotton ginnery in 1965, since ginneries were the main processing and marketing points for the dominant cash crop (Schalken, 2025). Finally, I control for ethnic homeland fractionalization in the county, computed from the ethnic from Murdock et al. (1959).

4 Empirical Strategy

A naive comparison of more- and less-exposed localities is biased because localities better connected to Indian-populated towns differ systematically from more remote ones in ways that independently affect long-term agricultural outcomes. To isolate variation in exposure that is unrelated to these advantages, I exploit the timing of a road upgrading program, following the recentering approach of Borusyak and Hull (2023).

Between 1963 and 1974, 291 road segments were upgraded under a program designed by a World Bank mission, which selected road segments carrying traffic above a given threshold and therefore favored roads serving major commercial centers (World Bank, 1962). 222 were completed by the end of 1971 and the remaining 69 between 1972 and 1974 (see Figure 2).

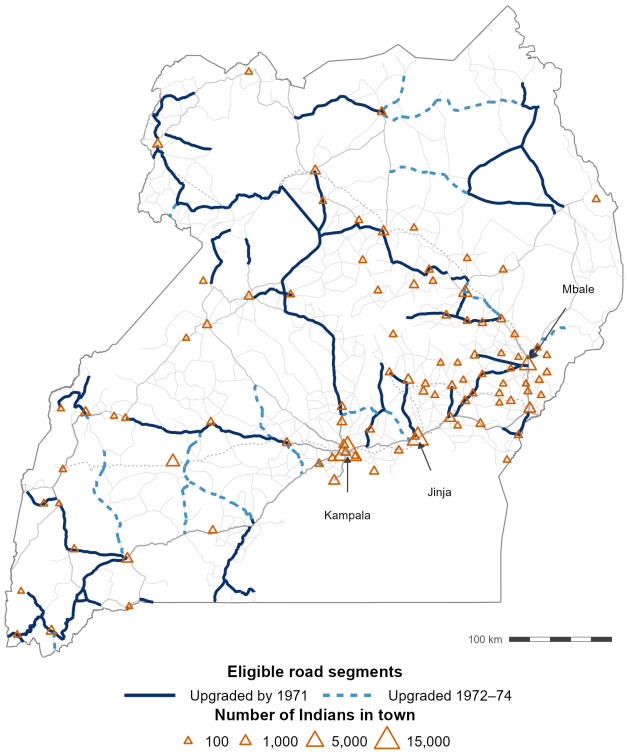
Selection of road segments into the program is not random but which selected segments were completed before the expulsion is plausibly random. Contemporary assessments suggest that the sequencing within the programme was not itself planned. The government committed to a number of miles to be upgraded within a fixed expenditure envelope, but which segments filled that target remained under continuous review, and secondary roads were programmed piecemeal by local administrations with little technical supervision (World Bank, 1962). Completion dates were further governed by engineering constraints.[11]

Figure 3 shows standardized mean differences in pre-treatment characteristics between the eligible road segments upgraded by 1971 and those upgraded between 1972 and 1974. The mean differences are statistically indistinguishable from zero in the characteristics of road segments such as length, sinuosity, average slope and terrain ruggedness, but not in their position in the road network and in the road class. Road segments finished before 1972 were more central in the 1961 road network. I therefore treat completion as good as random only among segments that are similar on these two characteristics. I define strata by the interaction of segment's road class and the tercile of its 1961 edge betweenness.

Given this assignment process, I construct counterfactual road networks by randomly reassigning which segments were completed by 1971 within each stratum, holding the number of completed segments in each stratum fixed. I draw 1,000 such counterfactual networks, re-

[11] For instance, bituminizing a road was uneconomical unless it already lay on its final alignment, so upgrading frequently required realignment that included survey, land acquisition, and new construction, each of which could postpone completion.

Figure 2: Road Segments Upgraded By 1971 Versus Upgraded Between 1972 and 1974

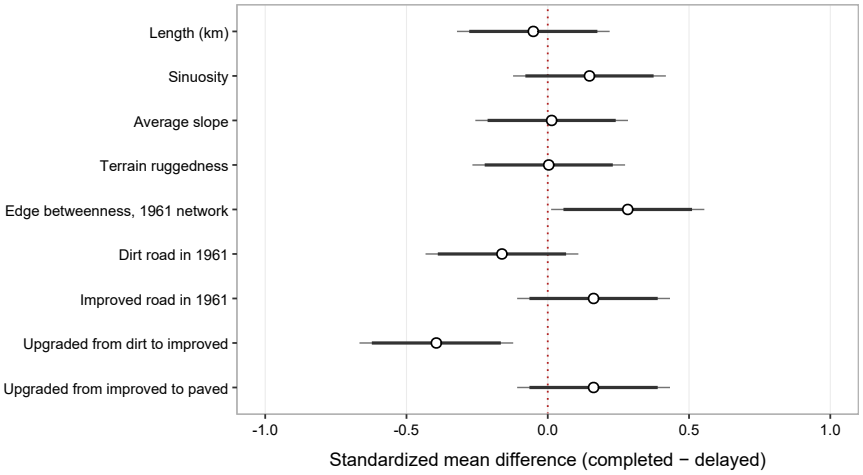


Notes: The figure illustrates the 1971 road network of Uganda. Eligible road segments are the 291 segments whose road class improved between 1961 and 1974. 222 were upgraded by 1971, shaded (solid blue lines) and 69 were upgraded between 1972 and 1974 (dashed blue lines). Triangles mark the 93 towns with an Indian population in the 1959 census, sized by their number of Indians.

compute Indian market access in 1971 for every locality under each draw, and define expected exposure as the average of Indian market access across the 1,000 draws.

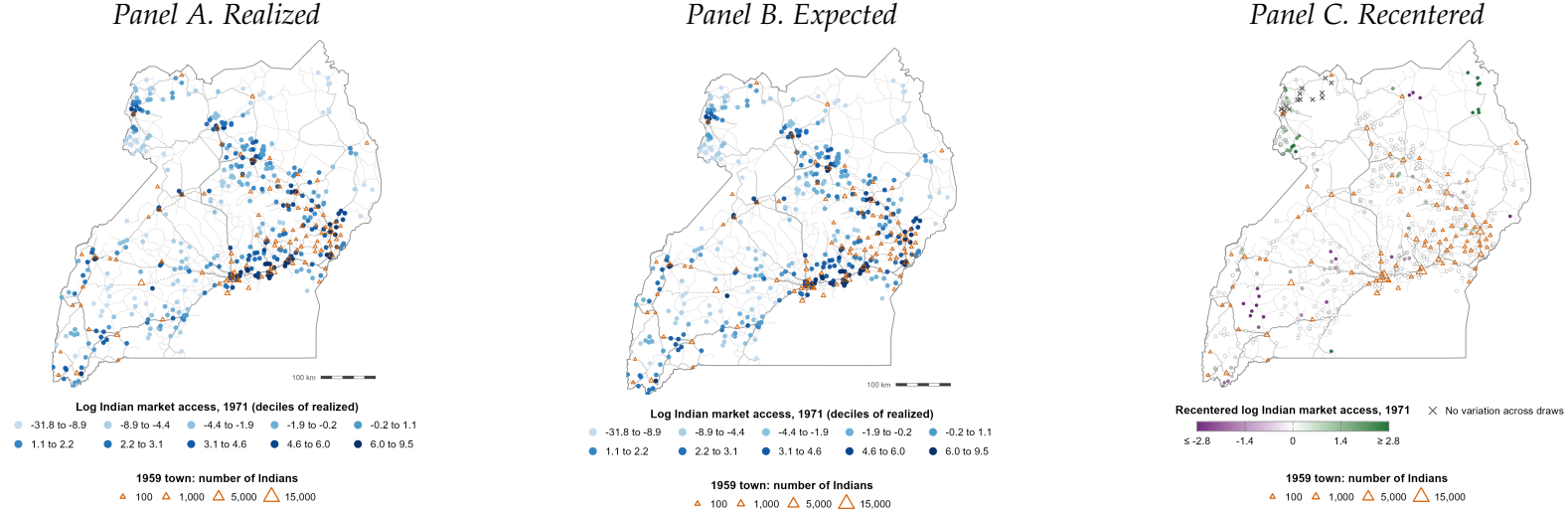
Expected exposure captures the part of a locality's exposure that is predictable from its position in the road network and the set of segments eligible for upgrading. Controlling for expected exposure removes this predictable component, so that the remaining variation in exposure comes only from which segments happened to be completed before the expulsion. Figure 4 shows the variation of realized, expected, and recentered Indian market access in respective panels.

Figure 3: Standardized Mean Difference Between Upgraded By 1971 and Delayed Roads



Notes: Standardized mean difference in pre-existing characteristics between road segments that saw upgrade completed by 1971 versus those that witnessed delays.

Figure 4: Indian Market Access in 1971: Realized, Expected, and Recentered



Notes: The figure shows log Indian market access in 1971 across the UNPS localities: realized in Panel A, expected (the mean over 1,000 counterfactual road-completion schedules) in Panel B, and recentered (realized minus expected) in Panel C. Panels A and B are shaded by the deciles of realized market access, so the two can be read on one scale. In Panel C, crosses mark localities whose market access is identical in every counterfactual schedule. Triangles mark the 93 towns with an Indian population in the 1959 census, sized by their number of Indians.

4.1 Estimating Equation

Throughout the analysis, I impose two sample restrictions. First, I restrict the sample to farming households since the outcomes are defined only for households engaged in crop production. Second, I exclude localities that lie within an Indian-populated town in 1959 to remove the direct effect of the departure of the Indian population itself.[12]

The estimating equation is:

$$Y_{il} = \beta_1 \text{Realized Indian MA}_{l,1971} + \beta_2 \text{Expected Indian MA}_{l,1971} + \mathbf{X}_l'\gamma + \mathbf{X}_i'\zeta + \epsilon_{il} \tag{2}$$

where Y_{il} denotes the outcome of a household i in locality l (e.g., log crop value of farmland), $\mathbf{X}_l$ is a vector of locality characteristics, and $\mathbf{X}_i$ is a vector of household characteristics (as described below). The parameter of interest, β_1, measures the effect of a one-log-point increase in Indian market access in 1971 on the outcome, holding expected exposure and the controls fixed. Because expected exposure absorbs the component of exposure that is predictable from the road network, β_1 is identified only from variation in which segments happened to be completed before 1972.

The controls are characteristics determined before the expulsion that may have shaped both where Indians settled and how localities developed afterwards. I group them into four sets and add them one set at a time across the columns of each table. The first set captures agricultural potential: terrain ruggedness, elevation, slope, high-input rainfed suitability for cotton and for coffee, and average annual rainfall over 1960–1969. The second captures location: distances to the nearest 1959 town, to Kampala, to the nearest district capital of the 1960s, to the railway, and to the nearest mission station. The third captures development before the expulsion: the number of populated places within 10 kilometers in 1964, distance to the nearest cotton ginnery in 1965, and the ethnic fractionalization of the county's historical homelands. The fourth captures household composition: the sex and age of the household head and household size.

Throughout, standard errors are clustered based on Conley (1999) that allows for spatial correlation among observations within 50 kilometers.[13] I also report valid confidence intervals based on the randomization test statistic proposed by Borusyak and Hull (2023).

Balance. Within strata of similar road segments, which eligible road segments were completed by 1971 is as good as randomly assigned. I check whether recentered exposure is balanced on pre-existing characteristics.

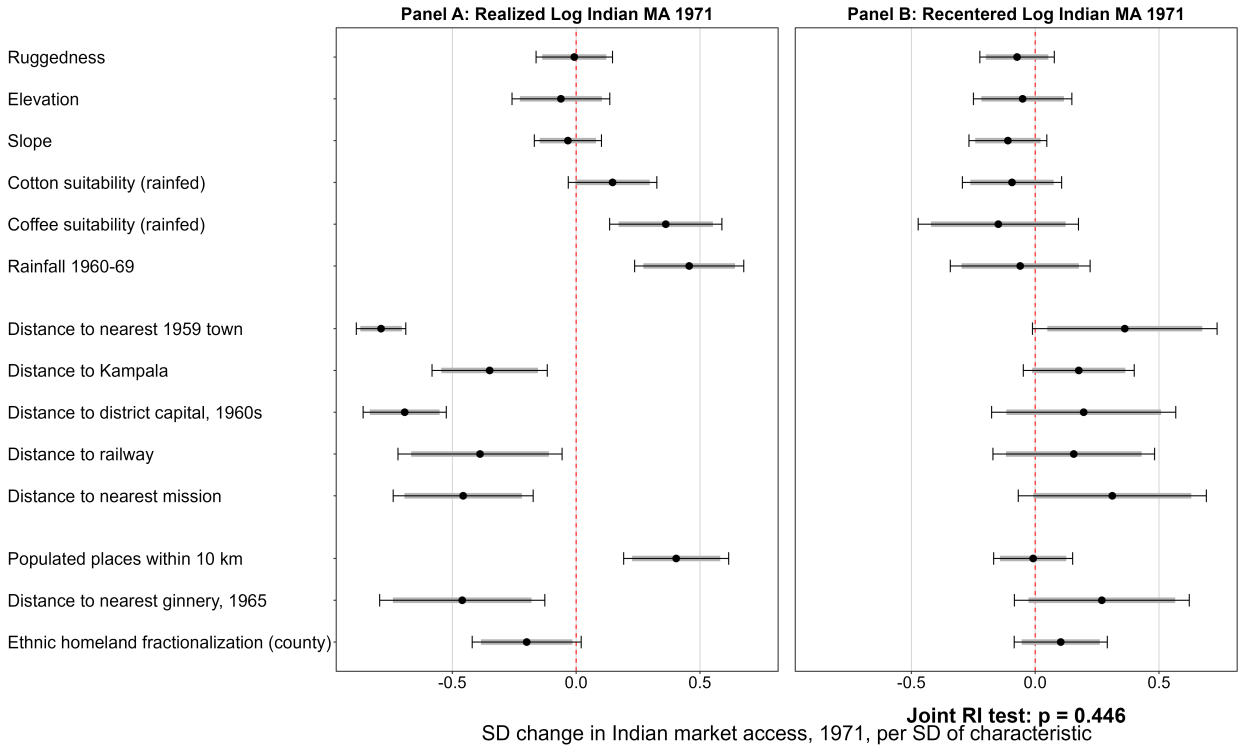
Panel A of Figure 5 first quantifies the identification concerns by regressing realized Indian market access on pre-determined characteristics. Indeed, localities with greater realized Indian market access in 1971 are systematically more populated in 1964, closer to a town in 1959, closer

[12] In Appendix Figure A9, rows 10 through 13, I show that results are not sensitive to the further exclusion of localities within 5km, 10km, 20km, and 30km of these towns.

[13] In Appendix Figure A6, I show that results are not sensitive to the choice of distance thresholds.

to Kampala, and closer to the nearest mission station, more suitable for coffee cultivation, receive more rainfall, and have greater market access in 1961. Panel B of Figure 5 shows that the recentered exposure, the difference between realized Indian market access and expected Indian market access, is not predicted by any of the pre-determined characteristic.

Figure 5: Indian Expulsion and Pre-determined Characteristics

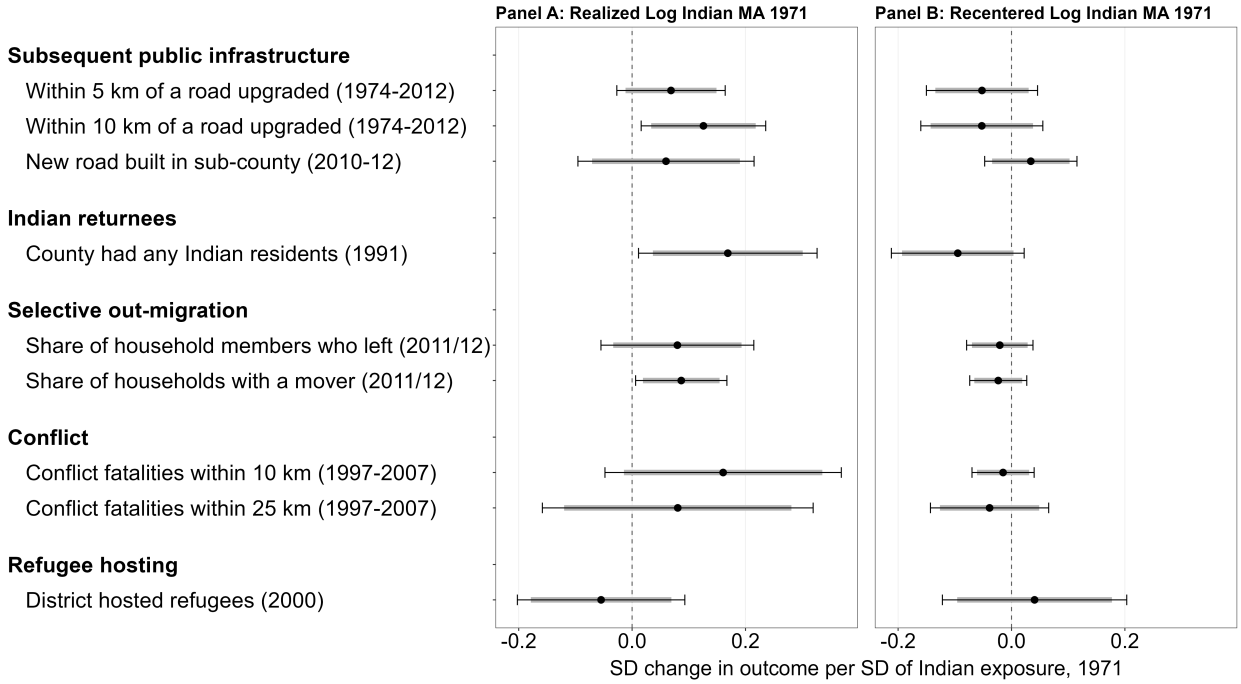


Notes: The unit of analysis is the UNPS locality. Each marker is from a separate bivariate OLS regression of Indian exposure on each of the pre-determined characteristic. The dependent variable is realized Indian market access in Panel A and recentered Indian market access (the difference between realized Indian market access and expected Indian market access) in Panel B. Thick bars are 90 percent and thin bars are 95 percent confidence intervals. Standard errors allowing for spatial correlation among observations within 50 km, following Conley (1999).

Exclusion restriction. The road upgrade timing should only affect outcomes through the Indian expulsion and not through other time-intervening shocks. Figure 6 examines shocks after 1972 that could independently affect agriculture: later road construction, the return of Indians in the 1990s, out-migration, conflict, and the hosting of refugees.

Panel A of Figure 6 shows that realized Indian market access in 1971 systematically predicts the likelihood of having a road upgraded within 10 kilometers, the likelihood of receiving Indian returnees, and higher share of households with a member moved out. Panel B of Figure 6 shows that the recentered Indian market access does not predict any of the subsequent time-intervening shocks considered. These results rule out these time-intervening shocks as explanations to the main effects.

Figure 6: Indian Expulsion and Subsequent Time-intervening Shocks



Notes: The unit of analysis is the UNPS locality. Each marker is the coefficient on log realized Indian market access in 1971 from a separate OLS regression of the outcome indicated in Panel A and recentered log Indian market access (the difference between realized Indian market access and expected Indian market access) in Panel B. Thick bars are 90 percent and thin bars are 95 percent confidence intervals. Standard errors allowing for spatial correlation among observations within 50 km, following Conley (1999).

5 Main Results

5.1 Lower Crop Value of Farmland

Did the expulsion lower the value that farmers obtain from their land in the long-run? I test whether households in localities that were better connected to Indian-populated towns in 1971, because of the timing of road upgrades, obtain less crop value from their farmland four decades later. Table 1 reports the estimates of Equation 2 where the outcome is the log crop value of farmland. All regressions control for expected Indian market access. Column 1 includes no controls. Columns 2 to 4 add, in turn, agroclimatic, location, and pre-expulsion development controls. Column 5 ads household controls.

I find that greater exposure to Indian middlemen in 1971 lowers the crop value of farmland about four decades later. Column 1 reports the estimate controlling only for expected exposure: the point estimate is -0.194, and the randomization-inference confidence interval (-0.236 to -0.133) rejects the null of no effect. As I add controls in columns 2 to 4, the point estimate declines to -0.117 but remain stable. The confidence interval continues to reject the null in every specification. Adding household controls in column 5. As household characteristics are

measured in 2011, they may be “bad controls". I nonetheless report this specification and show that the point estimate is similar (-0.124), with a confidence interval from -0.148 to -0.084, suggesting that differences in household composition do not drive this result.

In my preferred specification in column 4, a one-standard-deviation increase in recentered Indian exposure lowers the crop value of famland by 18.3 log points, or about 17 percent, which corresponds to 0.15 standard deviation of the outcome. The estimate implies that crop value of farmland is about 14 percent lower among households at the 90th percentiles of recentered exposure compared with households at the 10th percentile. For the median household, which obtains about UGX 735,000 in crop value from its farmland over the survey year, a one-standard deviation increase in exposure implies a loss of about UGX 123,000 per year. The results suggest that the removal of Indian middlemen had a lasting effect on the returns famers obtain from their land four decades later.

Table 1: Indian Expulsion 1972 and Crop Value of Farmland

	Log crop value of farmland				
	(1)	(2)	(3)	(4)	(5)
Realized Indian MA 1971	-0.194	-0.163	-0.138	-0.117	-0.124
	(0.032)***	(0.025)***	(0.023)***	(0.024)***	(0.023)***
	[-0.236, -0.133]	[-0.197, -0.111]	[-0.168, -0.096]	[-0.141, -0.079]	[-0.148, -0.084]
R^2	0.068	0.096	0.126	0.140	0.223
Observations	1,811	1,811	1,811	1,811	1,811
Localities	417	417	417	417	417
Mean of dependent variable	13.447	13.447	13.447	13.447	13.447
Controls:					
Expected Indian MA 1971	Y	Y	Y	Y	Y
Agroclimatic	–	Y	Y	Y	Y
Location	–	–	Y	Y	Y
Pre-expulsion development	–	–	–	Y	Y
Household	–	–	–	–	Y

Notes: The table reports estimates of Equation 2, where the dependent variable is the log-transformed crop value of farmland. The explanatory variable is locality l's log Indian market access in 1971, as in Equation 1, controlling for its expected value across counterfactual road-completion schedules. All regressions exclude localities within 1959 towns. Controls are predetermined characteristics, added one set per column: agroclimatic (ruggedness, elevation, slope, rainfed cotton and coffee suitability and average annual rainfall over 1960–1969), location (distances to the nearest 1959 town, to Kampala, to the nearest 1960s district capital, to the railway and to the nearest mission) and pre-expulsion development (the number of populated places within 10 km in 1964, distance to the nearest cotton ginnery in 1965 and county ethnic homeland fractionalization). Column 5 adds household controls: the sex and age of the household head and household size. Standard errors allowing for spatial correlation among observations within 50 km, following Conley (1999), are reported in parentheses. Confidence intervals using randomization inference following the procedure by Borusyak and Hull (2023) in brackets. Stars refer to the Conley standard errors: * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

5.2 Robustness Checks

I subject the main result to a series of robustness checks, reported in Appendix C. Unless noted otherwise, each check uses the specification of column 4 of Table 1.

Alternative strata. The counterfactual road-completion schedules permute which eligible segments were completed before the expulsion within strata of observably similar segments. In the baseline, the strata are defined by road class interacted with the tercile of a segment's 1961 edge betweenness, the two characteristics on which early and late upgraded road segments differ (see Figure 3). I show that results are similar when strata are defined as the interaction between a segment's road class transition and the median of its 1961 edge betweenness (Appendix Figure A3).

Matching. Coarsened exact matching suggests limited residual bias from differences in geography and pre-expulsion development between more- and less-exposed localities. I split each of the eight agroclimatic and geographic controls at its median and group localities into strata defined by the resulting combinations, dropping strata that do not contain both a high- and a low-exposure locality. This leaves 1,095 households in 243 localities across 38 strata.

First, restricting the sample to these matched localities leaves the core findings unchanged (Appendix Figure A4, row 2). Second, including stratum fixed effects, which restricts the comparison to localities that fall on the same side of the median on all eight characteristics, yields similar estimates (Appendix Figure A4, row 3). Even among localities with similar terrain, rainfall, crop suitability, settlement density, and distances to Kampala, and missions, more-exposed households obtain significantly lower crop value of farmland. Third, adding controls of column 4 of Table 1 on top of the stratum fixed effects reduces the estimate but it remains economically and statistically significant (Appendix Figure A4, row 4).

Alternative exposure definitions. The results are robust to alternative measures of exposure (Appendix Figure A5). First, replacing the gravity sum with exposure to the single nearest Indian-populated town, weighted by that town's Indian population, yields an effect nearly identical to the baseline (row 3). Second, the results hold for decay parameters ranging from 10 to 50 kilometers (rows 4-7). The estimated effect grows modestly as the decay parameter increases.

Alternative inference and samples. Results hold if I use 10km, 30km, 100km Conley SE as well as clustering SE at the locality-, sub-county-, and district-level (Appendix Figure A6). The results are robust. Results hold if I drop one region or sub-region at a time (Appendix Figure A7). The estimate is not driven by any single town: removing each of the 93 towns with an Indian population in 1959 from the measure in turn yields coefficients between 0.129 and 0.109, all significant at the 1 percent level (Appendix Figure A8).

Indian versus general market access. The effect could reflect earlier road access to towns rather than exposure to the Indian commercial network. I note that Indian market access is highly correlated with access to towns in general. To distinguish the two, I restrict the sample

to households whose nearest 1959 town, under 1971 road network, had a low Indian share of its population. In these localities, the timing of road upgrades influenced access to towns with few Indians. If the effect captures general market access, we should observe significant effects in this sample. Appendix Table A6 shows that among households whose nearest town was at most 15 and 20 percent Indian, the estimates are small and statistically insignificant (columns 2 and 3).

Other later shocks. The decades after the expulsion brought further shocks that could have affected agriculture independently, including later road construction, the return of Indians after 1992, armed conflict, and the hosting of refugees. As shown in Section 4, recentered exposure does not predict these shocks (Figure 6, Panel B).

Two further shocks were concentrated in particular regions. First, Indians expelled from Uganda may have relocated to Kenya and Tanzania, or Indian intermediaries in these countries may have supplied services to Ugandan farmers near the border. Such cross-border substitution would partly offset the loss of Indian middlemen near the border. The results are robust to excluding localities within 10, 20, 30, and 50 kilometers of the Kenyan and Tanzanian borders, where this substitution is likely to be strongest (Appendix Figure A9). Second, the districts of Luwero, Nakaseke, and Nakasongola, known as the Luwero Triangle, were the site of mass population removal during the 1981–1986 Bush War, which displaced about 750,000 people. The results are robust to excluding localities in the Triangle and within 25, 50, and 75 kilometers of it (Appendix Figure A9).

6 Potential Channel

6.1 Ruling Out Other Channels

My results suggest that households in localities more exposed to the loss of Indian middlemen obtain less crop value from their farmland four decades after the expulsion. Here, I address four alternative explanations based on differences in land use, a general contraction of the local economy, a loss of credit and inputs, and selective out-migration.

6.1.1 Differences in land use

A lower crop value of farmland may simply reflect that more-exposed households farm smaller plots or leave more of their land fallow. Table A7 reports estimates for three outcomes: log size of farmland (Panel A), log crop value per cropped acre (Panel B), and log share of farmland that is cropped (Panel C).

The decline is not explained by farming less land or by cropping the land less intensively. In Panel A, the estimates for the size of farmland are small and statistically insignificant in every specification. In Panel B, the estimates for the share of farmland that is cropped are close to zero and insignificant once agroclimatic and geographic controls are included.

6.1.2 A general contraction of local economy

The main analysis excludes localities within towns that had an Indian population in 1959, removing the direct effect of the departure of Indian households themselves. Their departure may nonetheless have depressed demand and economic activity in the surrounding places, lowering the returns to farming for reasons unrelated to the loss of middlemen.

Two pieces of evidence argue against this explanation. First, if the effects reflected economic spillovers from the towns, they should weaken substantially as localities near them are excluded. Appendix Figure A9, rows 10 through 13 show that the estimates remain negative, significant, and similar in magnitude when excluding localities within 5, 10, 20, and 30 kilometers of these towns. Second, a general contraction would also reduce economic activity outside agriculture. Table A8 shows that exposure has no significant effect on the presence of nighttime lights in 1992, 2000, or 2010. The effects of the expulsion therefore appear to be specific to agriculture.

6.1.3 A loss of credit and inputs

Indian traders provided services not only in intermediation but also before production. They advanced goods and cash to farmers against future harvests. Indian-owned shops were an important source of seed, tools, and other goods. If the expulsion mainly removed access to credit and inputs, it would have raised the cost of producing crops rather than the cost of selling them, lowering yields directly by limiting farmers' ability to invest in equipment and purchase inputs.

Table A10 shows that exposure has no significant effect on the value of farm implements per acre (Panel A), the number of implements used (Panel C), or the use of labor-saving implements such as ploughs, wheelbarrows, and sprayers (Panel B). Table A11 shows no effect on the use of inorganic fertilizer, or growth regulators, and only a marginally significant, economically small effect on insecticide use. The evidence does not support this channel.[14]

6.1.4 Selective out-migration

If the expulsion led more productive households or members to leave more-exposed localities, the households that remain could be less productive for reasons unrelated to disintermediation.

Three checks suggest that selective out-migration does not drive the results. First, I restrict the sample to households whose head has never left the community. Among households whose head has lived in the community since birth, the core findings are unchanged (Appendix Figure A10, Panel A, row 2). Second, results remain robust for households whose head has lived in the community since 1972 (Panel A, row 3). Third, exposure does not predict out-migration from the household itself (Panel B). The estimated effects on whether any member has left permanently,

[14]This is consistent with the historical record: Indian credit to farmers took mainly the form of goods advanced against the harvest, and by the late 1960s cooperatives and state lending institutions supplied much of the credit and inputs available to farmers (Young et al., 1981).

the share and the number of members who have left, and whether any member has moved out of the dwelling are all small and statistically insignificant. These results suggest that the decline in crop value is not explained by differential migration among the households that remain.

6.1.5 Loss of human capital

The expulsion may have disrupted schooling in more-exposed places, children of school age in 1972 may therefore have completed less schooling and more likely to work in agriculture. I examine this channel with a Duflo-style cohort difference-in-differences (Duflo, 2001). Using the individual records of the 1991 census, I estimate the difference-in-differences on cells of district of birth by year of birth for Ugandan-born persons born 1931–1970.

In Figure A12, the left panels plot raw person-weighted means for the districts of birth above and below the median of recentered Indian market access in 1971. The right panels report the coefficients on realized market access interacted with each cohort indicator, with expected market access interacted with each cohort indicator, birth district fixed effects, and birth year fixed effects. The decline in educational attainment appears in cohorts that were of primary-school age or younger in 1972. However, Figure A13 shows that the loss of educational attainment by exposed cohorts does not translate into changes in employment, suggesting that the loss of human capital is unlikely a channel.

6.2 Channel: Disintermediation

The conceptual framework in Section 2.3 attributes the effect of the expulsion to its impact on intermediation capacity: the buyers, processors, transporters, and wholesalers that connect farmers to markets. In localities that depended on Indians for these services, the expulsion left less capacity behind. The main results are consistent with Prediction 1: greater pre-expulsion exposure lowers the crop value of farmland today, implying that the dependence channel dominates the replacement channel. This section tests the remaining predictions, each of which follows from disintermediation.

6.2.1 Effects are Driven by the Most Marketed Crops

Prediction 2 states that the effect of exposure should be largest for the crops that rely most on intermediation. Before a crop can be sold beyond the village, it typically passes through a sequence of intermediation services: small quantities must be aggregated from many farmers, dried, graded, or processed, stored until they can be sold, and transported to urban or export markets. Crops differ in how much they rely on these services before they become valuable in the market.

To capture this, I rank crops by their total sales value in the 2011/12 UNPS, with each crop

valued at its national median price and use this ranking as a proxy for a crop's reliance on intermediation. The five most marketed crops heavily depend on intermediation. For coffee, dried cherries must be hulled, graded, and bulked into export-sized lots before they can be sold to exporters. Maize and beans are grown in small quantities by many farmers and become valuable to urban and regional buyers only once they are aggregated, dried, stored, and transported. Food bananas are bulky and highly perishable, so their value in urban markets depends on collecting bunches from many farms and transporting them quickly to towns. Sugarcane must be milled and processed in sugar factories.

I group crops into nested baskets ordered by sales value: the top 3 (coffee, maize, and food bananas), top 5 (adding sugarcane and beans), and top 10 (adding cocoa, rice, groundnuts, cassava, and cotton). I then estimate the impact of Indian expulsion on crop value of farmland for each basket of the most marketed crops. Table 2 regresses crop value of farmland for baskets of the most marketed crops on realized Indian market access in 1971, using Poisson pseudo-maximum likelihood estimates (PPML). This retains households that harvested none of a basket's crops.

Greater exposure to Indian middlemen lowers the crop value of every basket, and the effect is largest for the most marketed crops. With the full set of controls in column 5, a one-standard-deviation increase in recentered exposure lowers the value of the top three crops by about 15 percent, and of the top five and top ten crops by about 11 percent each. The randomization-inference confidence intervals exclude zero for every basket and in every specification. In column 5 they imply that a one-standard-deviation increase lowers the value of the top three crops by between 5 and 19 percent, of the top five by between 4 and 15 percent, and of the top ten by between 5 and 17 percent. The point estimates are largest for the three crops that depend most on intermediation, which is consistent with the decline in the crop value of farmland being concentrated in intermediated crops.

6.2.2 Less of the Harvest Reaches the Market

If fewer intermediaries operate, less of what farmers produce should reach the market. Prediction 3 states that if dependence dominates, greater exposure should reduce participation in crop markets, as farmers shift land toward crops consumed at home. Table 3 reports estimates for an indicator for selling any crop (Panel A) and the percentage of the value of the harvest that is sold (Panel B). Columns 2 to 5 add agroclimatic, location, pre-expulsion development, and household controls in turn.

Greater exposure reduces how much farmers sell, but the estimates ae imprecise once location is controlled for. Without controls, a one-standard-deviation increase in recentered exposure lowers the probability of selling any crop by 7.0 percentage points and the share of the harvest sold by 3.2 percentage points, both significant at the 1 percent level. However, with the full set of controls in column 5, the same increase lowers the probability of selling any crop by 2.8

Table 2: Indian Expulsion and Crop Value of Farmland by Crop Basket

	(1)	(2)	(3)	(4)	(5)
Panel A. Crop value of farmland for top three crops					
Realized Indian MA 1971	-0.211	-0.120	-0.099	-0.090	-0.102
	(0.034)***	(0.070)*	(0.053)*	(0.056)	(0.051)**
	[-0.383, -0.163]	[-0.148, -0.060]	[-0.139, -0.039]	[-0.116, -0.026]	[-0.132, -0.034]
Pseudo R^2	0.033	0.161	0.201	0.232	0.266
Mean of dependent variable	0.602	0.602	0.602	0.602	0.602
Panel B. Crop value of farmland for top five crops					
Realized Indian MA 1971	-0.173	-0.104	-0.072	-0.052	-0.072
	(0.031)***	(0.050)**	(0.045)	(0.048)	(0.044)
	[-0.307, -0.144]	[-0.147, -0.057]	[-0.124, -0.026]	[-0.087, -0.009]	[-0.106, -0.026]
Pseudo R^2	0.022	0.108	0.141	0.171	0.220
Mean of dependent variable	0.870	0.870	0.870	0.870	0.870
Panel C. Crop value of farmland for top ten crops					
Realized Indian MA 1971	-0.141	-0.088	-0.057	-0.053	-0.076
	(0.027)***	(0.040)**	(0.041)	(0.039)	(0.035)**
	[-0.243, -0.113]	[-0.129, -0.048]	[-0.107, -0.017]	[-0.093, -0.015]	[-0.117, -0.031]
Pseudo R^2	0.014	0.076	0.089	0.103	0.163
Mean of dependent variable	1.294	1.294	1.294	1.294	1.294
Observations	1,811	1,811	1,811	1,811	1,811
Localities	417	417	417	417	417
Controls:					
Expected Indian MA 1971	Y	Y	Y	Y	Y
Agroclimatic	–	Y	Y	Y	Y
Location	–	–	Y	Y	Y
Pre-expulsion development	–	–	–	Y	Y
Household	–	–	–	–	Y

Notes: The table reports Poisson pseudo-maximum likelihood estimates of Equation 2, where the dependent variable is the crop value of farmland for the crop basket, in millions of Uganda shillings. Households that harvested none of a basket's crops enter at zero. Baskets are the highest-ranked crops by observed sales value: Panel A is Coffee All, Maize, Banana Food; Panel B adds Sugarcane, Beans; Panel C adds Cocoa, Rice, Groundnuts, Cassava, Cotton. The explanatory variable is locality l's log Indian market access in 1971, as in Equation 1, controlling for its expected value across counterfactual road-completion schedules. All regressions exclude localities within 1959 towns. Controls are as in Table 1, added one set per column. Standard errors allowing for spatial correlation among observations within 50 km, following Conley (1999), are reported in parentheses. Confidence intervals using randomization inference following the procedure by Borusyak and Hull (2023) in brackets; for these Poisson estimates, the bracket is the part of the confidence set that contains the estimate. Stars refer to the Conley standard errors: * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

percentage points and the share of the harvest sold by 1.2 percentage points. The randomization-inference confidence intervals include zero from column 3 onward.

Table 3: Indian Expulsion and Agricultural Commercialization

	(1)	(2)	(3)	(4)	(5)
Panel A. Sells any crop (×100)					
Realized Indian MA 1971	-4.485	-3.656	-1.941	-1.736	-1.790
	(1.735)***	(1.531)**	(1.335)	(1.194)	(1.150)
	[-7.058, -0.299]	[-6.083, 0.282]	[-3.990, 0.258]	[-3.674, 0.269]	[-3.662, 0.189]
R^2	0.036	0.053	0.076	0.087	0.097
Mean of dependent variable	80.453	80.453	80.453	80.453	80.453
Panel B. Percentage of harvest value sold					
Realized Indian MA 1971	-2.032	-1.468	-0.947	-0.728	-0.767
	(0.576)***	(0.534)***	(0.539)*	(0.486)	(0.459)*
	[-3.002, -0.495]	[-2.392, -0.072]	[-1.964, 0.194]	[-1.590, 0.248]	[-1.555, 0.131]
R^2	0.018	0.040	0.047	0.070	0.098
Mean of dependent variable	28.617	28.617	28.617	28.617	28.617
Observations	1,811	1,811	1,811	1,811	1,811
Localities	417	417	417	417	417
Controls:					
Expected Indian MA 1971	Y	Y	Y	Y	Y
Agroclimatic	–	Y	Y	Y	Y
Location	–	–	Y	Y	Y
Pre-expulsion development	–	–	–	Y	Y
Household	–	–	–	–	Y

Notes: The table reports estimates of Equation 2, where the dependent variable is an indicator for selling any crop output in Panel A and the percentage of the value of the household's harvest that was sold in Panel B. Both are scaled by 100, so coefficients are percentage points. Households selling nothing enter Panel B at zero. The explanatory variable is locality l's log Indian market access in 1971, as in Equation 1, controlling for its expected value across counterfactual road-completion schedules. All regressions exclude localities within 1959 towns. Controls are as in Table 1, added one set per column. Standard errors allowing for spatial correlation among observations within 50 km, following Conley (1999), are reported in parentheses. Confidence intervals using randomization inference following the procedure by Borusyak and Hull (2023) in brackets. Stars refer to the Conley standard errors: * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

6.2.3 Sales Shift Away from Traders

If farmers shifted land toward crops sold locally, Prediction 4 implies that their sales should shift away from traders toward direct sales to consumers. I test this using the survey's report of the buyer of the largest part of each sale and test whether households in more exposed localities are less likely to sell to private traders and more likely to sell directly to consumers, conditional on households that sell. In the survey, traders are private traders in the local village or market and in the district market and non-traders are consumers at a market, neighbors and relatives, the government, and other buyers.

Table 4 shows that sales in more exposed localities shift away from traders, and this shift is stable across specifications. With the full set of controls in column 5, a one-standard-deviation increase in recentered exposure reduces the probability of selling any output to a trader by 3.5 percentage points, against a mean of 87 percent (Panel A), and increases the probability of selling

Table 4: Indian Expulsion and the Composition of Crop Buyers

	(1)	(2)	(3)	(4)	(5)
Panel A. Sells any output to a trader (×100)					
Realized Indian MA 1971	-3.216	-2.616	-2.561	-2.433	-2.500
	(0.772)***	(0.623)***	(0.478)***	(0.483)***	(0.483)***
	[-4.260, -2.133]	[-3.613, -1.441]	[-3.411, -1.352]	[-3.393, -1.140]	[-3.454, -1.169]
R^2	0.029	0.051	0.068	0.070	0.084
Mean of dependent variable	87.208	87.208	87.208	87.208	87.208
Panel B. Sells any output to a non-trader (×100)					
Realized Indian MA 1971	1.911	1.317	1.507	1.774	1.827
	(0.757)**	(0.702)*	(0.595)**	(0.756)**	(0.748)**
	[0.533, 3.529]	[0.071, 2.882]	[0.231, 2.755]	[0.311, 3.255]	[0.369, 3.292]
R^2	0.011	0.026	0.035	0.043	0.045
Mean of dependent variable	48.693	48.693	48.693	48.693	48.693
Panel C. Share of sales value sold to traders (×100)					
Realized Indian MA 1971	-3.561	-2.931	-3.184	-3.060	-3.124
	(0.531)***	(0.459)***	(0.443)***	(0.484)***	(0.478)***
	[-4.609, -2.513]	[-3.921, -1.852]	[-4.137, -1.869]	[-4.160, -1.612]	[-4.236, -1.660]
R^2	0.031	0.052	0.066	0.071	0.084
Mean of dependent variable	75.082	75.082	75.082	75.082	75.082
Observations	1,454	1,454	1,454	1,454	1,454
Localities	368	368	368	368	368
Controls:					
Expected Indian MA 1971	Y	Y	Y	Y	Y
Agroclimatic	–	Y	Y	Y	Y
Location	–	–	Y	Y	Y
Pre-expulsion development	–	–	–	Y	Y
Household	–	–	–	–	Y

Notes: The table reports estimates of Equation 2, where the dependent variable is an indicator for selling any crop output to a trader in Panel A, an indicator for selling any output to a non-trader in Panel B, and the percentage of the household's crop sales value sold to traders in Panel C; all are scaled by 100. Traders are private traders in the local village or market and in the district market; non-traders are consumers at market, neighbours and relatives, government and other buyers. The sample is households that sell any crop. The explanatory variable is locality l's log Indian market access in 1971, as in Equation 1, controlling for its expected value across counterfactual road-completion schedules. All regressions exclude localities within 1959 towns. Controls are as in Table 1, added one set per column. Standard errors allowing for spatial correlation among observations within 50 km, following Conley (1999), are reported in parentheses. Confidence intervals using randomization inference following the procedure by Borusyak and Hull (2023) in brackets. Stars refer to the Conley standard errors: * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

any output to a non-trader by 2.6 percentage points, against a mean of 49 percent (Panel B). The share of sales value going to traders falls by 4.4 percentage points, against a mean of 75 percent (Panel C). The randomization-inference confidence intervals exclude zero throughout. In column 5 they imply that the probability of selling to a trader falls by between 1.6 and 4.9 percentage points, and the share of sales value going to traders by between 2.3 and 6.0 percentage points.

While the effects could in principle reflect a change in which households sell rather than a change in whom sellers sell to, I document no precise effects on market participation in Table 3.

This suggests that the composition effect unlikely drives the results. Altogether, these results suggest that in more exposed localities, crops reach buyers through shorter, more local channels, which are less suited to the crops that generate the most value. In section 8 below, I show that there are important downstream impact of disintermediation on household consumption.

7 Why Do The Losses Persist?

The expulsion took ninety days, yet more-exposed localities still obtain less crop value from their farmland four decades later. Entering trade appears to be profitable. Why did traders not take the Indians' place? In this section, I first show economic effects across subsequent decades after the expulsion, before exploring explanations.

The explanations fall into two groups. In the first, the expulsion damaged the fundamentals that make a locality a viable place to trade, such as its roads and transport, the assets traders need, or a political environment in which commerce is safe. In the second, traders and farmers may have benefited from the other's presence. Traders enter only where enough farmers grow crops for sale, and farmers grow crops for sale only where traders will buy them. A large enough loss of traders can leave a locality in a low-trade equilibrium from which it does not recover over time, even if its fundamentals are intact. Explanations that operate through farmers themselves, such as lost schooling, credit or inputs, are ruled out in Section 6.1.

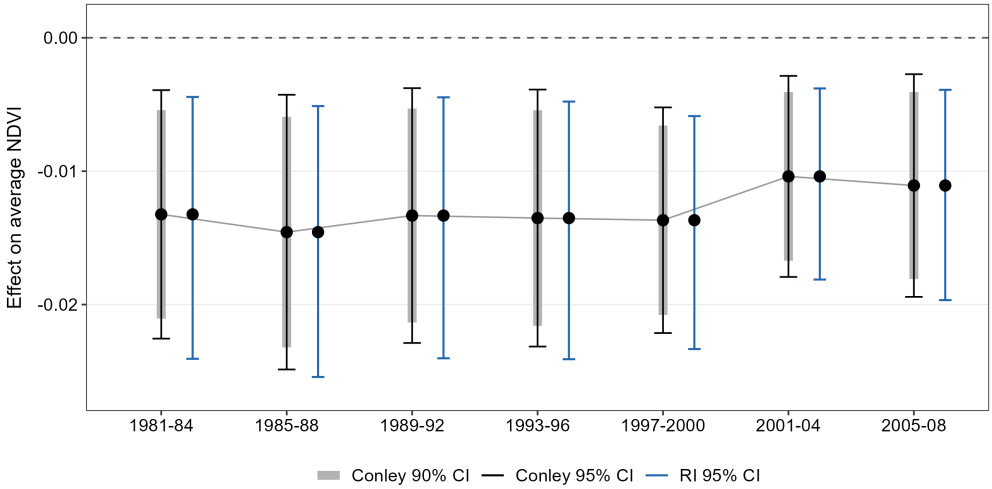
I use the settlement-level data, in which agricultural activity is measured by the normalized difference vegetation index (NDVI) for seven four-year periods from 1981–1984 to 2005–2008. I then estimate Equation 2 separately for each period, with historical settlements as the unit of observation and the agroclimatic and geographic controls of Table 1.

Figure 7 shows that more-exposed settlements have lower vegetation in every period. The gap is already present in 1981–1984, within a decade of the expulsion. Its timing is informative about the explanations above. Uganda's conditions for trade changed markedly over this period. The war that began in 1979 ended in 1986, the government began liberalizing crop marketing in the late 1980s, the Coffee Marketing Board lost its monopoly in the early 1990s, and expelled Indians were invited to reclaim their property from 1992 onward. If the losses reflected only the hostile environment of the 1970s and early 1980s, the gap should have narrowed after these reforms.

7.1 Locational Fundamentals

Roads. Roads may have been deteriorated more in more-exposed localities. For instance, if maintenance declined along the routes that had served Indian towns, it may have raised the cost of trading there. However, recentered exposure does not predict later road upgrades within 10 kilometers (See Figure 6, Panel B).

Figure 7: Indian Expulsion and Agricultural Production, 1981–2008



Notes: The unit of analysis is a populated place recorded in the 1964 gazetteer. Each point is the coefficient on realized log Indian market access in 1971 from a separate cross-sectional regression. The dependent variable is average NDVI over the four years of the period. Every regression includes expected log Indian market access in 1971, the location controls (distances to the nearest 1959 town, to Kampala, to the nearest 1960s district capital, to the railway, and to the nearest mission), and the pre-expulsion development controls (the number of populated places within 10 km in 1964, distance to the nearest cotton ginnery in 1965, and county ethnic homeland fractionalization). Thick and thin bars are 90 and 95 percent confidence intervals based on standard errors allowing for spatial correlation within 50 km following Conley (1999); blue bars are 95 percent confidence intervals using randomization inference over the 1,000 counterfactual road-completion schedules following Borusyak and Hull (2023). All regressions exclude settlements inside 1959 towns.

Assets left behind. The shops, lorries, mils, and estates the Indians owned were not destroyed but reallocated through the Departed Asians' Property Custodian Board, often to soldiers and political clients with little experience of trade (Jamal, 1976). Since assets were concentrated in Indian-populated towns, more-exposed localities lost access to more of them. Yet if missing assets had been the only obstacle, entry should have resumed once trade became profitable again, and particularly so after the restitution of Indian property in the 1990s. As shown in Figure 7, the absence of recovery after the reforms suggests that the loss of assets delayed replacement but cannot by itself explain why it never occurred.

The political environment. Under Amin, state marketing boards held monopolies over major crops, expropriation remained a risk for anyone accumulating commercial wealth. These conditions may have discouraged entry into trade, but they applied to the whole country. They are therefore unlikely to explain why more-exposed localities fell behind.

Attitudes toward trade. If the expulsion left more-exposed communities more distrustful of commerce, fewer farmers would deal with traders and fewer people would enter trade. The rhetoric of the "economic war" may have created a lasting stigma toward trade. I examine attitudes using Round 2 of the Afrobarometer survey, which asks respondents how much they

trust traders and small business owners. Appendix Table A14 shows that respondents in more-exposed localities trust both significantly less. Since the data do not allow me to explore cohort heterogeneity due to a lack of statistical power, it is unclear whether distrust of traders is a legacy of the expulsion itself or a consequence of the low-trade equilibrium that followed.

7.2 Multiplicity

The remaining explanation is that Indian traders and African farmers benefit from each other's presence, so that a large enough loss of traders can shift a locality to a low-trade equilibrium. When the Indians left, more-exposed localities lost most of their traders at once. Farmers responded by shifting toward crops they could consume or sell locally. With less marketed output, entering trade became less profitable, which in turn kept farmers away from marketed crops. Farmers in more-exposed localities have moved away from the crops whose value depends on traders (Section 6.2). They also sell a smaller share of their harvest, and those who sell rely more on consumers and neighbors than on traders. Each of these responses lowers the volume of trade that an entrant could expect.

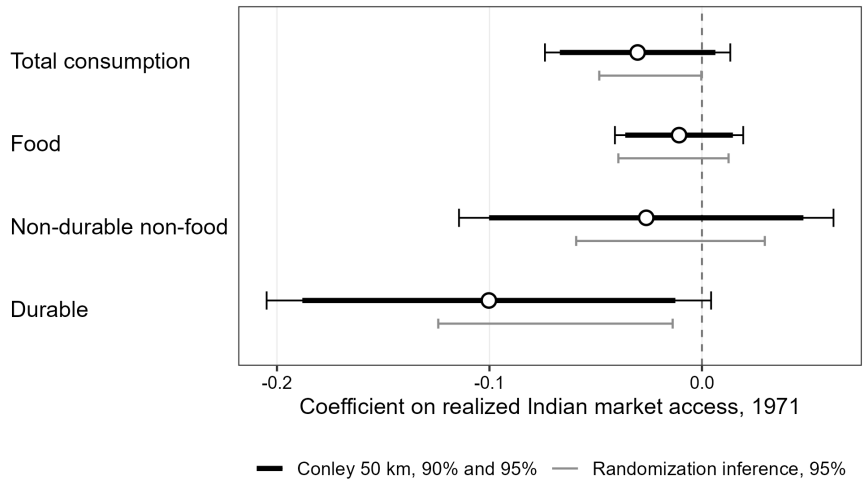
8 Downstream Impact on Consumption

So far, I have shown that more-exposed households obtain less value from their farmland. A natural question is whether this lower crop value translates into lower household welfare.

I use the consumption aggregates constructed by the Uganda Bureau of Statistics for the 2011/2012 UNPS, expressed as monthly consumption per adult equivalent and deflated to 2005/2006 prices. I examine three components: food consumption covers food, beverages, and tobacco over the past seven days, scaled to thirty days, and includes food produced by the households; non-durable non-food consumption covers spending over the past thirty days on housing, fuels and utilities, personal and household supplies, transport, communication, health care, and personal services; durable consumption covers spending over the past 365 days on education, clothing and footwear, household durables, and insurance, scaled to thirty days.

Figure 8 shows estimates using Poisson pseudo-maximum likelihood, with each consumption measure as the outcome. All regressions include expected Indian market access, agroclimatic and geographic controls as well as household controls. Lower crop value translates into lower spending on durable goods. A one-standard-deviation increase in recentered exposure significantly lowers durable spending by about 13 percent at the 5 percent level and close in magnitude to the decline in crop value documented above. In contrast, the effects on food consumption and total consumption are small and statistically insignificant. This pattern is consistent with households maintaining their food consumption through home production, since they sell a smaller share of their harvest, while absorbing the loss in crop value by cutting back on durable purchases.

Figure 8: Indian Expulsion and Household Consumption



Notes: The figure reports Poisson pseudo-maximum-likelihood estimates of the coefficient on realized log Indian market access in 1971 for monthly consumption per adult equivalent, deflated to 2005/2006 prices. Total consumption is the consumption aggregate; food is food, beverages, tobacco over the past 7 days, scaled to 30 days; non-durable non-food is spending over the past 30 days on housing, fuels and utilities, personal and household supplies, transport, communication, health care, and personal services; durable is spending over the past 365 days, scaled to 30 days, on education, clothing and footwear, household durables, insurance. All regressions include expected log Indian market access in 1971, the number of populated places within 10km in 1964, ruggedness, rainfed cotton and coffee suitability, average annual rainfall over 1960–1969, and distances to the nearest 1959 town, to Kampala, and to the nearest mission. Thick bars are 90 per cent and thin bars 95 per cent confidence intervals, constructed from standard errors allowing for spatial correlation among observations within 50 km following Conley (1999).

9 Discussion and Conclusion

Ethnic minorities often dominate particular occupations in their host economies, yet little is known about whether others can take their place once the group is gone. This paper studies one of the starkest removals of such a group–the 1972 expulsion of Uganda's Indian minority, which had occupied the intermediary layer of the country's agricultural value chain. Using newly digitized census and road network data, I measure each locality's exposure to the Indian commercial network on the eve of the expulsion and isolate variation in exposure from which segments of a road upgrading program happened to be completed before 1972.

Four decades later, households in more-exposed localities obtain substantially lower crop value from their farmland. They farm as much land and plant as much of it as other households, but obtain less value from what they plant. Satellite data show lower vegetation in more-exposed places from 1981 onward. The evidence points to disintermediation. The decline is largest for the crops that depend most on intermediation services; more-exposed households sell less of their harvest; and those who sell rely less on traders and more on consumers, neighbours, and other local buyers. The effect is specific to exposure to Indian commerce rather than to towns in general, and it is not explained by a loss of credit and inputs, a general contraction of the local economy, selective out-migration, or later shocks correlated with exposure.

These findings suggest that the niche the Indians occupied rested on group-specific network capital that could not simply be inherited. Their successors took over the shops, lorries, and mills, but not the chains of credit and trust that had linked farmers to distant markets. The expulsion was justified as an “economic war" to return commerce to African hands. In the localities most dependent on Indian commerce, its long-run effect was instead to leave farmers with fewer intermediaries and less value from their farmland.

The results have implications beyond Uganda. Governments across the world restrict, tax, or displace traders on the grounds that they capture margins that would otherwise accrue to farmers. When those traders belong to a minority whose commercial advantage rests on networks rather than on transferable skills, such policies may not redistribute those margins but eliminate the services that generated them. More broadly, the findings suggest that the gains from exchange between ethnic groups that specialize in different activities may be fragile. Once it is interrupted, they need not be rebuilt by the groups that remain.

There are several open questions. First, the analysis shows that the intermediaries were not replaced, but not *why* entry remained low over four decades. Understanding what prevented the rebuild, whether it was limited commercial skills, barriers to entry, would clarify when ethnic niches can be refilled. Second, similar expulsions of commercial minorities, from the Chinese in Southeast Asia to traders in West Africa, offer settings in which to test whether the pattern documented here is general.

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APPENDIX

A Data and Summary Statistics

This appendix describes the data used in the analysis and how I construct each variable. The analysis combines five sources: the 1959 census of Uganda's non-African population, historical road maps recording the surface class of each road segment, the 2011/12 wave of the Uganda National Panel Survey, the 1964 gazetteer of Ugandan populated places, and gridded geographic and satellite data. I first describe the sources and then detail the construction of Indian market access, and of the counterfactual road networks that define the expected exposure. Next I turn to household outcomes, the sample restrictions, the controls and the settlement-level data.

A.1 Data Sources

1959 census of the non-African population. The East African Statistical Department enumerated Uganda's non-African population separately from the African population in 1959 (East African Statistical Department, 1960). Its town tables report the population of each town and trading centre by community. I define the Indian population of a town as the sum of the census categories "Indian", "Pakistani", and "Goan". This is the same aggregation the 1969 census uses for its Asian total.

I geocode each town by matching it to its entry in the 1964 gazetteer of Uganda (described below). I match on the town's name within its district, using the gazetteer's area code, which identifies the district in which a place lies. For cases where names differ only in spelling or spacing (for example, "Aboke" and "Aboki"), I match by hand. I assign each town the gazetteer's latitude and longitude. One town, Lwambu in Masaka district, cannot be located and is dropped.

1964 gazetteer. The gazetteer is Office of Geography (1964), which lists every named geographic feature in the country, including populated places, missions, hills and streams. For each feature, it gives the approved name, a feature designation, latitude and longitude (in degrees and minutes), and an area code identifying the district.

I digitize the gazetteer from a scanned copy. I extract the text of each page and parse each entry into these fields. The digitized file contains 11,198 entries, of which 9,334 are main entries. I keep the 4,756 entries designated as populated places. Of these, 3,994 have both coodinates recovered and the rest lost a coordinate in digitization and are dropped. I use the 3,881 populated places as the units of the settlement-level analysis, and counts of them form the settlement-density control.

Road network. The road data come from Jedwab and Storeygard (2022). They digitize the road network of sub-Saharan African countries from Michelin and other road maps and record

each segment's surface class in a series of benchmark years. I use the Ugandan network in 1961, 1971, and 1974 and add the Uganda Railway, whose alignment did not change over the period considered.

Uganda National Panel Survey (UNPS), 2011/12. The UNPS is conducted by the Uganda Bureau of Statistics under the World Bank's LSMS-ISA program. The 2011/12 wave is nationally representative. Its agriculture module records parcels, plots, crops, harvests, sales and buyers for the two copping seasons of 2011. Survey enumerators record the GPS location of each dwelling. The public release does not report these locations. Instead, the World Bank publishes modified coordinates that are displaced to protect respondents' confidentiality and are, for most households, common to all households in an enumeration area. I use the released coordinates directly and define a locality as a distinct pair of them.

A.2 Construction of Indian Market Access

Road network. I convert the road and railway lines into a network in which each segment is an edge. Segments are split at every point where they intersect another segment, so that a traveller can switch roads at any junction. A segment without a recorded class is treated as an earth road.

Travel costs. The cost of traversing an edge in year t is its length in kilometers multiplied by a cost factor that depends on its surface class in t. Costs are measured in kilometer-equivalents (See Appendix Table A1).

Each UNPS locality and each 1959 town is assigned to the nearest node of the network. The travel cost $\tau_{lj,t}$ between locality l and town j is the least-cost path through the network in year t, computed with Dijkstra's algorithm. Pairs that the network does not connect are assigned twice the largest finite cost. This affects three localities, which I exclude from the sample.

Table A1: Road Network by Surface Class, 1961 and 1971

		Number of segments	
Surface class	Cost factor	1961	1971
Paved	1.0	135	195
Improved	1.5	185	297
Earth	3.0	1,093	921
Railway	1.0	12	12
Total		1,425	1,425

Notes: Road segments and surface classes are from Jedwab and Storeygard (2022). The cost of traversing a segment is its length in kilometers multiplied by the cost factor of its surface class.

Measure. Indian market access of locality l in 1971 is

$$IndianMA_{l,1971} = \sum_{j=1}^{N} \frac{IndPop_j}{\tau(Network_{1971}, Loc_l, Loc_j)} \tag{3}$$

with distance-decay parameter $\theta = 10$ kilometer-equivalents. All regressions use the natural logarithm of the measure.

Localities inside a town. A locality assigned to the same network node as a 1959 town has zero travel cost to that town. Its exposure therefore reflects the presence of the Indian population itself rather than access to it. I classify such localities as lying inside a 1959 town and exclude them.

A.3 Counterfactual Road Networks and Expected Exposure

Eligible segments. A segment is eligible if its surface class improved between 1961 and 1974. There are 291 segments in total. A segment is *completed* if it had reached its 1974 class by 1971. That is the case for 222 segments. The other 69 were completed between 1972 and 1974.

Strata. Completed segments were more central in the 1961 network than delayed ones and they differ in their class transition (See Figure 3). I therefore draw counterfactual completions within strata. A stratum is defined as the interaction of two characteristics: (i) the segment's class transition; (ii) the tercile of its edge betweenness in the 1961 road network. Edge betweenness is the number of least-cost paths between pairs of nodes that pass through the segment, computed with 1961 travel costs and summed over the edges into which the segment is split. 22 segments lie in strata in which every segment was completed, hence their status never varies across draws.

Draws. In each draw I select, within every stratum, as many segments as were actually completed there. The counterfactual 1971 network has three components: the drawn segments at their 1974 class, the remaining eligible segments at their 1961 class, and every ineligible segment at its actual 1971 class. I recompute Indian market access for every locality on each of 1,000 draws, using a fixed random seed. Expected exposure is the mean of log Indian market access across the 1,000 draws.

A.4 Household Outcomes

All household outcomes come from the UNPS agriculture module.

Farmland. I build farmland from the parcel rosters for owned parcels (AGSEC2A) and rented-in parcels (AGSEC2B). A parcel counts as farmland if two conditions hold: (i) its primary use in either season is own cultivation of annual or perennial crops or fallow; (ii) the household currently has access to it. Parcels that are rented out, sub-contracted out, or used as woodlot, forest or pasture are excluded. This leaves 96.5 percent of parcels and 94.2 percent of parcel area.

Parcel area is the GPS measurement where available and the farmer's estimate otherwise.

Crop value of farmland. Harvests come from the crop-by-plot-by-season rosters (AGSEC5A and AGSEC5B). The construction has three steps:

1. *Quantities in kilograms.* I convert each harvest into kilograms using the unit-specific conversion factors supplied by UBoS. Harvests reported directly in kilograms carry no conversion factor.

2. *Prices.* I value each crop at its national median sale price. Since every household faces the same price for a given crop, differences in crop value reflect differences in the quantities and composition of what households harvest, instead of local price differences.

3. Crop value is the sum of harvest value over all crops, plots, and both seasons of 2011.

The estimation sample covers 43 crops. Its median crop value is 735,385 Uganda shillings. Crop rows whose harvest unit has no conversion factor contribute zero, so crop value is a lower bound for the households that report them.

Cropped area. Cropped area is built from the same parcel roster as farmland. In each season, a farmland parcel contributes its area multiplied by the reported share planted if its primary use that season is own cultivation, and zero otherwise. The share planted is asked only for owned parcels. Rented-in parcels are treated as fully planted.

Crop baskets. I rank crops by their total sales value in the survey (See Appendix Table A5). The five largest are coffee, maize, food bananas, sugarcane and beans, which together account for about 60 percent of sales value. For each nested basket (top 3, top 5, top 10), crop value is the median-price value of the harvest of the crops in the basket.

Market participation and buyers. A household participates in crop markets if it sold any crop in either season. The share of harvest sold is the value of sales divided by the value of the harvest, both at median prices.

For each crop sold, the survey records only the buyer of the largest part of the sale. I classify buyers into two groups: (i) traders: private traders in the village or in a district market; (ii) non-traders: consumers at market, neighbours and relatives, government, and other buyers. Since only the main buyer is recorded, I assign the entire sale of a crop to that buyer's group.

Consumption. I use the consumption aggregates published by UBoS. They are expressed as monthly consumption per adult equivalent and deflated spatially and temporally to 2005/06 prices.

Household controls. These are the gender and age of the household head and the number of household members, taken from the household roster.

A.5 Data Processing and Sample Construction

I construct the estimation sample in five steps. First, the starting point is the 2,169 households that complete the agriculture module and have released coordinates. They live in 488 localities. I drop 21 households in 3 localities that the 1971 network does not connect to any 1959 town, because their exposure is undefined. I then drop 251 households in 58 localities that lie inside a 1959 town. I drop 64 households with a missing value on any control in the most saturated specification, leaving 1,833 households in 419 localities. I keep households with positive farmland and positive crop value, which drop 8 and 14 households respectively.

A.6 Controls

Terrain ruggedness. This is the World Bank's terrain-roughness geovariable distributed with the UNPS, computed from SRTM elevation data.

Cotton and coffee suitability. The data are from the FAO Global Agro-Ecological Zones (GAEZ) suitability indices for high-input, rain-fed cultivation.

Rainfall. It is mean annual precipitation over 1960–1969, from the WorldClim historical monthly weather series. For each year, I sum the monthly totals and then average over the ten years.

Settlement density. It is the number of populated places in the 1965 gazetteer within 10 kilometers of the locality.

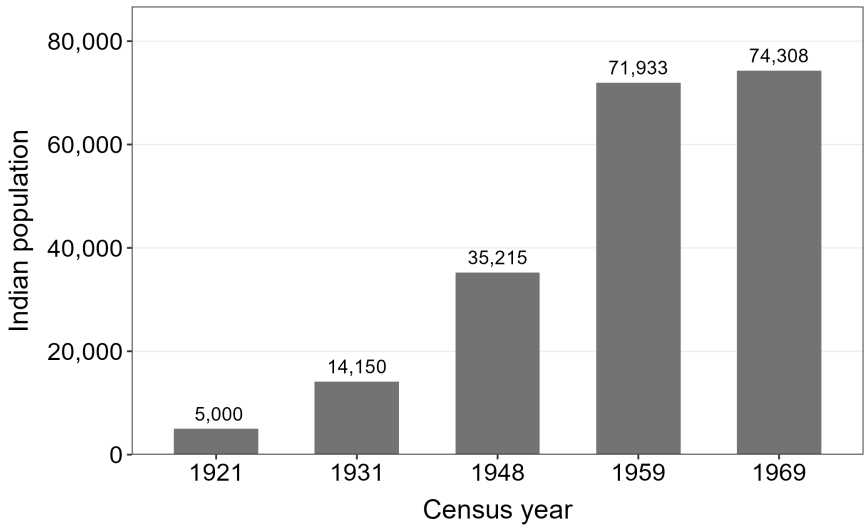
Distance to the nearest 1959 town. This is the straight-line distance to the nearest town with an Indian population in the 1959 census.

Distance to Kampala. This is the straight-line distance to Kampala.

Distance to the nearest mission. This is the straight-line distance to the nearest Christian mission station in Nunn (2010).

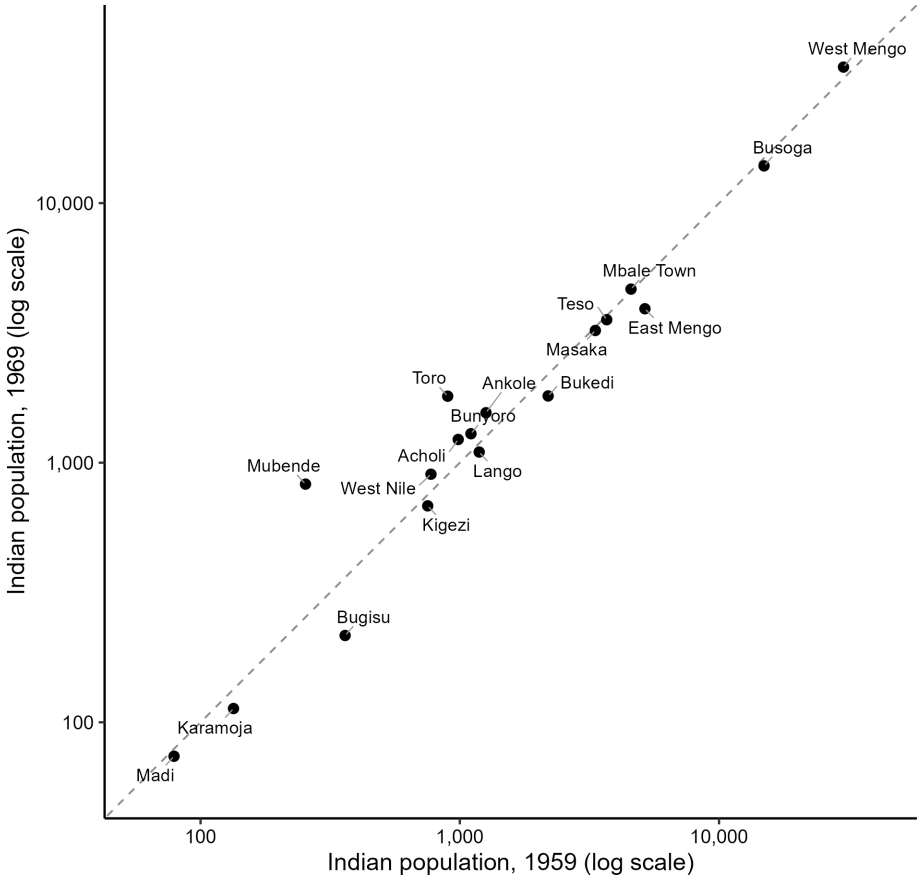
B Additional Figures and Tables

Figure A1: Indian population of Uganda, 1921–1969



Notes: Figures for 1921, 1931, 1948, and 1959 are from the protectorate censuses, as reported in Hundle (2013). The 1948 and 1959 figures are from the non-native censuses, which enumerated non-Africans separately. The 1969 figure is from the 1969 census (Uganda. Ministry of Planning and Economic Development. Statistics Division, 1971). The 1921 figure is rounded in the source.

Figure A2: Indian Population by District, 1959 and 1969



Notes: Each point is a district. The 1959 population is the number of Indians, Pakistanis, and Goans recorded in the 1959 census of the non-African population; the 1969 population is the number of Asians (Indians, Pakistanis, and Goans) recorded in the 1969 census. Districts created after 1959 are merged into their 1959 parents: Kampala into West Mengo, Jinja into Busoga, and Sebei into Bugisu. Both axes are on a log scale. The dashed line is the 45-degree line.

Table A2: Indian and Total Population of Ugandan Towns, 1959

Town	District	Indian	Total	Town	District	Indian	Total
Aboke	Lango	63	72†	Kisoro	Kigezi	63	68†
Aduku	Lango	90	91†	Kitgum	Acholi	199	3,454
Aloi	Lango	37	37†	Kumi	Teso	219	1,037
Amuria	Teso	41	711	Kyenjojo	Toro	48	60†
Arua	West Nile	516	4,645	Kyere	Teso	96	106†
Atura	Lango	71	71†	Lira	Lango	671	2,929
Bombo	East Mengo	410	432†	Lugazi	East Mengo	305	8,105
Budadiri	Bugisu	41	42†	Majanji	Bukedi	47	47†
Budaka	Bukedi	18	68†	Masaka	Masaka	2,139	4,782
Bududa	Bugisu	104	104†	Masindi	Bunyoro	401	1,571
Bugiri	Busoga	275	392†	Masindi Port	Bunyoro	81	601
Buikwe	East Mengo	188	231†	Mayenze	Bugisu	80	80†
Bukedea	Teso	71	102†	Mazimasa	Bukedi	0	10†
Bulopa	Busoga	255	271†	Mbale	Mbale	4,575	13,569
Bundibugyo	Toro	18	1,615	Mbarara	Ankole	919	3,844
Busembatia	Busoga	264	1,316	Mbulamuti	Busoga	67	67†
Bushenyi	Ankole	136	146†	Minakulu	Lango	57	60†
Busia	Bukedi	103	108†	Mityana	West Mengo	264	291†
Busiu	Bugisu	22	31†	Molo	Bukedi	84	89†
Busolwe	Bukedi	81	84†	Moroto	Karamoja	77	2,082
Butaleja	Bukedi	23	23†	Moyo	Madi	37	2,009
Butiaba	Bunyoro	49	1,216	Mpigi	West Mengo	187	191†
Butiru	Bugisu	52	52†	Mubende	Mubende	102	1,877
Butiti	Toro	14	33†	Mukono	East Mengo	208	224†
Entebbe	West Mengo	904	10,941	Muntemo	Bunyoro	17	17†
Fort Portal	Toro	519	8,317	Naboa	Bukedi	17	17†
Gulu	Acholi	571	4,770	Nagalama	East Mengo	125	180†
Hoima	Bunyoro	312	1,056	Nagongera	Bukedi	181	222†
Iganga	Busoga	1,005	3,146	Naigobia	Busoga	49	74†
Ishasha	Kigezi	6	6†	Namasagali	Busoga	100	100†
Jinja	Busoga	8,883	29,741	Namirembe	West Mengo	422	429†
Kabale	Kigezi	611	10,919	Namutumba	Busoga	77	118†
Kabataro	Toro	74	80†	Namwendwa	Busoga	117	149†
Kaberamaido	Teso	314	342†	Namwiwa	Busoga	22	97†
Kakoro	Bukedi	25	33†	Nawaikoke	Busoga	27	63†
Kalaki	Teso	60	60†	Ngora	Teso	175	233†
Kaliro	Busoga	253	914	Njeru	East Mengo	8	1,988
Kalisizo	Masaka	173	759	Otuboi	Teso	121	130†
Kampala	West Mengo	19,268	46,735	Pallisa	Bukedi	258	292†
Kamuli	Busoga	817	1,867	Petete	Bukedi	32	32†
Kasese	Toro	46	1,564	Port Bell	West Mengo	33	102†
Katakwi	Teso	79	661	Serere	Teso	196	1,181
Katunguru	Ankole	5	6†	Siroko	Bugisu	38	52†
Kawempe	West Mengo	401	436†	Soroti	Teso	1,833	6,645
Kibuku	Bukedi	24	49†	Tororo	Bukedi	1,220	6,365
Kidera	Busoga	60	60†	Vukula	Busoga	16	67†
Kikagati	Ankole	15	17†	Wobulenzi	East Mengo	275	282†
				All towns		53,652	200,360

Notes: Town-level counts from the 1959 census of Uganda (94 towns). Indian population includes Pakistanis and Goans. Total population sums all recorded groups. African population is not reported for 60 of 94 towns and is coded as zero (†), so their totals understate the town population.

Table A3: Summary Statistics, Household Level

	Obs.	Mean	St. Dev.	Min.	Max.
Indian market access, 1971:					
Realized log Indian market access	1,811	-0.871	6.659	-31.799	9.535
Expected log Indian market access	1,811	-0.885	6.976	-36.650	9.535
Recentered log Indian market access	1,811	0.014	1.565	-8.240	6.714
Crop value of farmland:					
Crop value of farmland (millions UGX)	1,811	1.709	7.471	0.004	192.994
Log crop value of farmland	1,811	13.447	1.231	8.412	19.078
Decomposition of crop value:					
Farmland (acres)	1,811	4.286	7.287	0.010	100.000
Log farmland	1,811	0.916	1.008	-4.605	4.605
Crop value per cropped acre (millions UGX)	1,811	0.863	3.845	0.001	111.830
Log crop value per cropped acre	1,811	12.933	1.033	7.131	18.532
Cropped area (acres)	1,811	2.531	3.289	0.008	70.000
Cropped area as a share of farmland	1,811	0.741	0.263	0.005	1.000
Log cropped area as a share of farmland	1,811	-0.402	0.540	-5.298	0.000
Crop value per acre of farmland, by basket:					
Top three crops (millions UGX)	1,515	0.315	2.905	0.000	111.505
Log, top three crops	1,473	11.411	1.548	6.215	18.530
Top five crops (millions UGX)	1,657	0.378	2.903	0.000	111.673
Log, top five crops	1,620	11.678	1.515	6.215	18.531
Top ten crops (millions UGX)	1,782	0.470	2.957	0.000	111.830
Log, top ten crops	1,748	12.109	1.347	6.215	18.532
Crop value of farmland, by basket including non-producers (millions UGX):					
Top three crops	1,811	0.602	4.194	0.000	167.257
Top five crops	1,811	0.870	5.284	0.000	167.509
Top ten crops	1,811	1.294	7.161	0.000	192.640
Capital and implements:					
Implement value per acre of farmland (millions UGX)	1,805	0.024	0.125	0.000	4.777
Log implement value per acre of farmland	1,800	9.208	1.135	3.743	15.379
Uses any labour-saving implement (×100)	1,805	27.535	44.681	0.000	100.000
Number of implements used	1,805	3.789	2.695	0.000	54.000
Log number of implements used	1,790	1.163	0.595	0.000	3.989
Crop marketing:					
Sells any crop (×100)	1,811	80.453	39.667	0.000	100.000
Percentage of harvest value sold	1,811	28.617	25.911	0.000	100.000
Sells any output to a trader (×100)	1,454	87.208	33.412	0.000	100.000
Sells any output to a non-trader (×100)	1,454	48.693	50.000	0.000	100.000
Share of sales value sold to traders (×100)	1,454	75.082	36.458	0.000	100.000
Purchased inputs:					
Uses inorganic fertiliser (×100)	1,811	5.743	23.272	0.000	100.000
Uses insecticide (×100)	1,811	8.614	28.065	0.000	100.000
Uses a growth regulator (×100)	1,811	5.356	22.521	0.000	100.000
Agroclimatic and geographic controls:					
Ruggedness	1,811	6.939	3.357	3.000	14.000
Cotton suitability (rainfed)	1,811	5105.496	2502.762	0.000	10000.000
Coffee suitability (rainfed)	1,811	5578.192	2105.813	0.000	9344.000
Average annual rainfall, 1960–1969 (mm)	1,811	1298.103	212.276	750.730	1952.690
Populated places within 10 km, 1964	1,811	9	6	0	28
Distance to nearest 1959 town (km)	1,811	25.527	22.689	0.725	138.393
Distance to Kampala (km)	1,811	209.849	94.482	4.721	403.911
Distance to nearest mission (km)	1,811	39.108	38.011	0.033	219.066
Household controls:					
Household head is female	1,811	0.304	0.460	0.000	1.000
Age of household head	1,811	47.909	14.944	16.000	97.000
Household size	1,811	7.948	3.816	1.000	33.000

Table A4: Summary Statistics, Settlement Level

	Obs.	Mean	St. Dev.	Min.	Max.
Indian market access, 1971:					
Realized log Indian market access	3,429	-0.884	6.018	-39.089	9.797
Expected log Indian market access	3,429	-0.962	6.208	-42.767	9.797
Recentered log Indian market access	3,429	0.079	1.047	-6.824	6.714
Night-time lights, 1992:					
Lit ($\times$100)	3,429	4.899	21.589	0.000	100.000
Mean digital number within 5 km	3,429	0.156	1.622	0.000	40.849
Log mean digital number, lit settlements	168	-0.073	1.574	-2.923	3.710
Night-time lights, 2000:					
Lit ($\times$100)	3,429	13.386	34.055	0.000	100.000
Mean digital number within 5 km	3,429	0.365	2.512	0.000	53.199
Log mean digital number, lit settlements	459	-0.433	1.782	-3.839	3.974
Night-time lights, 2010:					
Lit ($\times$100)	3,429	15.165	35.873	0.000	100.000
Mean digital number within 5 km	3,429	0.627	3.565	0.000	59.966
Log mean digital number, lit settlements	520	0.307	1.508	-2.686	4.094
Agroclimatic and geographic controls:					
Ruggedness	3,429	77913.227	94973.381	0.000	943146.000
Cotton suitability (rainfed)	3,429	5494.357	2437.190	0.000	10000.000
Coffee suitability (rainfed)	3,429	5870.829	1954.353	0.000	9765.000
Average annual rainfall, 1960–1969 (mm)	3,429	1293.872	201.997	707.720	2288.140
Populated places within 10 km, 1964	3,429	11	6	0	33
Distance to nearest 1959 town (km)	3,429	25.397	18.151	1.842	144.808
Distance to Kampala (km)	3,429	174.837	93.088	1.782	420.848
Distance to nearest mission (km)	3,429	37.294	31.097	0.348	235.358

Table A5: Crop Sale Value in the Uganda National Panel Survey, 2011–2012

Crop	Value (m UGX)	% of National	Crop	Value (m UGX)	% of National
Coffee All	262.7	18.59	Banana Beer	10.8	0.76
Maize	179.3	12.69	Oranges	8.3	0.59
Banana Food	167.5	11.85	Tea	8.2	0.58
Sugarcane	148.8	10.53	Onions	8.2	0.58
Beans	89.5	6.33	Banana Sweet	6.8	0.48
Cocoa	78.5	5.56	Field Peas	3.0	0.21
Rice	55.0	3.89	Passion Fruit	2.8	0.20
Groundnuts	49.6	3.51	Yam	2.7	0.19
Cassava	47.8	3.38	Pumpkins	2.7	0.19
Cotton	45.1	3.19	Vanilla	2.2	0.15
Sun Flower	36.0	2.55	Avocado	1.7	0.12
Tobacco	28.0	1.98	Eggplants	1.3	0.09
Soya Beans	23.1	1.64	Pineapples	1.2	0.09
Sweet Potatoes	20.3	1.44	Jackfruit	0.9	0.06
Other	19.7	1.40	Cow Peas	0.8	0.06
Tomatoes	17.0	1.21	Mango	0.7	0.05
SimSim	16.0	1.13	Pigeon Peas	0.6	0.04
Finger Millet	15.0	1.06	Dodo	0.3	0.02
Cabbage	13.7	0.97	Chick Peas	0.0	0.00
Irish Potatoes	13.6	0.97	Coco Yam	0.0	0.00
Pawpaw	12.5	0.89	Wheat	0.0	0.00
Sorghum	11.1	0.79			
			Total	1,413.5	100.00

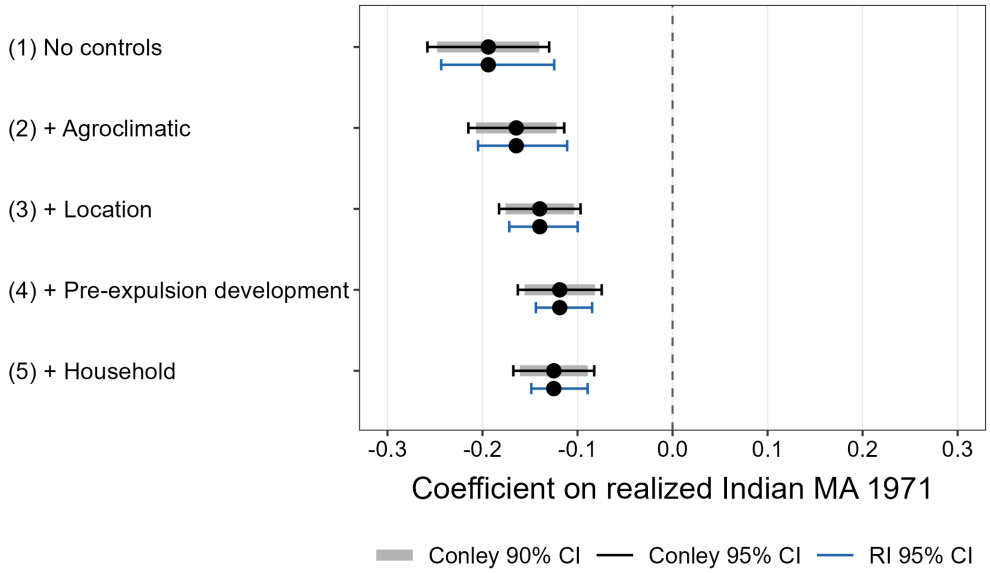
Notes: The table reports the total value of crop sales by crop, and each crop's share of total crop-sale value, in the 2011–2012 wave of the Uganda National Panel Survey. Crops are sorted by sale value, reading down the left block and then down the right. Sale value is the sum of reported sale value over plot-crop-season records, pooling both seasons, and is gross of transport costs. Records reporting no sale value contribute zero. Sales are highly concentrated: the five largest crops account for 60.0 percent of all crop-sale value and the ten largest for 79.5 percent. *Other* is a survey response category rather than a residual computed here. The Uganda National Panel Survey carries no sampling weights, so the figures are unweighted sample aggregates and not population estimates.

C Robustness for Table 1

This appendix reports the robustness checks summarized in Section 5. Unless noted otherwise, every estimate uses the specification of column 4 of Table 1, which controls for expected Indian market access and the agroclimatic, geographic, and household controls, and excludes localities within 1959 towns.

Alternative strata. The counterfactual road-completion schedules permute which eligible segments were completed by 1971 within strata. The baseline strata interact a segment's road-class transition with the tercile of its 1961 edge betweenness. Appendix Figure A3 replaces the terciles with a median split, which yields six strata instead of nine. I redraw 1,000 schedules and recompute expected exposure from them. The estimates are virtually unchanged to the baseline in all three specifications.

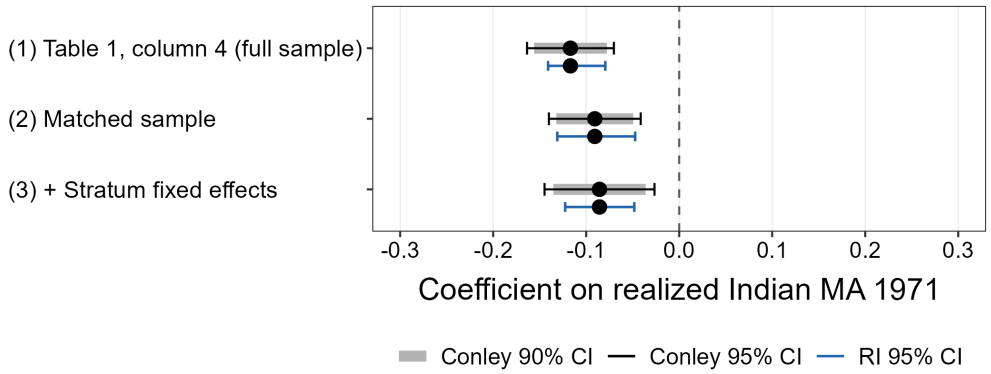
Figure A3: Road-Class Transition Interacted with Betweenness Median



Notes: The figure reports the coefficient on realized Indian market access in 1971 from the specifications of Table 1, when the counterfactual road-completion schedules permute completion within strata defined by a segment's road-class transition interacted with the median of its 1961 edge betweenness, rather than the baseline strata of road class interacted with betweenness terciles. Thick and thin bars are 90 and 95 percent confidence intervals, based on standard errors allowing for spatial correlation among observations within 50 kilometers following Conley (1999). Blue bars are 95 percent confidence intervals using randomization inference over the same 1,000 schedules, following the procedure by Borusyak and Hull (2023).

Coarsened exact matching. Appendix Figure A4 restricts the comparison to localities with similar geography. I split each of the eight agroclimatic and geographic controls at its median across localities and define a stratum as one combination of the resulting bins. Of the 256 possible strata, I keep the 38 that contain both a locality above and a locality below median recentered exposure, leaving 1,095 households in 243 localities. Across all four specifications, the estimates are significant at the 1 percent level.

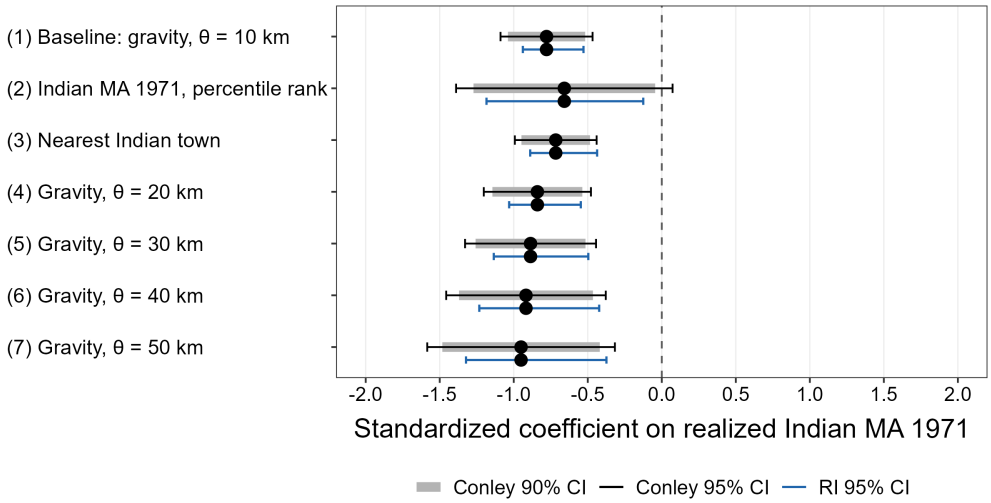
Figure A4: Coarsened Exact Matching



Notes: The figure reports the coefficient on realized Indian market access in 1971 from the specification of column 4 of Table 1. Row 1 is the full sample. Rows 2 to 4 restrict it to a coarsened exact matching sample: each of the eight agroclimatic and geographic controls is split at its median across localities, a stratum is a combination of these bins, and strata without both a high- and a low-exposure locality are dropped, leaving 1,095 households in 243 localities and 38 strata. Row 3 adds stratum fixed effects and row 4 adds the controls of column 4 of Table 1. Thick and thin bars are 90 and 95 percent confidence intervals, based on standard errors allowing for spatial correlation among observations within 50 kilometers following Conley (1999). Blue bars are 95 percent confidence intervals using randomization inference over the same 1,000 schedules, following the procedure by Borusyak and Hull (2023).

Alternative exposure measures. Appendix Figure A5 varies the construction of exposure while holding the counterfactual schedules fixed. For each alternative measure, I recompute both realized and expected exposure on the same 1,000 schedules. As the measures are on different scales, the figure reports each coefficient multiplied by the standard deviation of realized exposure under that measure. First, replacing log market access with its percentile rank gives an estimate of similar size, though it is less precise. Second, replacing the gravity sum over all towns with exposure to the single nearest town, weighted by its Indian population, yields similar estimate. Third, raising the decay parameter from 10 to 20, 30, 40, and 50 kilometer-equivalents gives similar estimates to the baseline.

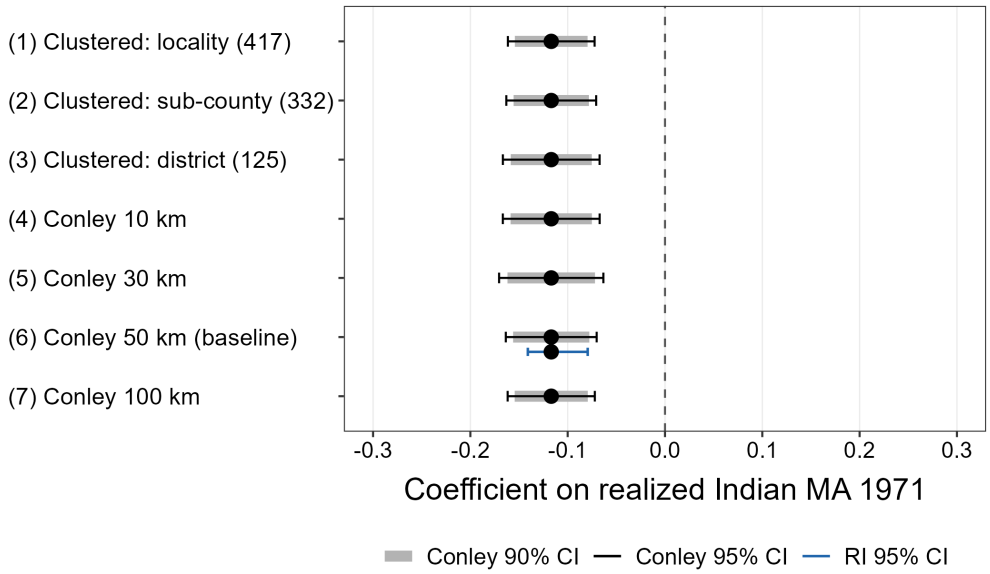
Figure A5: Alternative Exposure Measures and Decay Parameters



Notes: The figure reports the coefficient on realized Indian market access in 1971 multiplied by the standard deviation of realized market access under each row's measure, where the dependent variable is the log-transformed crop value of farmland and every regression is the specification of column 4 of Table 1. The first row is the baseline, a gravity sum over all 1959 Indian-populated towns with a decay parameter θ of 10 km. The second row replaces the gravity sum with its percentile rank; the third replaces it with exposure to the nearest town's Indian population; the remaining rows vary θ from 20 to 50 km, re-solving the gravity measure at the counterfactual road-completion schedules. Thick and thin bars are 90 and 95 percent confidence intervals, based on standard errors allowing for spatial correlation among observations within 50 kilometers following Conley (1999). Blue bars are 95 percent confidence intervals using randomization inference over the same 1,000 schedules, following the procedure by Borusyak and Hull (2023).

Alternative inference. Appendix Figure A6 varies the variance estimator. Clustering at the locality (417 clusters), sub-county (332) or district (125) gives standard errors of 0.022 to 0.024. Conley standard errors with cutoffs of 10, 30 and 100 kilometers give 0.024 to 0.026, against the baseline 0.023 at 50 kilometers.

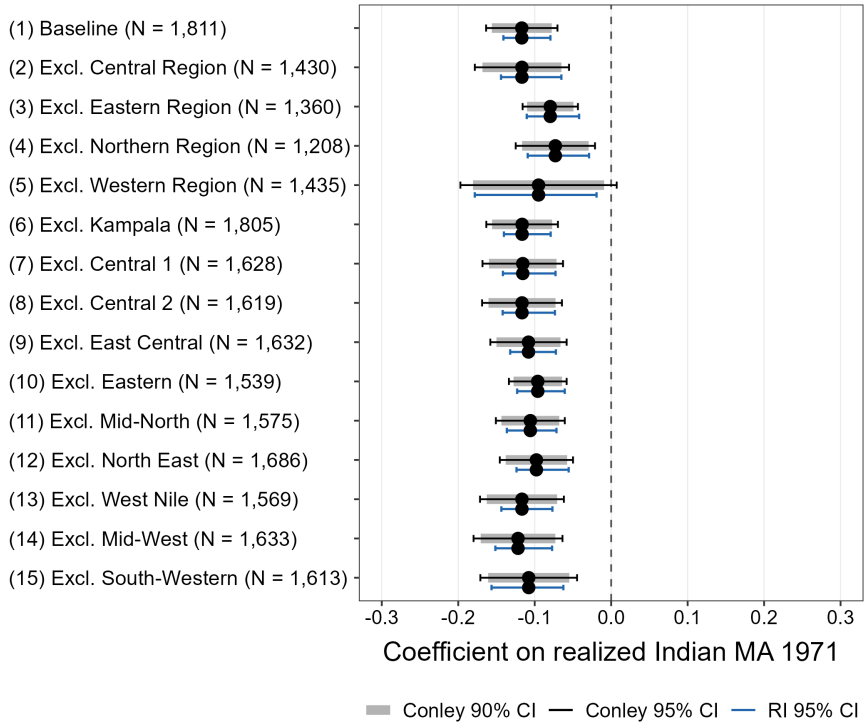
Figure A6: Alternative Inference



Notes: The figure reports the coefficient on realized Indian market access in 1971 from the specification of column 4 of Table 1, with standard errors clustered at the locality, sub-county, or district level (number of clusters in parentheses) or allowing for spatial correlation within 10, 30, 50, or 100 kilometers following Conley (1999). Thick and thin bars are 90 and 95 percent confidence intervals. Blue bars are 95 percent confidence intervals using randomization inference over the same 1,000 schedules, following the procedure by Borusyak and Hull (2023).

Excluding one region or sub-region at a time. Appendix Figure A7 re-estimates the specification excluding one of Uganda's four regions or ten sub-regions at a time.

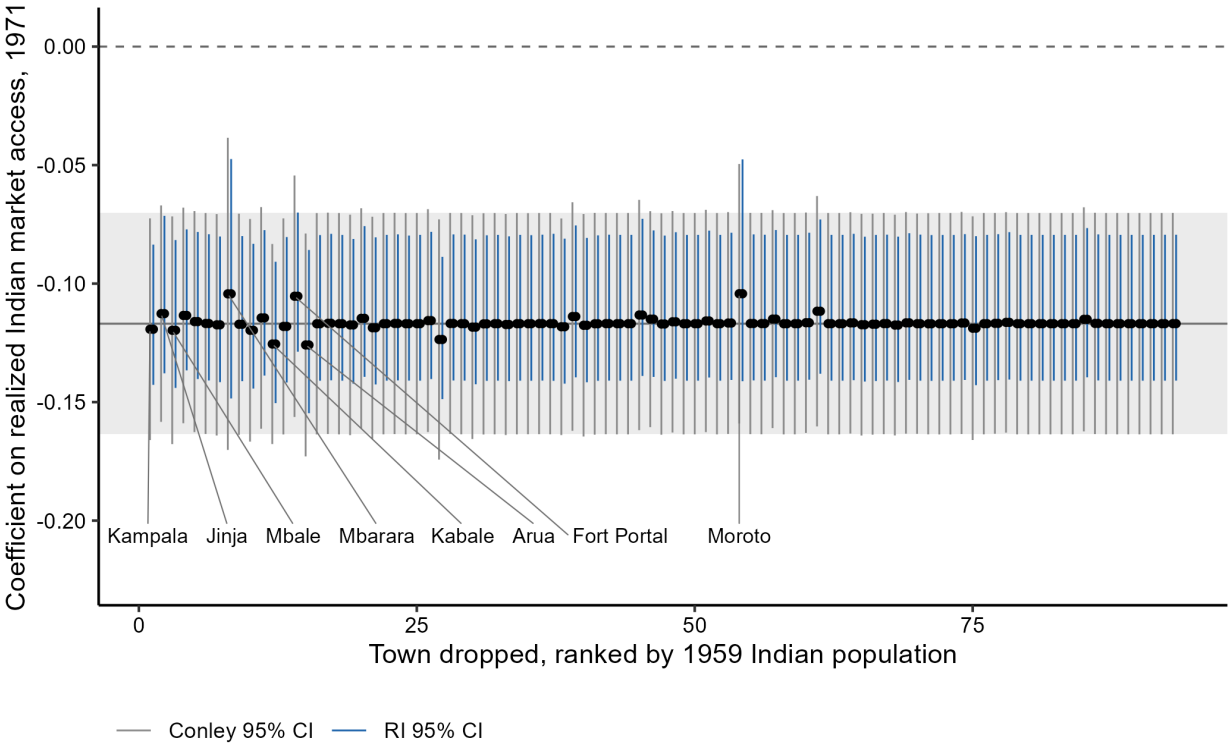
Figure A7: Excluding One Region or Sub-region At A Time



Notes: The figure plots the coefficient on realized Indian market access in 1971 from Equation 2, where the dependent variable is the log-transformed crop value of farmland. Every row is the specification of column 4 of Table 1, excluding the region or sub-region indicated. Thick and thin bars are 90 and 95 percent confidence intervals, based on standard errors allowing for spatial correlation among observations within 50 kilometers following Conley (1999). Blue bars are 95 percent confidence intervals using randomization inference over the same 1,000 schedules, following the procedure by Borusyak and Hull (2023).

Excluding one Indian-populated town in 1959 at a time. I drop each town from the gravity sum and rebuild both realized and expected exposure over the same 1,000 counterfactual schedules. Appendix Figure A8 shows that the results are robust.

Figure A8: Leaving One 1959 Town Out of Indian Market Access



Notes: Each point is the coefficient on realized Indian market access in 1971 from the specification of column 4 of Table 1, with one 1959 town removed from the measure. Realized and expected Indian market access are both recomputed without that town. Towns are ordered by their 1959 Indian population, with the largest on the left. The solid line and shaded band show the baseline estimate and its 95 percent confidence interval. Bars are 95 percent confidence intervals based on standard errors allowing for spatial correlation among observations within 50 kilometers following Conley (1999). Blue bars are 95 percent confidence intervals using randomization inference over the same 1,000 schedules, following the procedure by Borusyak and Hull (2023).

Indian versus general market access. Appendix Table **??** restricts the sample to households whose nearest 1959 town, under 1971 travel costs, had a low Indian share of its population. At cutoffs of 5 and 10 percent the coefficients are positive and insignificant. At cutoffs of 15 and 20 percent, they are negative, small, and insignificant. The results show no sign of an effect where road upgrads improved access to towns with few Indians.

Table A6: Indian Expulsion and Crop Value of Farmland by Indian Share of the Nearest Town

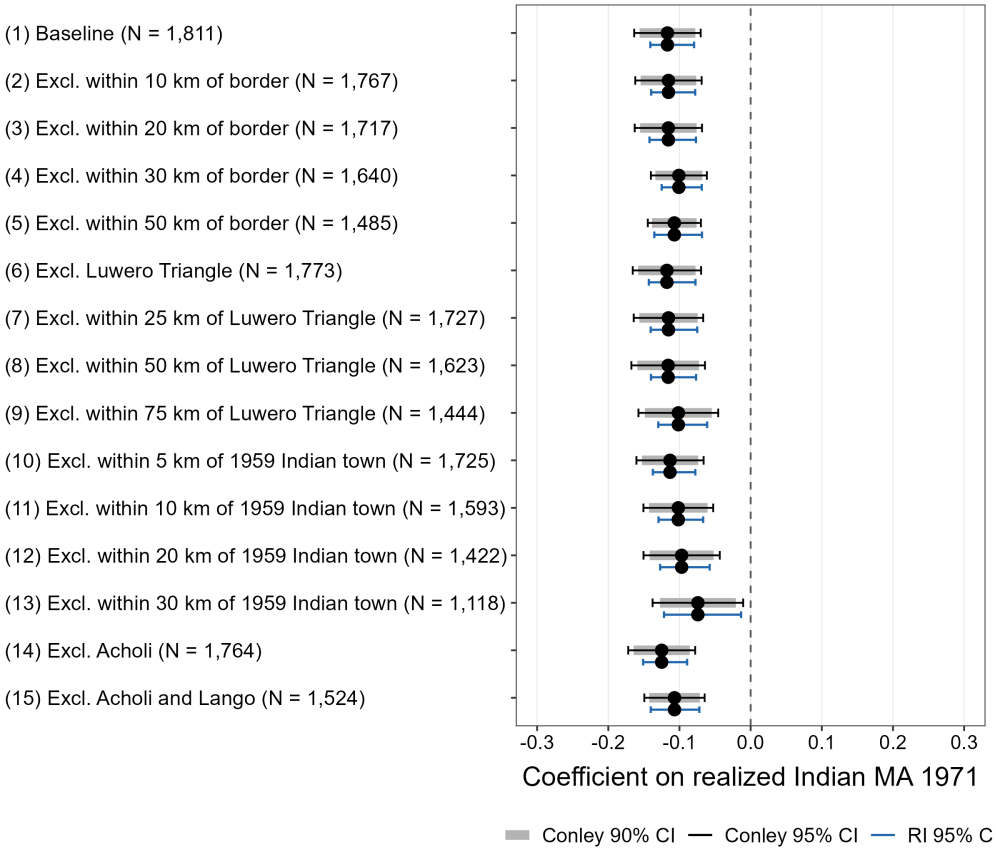
	Log crop value of farmland Indian share of the nearest 1959 town			
	≤5%	≤15%	≤20%	≤25%
	(1)	(2)	(3)	(4)
Realized Indian MA 1971	-0.210	0.045	0.044	-0.084
	(0.212)	(0.066)	(0.066)	(0.029)***
	$(-\infty, \infty)$	[-0.140, 0.188]	[-0.127, 0.184]	[-0.126, -0.028]
R^2	0.427	0.196	0.196	0.231
Observations	183	576	598	946
Localities	35	146	153	232
Mean of dependent variable	12.694	12.984	12.995	13.325
Controls:				
Expected Indian MA 1971	Y	Y	Y	Y
Agroclimatic	Y	Y	Y	Y
Location	Y	Y	Y	Y
Pre-expulsion development	Y	Y	Y	Y
Household	–	–	–	–

Notes: The table reports estimates of Equation 2, where the dependent variable is the log-transformed crop value of farmland, on households whose nearest 1959 town under 1971 travel costs has an Indian share of town population at or below the cutoff in the column heading. A town is classified only if its African population is recorded. The explanatory variable is locality l's log Indian market access in 1971, as in Equation 1, controlling for its expected value across counterfactual road-completion schedules. All regressions exclude localities within 1959 towns. Controls are those of column 4 of Table 1. Standard errors allowing for spatial correlation among observations within 50 km, following Conley (1999), are reported in parentheses. Confidence intervals using randomization inference following the procedure by Borusyak and Hull (2023) in brackets. Stars refer to the Conley standard errors: * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Excluding border, conflict-affected, and town-adjacent localities. Appendix Figure A9 excludes localities exposed to shocks concentrated in particular areas. Excluding localities within 10, 20, 30 and 50 kilometers of the Kenyan and Tanzanian borders gives estimates between −0.121 and −0.134. Excluding the Luweo Triangle districts and localities within 25, 50, and 75 kilometers gives estimates between −0.098 and −0.123. Excluding Acholi, the area most affected by the insurgency in the North, gives −0.128, and excluding both Acholi and Lango yields −0.109.

Figure A9 also excludes localities within 5, 10, 20 and 30 kilometer-equivalents of travel on the 1971 network from the nearest 1959 Indian-populated town. The estimates decline gradually, from −0.117 to −0.089. At the widest radius, which drops 38 percent of the sample, the decline remains 13.0 percent and significant at the 1 percent level.

Figure A9: Excluding Border, Conflict-Affected and Town-Adjacent Localities



Notes: The figure reports the coefficient on realized Indian market access in 1971 from the specification of column 4 of Table 1. The first row is the baseline. Subsequent rows exclude localities within the indicated distance of the Kenyan or Tanzanian border; the districts of the Luwero Triangle (Luweero, Nakaseke and Nakasongola) and localities within the indicated distance of them; localities within the indicated least-cost travel distance, in kilometer-equivalents on the 1971 road network, of the nearest Indian-populated 1959 town; and the districts of Acholi, and of Acholi and Lango. Thick and thin bars are 90 and 95 percent confidence intervals, based on standard errors allowing for spatial correlation among observations within 50 kilometers following Conley (1999). Blue bars are 95 percent confidence intervals using randomization inference over the same 1,000 schedules, following the procedure by Borusyak and Hull (2023).

D Alternative Explanations

This appendix reports the evidence summarized in Section 6.1. The lower crop value of farmland in more-exposed localities could reflect four channels other than the loss of intermediation: differences in land use, a general contraction of the local economy, a loss of credit and inputs, and selective out-migration. I examine each in turn. Unless noted otherwise, all estimates use the specification of column 3 of Table **??**.

Differences in land use. Table A7 decomposes the main outcome.

Table A7: Decomposing the Effect of Indian Expulsion on Crop Value of Farmland

	(1)	(2)	(3)	(4)	(5)
Panel A. Log farmland (acres)					
Realized Indian MA 1971	-0.023	-0.037	-0.030	-0.022	-0.029
	(0.031)	(0.029)	(0.034)	(0.037)	(0.035)
	[-0.069, 0.051]	[-0.081, 0.032]	[-0.080, 0.026]	[-0.075, 0.037]	[-0.083, 0.033]
R^2	0.012	0.079	0.089	0.093	0.203
Mean of dependent variable	0.916	0.916	0.916	0.916	0.916
Panel B. Log cropped area as a share of farmland					
Realized Indian MA 1971	-0.038	-0.018	-0.008	-0.009	-0.009
	(0.016)**	(0.015)	(0.022)	(0.022)	(0.022)
	[-0.075, -0.015]	[-0.056, 0.006]	[-0.047, 0.026]	[-0.052, 0.029]	[-0.052, 0.031]
R^2	0.072	0.142	0.185	0.189	0.195
Mean of dependent variable	-0.402	-0.402	-0.402	-0.402	-0.402
Observations	1,811	1,811	1,811	1,811	1,811
Localities	417	417	417	417	417
Controls:					
Expected Indian MA 1971	Y	Y	Y	Y	Y
Agroclimatic	–	Y	Y	Y	Y
Location	–	–	Y	Y	Y
Pre-expulsion development	–	–	–	Y	Y
Household	–	–	–	–	Y

Notes: The table decomposes the estimates in Table 1. Log crop value of farmland is the sum of log farmland (Panel A), log crop value per cropped acre and log cropped area as a share of farmland (Panel B), so the coefficient on log crop value per cropped acre equals the coefficient in Table 1 minus those in Panels A and B. Cropped area is the area of farmland planted, averaged over the two 2011 cropping seasons; rented-in parcels, for which the planted share is not recorded, are treated as fully planted. All regressions exclude localities within 1959 towns. Controls are as in Table 1. Standard errors allowing for spatial correlation among observations within 50 km, following Conley (1999), are reported in parentheses. Confidence intervals using randomization inference following the procedure by Borusyak and Hull (2023) in brackets. Stars refer to the Conley standard errors: * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

General contraction of the local economy. Table A8 tests whether exposure reduced non-agricultural activity, using nighttime lights at the 1964 gazetteer settlements. The data are the stable-lights composites of the Defense Meteorological Satellite Program's Operational Linescan

System (DMSP-OLS) for 1992, 2000, and 2010. For each settlement, I average the digital number over a 5-kilometer buffer around the settlement and define an indicator, scaled by 100, for whether this mean is positive. I use the extensive margin because most settlements are unlit. Table A8 reports the effect of exposure on whether historical settlements have positive nighttime light within 5 kilometers. The coefficients on realized exposure are positive in every year and insignificant. Table A9 reports the effect on the share of lit cells within 5 kilometers of a historical settlement. Similarly, the coefficients are not statistically significant.

Table A8: Indian Expulsion and Indicators for Lit Settlements

	(1)	(2)	(3)	(4)
Panel A. Lit in 1992 (×100)				
Realized Indian MA 1971	1.102	1.309	1.618	1.105
	(0.834)	(1.043)	(1.079)	(0.934)
	[-0.057, 1.983]	[-0.744, 2.836]	[0.253, 2.715]	[-0.116, 2.172]
R^2	0.053	0.098	0.137	0.150
Mean of dependent variable	4.899	4.899	4.899	4.899
Panel B. Lit in 2000 (×100)				
Realized Indian MA 1971	0.965	1.537	2.054	1.010
	(1.372)	(1.849)	(1.929)	(1.619)
	[-1.644, 2.873]	[-2.563, 4.523]	[-1.204, 4.639]	[-1.946, 3.423]
R^2	0.101	0.167	0.203	0.226
Mean of dependent variable	13.386	13.386	13.386	13.386
Panel C. Lit in 2010 (×100)				
Realized Indian MA 1971	1.570	2.274	2.764	1.620
	(1.572)	(1.967)	(2.083)	(1.723)
	[-1.322, 3.598]	[-2.020, 5.330]	[-0.796, 5.255]	[-1.385, 3.879]
R^2	0.103	0.179	0.212	0.239
Mean of dependent variable	15.165	15.165	15.165	15.165
Observations	3,429	3,429	3,429	3,429
Controls:				
Expected Indian MA 1971	Y	Y	Y	Y
Agroclimatic	–	Y	Y	Y
Location	–	–	Y	Y
Pre-expulsion development	–	–	–	Y

Notes: The table reports estimates of Equation 2, where the dependent variable is an indicator for a positive mean DMSP-OLS digital number within 5 km of the settlement, scaled by 100. The explanatory variable is settlement s's log Indian market access in 1971, as in Equation 1, controlling for its expected value across counterfactual road-completion schedules. The unit of analysis is a populated place recorded in the 1964 gazetteer; all regressions exclude settlements inside 1959 towns. Controls are as in Table 1, measured at the settlement, and are added one set per column. Standard errors allowing for spatial correlation among observations within 50 km, following Conley (1999), are reported in parentheses. Confidence intervals using randomization inference following the procedure by Borusyak and Hull (2023) in brackets. Stars refer to the Conley standard errors: * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table A9: Indian Expulsion and the Share of Lit Area within 5 km

	(1)	(2)	(3)	(4)
Panel A. Share of lit cells within 5 km in 1992 (%)				
Realized Indian MA 1971	0.294	0.341	0.453	0.134
	(0.283)	(0.346)	(0.376)	(0.237)
	[-0.047, 0.541]	[-0.307, 0.793]	[0.021, 0.799]	[-0.229, 0.451]
R^2	0.031	0.058	0.085	0.116
Mean of dependent variable	1.208	1.208	1.208	1.208
Panel B. Share of lit cells within 5 km in 2000 (%)				
Realized Indian MA 1971	0.648	0.771	1.065	0.376
	(0.651)	(0.811)	(0.894)	(0.632)
	[-0.312, 1.336]	[-0.910, 1.969]	[-0.174, 2.010]	[-0.643, 1.232]
R^2	0.070	0.124	0.172	0.213
Mean of dependent variable	3.924	3.924	3.924	3.924
Panel C. Share of lit cells within 5 km in 2010 (%)				
Realized Indian MA 1971	0.878	1.008	1.323	0.554
	(0.790)	(0.984)	(1.079)	(0.774)
	[-0.236, 1.673]	[-0.970, 2.402]	[-0.106, 2.404]	[-0.672, 1.546]
R^2	0.082	0.148	0.199	0.242
Mean of dependent variable	4.636	4.636	4.636	4.636
Observations	3,429	3,429	3,429	3,429
Controls:				
Expected Indian MA 1971	Y	Y	Y	Y
Agroclimatic	–	Y	Y	Y
Location	–	–	Y	Y
Pre-expulsion development	–	–	–	Y

Notes: The table reports estimates of Equation 2, where the dependent variable is the percentage of DMSP-OLS 30-arc-second cells within 5 km of the settlement with a positive digital number. The explanatory variable is settlement s's log Indian market access in 1971, as in Equation 1, controlling for its expected value across counterfactual road-completion schedules. The unit of analysis is a populated place recorded in the 1964 gazetteer; all regressions exclude settlements inside 1959 towns. Controls are as in Table 1, measured at the settlement, and are added one set per column. Standard errors allowing for spatial correlation among observations within 50 km, following Conley (1999), are reported in parentheses. Confidence intervals using randomization inference following the procedure by Borusyak and Hull (2023) in brackets. Stars refer to the Conley standard errors: * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Credit and inputs. Table A10 reports effects on farm implements and Table A11 on purchased inputs. The data come from the UNPS farm implements module (AGSEC10), which lists 23 implement types and asks, for each, how many the household owns, their total estimated value, and whether the household used the item in the past 12 months. In Panel A, implement value is the sum of the reported value of all implements the household owns, divided by its farmland in acres. In Panel B, labor-saving instruments are ploughs, animal-drawn ploughs, wheelbarrows and sprayers. The indicator equals 100 if the household used any of them, so that borrowed or rented implements also count. The hoe is excluded from this indicator since 99.7 percent of households use one in the data. In Panel C, the number of implements is the number of hoes,

ploughs, animal-drawn ploughs, wheelbarrows and sprayers the household owns, counting only items it reports using.

Table A11 reports effects on purchased chemical inputs. These come from the plot-level input modules for the first and second seasons of 2011 (AGSEC3A and AGSEC3B). For each plot, the survey records whether the household applied inorganic fertilizer and whether it applied a pesticide, and if so of which type. I define three indicators, each scaled by 100, for whether the household used inorganic fertilizer, an insecticide, or a growth regulator on any plot in either season.

Table A10: Indian Expulsion and Capital Investment and Modernization

	(1)	(2)	(3)	(4)	(5)
Panel A. Log implement value per acre of farmland					
Realized Indian MA 1971	-0.009	0.016	0.007	0.002	-0.001
	(0.034)	(0.031)	(0.044)	(0.044)	(0.045)
	[-0.095, 0.048]	[-0.064, 0.072]	[-0.055, 0.073]	[-0.066, 0.076]	[-0.070, 0.073]
R^2	0.020	0.055	0.087	0.089	0.102
Mean of dependent variable	9.208	9.208	9.208	9.208	9.208
Observations	1,800	1,800	1,800	1,800	1,800
Localities	415	415	415	415	415
Panel B. Uses any labour-saving implement (×100)					
Realized Indian MA 1971	-0.231	-0.456	-0.362	-0.133	-0.379
	(1.002)	(0.863)	(0.517)	(0.461)	(0.340)
	[-1.718, 0.915]	[-2.093, 0.633]	[-1.596, 0.888]	[-1.339, 1.036]	[-1.612, 0.875]
R^2	0.005	0.060	0.079	0.083	0.139
Mean of dependent variable	27.535	27.535	27.535	27.535	27.535
Observations	1,805	1,805	1,805	1,805	1,805
Localities	416	416	416	416	416
Panel C. Log number of implements used					
Realized Indian MA 1971	-0.005	-0.000	0.012	0.018	0.011
	(0.009)	(0.008)	(0.009)	(0.010)*	(0.010)
	[-0.019, 0.009]	[-0.014, 0.012]	[-0.001, 0.026]	[0.004, 0.033]	[-0.001, 0.026]
R^2	0.008	0.024	0.053	0.057	0.299
Mean of dependent variable	1.163	1.163	1.163	1.163	1.163
Observations	1,790	1,790	1,790	1,790	1,790
Localities	414	414	414	414	414
Controls:					
Expected Indian MA 1971	Y	Y	Y	Y	Y
Agroclimatic	–	Y	Y	Y	Y
Location	–	–	Y	Y	Y
Pre-expulsion development	–	–	–	Y	Y
Household	–	–	–	–	Y

Notes: The table reports estimates of Equation 2, where the dependent variable is the log-transformed value of farm implements per acre of farmland in Panel A, an indicator for using any labour-saving implement in Panel B, and the log-transformed number of implements the household uses in Panel C. Implement value is the reported value of all farm implements the household owns. Labour-saving implements are ploughs, animal-drawn ploughs, wheel barrows and sprayers; the indicator is scaled by 100. The explanatory variable is locality l's log Indian market access in 1971, as in Equation 1, controlling for its expected value across counterfactual road-completion schedules. All regressions exclude localities within 1959 towns. Controls are as in Table 1, added one set per column. Standard errors allowing for spatial correlation among observations within 50 km, following Conley (1999), are reported in parentheses. Confidence intervals using randomization inference following the procedure by Borusyak and Hull (2023) in brackets. Stars refer to the Conley standard errors: * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table A11: Indian Expulsion and the Use of Purchased Agricultural Inputs

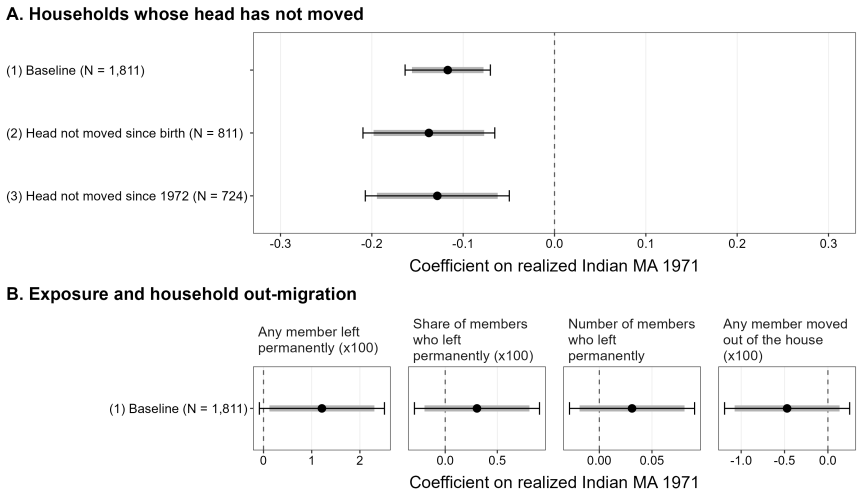
	(1)	(2)	(3)	(4)	(5)
Panel A. Uses inorganic fertiliser (×100)					
Realized Indian MA 1971	-0.229	0.076	0.212	0.405	0.366
	(0.677)	(0.568)	(0.713)	(0.669)	(0.654)
	[-0.893, 0.401]	[-0.647, 0.562]	[-0.605, 0.832]	[-0.439, 1.054]	[-0.449, 0.992]
R^2	0.001	0.029	0.046	0.050	0.059
Mean of dependent variable	5.743	5.743	5.743	5.743	5.743
Panel B. Uses insecticide (×100)					
Realized Indian MA 1971	-0.108	0.051	-0.205	-0.375	-0.413
	(0.325)	(0.299)	(0.313)	(0.308)	(0.276)
	[-0.786, 0.223]	[-0.886, 0.498]	[-0.779, 0.227]	[-0.936, 0.067]	[-0.975, 0.040]
R^2	0.010	0.024	0.031	0.034	0.040
Mean of dependent variable	8.614	8.614	8.614	8.614	8.614
Panel C. Uses a growth regulator (×100)					
Realized Indian MA 1971	-0.850	-0.355	-0.059	-0.060	-0.089
	(0.915)	(0.691)	(0.574)	(0.571)	(0.564)
	[-1.863, -0.080]	[-1.321, 0.261]	[-0.850, 0.472]	[-0.890, 0.481]	[-0.937, 0.462]
R^2	0.003	0.047	0.116	0.118	0.127
Mean of dependent variable	5.356	5.356	5.356	5.356	5.356
Observations	1,811	1,811	1,811	1,811	1,811
Localities	417	417	417	417	417
Controls:					
Expected Indian MA 1971	Y	Y	Y	Y	Y
Agroclimatic	–	Y	Y	Y	Y
Location	–	–	Y	Y	Y
Pre-expulsion development	–	–	–	Y	Y
Household	–	–	–	–	Y

Notes: The table reports estimates of Equation 2, where the dependent variable is an indicator for using inorganic fertiliser in Panel A, an insecticide in Panel B and a growth regulator in Panel C, on any plot in either season; all are scaled by 100. Households without a plot-input record are excluded rather than coded as non-users. The explanatory variable is locality l's log Indian market access in 1971, as in Equation 1, controlling for its expected value across counterfactual road-completion schedules. All regressions exclude localities within 1959 towns. Controls are as in Table 1, added one set per column. Standard errors allowing for spatial correlation among observations within 50 km, following Conley (1999), are reported in parentheses. Confidence intervals using randomization inference following the procedure by Borusyak and Hull (2023) in brackets. Stars refer to the Conley standard errors: * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Selective out-migration. Figure A10, Panel A reports the main estimate in samples restricted by household head's residence history. The household questionnaire asks each member how many years they have lived in the current village or community, with a separate code for having always lived there. A head has lived in the community since birth if they report always having lived there. This represents 811 households in the data. A head has lived in the community since 1972 if they report at least 39 years of residence, or always having lived there and are at least 39 years of residence, or always having lived there and are at least 39 years old. This represents 724 households.

Panel B uses the baseline sample with out-migration from the household as the outcome. The household roster records former members together with the reason they are no longer present. I count a member as having left permanently if the roster records them as having left permanently. Fromn this, I construct three outcomes: an indicator for any member having left permanently, the share of roster members who left permanently, and their number. A fourth outcome is an indicator for any member having moved out of the dwelling.

Figure A10: Selective Out-Migration



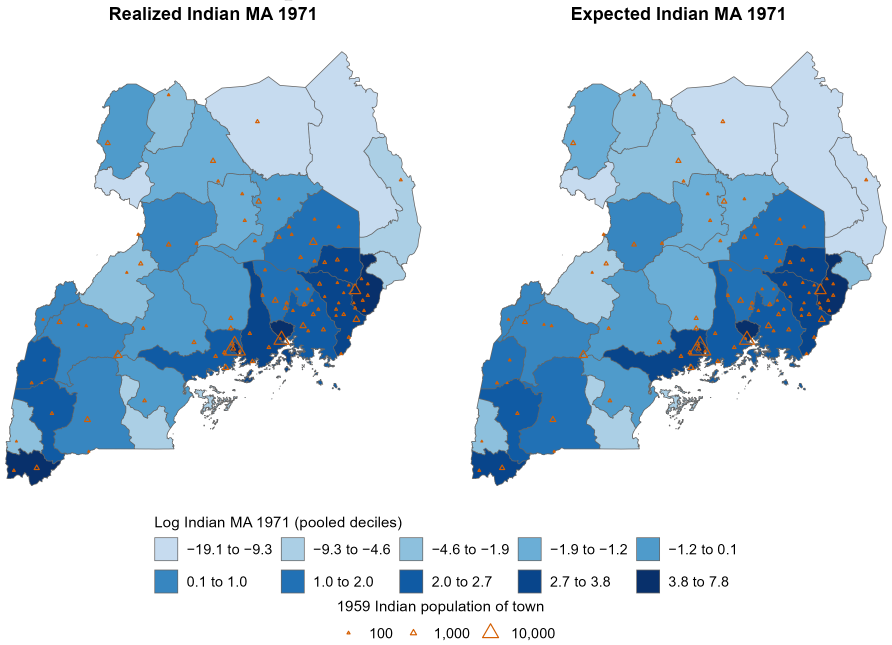
Notes: The figure reports the coefficient on realized Indian market access in 1971 from the specification of column 4 of Table 1. Panel A shows the impact on log crop value of farmland for the baseline sample and for households whose head has lived in the community since birth, or since 1972; six households with missing residence history are excluded from both restricted samples. Panel B uses the baseline sample with out-migration as the dependent variable: an indicator for any household member having left permanently, the share of the roster who left permanently, their number, and an indicator for any member having moved out of the dwelling; indicators and shares are scaled by 100. Residence and out-migration are recorded in 2011 and are therefore post-treatment. Thick and thin bars are 90 and 95 percent confidence intervals, based on standard errors allowing for spatial correlation among observations within 50 kilometers following Conley (1999). All regressions exclude localities within 1959 towns.

Loss of human capital. This section examines whether the expulsion lowered the schooling of children who were of school age in 1972, a channel consistent with the lower education spending reported. I use the 1991 Population and Housing Census, distributed by IPUMS-International. All estimates use cells of district of birth by year of birth, weighted by the number of persons

reporting schooling, with standard errors clustered by district of birth.

The census records each person's age, district of birth, and highest grade completed. I keep persons born in Uganda and assign year of birth as 1991 minus age. Years of schooling is the highest grade completed. A person has completed primary school if they report at least seven years of schooling. I measure exposure at the district of birth. Realized and expected Indian market access in 1971 for a district are the unweighted means of the settlement-level measures over the 1964 settlements in that district. Figure A11 illustrates the variation across districts of birth.

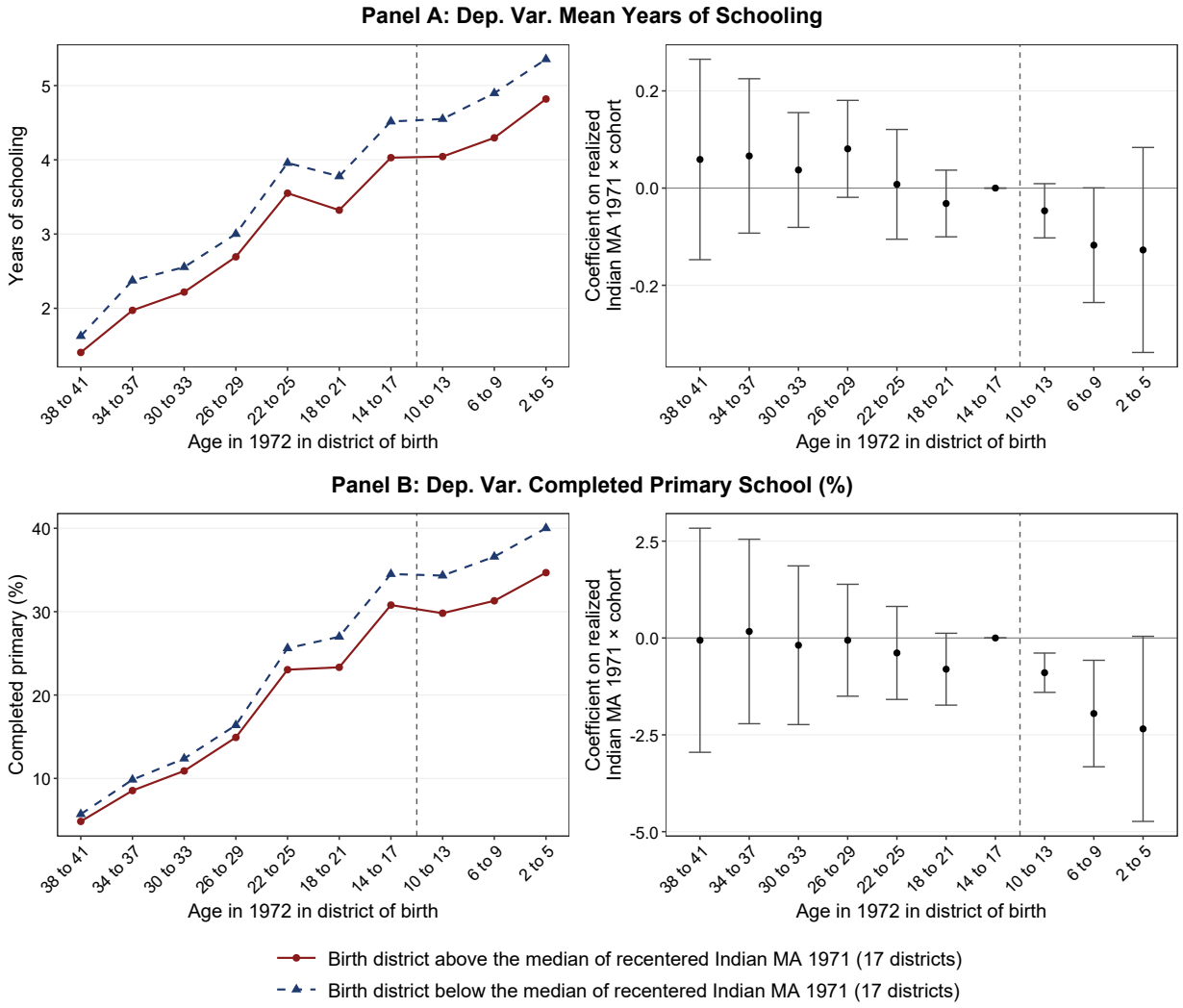
Figure A11: Realized and Expected Indian Market Access Across Districts of Birth



Notes: The figure shows log Indian market access in 1971 for the 34 districts of birth recorded in the 1991 census. Expected market access is the mean over 1,000 counterfactual road-completion schedules. Triangles mark 1959 towns with an Indian population, sized by Indian population.

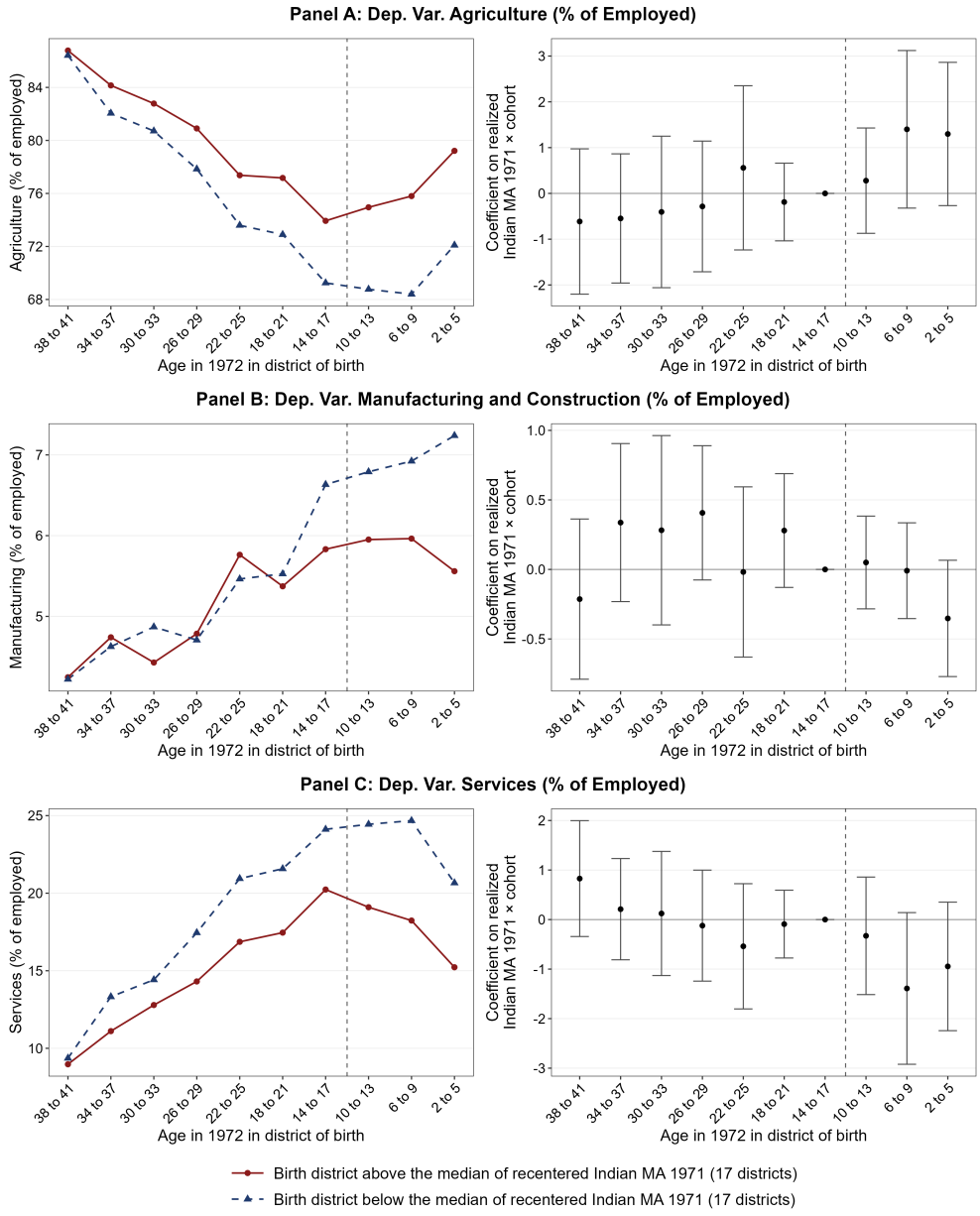
Table A12 examines whether children who were of school age at the expulsion completed less schooling. The regression compares treated and control cohorts across districts of birth with different realized Indian market access in 1971, conditional on expected Indian market access, district-of-birth fixed effects and year-of-birth fixed effects. In column (1), one log point higher realized Indian market access lowers schooling among treated cohorts by 0.12 years, or about 3.8 percent of the control-cohort mean. In column (3), it lowers the share completing primary school by 1.5 percentage points, or 7.5 percent of the 20 percent control mean. In columns (2) and (4), I additionally include region by year-of-birth fixed effects, which absorb differential schooling expansion across Uganda's four regions. The coefficients do not change much. The randomization-inference intervals exclude zero in every column.

Figure A12: Indian Market Access and Schooling by Birth Cohort



Notes: The unit of analysis is district of birth × four-year birth cohort in the 1991 census, Ugandan-born. The left figure reports person-weighted means for birth districts above and below the median of recentered Indian market access 1971. The right figures report coefficients on realized Indian market access 1971 interacted with cohort dummies, controlling for expected market access interacted with the same dummies, district-of-birth and birth-year fixed effects. The reference cohort is aged 14–17 in 1972, the typical terminal age of formal schooling. The dashed line separates cohorts aged 14 and older in 1972 from those aged 13 and younger. 95% confidence intervals clustered by district of birth.

Figure A13: Indian Market Access and Structural Transformation by Birth Cohort



Notes: The unit of analysis is district of birth × four-year birth cohort in the 1991 census, Ugandan-born. The left figure reports person-weighted means for birth districts above and below the median of recentered Indian market access 1971. The right figures report coefficients on realized Indian market access 1971 interacted with cohort dummies, controlling for expected market access interacted with the same dummies, district-of-birth and birth-year fixed effects. The reference cohort is aged 14–17 in 1972, the typical terminal age of formal schooling. The dashed line separates cohorts aged 14 and older in 1972 from those aged 13 and younger. 95% confidence intervals clustered by district of birth.

Table A12: Indian Market Access and Schooling by Birth Cohort

	Mean years of schooling		Completed primary (%)	
	(1)	(2)	(3)	(4)
Realized Indian MA × Treated	-0.120**	-0.114*	-1.511**	-1.435*
	(0.058)	(0.062)	(0.690)	(0.768)
	[-0.217, -0.028]	[-0.217, -0.005]	[-2.624, -0.513]	[-2.696, -0.243]
Expected Indian MA × Treated	0.147**	0.143**	1.785***	1.736**
	(0.057)	(0.061)	(0.644)	(0.759)
Birth district FE	Y	Y	Y	Y
Birth year FE	Y	Y	Y	Y
Region × birth year FE	–	Y	–	Y
Mean, control cohorts	3.14	3.14	20.04	20.04
Observations (individuals)	519,640	519,640	519,640	519,640
Birth district × year cells	1,360	1,360	1,360	1,360
Birth districts	34	34	34	34

Notes: The table reports cohort difference-in-differences estimates on district-of-birth × year-of-birth cells from the 1991 census, for Ugandan-born persons born 1931–1970. The dependent variable is mean years of schooling in columns 1–2 and the percentage who completed primary school in columns 3–4. The explanatory variable is log Indian market access in 1971 in the district of birth, interacted with an indicator for cohorts aged 13 or younger in 1972, controlling for its expected value interacted with the same indicator. Control cohorts were aged 14–41 in 1972. Cells are weighted by the number of persons reporting schooling. Regions are Uganda's four regions. Standard errors clustered by district of birth are reported in parentheses. Randomization-inference 95% confidence intervals following Borusyak and Hull (2023) are reported in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A13: Indian Market Access and Sector of Employment by Birth Cohort

	Share of employment (%)		
	Agriculture (1)	Manufacturing (2)	Services (3)
Panel A: Birth district and birth year FE			
Realized Indian MA × Treated	1.173	-0.256	-0.917
	(1.019)	(0.214)	(0.876)
	[-0.020, 2.707]	[-0.656, 0.128]	[-2.131, 0.054]
Expected Indian MA × Treated	-1.214	0.253	0.962
	(0.931)	(0.191)	(0.818)
Panel B: Adding region × birth year FE			
Realized Indian MA × Treated	0.688	-0.353**	-0.335
	(0.767)	(0.146)	(0.650)
	[-0.396, 1.985]	[-0.619, -0.113]	[-1.382, 0.543]
Expected Indian MA × Treated	-0.654	0.392***	0.262
	(0.731)	(0.142)	(0.629)
Mean, control cohorts	77.75	5.24	17.01
Observations (individuals)	399,205	399,205	399,205
Birth district × year cells	1,360	1,360	1,360
Birth districts	34	34	34

Notes: The table reports cohort difference-in-differences estimates on district-of-birth × year-of-birth cells from the 1991 census, for employed Ugandan-born persons born 1931–1970. The dependent variable is the percentage of the employed working in agriculture (column 1), manufacturing and construction (column 2) and services (column 3), classified by occupation. The explanatory variable is log Indian market access in 1971 in the district of birth, interacted with an indicator for cohorts aged 13 or younger in 1972, controlling for its expected value interacted with the same indicator. Control cohorts were aged 14–41 in 1972. Cells are weighted by the number of employed persons. Regions are Uganda's four regions. Standard errors clustered by district of birth are reported in parentheses. Randomization-inference 95% confidence intervals following Borusyak and Hull (2023) are reported in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

E Results for Why the Losses Persist

Table A14: Indian Expulsion and Trust in Traders

	(1)	(2)	(3)
Panel A. Trusts traders (×100)			
Realized Indian MA 1971	-6.437	-6.900	-6.869
	(1.451)***	(1.053)***	(1.051)***
	[-9.002, -2.872]	[-9.445, -4.397]	[-9.402, -4.345]
Observations	1,855	1,855	1,855
Enumeration areas	298	298	298
Mean of dependent variable	50.6	50.6	50.6
Panel B. Trusts small business owners (×100)			
Realized Indian MA 1971	-4.629	-5.017	-4.998
	(1.683)***	(1.267)***	(1.285)***
	[-7.072, -0.900]	[-7.638, -1.771]	[-7.626, -1.722]
Observations	1,863	1,863	1,863
Enumeration areas	298	298	298
Mean of dependent variable	54.4	54.4	54.4
Controls:			
Expected Indian MA 1971	Y	Y	Y
Agroclimatic	–	Y	Y
Location	–	Y	Y
Pre-expulsion development	–	Y	Y
Respondent sex and age	–	–	Y

Notes: The table reports estimates of Equation 2, where the dependent variable is an indicator, scaled by 100, for the respondent's answer in Round 2 (2002) of the Afrobarometer survey. The explanatory variable is the log Indian market access in 1971 of the respondent's enumeration area, as in Equation 1, controlling for its expected value across counterfactual road-completion schedules. Enumeration areas within 1959 towns are excluded. Controls are those of Table 1. Standard errors allowing for spatial correlation among observations within 50 km, following Conley (1999), are reported in parentheses. Confidence intervals using randomization inference following the procedure by Borusyak and Hull (2023) in brackets. Stars refer to the Conley standard errors: * $p<0.10$, ** $p<0.05$, *** $p<0.01$.