The Mining Mita*

Explaining Institutional Persistence

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ABSTRACT

This study utilizes regression discontinuity to examine the long run impacts of the *mita*, an extensive forced mining labor system in effect in Peru and Bolivia between 1573 and 1812. Results indicate that a *mita* effect lowers household consumption by 32 percent in subjected districts today. Using data from the Spanish Empire and Peruvian Republic to trace channels of institutional persistence, I show that the *mita*'s influence has persisted through its impacts on land tenure and public goods provision. *Mita* districts historically had fewer large landowners and lower educational attainment. Today, they are less integrated into road networks, and their residents are substantially more likely to be subsistence farmers.

Keywords: institutional persistence, colonialism, land tenure, public goods.
JEL Classification: H41, N26, O43

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1. Introduction

The role of historical institutions in explaining contemporary underdevelopment has generated significant debate in recent years.[1] Studies find quantitative support for an impact of history on current economic outcomes (Nunn, 2008; Glaeser and Shleifer, 2002; Acemoglu et al., 2001, 2002; Hall and Jones, 1999) but have not focused on channels of persistence. Existing empirical evidence offers little guidance in distinguishing a variety of potential mechanisms, such as property rights enforcement, high inequality, ethnic fractionalization, barriers to entry, and public goods. This paper uses variation in the assignment of historical institutions in Peru to identify land tenure and public goods as channels through which its historical institutions persist.

Specifically, I examine the long run impacts of the mining *mita*, a forced labor system instituted by the Spanish government in Peru and Bolivia in 1573 and abolished in 1812. The *mita* required over 200 indigenous communities to send one seventh of their adult male population to work in the Potosi silver and Huancavelica mercury mines (Figure 1). The contribution of *mita* conscripts changed discretely at the boundary of the subjected region - on one side all communities sent the same percentage of their population to the mines, while on the other side all communities were exempt. This discrete change suggests a regression discontinuity (RD) approach for evaluating the long term effects of the *mita*.

The validity of the RD approach requires all relevant factors besides treatment to vary smoothly at the *mita* boundary, and detailed quantitative and historical evidence presented in this paper suggest that this restriction is plausible. I implement the RD approach by focusing exclusively on the portion of the *mita* boundary that transects the Andean range in southern Peru. While much of the boundary tightly follows the steep Andean precipice – and hence has elevation and the ethnic distribution of the population changing discretely at the boundary – elevation and

[1] See for example Coatsworth, 2005; Glaser et al., 2004; Easterly and Levine, 2003; Bockstette et al., 2002; Acemoglu et al., 2001, 2002; Sachs, 2001; Engerman and Sokoloff, 1997; Bloom and Sachs, 1998; Diamond, 1997.

the ethnic distribution are identical across the segment of the boundary on which this study focuses. Moreover, a specification check using detailed census data on local economic capacity, collected just prior to the *mita's* institution in 1573, indicates no differences in economic prosperity across this segment before the *mita'*s enactment. All specifications in this paper include an RD polynomial in distance to the Potosi mines, the underlying determinant of treatment.

Using the RD approach and household survey data, I show that a long run *mita* effect lowers equivalent household consumption by around 32 percent in subjected districts today. The estimate remains stable as I limit the sample to fall within increasingly narrow bands of the *mita* boundary. Moreover, the effect is robust to controlling for ethnicity and to a variety of functional form assumptions. This finding is consistent with recent empirical studies, most notably Acemoglu et al. (2002). These authors document a reversal in the world income ranking between 1500 and today, hypothesizing that colonial rulers established persistent extractive institutions in historically prosperous regions to exploit dense indigenous populations and natural resources. This study offers direct quantitative evidence for a long run impact of extractive institutions. More generally, it provides microeconomic evidence consistent with a number of studies that establish a relationship between historical institutions and contemporary economic outcomes using aggregate data at the within-country (Banerjee and Iyer, 2005) or cross-country (Nunn, 2008; Glaeser and Shleifer, 2002) level.

After establishing this result, the remainder of the paper uses data from the Spanish Empire and Peruvian Republic, combined with the RD approach, to investigate channels of persistence. Three principal findings emerge. First, using district level data collected in 1689, I document that *haciendas* – rural estates with an attached labor force – developed primarily outside the *mita* catchment. In order to minimize the competition the state faced in accessing scarce *mita* labor, colonial policy restricted the formation of *haciendas* in *mita* districts, promoting communal land tenure there instead (Garrett, 2005; Larson, 1988; Sanchez-Albornoz, 1978). The *mita*'s effect on *hacienda* concentration remained negative and significant in 1940. Second, *mita* districts historically achieved lower levels of education, and today they remain less integrated into road networks. Finally, data from the most recent agricultural census document that residents of *mita* districts are substantially more likely to be subsistence farmers.

The positive association between the historical presence of large landowners and contemporary levels of economic development that this study documents contrasts with the well-known hypothesis that historically high land inequality is at the heart of Latin America's poor long run growth performance (Engerman and Sokoloff, 1997). This paper's findings cast doubt on this consensus and are consistent with recent quantitative evidence from other Latin American countries (Acemoglu et al., 2007; Coatsworth, 2005).[2]

Based on quantitative and historical evidence, I hypothesize that the long-term presence of large landowners in non-*mita* districts provided a stable land tenure system that encouraged public goods provision. In Peru, the alternative to large landowners was not relative equality between small, enfranchised landowners, as the institutional structures in place did not respect the rights of the peasants who held most of the land in *mita* districts. Rather, the alternative was the *mita* (during the colonial era) and poorly defined property rights and the underprovision of public goods (subsequently). Soon after the *mita* ended, the Peruvian government abolished the communal land tenure that had predominated in *mita* districts during the colonial period, but did not replace it with a system of enforceable peasant titling (Jacobsen, 1993; Dancuart and Rodriguez, 1902, vol. 2, p. 136). As a result, extensive confiscation of peasant lands and numerous responding peasant rebellions were concentrated in *mita* districts during the late 19th and early 20th

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[2] Acemoglu et al. (2007) document that in Cundinamarca, Colombia, municipalities with a higher land gini in the 19th century are more developed today. Coatsworth (2005) cites evidence that inequality in Mexico did not became high relative to the U.S. until the early 20th century, after almost a century of very poor economic performance relative to the U.S. had already occurred.

centuries (Bustamante Otero, 1987, p. 126-130; Flores Galindo, 1987, p. 240; Ramos Zambrano, 1985, p. 29-34). Widespread banditry and livestock rustling remained endemic there well into the 20th century (Jacobsen, 1993; CVR, 2003). In contrast, the property rights of large landowners remained consistently secure. Because they enjoyed more secure title to their property, it is probable that the established landowners in non-*mita* districts received higher returns from investing in public goods than did most individuals inside the *mita* catchment. Moreover, landowners controlled a substantial percentage of the productive factors, both land and labor, so they could expropriate much of the surplus that public goods provided. Finally, historical evidence indicates that well-established landowners possessed the political connections required to secure public goods (Stein, 1980).

Roads offer an important example of the role landowners played in securing public goods. The *hacienda* elite lobbied successfully for roads, constructed to pass through as many *haciendas* as possible (Stein, 1980, p. 59). Recent empirical evidence links roads to increased market participation and higher household income (Escobal, 2001; Agreda and Escobal, 1998). Roads constructed during the era of *haciendas* remain – although *haciendas* were dissolved by agrarian reform in the 1970's – and they continue to impact market participation and household income.

The rest of this paper is organized as follows: In the next section, I provide an overview of the *mita*, and Section 3 tests whether the *mita* affects contemporary household consumption. Section 4 examines channels empirically. Finally, Section 5 offers concluding remarks.

2. The Mining *Mita*

2.1. Historical Introduction

The mining *mita*, instituted by the Spanish government in 1573 and abolished in 1812, required over 200 indigenous communities in Peru and Bolivia to send one seventh of their adult male population to work in the Potosi silver and Huancavelica mercury mines (Figure 1). The Potosi mines, discovered in 1545, provided the largest deposits of silver in the Spanish Empire, but production collapsed in the 1560's due to severe labor shortages and the exhaustion of high-grade ores (Cole, 1985, p. 4). The development in 1557 of a mercury amalgamation process for refining low-grade ores and the discovery of mercury at Huancavelica in 1563 created hopes for revitalizing Potosi silver production. Beginning in 1573, villages located within a contiguous region were required to provide rotating *mita* laborers to Potosi or Huancavelica. The *mita* assigned 14,181 conscripts from southern Peru and Bolivia to Potosi and 3,280 conscripts from central and southern Peru to Huancavelica (Bakewell, 1984, p. 83).[3]

Historical evidence indicates that authorities enforced the *mita* throughout the subjected region, so treatment was likely fairly homogenous. Local native elites were responsible for collecting conscripts, delivering them to Potosi or Huancavelica, and ensuring that they reported regularly for mine duties (Cole, 1985, p. 15; Bakewell, 1984). If community leaders were unable to provide their allotment of conscripts, *mita* captains required them to pay in silver the sum needed to hire wage laborers instead.[4] Historical documents and scholarship suggest that this rule was strictly enforced (Zavala, 1980, II, p. 67-70; Sanchez- Albornoz, 1978).[5]

With silver deposits depleted, the Court of Cadiz abolished the *mita* in 1812.[6] At the date of its dissolution, the *mita* had been in force for almost 240 years. Sections 3 and 4 will discuss historical and empirical evidence showing divergent histories of *mita* and non-*mita* districts.

[3] Individuals could attempt to escape *mita* service by fleeing their communities, and a number pursued this strategy (Wightman, 1993). Yet fleeing had costs – giving up access to land, community, and family; facing severe punishment if caught; and either paying additional taxes in the destination location as a 'foreigner' (*forastero*) or attaching oneself to an *hacienda*.

[4] Meeting *mita* obligations through payments in silver was common, as official *mita* quotas were rarely adjusted despite population decline (Cole, 1985). Detailed district level data from indicate that communities in the study region, located far from sources of silver, contributed primarily in people (Zavala, 1980, II, p. 67-70).

[5] Community leaders faced confiscation of oftentimes substantial personal property, removal from office, physical abuse, and imprisonment if they failed to comply (Garrett, 2005, p. 126; Cole, 1985, p. 44).

[6] Peru gained independence from Spain a few years later, in 1821.

2.2. The Mita's Assignment

Why did colonial authorities require only a portion of districts in Peru to contribute to the *mita*, and how did they determine which districts to subject? There is little doubt that the *mita'*s objective was to increase royal silver revenues (Levillier, 1921 [1572], 4, p. 108). However, the Crown's desire to benefit from Peru's mineral wealth was tempered by the potential costs that forced mining labor posed. These included administrative and enforcement costs, compensation to conscripts for traveling to and from the mines (as much as two months each way from the region I examine), and the risk of decimating Peru's indigenous population, as had occurred in earlier Spanish mining ventures in the Caribbean (Tandeter, 1993, p. 61; Cole, 1985, p. 3, 31; Arzans, 1975, vol. 1, p. 43-46; Canete, 1973 [1794]). To establish the minimum number of conscripts required to revive silver production to previous levels, Peruvian Viceroy Francisco Toledo commissioned a detailed inventory of mines and production processes in Potosi and elsewhere in Peru (Bakewell, 1984, p. 76-78; Levillier, 1921 [1572], 4). These numbers were used, together with census data collected in the early 1570's, to enumerate the *mita* assignments. The limit that the *mita* subject no more than one seventh of a community's male population at a given time was already an established rule that regulated local labor drafts in Peru (Glave, 1989). Together with estimates of the required number of conscripts, this rule roughly determined what fraction of Andean Peru's districts would need to be subjected to the *mita.*

Historical documents and scholarship reveal two criteria used to assign the *mita*: distance to the mines at Potosi and Huancavelica and elevation. Important costs of administering the *mita*, such as travel wages and the probability that conscripts would die or desert en route, were increasing in distance to the mines (Tandeter, 1993, p. 60; Cole, 1985, p. 31). Moreover, Spanish officials believed that only highland peoples could survive intensive physical labor in the Potosi and Huancavelica mines, both located at over 4000 meters (13,000 feet) (Golte, 1980). The geographic extent of the *mita* is consistent with the application of these two criteria. Figure 1 shows that an elevation constraint was binding along the eastern and western *mita* boundaries, which tightly follow the steep Andean precipice. The southern Potosi *mita* boundary was also constrained, by the border between Peru and the Viceroyalty of Rio de la Plata (Argentina) and by the geographic divide between agricultural lands and an uninhabitable salt flat (Figure 1). This study focuses on the portion of the *mita* boundary that transects the Andean range. The districts along this portion of the boundary are termed the *study region*. Here, exempt districts were the ones located furthest from the mining centers given the road networks at the time (Hylsop, 1984).[7]

The key RD identifying assumption is that all relevant factors besides treatment vary smoothly at the *mita* boundary. Distance to the mines clearly varies smoothly, and I focus on the segment of the boundary that transects the Andean range; hence elevation does not jump. Concerns remain that other factors – not mentioned in the historical documentation on *mita* assignment – may have been used to draw the *mita* boundary and may also impact economic outcomes today. I examine the following potentially important characteristics: elevation, terrain ruggedness, ethnicity, pre-existing settlement patterns, variation in Inca institutions, and local economic prosperity just prior to the *mita's* enactment. To be conservative, the statistics that follow, and all results in this paper, exclude metropolitan Cusco. Cusco is composed of seven non-*mita* districts located along the *mita* boundary. It was the capital of the Inca Empire, with an estimated population of around 100,000 at the date of Spanish conquest (Cook, 1981, p. 212-214;

[7] This discussion suggests that exempt districts were those located relatively far from both Potosi and Huancavelica. The correlation between distance to Potosi and distance to Huancavelica is -0.996, making it impossible to separately identify the effect of distance to each mine on the probability of receiving treatment. Thus, I divide the sample into two groups – municipalities to the east and those to the west of the dividing line between the Potosi and Huancavelica *mita* catchment areas. When considering districts to the west (Potosi side) of the dividing line, a flexible specification of *mita* treatment on a cubic in distance to Potosi, a cubic in elevation, and their linear interaction shows that being 100 additional kilometers from Potosi lowers the probability of treatment – evaluated at the mean – by 0.873, with a standard error of 0.244. Being 100 meters higher increases the probability of treatment by 0.061, with a standard error of 0.027. When looking at districts to the east (Huancavelica side) of the dividing line and using the same specification with a polynomial in distance to Huancavelica instead of distance to Potosi, the marginal effect of distance to Huancavelica, evaluated at the mean, is negative but not statistically significant.

Cieza de Leon, 1959, p. 144-148). I exclude Cusco because part of its relative prosperity today very likely relates to its pre-*mita* heritage as the Inca capital. When Cusco is included, the impacts of the *mita* are estimated to be even larger.

To examine elevation – the principal determinant of climate and crop choice in Peru – as well as terrain ruggedness, I use 30 arc second (one kilometer) resolution data produced by NASA's Shuttle Radar Topography Mission (SRTM, 2000). I divide the study region into twenty by twenty kilometer grid cells, approximately equal to the mean size of the districts in my sample, and calculate the mean elevation and slope within each grid cell.[8] These grid cells then act as the unit of observation. Spatial correlation is a serious concern with means comparisons of geographic measures, and hence I report standard errors corrected for spatial correlation in square brackets. Following Conley (1999), I allow for spatial dependence of an unknown form.[9] For comparison, I report robust standard errors in parentheses.

Means comparisons are reported in Table 1. The first set of columns restricts the sample to fall within 100 kilometers of the *mita* boundary and the second, third, and fourth set of columns restrict it to fall within 75, 50, and 25 kilometers, respectively. Row 1 shows that elevation is statistically identical across the *mita* boundary.[10] I next look at terrain ruggedness, using the SRTM data to calculate the mean uphill slope in each grid cell. In contrast to elevation, there are some statistically significant, but relatively small, differences in slope. These disappear as one moves closer to the boundary. Although potentially concerning, any differences that exist are not likely to pose a threat to identification. Available empirical evidence suggests that the direct

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[8] All results are similar if the district is used as the unit of observation instead.
[9] Specifically, the Conley covariance matrix is a weighted average of spatial autocovariances, where the weights are the product of Bartlett kernels in two dimensions (North/South and East/West). They start at one and decline linearly to zero when a pre-specified cut point is reached. I choose the cutoff in both dimensions to be one degree (approximately 100 kilometers); choosing other cut points produces similar estimates.
[10] Elevation remains identical across the *mita* boundary if I restrict the sample to inhabitable areas (<4800 m) or weight by population, rural population, or urban population, using 30 arc second (one kilometer) resolution population data (SEDAC, 2007).

effects of terrain ruggedness would tend to reduce economic prosperity, biasing estimates of the *mita's* impact downwards since *mita* districts are *less* rugged (Nunn and Puga, 2007). Moreover, terrain ruggedness is observable. I control for it, and it is rarely statistically significant.

Row 3 examines ethnicity using data from the 2001 Peruvian National Household Survey, which is described in greater detail in the data appendix. A household is defined as indigenous if the primary language spoken in the household is an indigenous language (usually Quechua). Results show no significant differences in ethnic identification across the *mita* boundary.

Spanish authorities could have based *mita* assignment on settlement patterns, for example instituting the *mita* in densely populated areas and claiming land for themselves in sparsely inhabited regions where it was easier to usurp. Evidence does not suggest differential settlement patterns across the *mita* boundary at the date of enactment. A detailed review by Bauer and Covey (2002) of all archaeological surveys in the region surrounding the Cusco basin indicates no large differences in settlement density at the date of Spanish Conquest. Moreover, there is no evidence suggesting differential rates of population decline in the forty years between Spanish conquest and the enactment of the *mita* (Cook, 1981, p. 108-114).

The term '*mita'* was first used by the Incas to describe the system of labor obligations that supported the Inca state. While the Spanish co-opted this phrase to describe their system of mine labor, the Inca and Spanish *mitas* were very different institutions, and historical evidence strongly supports independent assignment.[11] Centrally, the Inca *m'ita* required *every* married adult male in

[11] It should also be noted that the Inca and Spanish *mitas* served different purposes. The Inca *m'ita* provided public goods, such as maintenance of road networks and sophisticated irrigation and cropping systems that required inter-community coordination of labor (D'Altoy, 2002). The majority of Inca subjects performed their *m'ita* obligations in or near their home communities, often in agriculture; service in mines was extremely rare (D'Altoy, 2002, p. 266; Rowe, 1946, 267-269). In contrast, the Spanish *mita* acted as a subsidy to private mining interests and the Spanish state, which used tax revenues from silver production largely to finance European wars (Cole, 1985, p. 20).

the Inca Empire (besides leaders of large communities), spanning an area far more extensive than the study region, to provide several months of labor services for the state each year.[12]

Finally, Row 4 examines detailed data on local economic prosperity, collected just prior to the *mita'*s 1573 enactment.[13] Holding excessive rates of tribute extraction responsible for demographic collapse, Viceroy Francisco Toledo coordinated an in depth inspection of the viceroyalty (modern Peru, Bolivia, and Ecuador) in the early 1570's to assess how much tribute local groups could sustainably contribute. Based on this assessment, authorities assigned varying rates of tribute at the level of the district - socioeconomic group.[14] The tribute assignments have been preserved for all districts in the study region and were published by Noble David Cook (1975). Summary statistics are provided in Appendix Table A1. Simple means comparisons across the *mita* boundary reveal no differences in assessed economic prosperity just prior to the *mita'*s institution. These data will be examined further in Section 3.

3. The *Mita* and Long Run Development

3.1 Data

I examine the *mita'*s long run impact on economic development by testing whether it affects household consumption today. A list of districts subjected to the *mita* is obtained from Saignes (1984) and Amat y Juniet (1947) and matched to modern districts using sources discussed

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[12] The Incas used knot records to keep track of communities' *m'ita* obligations, and archaeologists have located these in diverse locations. The labor services they record are proportional to the number of household dwellings (D'Altoy, 2002, p. 266). This corroborates colonial chronicles, which report that the Inca *m'ita* applied uniformly to all Inca subjects (Cieza de Leon (1967 [1551]).

[13] The state also collected rents through tribute, *repartimiento,* and *trajin.* Tribute obligated all adult males to make payments to the state in cash and kind, the *repartimiento* mandated the purchase of merchandise at above market prices, and the *trajin* required indigenous subjects to transport goods for the commercial ventures of provincial governors. All were practiced throughout the study region, and evidence does not suggest that they varied systematically with participation in the *mita* (Glave, 1989; Sanchez-Albornoz, 1978; Miranda, 1975 [1583]).

[14] Teams of surveyors were ordered to list the ages and occupations of residents; inspect the communities' grain storage facilities; uncover the tribute that residents provided in the past; investigate a series of geographic and economic questions relating to natural resources and agricultural production; record the tribute, labor services, and land received by indigenous leaders and Spanish administrators; and investigate a variety of other questions.

in the data appendix. Consumption data are taken from the 2001 Peruvian National Household Survey (ENAHO), collected by the Peruvian National Institute of Statistics (INEI). To construct a measure of household consumption that reflects productive capacity, I subtract the transfers received by the household from total household consumption, and normalize to Lima metropolitan prices using the deflation factor provided in ENAHO.

Geospatial data are used to construct controls for exogenous geographic characteristics, and these controls are subsequently included in all regressions. I calculate the mean area weighted elevation of each district by overlaying a map of Peruvian districts on the SRTM data, discussed in the previous section, and employ a similar procedure to obtain each district's mean area weighted slope.[15] I also utilize soil type data, at a scale of one to five million, produced by the Soil Terrain Database for Latin America (SOTERLAC). I construct a series of soil type dummies equal to one for the soil type(s) that predominate over the greatest percentage of the district's landmass area.

3.2 Estimation Framework

M*ita* treatment is a deterministic and discontinuous function of a known covariate: geographic location. This suggests estimating the *mita's* long run impacts using a regression discontinuity design. Specifically, I run regressions of the following form:

$$y_{hdb} = \alpha + \gamma MITA_d + X'\beta + f(DIST_d) + \phi_b + \delta\phi_b * DIST_d + \varepsilon_{hdb} \qquad (1)$$

where y_{hdb} is the outcome variable of interest, and X' is a vector of covariates that includes soil type indicators, the area weighted mean elevation and slope for district *d*, and (in regressions with household consumption on the LHS) demographic controls for the number of infants, children, and adults in the household. $MITA_d$ is an indicator equal to 1 if district *d* contributed to the *mita* and equal to zero otherwise, $\boldsymbol{\phi_b}$ is a boundary segment fixed effect corresponding to the upper

[15] I choose not to weight by population because it may be endogenous to the *mita*. However, when I instead weight by population and employ these controls in the analysis that follows, results are unchanged.

discontinuous segment of the *mita* boundary, and $f(DIST_d)$ is the RD polynomial, which controls for smooth functions of distance (various forms will be explored). Finally, I include an interaction between the boundary fixed effect and $DIST_d$ to control for heterogeneity along the boundary. To be conservative, all analysis excludes metropolitan Cusco.[16]

The following identifying assumptions are necessary for γ to estimate the causal impact of the *mita*. First, and most centrally, identification requires all relevant factors besides treatment to vary smoothly at the *mita* boundary. That is, letting y_1 and y_0 denote potential outcomes under treatment and control, identification requires that $E[y_0|DIST = d]$ and $E[y_1|DIST = d]$ are continuous in d at the boundary. We need this assumption for individuals located just outside the *mita* catchment to be an appropriate counterfactual for those located just inside it. The evidence discussed in Section 2.2 supports the plausibility of this assumption.

A second identifying assumption is that there has not been selective sorting around the *mita* boundary. One might hypothesize that a small direct *mita* effect could provoke high rates of out-migration of the most productive individuals, leading to a much larger indirect effect. If this were the case, it would still suggest a long run impact of the *mita*, but the interpretation would change. Section 3.3 examines data on population and migration, from 1876 through the most recent census. These data show that population in the region has been remarkably immobile; population flows have been too low to account for much of the observed *mita* effect.

In this section, I test for a *mita* impact on household consumption, estimating eqn. (1) with the log of equivalent household consumption, net transfers, in 2001 on the LHS.[17] The first column of Table 2 limits the sample to districts within 100 kilometers of the *mita* boundary, and columns (2) through (4) restrict it to fall within 75, 50, and 25 kilometers, respectively. Panel A

[16] When Cusco is included, the *mita's* impact is estimated to be even larger. See Table 3.

[17] Following Deaton (1997), I assume that children aged 0 to 4 are equal to 0.4 adults and children aged 5 to 14 are equal to 0.5 adults.

contains a cubic polynomial in Euclidean distance to the mines at Potosi, the underlying determinant of treatment.[18] An alternative, reasonable model holds that any omitted variables change smoothly as the *mita* boundary is approached. Thus Panel B instead uses a cubic in Euclidean distance to the nearest point on the *mita* boundary. Throughout this paper, I focus on the specification with distance to Potosi, while Appendix Table A2 presents the main results when the *mita*'s impacts are estimated using distance to the *mita* boundary as the running variable instead. In no case is interpretation substantially altered.[19]

3.3: Estimation Results

Both specifications offer strong support for a long run *mita* effect on contemporary household consumption. Taking the median point estimate, from Panel A, column 1, we see that the *mita* lowers household consumption by around 32 percent in subjected districts. The effect is highly significant, with a coefficient of -0.278 and a standard error of 0.12, and it remains relatively stable as the sample is restricted to fall within narrower bands of the *mita* boundary. Figure 2, panel A presents this result visually. While the unit of observation in regression analysis is the household, to give an overall picture of the data each point in the figure is the log of average equivalent household consumption within 5 km wide intervals of distance to the *mita* boundary. Points to the left of the vertical line fall outside the *mita* catchment, and points to the right fall inside. The solid line gives predicted log equivalent consumption from a regression that includes a third order polynomial in distance to Potosi, demographic controls, and the *mita* dummy. The jump of consumption downwards upon entering the *mita* catchment is visible.

[18] The correlation between distance to the mines at Potosi and distance to the mines at Huancavelica is -0.996. Hence, I only include distance to Potosi.

[19] I report robust standard errors, clustered by district when the data are at the individual level. This would be inappropriate if spatial correlation is important. I have re-estimated all regressions in this paper using Conley (1999) standard errors, described in Section 2.2. The spatial errors are very similar to the clustered errors. In no case did using spatial errors change the interpretation of results, and hence the tables that follow only report clustered errors.

3.4 Specification Checks

Table 3 reexamines the main result using a number of alternative specifications. I report only those estimates where the sample is limited to fall within 50 kilometers of the *mita* boundary, as results are similar when I limit the sample to fall within 100, 75, or 25 kilometers. I focus on specifications that include a polynomial in distance to Potosi; results using a polynomial in distance to the *mita* boundary are similarly robust. For comparison purposes, column (1) presents the baseline estimates from Table 2. Column (2) shows that adding a control for ethnicity, equal to one if an indigenous language is spoken in the household and zero otherwise, does not substantially change the coefficient on $MITA_d$, now equal to -0.248 (implying an effect of ≈ 28%). The coefficient on *indigenous* is difficult to interpret since ethnic identification is probably endogenous to income. Nevertheless, this result suggests that the *mita*'s impact cannot be explained primarily by an effect on ethnic identification. Next, column (3) includes metropolitan Cusco, and as expected given the city's relative prosperity, the *mita* coefficient remains highly significant and increases substantially in magnitude (to -0.473, with a standard error of 0.12).

In response to the potential endogeneity of the *mita* to Inca landholding patterns, column (4) excludes districts that contained estates of Inca royalty.[20] Similarly, column (5) excludes districts falling along portions of the *mita* boundary formed by rivers, to account for one way in which the boundary could be endogenous to geography. Finally, column (6) estimates consumption equivalence flexibly, using log household consumption as the dependent variable and controlling for the ratio of children to adults and the log of household size. In all cases, point estimates and significance levels remain similar.

[20] The Inca chose their estates to serve sacred as opposed to productive purposes (some existed only after they were reclaimed from swampland) (Niles, 1987, p. 13; Rotsworowski, 1962, p. 134-35). According to Spanish law, the Spanish Crown inherited personal possession of these properties upon Inca defeat.

All specifications thus far use linear controls for elevation and slope. In column (7), I estimate a more flexible specification that includes a cubic in elevation and a cubic in slope. The coefficient on $MITA_d$ remains almost unchanged. I further investigate functional form assumptions by experimenting with a variety of specifications for $f(DIST_d)$: linear in column (8), quadratic in column (9), quartic in column (10), and omitting $f(DIST_d)$ in column (11). The *mita* effect is large and statistically significant regardless of the specification.

Finally, one might wonder whether a small direct *mita* effect could provoke out-migration of the most productive individuals, leading to a much larger indirect effect through migration. Data from the 1993 Population Census reveal that there are no statistically significant differences in rates of out-migration between *mita* and non-*mita* districts, though rates of in-migration are around 4.8% higher outside the *mita* catchment. Column (12) presents a (conservative) test of whether differential rates of migration could be primarily responsible for income differences between *mita* and non-*mita* districts, by omitting the 4.8% of the non-*mita* sample with the highest equivalent household consumption. Results remain significant at the five percent level, documenting that migration today is not the primary force responsible for the *mita* effect. Historical migration also does not appear to have been large. Data from the 1876, 1940, and 1993 population censuses show a (quite high) district level population correlation of 0.87 between 1940 and 1993 for both *mita* and non-*mita* districts. Similarly, the population correlation between 1876 and 1940 is 0.80 in *mita* districts and 0.85 in non-*mita* districts.

If the RD specification is estimating the *mita*'s long run effect, as opposed to some other underlying difference, being inside the *mita* catchment should have no effect on relative economic performance prior to the *mita*'s enactment. As a specification check, I regress the log of the mean district 1572 tribute rate on the same variables as the regressions in Table 2, Panel A, omitting household demographic controls. The coefficient on $MITA_d$, reported in column 1 of Table 4, is now small and statistically insignificant. This result can be seen in Figure 2, Panel B. Since the 1572 data are from a census, whereas the 2001 household consumption data are from a (representative) sample, column (2) includes only those districts that are represented in the 2001 ENAHO sample. Then, columns (3) through (7) consider alternative functional forms for the RD polynomial. In all cases, the coefficient on $MITA_d$ is small and statistically insignificant, documenting similar levels of assessed economic prosperity just prior to the *mita'*s enactment. Finally, so that the unit of observation is directly comparable to the 1572 data, column (8) re-estimates the contemporary household consumption regression aggregating consumption to the district level. The *mita* effect remains statistically significant and of similar magnitude.

In summary, Tables 3 and 4 strongly support a valid regression discontinuity design, showing an economically meaningful impact of the *mita* on prosperity today. These results are consistent with the cross-country literature on the long run impacts of institutions (Nunn, 2008; Easterly and Levine, 2003; Acemoglu et al., 2001, 2002) and provide microeconomic evidence that historical institutions matter. Now the question becomes: *why* would the *mita* affect economic prosperity nearly 200 years after its abolition? To open this black box, I turn to an investigation of channels of persistence.

4: Channels of Institutional Persistence

This section uses data from the Spanish Empire and Peruvian Republic to test the channels through which the *mita'*s impacts persist.[21] All estimates employ the RD specification from eqn. *(1)* with a cubic polynomial in distance to Potosi (omitting the household demographic controls). I present only those estimates where the sample is limited to fall within 50 kilometers of the *mita*

[21] Descriptions of these sources are provided in the relevant subsections and the data appendix.

boundary (because of space constraints), and metropolitan Cusco is excluded.[22] The main results can be seen graphically in Figure 2, Panels C through H, which plot different outcome variables on distance to the *mita* boundary. To give an overall picture of the data, each point in the figure is the average of the outcome variable within 5 km wide intervals of distance to the *mita* boundary. The solid line gives the predicted outcome from a regression that includes a third order polynomial in distance to Potosi and the *mita* dummy.

I focus on channels suggested as important by the historical literature: land tenure and public goods. Evidence shows that the *mita* limited the establishment of large landowners inside the *mita* catchment, and suggests that historical land tenure has in turn affected public goods provision and market participation.

4.1 Land Tenure and Labor Systems

This section examines the impact of the *mita* on the formation of *haciendas* – rural estates with an attached peasant labor force permanently settled on the estate (Keith, 1971, p. 437). Critically, when authorities instituted the *mita* in 1573 (forty years after the Spanish conquest of Peru), a landed elite had not yet formed. At the time, Peru was parceled into *encomiendas,* pieces of territory in which appointed Spaniards exercised the right to collect tribute and labor services from the indigenous population but did not hold title to land (Keith, 1971, p. 433). Rivalries between *encomenderos* provoked civil wars in the years following Peru's conquest, and thus the Crown began to dismantle the *encomienda* system during the 1570's. This opened the possibility for manipulating land tenure to promote other policy goals, in particular, the *mita.*[23]

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[22] Results are virtually identical when I limit the sample to fall within 100 or 75 kilometers. In most cases estimates are also similar at 25 kilometers, but for some outcomes there is not sufficient power to draw definitive conclusions.

[23] Throughout the colonial period, royal policy aimed to minimize the power of the (potentially rebellious) landed class – landowners never acquired the same political clout as mine owners, the most powerful colonial interest group (Tandeter, 1993; Cole, 1985).

Specifically, Spanish land tenure policy aimed to minimize the establishment of landed elites in *mita* districts.[24] Large landowners – who unsurprisingly opposed yielding their peasants for a year of *mita* service – formed the state's principal competition in accessing scarce *mita* labor (Larson, 1988; Sanchez-Albornoz, 1978). As Bolivian historian Brooke Larson concisely articulates: "*Haciendas* secluded peasants from the extractive institutions of colonial society" (1988, p. 171). Moreover, by protecting native access to agricultural lands, the state promoted the ability of the indigenous community to subsidize the *mita.* Subjected communities contained communal plots dedicated to sustaining *mita* conscripts, who were paid substantially below subsistence wages (Garrett, 2005, p. 120; Tandeter, 1993, p. 58-60; Cole, 1985, p. 31). Similarly, authorities believed that protecting access to land could be an effective means of staving off the demographic collapse that threatened the supply of *mita* labor (Larson, 1982, p. 11; Cook, 1981, p. 108-114, 250; Morner, 1978). Finally, a policy of indigenous communal land tenure provided opportunities for the colonial state to co-opt the support of the indigenous elite in administering the *mita*. In return for ensuring the delivery of conscripts, local authorities were permitted to extract surplus from their communities that would have otherwise been claimed by large landowners (Garrett, 2005, p. 120; Sala i Vila, 1991, p. 65-66).[25]

I now test empirically whether the *mita* affected *hacienda* formation, and if so, whether a *mita* effect persisted after the *mita's* abolition. I examine the concentration of *haciendas* in 1689, 1830, and 1940. 1689 data on *haciendas* are contained in parish reports commissioned by Bishop Manuel de Mollinedo and submitted by all parishes in the bishopric of Cusco, which encompassed

[24] For example, land sales under Phillip VI between 1634 and 1648 and by royal charter in 1654 played a central role in *hacienda* formation and were almost exclusively concentrated in non-*mita* districts (Brisseau, 1981, p. 146; Glave and Remy, 1978, p. 1).

[25] Various evidence for this hypothesis is contained in Peruvian historian David Garrett's book on the indigenous colonial elite in the region. As Garrett states: "The establishment of *haciendas* and other rural properties created competition for control of the rural economy and prevented rural Inca caciques [north of Cusco] from acquiring the wealth of their peers to the south [in *mita* districts]" (Garrett, 2005, p. 115).

most of the study region. The reports list the number of *haciendas* located within each subdivision of the parish and were compiled by Horacio Villanueva Urtega (1982). For *haciendas* in 1830, I employ data collected by the republican government on the percentage of rural tributary population (males between the ages of 18 and 50) residing in *haciendas* (Peralta Ruiz, 1991). Data from 1826, 1830, 1831, and 1836 are combined to form the c. 1830 dataset.[26] Finally, data from the 1940 Peruvian Population Census are aggregated to the district level to calculate the percentage of the rural population residing in *haciendas*.

Table 5, column (1) estimates the *mita'*s impact on the number of *haciendas* per district in 1689. Estimates show that the *mita* lowered the number of *haciendas* in subjected districts by 10.6 (with a standard error of 2.3), a very large effect given that on average *mita* districts contained only one *hacienda*. Figure 2, Panel C clearly demonstrates the discontinuity. Column (2) repeats the same regression with the number of *haciendas* per 1000 district residents in 1689 as the dependent variable. The effect remains large and highly significant.[27]

Did the effect persist after the *mita*'s abolition? Column (3) examines the *mita'*s impact on *haciendas* c. 1830, estimating that a persistent *mita* effect lowered the percentage of the rural tributary population in *haciendas* by 15 percentage points. Column (4) shows that the *mita*'s impact on the percentage of the rural labor force attached to *haciendas* in 1940 is also around 15 percentage points and significant at the 1% level.

While the gap between *mita* and non-*mita* districts remained relatively stable over time, the percentage of the rural population in *haciendas* rose from around 15% in 1830 to almost 38% in 1940. This parallels historical evidence documenting a rapid expansion in the concentration of *haciendas* in the late 19th and early 20th centuries. This expansion was spurred by a dramatic

[26] When data are available for more than one year, figures change very little, and I use the earliest observation.
[27] Information on the size of the attached *hacienda* labor force is available for around 25 percent of the sample. Data show no differences across the *mita* boundary in the number of attached peasants.

increase in land values due to late 19th century globalization and seems to have been particularly coercive inside the *mita* catchment (Jacobsen, 1993, p. 226-237; Spalding, 1974; Favre, 1967, p. 243; Nunez, 1913, p. 11). No longer needing to ensure *mita* conscripts, upon independence Peru abolished the communal land tenure predominant in *mita* districts, but did not replace it with enforceable peasant titling (Jacobsen, 1993; Dancuart and Rodriguez, 1902, vol. 2, p. 136). This opened the door to tactics such as the *interdicto de adquirir,* a judicial procedure which allowed aspiring landowners to legally claim 'abandoned' lands that in reality belonged to peasants. *Hacienda* expansion also occurred through violence, with cattle hustling, grazing estate cattle on peasant lands, looting, and physical abuse used as strategies to intimidate peasants into signing bills of sale (Avila, 1952, p. 22; Roca-Sanchez, 1935, p. 242-43). The historical literature documents that in response, numerous peasant rebellions engulfed *mita* districts during the 1910's and 1920's (Ramos Zambrano, 1984; Hazen, 1974, p. 170-78). In contrast, large landowners had been established since the early 17th century in non-*mita* districts, and these districts remained relatively stable (Flores Galindo, 1987, p. 240). By 1940, the *hacienda* expansion had ended, but indiscriminate banditry and livestock rustling remained prevalent in many *mita* districts for decades (Jacobsen, 1993; Tamayo Herrera, 1982).

In 1969, the Peruvian government enacted an agrarian reform bill mandating the complete dissolution of *haciendas*. As a result, the *hacienda* elite were deposed and lands formerly belonging to *haciendas* were divided into "Agricultural Societies of Social Interest" (SAIS) during the early 1970's (Flores Galindo, 1987). In SAIS, neighboring indigenous communities and the producers acted as collective owners. By the late 1970s, attempts to impose collective ownership through SAIS had failed, and many of these collective units were gradually divided and sold to individual producers (Alvarez and Caballero, 1980; Mar and Mejia, 1980). Column (5), using data from the most recent (1994) agricultural census, does not find differences in land inequality between *mita* and non-*mita* districts today.

4.2 Public Goods

In this section I consider the *mita'*s long run effects on access to the two principal public goods in Andean Peru: education and roads.[28] Table 6 examines the *mita*'s impact on education in 1876, 1940, 1981, 2001, and 2006, providing several interesting results. First, the *mita* lowered access to education historically. In column (1), the dependent variable is the district's mean literacy rate, obtained from the 1876 population census. Individuals are defined as literate if they could read, write, or both. Estimates show that the *mita* lowered literacy in subjected districts by 2.2 percentage points, and the result is highly significant. To put the magnitude of the coefficient in context, it is useful to note that literacy in *mita* districts was only 3.4% in 1876. Similar insight is provided by column (2), where the dependent variable is mean years of schooling by district, from the 1940 Population Census. Here, we see that the long run impact of the *mita* lowered mean years of schooling by 0.20 years, with a standard error of 0.09. Compare this to the mean schooling in *mita* districts, which was an abysmally low 0.41 years.

Second, there is at best weak evidence for a *mita* effect on education in recent years. This is seen in column (3), which examines mean years of schooling by district using data from the 1981 Population Census.[29] The coefficient on $MITA_d$ is small and statistically identical to zero. In column (4), the dependent variable is individual years of schooling, obtained from ENAHO 2001. Here, the *mita* coefficient is negative and marginally significant, providing some evidence that the *mita* could impact education today. However, the coefficient (results not shown) is not significant when the sample is limited to fall within 100 or 75 kilometers of the *mita* boundary, nor is it significant in Appendix Table A2. Hence, this result should be interpreted cautiously.

[28] Education, roads, and irrigation are the three public goods traditionally provided in Peru (Portocarrero and Zimmerman, 1988). Irrigation has been concentrated along the coast, with almost no projects in the study region.

[29] 1981 Census data for Apurimac (one of five departments comprising the study region) have not been preserved.

Finally, a preliminary look at state investment in education does not suggest disparities across the *mita* boundary. In column (5) the dependent variable is the student-to-teacher ratio in state funded primary schools, taken from the 2006 Educational Census conducted by the Ministry of Education. There does not appear to be a long run impact of the *mita*. Overall, these results are consistent with the qualitative literature, which emphasizes large, widespread increases in schooling since 1960 (Portocarrero and Oliart, 1989).

What about roads, the other principal public good? I estimate the *mita's* impact using a GIS road network map of Peru produced by the Ministry of Transportation (2006). Roads are classified as paved, gravel, non-gravel, and *trocha carrozable*, which translates roughly as "narrow path, often through wild vegetation…that a vehicle can be driven on with great difficulty" (Real Academia Espanola, 2008). The total length (in m) of the respective road type within each district is divided by the district surface area (in km squared) to obtain a road network density.

Several interesting findings emerge. First, column 1 of Table 7 suggests that the *mita* does not impact local road networks, which consist primarily of non-gravel and *trocha* roads. Care is required in interpreting this result, as the World Bank's Rural Roads program, operating since 1997, has worked to reduce disparities in local road networks in marginalized areas of Peru. This result may reflect the successful targeting of the World Bank program, as opposed to local institutional factors.

Second, there are significant disparities in regional road networks, which connect population centers to each other. Column (2) shows that a *mita* effect lowers the density of regional roads by 41.7 meters of roadway for every one kilometer squared of district surface area (standard error = 9.94). This large effect can be compared to the average density of roads in *mita* districts, which is 19.9. Columns (3) and (4) break down the result by looking separately at the two highest quality types of roads: paved and gravel. In both cases, the *mita* coefficient is negative and highly significant. The discontinuity is plainly apparent in Figure 2, panel G.

Results thus far have looked along the intensive margin; now I examine the extensive margin. In column (5), the dependent variable is an indicator equal to one if the district's capital can be accessed via a paved road, and equal to zero if it cannot. This measure includes national roads, which connect major metropolitan areas. I estimate that a *mita* effect decreases the probability that a district capital has a paved access road by 24 percentage points (with a standard error of 0.08). Only 18 percent of district capitals in the *mita* sample can be accessed by paved roads, as compared to 40 percent in the non-*mita* sample.

In sum, I find little evidence that a *mita* effect persists through education. On the other hand, there are pronounced disparities in road networks across the *mita* boundary. Consistent with this evidence, I hypothesize that the long-term presence of large landowners provided a stable land tenure system that encouraged public goods provision. In Peru, the alternative to large landowners was not relative equality between small, enfranchised landowners, as the institutional structures in place did not respect the rights of the peasants who held most of the land in *mita* districts. Rather, the alternative was the *mita* (during the colonial era) and poorly defined property rights and the underprovision of public goods (subsequently). As discussed above, the property rights of large landowners were secure, whereas confiscation of peasant lands and numerous responding peasant rebellions were concentrated in *mita* districts (Bustamante Otero, 1987, p. 126-130; Flores Galindo, 1987, p. 240; Ramos Zambrano, 1985, p. 29-34). Because established landowners in non-*mita* districts controlled a large percentage of the productive factors, both labor and land, and because their property rights were secure, it is probable that they received higher returns to investing in public goods than did those living inside the *mita* catchment. Moreover, historical evidence indicates that these landowners possessed the political connections required to secure public goods. The established *hacienda* elite lobbied successfully for roads to be constructed to pass through as many *haciendas* as possible (Stein, 1980, p. 59).[30] These roads remain, although *haciendas* were dissolved by agrarian reform in the early 1970's.

4.3: Proximate Determinants of Household Consumption

This section examines the *mita's* long run effects on the proximate determinants of consumption. The limited available evidence does not suggest differences in investment, so I focus on the labor force and market participation.[31] In column (1) of Table 8, the dependent variable is the percentage of the district labor force engaged in agriculture, taken from the 1993 Population Census. Estimates fail to find a *mita* effect on employment in agriculture, which is quite high – around one half – throughout the study region. Further results (not shown) likewise do not find a *mita* effect on male and female labor force participation and hours worked.

Column (1) alleviates concerns that a *mita* effect could bias selection into agriculture, an important result given that I now focus on outcomes within agriculture, the primary economic activity in the region. In column (2), the dependent variable, taken from the 1994 Agricultural Census, equals one if the agricultural household sells at least part of its produce in markets, and equals zero otherwise. We see that the *mita's* long run impact reduces participation in agricultural markets by 19.6 percentage points, a large and highly significant effect. Only 9 percent of agricultural households in the *mita* sample participate in markets, as compared to 33 percent in the non-*mita* sample. This result can be seen in Figure 2, Panel H. It is consistent with the findings on road networks, particularly given that recent empirical studies on Andean Peru empirically connect poor road infrastructure to higher transaction costs, lower market participation, and reduced household income (Escobal and Ponce, 2002; Escobal, 2001; Agreda and Escobal, 1998).

[30] The first modern road building campaigns occurred in the 1920's and many of the region's roads were constructed in the 1950's (Stein, 1980, Capunay, 1951, p. 197-199).

[31] Data from the 1994 Agricultural Census on utilization of fifteen types of capital goods and twelve types of infrastructure for agricultural production do not show differences across the *mita* boundary, nor is the length of fallowing different. I am not aware of data on private investment outside of agriculture.

An interesting result also emerges in column (3), which also draws on data from the 1994 Agricultural Census. The dependent variable is an indicator equal to one if a member of the agricultural household participates in secondary employment, and equal to zero otherwise. The *mita* lowers the probability of participation by 3.8 percentage points.

In sum, these results suggest that poor integration into the market economy, resulting from a paucity of road infrastructure, at least partially explains why *mita* districts are poorer today. While the analysis above suggests that roads are a particularly important proximate channel, this does not imply that they are the only channel. Others that may matter, as suggested by our discussion of the stabilizing role of *haciendas*, are differences in access to justice and rule of the law.

One might question whether the pattern of roads in the region is actually inefficient. If most population and economic activity have endogenously clustered along roads, there may be little that is surprising about the relative poverty of *mita* districts. The data do not support this hypothesis: the correlation between 1940 district population density and the density of paved and gravel roads (measured in 2006) is 0.58; when looking at this correlation using 1993 population density, it remains at 0.58.

One might also wonder whether residents in *mita* districts have less desire to participate in the market economy, perhaps because of a history of exploitation. Distrust of capitalism, rather than the availability of roads, could drive this paper's results. While Shining Path, a Maoist guerilla movement, gained a strong foothold in the region during the 1980's, this hypothesis seems unlikely.[32] Shining Path's rise to power surprised many scholars and politicians, given the general

[32] The observant reader may have noted that many of the factors that we have linked to the *mita* (poor infrastructure, limited access to markets, conflicts over property rights, and poverty) are also argued – by prominent scholars and the Peruvian government – to have been leading factors promoting popular support for Shining Path, a Maoist guerilla movement that seized power in many marginalized Peruvian communities in the 1980's and early 1990's (CVR, 2003, vol. 1, p. 94, McClintock, 1998; Palmer, 1994; Mitchell, 1991; Starn, 1991). I have also tested whether there was a

lack of support for Maoist ideology in the region, and the movement's attempts to reduce peasant participation in markets were particularly unpopular and unsuccessful where attempted (McClintock, 1998; Palmer 1994). I have cited several studies that focus on econometrically identifying the impact of roads on market participation and household income. While analysis of this sort is beyond the scope of this paper, simple correlations from the data I use are consistent with empirical evidence linking roads to market participation. 33% of agricultural households in districts with paved road network density above the median participated in markets, as compared to only 13% of households in districts with paved road network density below the median.

The interpretation I offer is consistent with fieldwork conducted in the region. The citizens I spoke with, while visiting eight primarily *mita* and six primarily non-*mita* provinces, were acutely aware that some areas are more prosperous than others. When discussing the factors leading to the observed income differences, a common theme was that it is difficult to get crops to markets. Thus, most residents in *mita* districts are engaged in subsistence farming. Edgar Gonzales Castro, an agrarian scientist who works with indigenous communities to improve farming techniques, argues: "It's certainly not geography, it's government… some provinces have been favored, with the government – particularly during the large road building campaign in the early 1950's – choosing to construct roads in some provinces and completely ignore others" (Dec. 14th, 2006). At the forefront of the local government's stated mission in the (*mita*) province of Espinar is "to

mita effect on Shining Path. To measure the intensity of Shining Path, I exploit a loophole in the Peruvian constitution which stipulates that when more than two thirds of votes cast are blank or null, authorities cannot be renewed (Pareja and Gatti, 1990). In an attempt to sabotage the reelection of authorities during the 1989 municipal elections, Shining Path operatives encouraged citizens to express support through casting blank or null (secret) ballots (McClintock, 1993, p. 79). I find (results available upon request) that a *mita* effect increased blank/null votes by 10.7 percentage points (standard error = 0.031), suggesting greater support for (and probably intimidation by) Shining Path in *mita* districts. Moreover, estimates show that a *mita* effect increased the probability that authorities were not renewed by a highly significant 43.5 percentage points. As a specification check, I also look at blank/null votes in 2002, ten years after Shining Path's defeat, and there is no longer a statistically significant effect. The Shining Path movement was crushed in the region in 1992, and it is unlikely that the contemporary effects of the *mita* are short-term outcomes of Shining Path, as these same factors are argued to have created support for Shining Path in the first place. The impact of historical institutions on civil conflict in Peru is the subject of future research.

advocate effectively for a system of modern roads to regional markets" (2008). Popular demands have also centered on roads and markets. In 2004, (the *mita* district) Ilave made international headlines when demonstrations involving over 10,000 protestors culminated with the lynching of Ilave's mayor, whom protestors accused of failing to deliver on promises to pave the city's access road and build a local market (Shifter, 2004).

5. Concluding Remarks

Numerous studies find a long run impact of history on comparative development, but few offer empirical evidence on how institutions persist. This paper documents and exploits plausible exogenous variation in the assignment of the mining *mita* in Peru to identify channels through which the *mita* influences contemporary economic development. I estimate that the *mita's* long run effects lower household consumption by around 32 percent in subjected districts today and document land tenure and public goods as important channels through which the *mita's* impacts persist. For labor competition reasons, the *mita* led *haciendas* to form primarily outside the *mita* catchment, and this effect persisted into the 20th century. I present evidence that the long run presence of large landowners in non-*mita* districts provided a stable land tenure system that encouraged public goods provision. *Mita* districts historically achieved lower levels of education, today they are less integrated into road networks, and their residents are substantially more likely to be subsistence farmers.

The region examined provides an important example in which the long run presence of large landowners is associated with relatively better outcomes. While production and politics in non-*mita* districts were not organized for the benefit of the masses, evidence suggests that large landowners severed as a stabilizing force, ensuring public goods that do benefit the general populace today. While specific to Peru, the results in this paper cast substantial doubt on the conventional wisdom that high land inequality is at the heart of Latin America’s poor long run growth performance (Engerman and Sokoloff, 1997).

Much work remains in acquiring a general understanding of how institutions persist and how institutional change can be promoted. The development of general models of institutional persistence and empirical investigation of how historical institutions interact with contemporary forces that promote institutional change are particularly central areas for future research.

6. Data Appendix

6.1 Data used to assess the mita's impact on long run economic development

***Mita* assignment.** A list of districts that contributed to the *mita* is taken from Saignes (1984) and Amat y Juniet (1947, p. 249, 284), and confirmed using a number of other sources. While authorities made small alterations to the geographic extent of the *mita* during the first five years of its operation, the districts that were required to contribute conscripts did not change between 1578 and the *mita'*s abolition in 1812.[33] District boundaries during the colonial period bear many similarities with district boundaries today, which facilitates matching. Colonial and modern administrative units are matched using information contained in Rodriguez Gutierrez (2000), Bachmann (1869), and Bueno (1951 [1764-1778]).

Living Standards. Household level data on consumption and ethnicity are from the National Household Survey (ENAHO), which the Peruvian Institute of Statistics and Information (INEI) collected in the fourth quarter of 2001. ENAHO is similar in methodology to the World Bank Living Standards Measurement Surveys, but offers a substantially larger sample and more extensive geographic coverage. Consumption is measured in 2000 soles. I subtract total transfers from total consumption, and normalize to Lima metropolitan prices using the local deflation factors provided in ENAHO (2001).

Geographic controls. I obtain the coordinates of district capitals from departmental statistical reports published by INEI (2001). A GIS map with district administrative boundaries was also produced by INEI. I first code each district as inside or outside the *mita* catchment using the *mita* assignment data described above. Then, I use geospatial software to calculate the Euclidean distance of each district capital to Potosi and to the nearest point on the *mita* boundary, as well as the location of the point.[34]

Elevation data are from the Shuttle Radar Topography Mission (SRTM), organized by the U.S. National Aeronautics and Space Agency (2000). The data are at 30 arc second resolution, which corresponds to a cell size of around one square kilometer. I use the SRTM data to obtain both the area-weighted elevation and slope within each district.[35]

I utilize soil type data, at a scale of one to five million, produced by the Soil Terrain Database for Latin America (SOTERLAC). I construct a series of soil type dummies equal to one for the soil type(s) which predominate over the greatest percentage of the district's landmass area, and zero otherwise.

[33] The first *mita repartimiento* (list of subjected districts) was drawn up in 1573. In 1578, eighteen districts subjected in the previous 1575 list do not reappear. They were primarily districts with small populations and do not appear in any later colonial censuses, which suggests that they were incorporated into nearby districts or disappeared entirely due to population collapse (Bakewell, 1984, p. 83). Moreover, several districts in Condesuyos (now part of Arequipa) were briefly required to contribute in 1578, but were subsequently re-exempt. Finally, in 1578, the Uros, who had previously been required to contribute two-sevenths of their population (because they were thought to be untrustworthy), had their quota reduced to the standard one-seventh.

[34] An equidistant cylindrical projection is used to ensure that distances are not distorted when projecting the earth's surface to a flat plain.

[35] For these calculations, I use the UTM WGS1984 – Zone 18S projection, which produces very little distortion when calculating surface areas for the region examined in this paper.

Local tribute data. Data on local economic capacity at the date of the *mita*'s enactment are drawn from Viceroy Francisco Toledo's *Tasa de la Visita General* (Tribute Assessment, General Visit), which assigned tribute at the level of the district-socioeconomic group based on local economic prosperity (Miranda, 1975 [1583]). It is estimated that the original documents from the *visita* comprised 6,000 to 12,000 folios (Cook, 1975). Cristobal de Miranda produced an unabridged copy of the tribute assessment portion of these documents in 1583. This copy, published by David Noble Cook (1975), has been preserved for all districts in the study region, where data were collected primarily in 1572 and 1573. This region consists of 210 1572 districts, which are aggregated to the modern district level for analysis. To match *encomienda* and current administrative boundaries, I use information on Peruvian political demarcation contained in Rodriguez Gutierrez (2000), Julien (1987), and Bachmann (1869), as well as *encomienda* maps produced by Puente Brunke (1992).[36]

Data used for additional robustness checks. The variable indigenous is taken from ENAHO (2001), which asks the household head and spouse the primary language they speak at home. This indicator is coded as one if the household head primarily speaks an indigenous language (in most cases Quechua) and is coded as zero otherwise. The locations of rivers are found using a GIS dataset of world rivers prepared by the Earth Science Research Institute (2004). The locations of Inca royal estates are obtained from D'Altoy (2002). D'Altoy provides a comprehensive list of estates that are mentioned in Inca histories written during the colonial era or that have been located by modern archaeological digs. Data on migration are from the 1993 Population Census.

6.2 Data on Channels

Haciendas. Data on the concentration of *haciendas* in 1689 are contained in detailed parish reports commissioned by Bishop Manuel de Mollinedo and submitted by all parishes in the bishopric of Cusco. The bishopric included present day Cusco and Apurimac departments, as well as portions of modern Puno and Arequipa departments, thus providing coverage for most districts within 100 kilometers of the *mita* boundary. The reports, submitted by 134 parishes, range from one to thirty-nine pages. All list the number of *haciendas* in the parish's jurisdiction. The data are at the level of the parish subdivision. They are aggregated to modern districts using Bueno (1951 [1764-1778]) and Bachmann (1869). Information in the reports on distance to nearby towns and districts serves as an additional check on matching. The reports were published by Horacio Villanueva Urtega (1982).

I also utilize district level data on *haciendas* from the 19th century. These data, collected by the republican government and preserved in the Treasury Section of Cusco's Municipal Archives, give the percentage of the rural tributary population (males between the ages of 18 and 50) residing in *haciendas*, for districts in the present-day departments of Cusco and Apurimac. Data from 1826, 1830, 1831, and 1836 are combined to form the c. 1830 dataset. For some districts, data are available for more than one year within this period. The numbers provided change very little, and the earliest observation is used. The data are contained in Victor Peralta Ruiz's 1991 compilation of Cusco tribute records.

[36] Nine 1572 districts cannot be matched precisely with current districts because their exact locations are unknown. Most had very low populations and likely disappeared soon after 1572 due to population collapse (Cook, 1982). The provinces in which these districts were located are known, and I match them with the contemporary provincial capitals. If I instead drop these observations, results are unchanged.

Finally, data from the 1940 Peruvian Population Census on the number of inhabitants in over 23,000 population centers (where anything from a small rural hut to a large city is classified as a population center) are aggregated to the district level to calculate the percentage of the rural population residing in *haciendas*. The census specifically uses the category '*hacienda'* in classifying population centers. Other rural categories are recognized and unrecognized indigenous communities and peasant landholdings of family or sub-family size (*estancias)*.

Education. The 1876 Population Census provides district level data on literacy. For each district, it lists how many individuals are able to read, to write, or neither. A literate individual is defined as one who can read, write, or both. The 1940 and 1981 population censuses provide information on mean years of schooling in each district. Individual level data on years of schooling are drawn from ENAHO 2001. Finally, the 2006 Educational Census, conducted by the Department of Education, lists the mean student-to-teacher ratio in publicly financed primary schools, by district.

Road networks. I calculate the densities of local and regional road networks using a GIS road network map of Peru, produced by the Ministry of Transportation (2006). Roads are classified as paved, gravel, non-gravel, and *trocha carrozable*. The total length of the respective type of road within each district, accounting for changes in elevation, is divided by the surface area of the district to obtain a road network density. Data on the type of road providing access to district capitals (paved, dirt, horse track, or footpath) are from the 2004 Peruvian Municipal Register, a census of district capitals collected by INEI.

Shining Path. Data on the percent of votes cast blank or null in the 1989 municipal elections come from Pareja and Gatti (1990), as do data on whether provincial and district authorities were renewed. Data on blank/null votes in 2002 are from the National Elections Board (*Oficina Nacional de Procesos Electorales*).

Consumption Channels. District level data on the percentage of the labor force whose primary occupation is agriculture are obtained from the 1993 Peruvian Population Census, collected by INEI. The 1994 Peruvian Agricultural Census is used to investigate market participation and supplementary employment. An agricultural household is defined as participating in markets if it sold at least part of its produce from one of its plots produced during the most recent harvest in markets

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References

Acemoglu, Daron, Simon Johnson, and James A. Robinson. 2001**.** "The Colonial Origins of Comparative Development: An Empirical Investigation." *American Economic Review,* 91: 1369-1401.

Acemoglu, Daron, Simon Johnson, and James A. Robinson. 2002. "Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution." *Quarterly Journal of Economics,* 118: 1231-1294.

Acemoglu, Daron, Maria Angelica Bautista, Pablo Querubin, and James A. Robinson. 2007. "Economic and Political Inequality in Development: The Case of Cundinamarca, Colombia." http://econ-www.mit.edu/files/222.

Agreda, Victor and Javier Escobal. 1998. "Analasis de la comercializacion agricola en el Peru." *Boletin de opinion,* 33.

Alvarez, Elena and Jose Maria Caballero. 1980. *Aspectos cuantitativos de la reforma agraria, 1969-1979*. Lima: Instituto de Estudios Peruanos.

Amat y Juniet, Manuel de. 1947. *Memoria de Gobierno*. Sevilla.

Arzans de Orsua y Vela, Bartolome. 1975. *Historia de la Villa Imperial de Potosi.* ed. Lewis Hanke and Gunnar Mendoza. Providence: Brown University Press.

Avila, Jose. 1952. *Exposicion e causas que justifican la necesidad de la reforma agraria en el distrito de Azangaro de la provincia del mismo nombre, Puno.* Cusco: Universidad Nacional del Cusco.

Bachmann, Carlos J. 1869. *Historia de la demarcacion politica del Peru.* Lima: Impr. G. Clauss.

Bakewell, Peter. 1984. *Miners of the Red Mountain. Indian Labor in Potosi,* 1545-1650. Albuquerque: University of New Mexico Press.

Banerjee, Abhijit and Laskshmi Iyer. 2005. "History, Institutions, and Economic Performance: The Legacy of Colonial Land Tenure Systems in India." *American Economic Review,* 95(4): 1190-1213.

Bauer, Brian and Alan Covey. 2002. "Processes of State Formation in the Inca Heartland (Cusco, Peru)." *American Anthropologist,* 104(3): 846-864.

Bloom, David and Jeffrey Sachs. 1998. "Geography, Demography and Growth in Africa." *Brookings Papers on Economic Activity,* 2: 207-273.

Bockstette, Valerie, Areendam Chanda, and Louis Putterman. 2002. "States and Markets: The Advantage of an Early Start."*Journal of Economic Growth,* 7(4): 347-369.

Brenner, Robert. 1976. "Agrarian Class Structure and Economic Development in Pre-Industrial Europe." *Past and Present,* 70: 30-75.

Brisseau, Janine. 1981. *Le Cuzco dans sa région : étude de l'aire d'influence d'une ville andine.* Lima: Institut français d'études andines.

Bueno, Cosme. 1951. Geografia del Peru Virrenial. Lima: Daniel Valcarcel.

Bustamante Otero, Luis H. 1987. "Mita y realidad: Teodomerio Gutierrez Cuevas o Rumi Maqui en el marco de la sublevacion campesina de Azangaro: 1915-1916." PhD diss. Pontificia Universidad Catolica del Peru.

Canete, Pedro Vicente. 1794. *El código carolino de ordenanzas reales de las minas de Potosí y demas provincias del Río de la Plata.* ed. Eduardo Martiré. Buenos Aires, 1973.

Capunay, Manuel. 1951. *Leguía, vida y obra del constructor del gran Perú*. Lima.

Center for International Earth Science Information Network. 2004. Global Rural-Urban Mapping Project, Alpha Version: Population Grids. Socioeconomic Data and Applications Center (SEDAC), Columbia University. Available at http://sedac.ciesin.columbia.edu/gpw. (May 10th, 2007).
Cieza de Leon, Pedro de. 1959. *The Incas*. Norman: University of Oklahoma Press.
Cieza de Leon, Pedro de. 1551. *El Senorio de los Incas; 2a. parte de la Cronica del Peru.* Lima: Instituto de Estudios Peruanos, 1967.
Coatsworth, John. 2005. "Structures, Endowments, and Institutions in the Economic History of Latin America." *Latin American Research Review*, 40(3): 126-144.
Cole, Jeffrey. 1985. *The Potosi Mita 1573-1700. Compulsory Indian Labor in the Andes*. Stanford: Stanford University Press.
Comision de la Verdad y Reconciliacion. 2003. *Informe Final*. Lima.
Conley, Timothy. 1999. "GMM Estimation with Cross Sectional Dependence." *Journal of Econometrics*, 92(1): 1-45.
Cook, Noble David. 1975. *Tasa de la visita general de Francisco Toledo*. Lima: Universidad Nacional de San Marcos.
Cook, Noble David. 1981. *Demographic Collapse: Colonial Peru 1520-1620*. Cambridge: Cambridge University Press.
Covey, Alan. 2006. *How the Incas built their heartland: state formation and the innovation of imperial strategies in the Sacred Valley, Peru*. Ann Arbor: University of Michigan Press.
D'Altoy, Terence. 2002. *The Incas*. Oxford: Blackwell Publishers.
Dancuart, Emilio and Jose Rodriguez. 1902. *Anales de la hacienda publica del Peru.* 24 vols. Lima: Imprenta de "La Revista" y Imprenta de Guillermo Stolte.
Deaton, Angus. 1997. *The Analysis of Household Surveys: A Microeconomic Approach to Development Policy.* Baltimore: Johns Hopkins University Press.
Diamond, Jared. 1997. *Guns, germs, and steel: the fates of human societies.* New York: W.W. Norton.
Direccion de estadistica del Peru. 1878. *Censo general de la republica del Peru, formatdo en 1876*. Lima: Imp. del Teatro.
Direccion de estadistica del Peru. 1944. *Censo Nacional de Poblacion y Ocupacion, 1940.* Lima.
Easterly, William and Ross Levine. 2003. "Tropics, germs, and crops: how endowments influence economic development." *Journal of Monetary Economics*, 50: 3–39
Engerman, Stanley and Kenneth Sokoloff. 1997. "Factors Endowments, Institutions, and Differential Paths of Growth Among New World Economies." *How Latin American Fell Behind.* ed. Stephen Haber. Stanford: Stanford University Press: p. 260-304.
Escobal, Javier. 2001. "The Benefits of Roads in Rural Peru: A Transaction Costs Approach." Grupo de Analisis para el Desarrollo (Lima)Working Paper.
Escobal, Javier and Carmen Ponce. 2002. "The Benefits of Rural Roads: Enhancing Income Opportunities for the Rural Poor." Grupo de Analisis para el Desarrollo (Lima) Working Paper 40.
Favre, Henri. 1967. "Evolucion y situacion de las haciendas en la region de Huancavelica, Peru." In *La Hacienda en el Peru*, ed. Henri Favre, Claude Collin-Delavaud, and Jose Matos Mar. Lima: Instituto de Estudios Peruanos, 237-257.
Flores Galindo, Alberto. 1987. *Buscando un inca: identidad y utopía en los Andes.* Lima: Instituto de Apoyo Agrario.

Garrett, David. 2005. *Shadows of Empire: The Indian Nobility of Cusco, 1750-1825*. Cambridge: Cambridge University Press.

Glaeser, Edward and Andrei Shleifer. 2002. "Legal Origins." *Quarterly Journal of Economics,* 117: 1193-1230.

Glaeser, Edward, Rafael LaPorta, Florencio Lopes-de-Silanes, and Andrei Shleifer. 2004. "Do Institutions Cause Growth?" *Journal of Economic Growth,* 9(3): 271-303.

Glave, Luis Miguel. 1989. *Trajinantes: Caminos indigenas de la sociedad colonial*. Lima: Instituto de Apoyo Agraria.

Glave, Luis Miguel and Maria Isabel Remy. 1978. "Estructura Agraria e historia rural cuzquena: a proposito de las haciendas del Valle Sagrado: 1780-1930." Cuzco, Archivo Historico del Cuzco.

Golte, Jürge. 1980. *La racionalidad de la organizacion andina*. Lima: Insituto de Estudios Peruanos.

Gonzales Castro, Edward. 2006. Personal Interview. 14 December.

Hall, Robert and Charles Jones. 1999. "Why do some countries produce so much more output per worker than others?" *Quarterly Journal of Economics,* 114: 83–116.

Hazen, Dan. 1974. "The Awakening of Puno: Government Policy and the Indian Problem in Southern Peru, 1900-1955." PhD diss. Yale University.

Hyslop, John. 1984. *The Inka Road System.* New York: Academic Press.

Instituto Nacional de Estadistica e Informacion de Peru. 1981. *VIII Censo de Poblacion.*

Instituto Nacional de Estadistica e Informacion de Peru. 1993. *IX Censo de Poblacion.*

Instituto Nacional de Estadistica e Informacion de Peru. 1994. *Tercer Censo Nacional Agropecuario.*

Instituto Nacional de Estadistica e Informacion de Peru. 2001. *Encuesta Nacional de Hogares* (ENAHO).

Instituto Nacional de Estadistica e Informacion de Peru. 2004. *Registro Nacional de Municipalidades (*REMANU).

ISRIC World Soil Information. 2007. *SOTER for Latin America and Caribbean, Version 2.*

Jacobsen, Nils. 1993. *Mirages of Transition: The Peruvian Altiplano, 1780-1930*. Berkeley: University of California Press.

Julien, Catherine. 1987. "The Uru Tribute Category; Ethnic Boundaries and Empire in the Andes." *Proceedings of the American Philosophical Society,* 131(1): 53-91.

Keith, Robert G. 1971. "Encomienda, Hacienda and Corregimiento in Spanish America: A Structural Analysis." *Hispanic American Historical Review,* 51(3): 431-446.

Larson, Brooke. 1982. *Explotacion Agraria y Resistencia Campesina en Cochabamba.* La Paz: Centro de Estudios de la Realidad Economico y Social.

Larson, Brooke. 1988. *Colonialism and agrarian transformation in Bolivia: Cochabamba, 1550-1900.* Princeton: Princeton University Press, 1988

Levillier, Roberto. 1921. *Gobernantes del Perú, cartas y papeles, siglo XVI; documentos del Archivo de Indias.* Madrid: Sucesores de Rivadeneyra.

Mar, Matos and Manuel Mejia. 1980. *La reforma agraria en el Peru.* Lima: Instituto de Estudios Peruanos.

McClintock, Cynthia. 1998. *Revolutionary movements in Latin America: El Salvador's FMLN and Peru's Shining Path*. Washington, D.C.: United States Institute of Peace Pres, 1998.

Ministro de Eduacion del Peru. 2006. *Censo Escolar.* Lima. Available at www.minedu.gob.pe.

Miranda, Cristobal. 1583. *Tasa de la visita general de Francisco Toledo*. ed. Noble David Cook. Lima: Universidad Nacional de San Marcos, 1975.

Mitchell, William. 1991. *Peasants on the Edge: Crop, Cult, and Crisis in the Andes.* Austin: University of Texas Press.

Mollinedo, Manuel de. 1689. *Cuzco 1689: Informes de los parrocos al obispo Mollinedo.* ed. Horacio Villanueva Urteaga. Cusco: Casa Bartolome de las Casas, 1982.

Morner, Magnus. 1978. *Perfil de la sociedad rural del Cuzco a fines de la colonia.* Lima: Universidad del Pacifico.

National Aeronautics and Space Administration and the National Geospatial-Intelligence Agency. 2000. Shuttle Radar Topography Mission 30 Arc Second Finished Data.

Niles, Susan. 1987. *Callachaca: Style and Status in an Inca Community*. Iowa City: University of Iowa Press.

Nunez, J. Teofilo. 1913. *Memoria leida de la ceremonia de aperture del ano judicial de 1913 por el Presidente de la Ilustrisima Corte Superior de los departamentos de Puno y Madre de Dios, Dr. J. Teofilo Nunez.* Puno: Imprenta del Seminario.

Nunn, Nathan. 2008. "The Long-Term Effects of Africa's Slave Trades." *Quarterly Journal of Economics*, 123(1).

Nunn, Nathan and Diego Puga. 2007. "Ruggedness: The Blessing of Bad Geography in Africa." http://diegopuga.org/papers/rugged.pdf.

Palmer, David S. 1994. *The Shining Path of Peru*. New York: St. Martin's Press.

Pareja Pflucker, Piedad and Aldo Gatti Murriel. 1990. *Evaluacion de las elecciones municipales de 1989: impacto politico de la violencia terrorista.* Lima: Instituto Nacional de Planificacion.

Peralta Ruiz, Victor. 1991. *En pos del tributo: Burocracia estatal, elite regional y comunidades indigenas en el Cusco rural (1826-1854).* Cusco: Casa Bartolome de las Casas.

Peru, Direcion de Estadistica. 1944. *Censo Nacional de Poblacion y Ocupacion, 1940*. Lima.

Peru, Espinar Municipal Government. 2008. "Vision." January 12th www.muniespinar.gob.pe/vision.php.

Portocarrero, Gonzalo and Patricia Oliart. 1989. *El Peru desde la escuela.* Lima: Instituto de Apoyo Agrario.

Portocarrero, Felipe, Arlette Beltran, and Alex Zimmerman. 1988. *Inversiones publicas en el Peru (1900-1968). Una aproximacion cuantitativa,* Lima: CIUP.

Puente Brunke, Jose. 1992. *Encomienda y encomenderos en el Peru: Estudio social y politico de una institucion colonial.* Sevilla: Diputacion Provincial.

Pulgar Vidal, Javier. 1950. *Geografia del Peru: Las ocho regiones naturales del Peru*. Lima: Editorial Universo.

Ramos Zmbrano, Augusto. 1984. *La Rebelion de Huancane: 1923-1924.* Puno: Editorial Samuel Frisancho Pineda.

Real Academia Espanola. 2006. *Diccionario de la lengua Espanola.* www.rae.es.

Roca Sanchez, P. Erasmo. 1935. *Por la clase indigena.* Lima: Pedro Barrantes Castro.

Rodriguez Gutierrez, Wilo. 2000. *El Peru en casa: demarcacion territorial.* Lima: Servicio de Investigaciones Parlamentarias.

Romero, Emilio. 1949. *Historia economica del Peru.* Buenos Aires: Sudamericano.

Rostworowski de Diez Canseco, Maria. 1962. “Nuevos datos sobre tenencia de tierras reales en el incario.” *Revista del Museo Nacional*, 31: 130-159.
Rowe, John. 1946. “Inca Culture at the Time of the Spanish Conquest.” *Handbook of South American Indians*. ed Julian Steward. Washington D.C.: Bureau of American Ethnology 2: 183-330.
Sachs, Jeffrey. 2001. “Tropical underdevelopment.” National Bureau of Economic Research Working Paper 8119.
Saignes, Thierry. 1984. "Las etnias de Charcas frente al sistema colonial (Siglo XVII): Ausentismo y fugas en el debate sobre la mano de obra indigena, 1595-1665." *Jahrbuchfr Geschichte (JAS)*, 21: 27-75.
Sala i Vila, Nuria. 1991. *Revueltas indígenas en el Perú tardocolonial*. Barcelona: Universitat de Barcelona.
Sanchez-Albornoz, Nicolas. 1978. *Indios y tributos en el Alto Peru*. Lima: Instituto de Estudios Peruanos.
Shifter, Michael. 2004. “Breakdown in the Andes.” *Foreign Affairs.* September/October.
Spalding, Karen. 1974. *De indio a campesino: Cambios en la estructura social del Peru colonial*. Lima: Instituo de Estudios Peruanos.
Starn, Orin. 1991. “Sendero, soldados y ronderos en el Mantaro.” *Quehacer*, 74:60-68.
Stein, Steve. 1980. *Populism in Peru: The emergence of the masses and the politics of social control.* Madison: University of Wisconsin Press.
Tamayo Herrera, Jose. 1982. *Historia social e indigenismo en el Altiplano.* Lima: Ediciones Treintaitres.
Tandeter, Enrique. 1993. *Coercion and market: silver mining in colonial Potosí,1692-1826.* Albuquerque: University of New Mexico Press.
Urquiaga, Jose. 1916. *Sublevaciones de indigenas en el departamento de Puno.* Arequipa.
Villanueva Urteaga, Horacio. 1971. “Documentos sobre Yucay en el siglo XVI,” *Revista del Archivo Historico del Cuzco,* 1-148.
Wightman, Ann. 1990. *Indigenous Migration and Social Change: The Forasteros of Cuzco, 1570-1720.* Durham: Duke University Press.
Zavala, Silvio. 1980. *El servicio personal de los indios en el Peru*. Mexico City: El Colegio de Mexico.

Table 1: Summary Statistics

	Sample falls within:											
	<100 km of *mita* boundary			<75 km of *mita* boundary			<50 km of *mita* boundary			<25 km of *mita* boundary		
	Inside	Outside	SE	Inside	Outside	SE	Inside	Outside	SE	Inside	Outside	SE
GIS Measures												
Elevation	4049	3984	[189.63]	4086	4063	[172.88]	4140	4071	[167.05]	4132	4047	[144.31]
			(85.00)			(83.07)			(86.35)			(108.18)
Slope	5.90	7.93	[0.94]**	6.11	7.77	[0.94]*	6.15	7.67	[1.00]	6.40	7.84	[0.94]
			(0.51)***			(0.54)***			(0.59)**			(0.78)*
Number of observations	176	100		143	91		104	77		57	51	
Percent indigenous	63.33	60.10	[10.19]	70.53	66.00	[6.76]	70.04	66.00	[7.04]	75.95	67.08	[11.15]
			(9.61)			(7.96)			(8.26)			(10.67)
Number of observations	1118	386		811	350		671	350		395	240	
Log 1572 tribute rate	1.614	1.606	[0.040]	1.612	1.607	[0.043]	1.634	1.604	[0.044]	1.650	1.602	[0.025]
			(0.029)			(0.032)			(0.033)			(0.024)
Number of observations	63	42		49	38		36	31		20	24	

The unit of observation is twenty kilometer by twenty kilometer grid cells for the geospatial measures, the household for ‘Percent indigenous’, and the district for ‘Log 1572 tribute rate.’ Conley standard errors for the difference in means between *mita* and non-*mita* observations are in brackets. Robust standard errors for the difference in means are in parentheses. For ‘percent indigenous’, the robust standard errors are corrected for clustering at the district level. The geospatial measures are calculated using elevation data at 30 arc second (one kilometer) resolution (SRTM, 2000). A household is indigenous if its members primarily speak an indigenous language in the home (ENAHO, 2001). In the first three columns, the sample includes only observations located less than 100 kilometers from the *mita* boundary, and this threshold is reduced to 75, 50, and finally 25 kilometers in the succeeding columns. Coefficients that are significantly different from zero are denoted by the following system: *10%, **5%, and ***1%.

Table 2: Household Consumption

	Dependent variable is log equivalent household consumption in 2001			
sample falls within	<100 km of *mita* boundary	<75 km of *mita* boundary	<50 km of *mita* boundary	<25 km of *mita* boundary
	(1)	(2)	(3)	(4)
Panel A: Distance to Potosi				
Mita	-0.278**	-0.303**	-0.336***	-0.375***
	(0.120)	(0.121)	(0.116)	(0.110)
Elevation	-0.336***	-0.268	-0.233	-0.654
	(0.117)	(0.175)	(0.163)	(0.394)
Slope	-0.018	-0.010	-0.002	-0.043
	(0.017)	(0.015)	(0.018)	(0.036)
R^2	0.05	0.04	0.04	0.08
Number of Clusters	72	60	53	31
Number of observations	1504	1161	1021	635
Panel B: Distance to the mita boundary				
Mita	-0.247**	-0.249**	-0.235**	-0.298***
	(0.101)	(0.101)	(0.103)	(0.084)
Elevation	-0.212*	-0.264*	-0.305	-0.546*
	(0.123)	(0.154)	(0.185)	(0.283)
Slope	-0.012	-0.016	-0.018	-0.016
	(0.012)	(0.014)	(0.017)	(0.034)
R^2	0.05	0.05	0.04	0.09
Number of Clusters	72	60	53	31
Number of observations	1504	1161	1021	635

The unit of observation is the household. Robust standard errors, adjusted for clustering by district, are in parentheses. The dependent variable is log household equivalent consumption (ENAHO, 2001). Mita is an indicator equal to one if the household's district contributed to the *mita* and equal to zero otherwise (Saignes, 1984; Amat y Juniet, 1947, p. 249, 284). Elevation and slope are the mean area weighted elevation and slope of the household's district. The unit of measure for elevation is 1000 meters and for slope is degrees. Panel A includes a cubic polynomial in Euclidean distance from the household's district capital to Potosi, and Panel B includes a cubic polynomial in Euclidean distance to the nearest point on the *mita* boundary. All regressions include soil type indicators, a boundary segment fixed effect, an interaction between the boundary segment fixed effect and distance (to Potosi in Panel A and the *mita* boundary in Panel B), and demographic controls for the number of infants, children, and adults in the household. In the first column, the sample includes households whose district capitals are located within 100 kilometers of the *mita* boundary, and this threshold is reduced to 75, 50, and finally 25 kilometers in the succeeding columns. Coefficients that are significantly different from zero are denoted by the following system: *10%, **5%, and ***1%.

Table 3: Specification Tests

	Dependent variable is log equivalent household consumption in 2001											
	Baseline	Control for ethnicity	Includes Cusco	Excludes districts with Inca estates	Excludes portions of boundary formed by rivers	Flexible estimation of consump. equivalence	Alternative functional forms					Migration
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Mita	-0.336***	-0.248***	-0.473***	-0.343***	-0.336***	-0.339***	-0.349***	-0.235**	-0.327**	-0.327***	-0.234**	-0.248**
	(0.116)	(0.089)	(0.117)	(0.125)	(0.116)	(0.120)	(0.121)	(0.100)	(0.123)	(0.112)	(0.106)	(0.114)
Elevation	-0.233	-0.335**	-0.539***	-0.229	-0.233	-0.224		-0.301*	-0.236	-0.233	-0.265	-0.236
	(0.163)	(0.132)	(0.152)	(0.271)	(0.163)	(0.167)		(0.178)	(0.167)	(0.167)	(0.171)	(0.160)
Slope	-0.002	-0.017	-0.047***	-0.005	-0.002	-0.004		-0.009	-0.004	-0.007	-0.015	-0.014
	(0.018)	(0.015)	(0.015)	(0.027)	(0.018)	(0.018)		(0.016)	(0.016)	(0.019)	(0.015)	(0.018)
Indigenous		-0.580***										
		(0.074)										
f(distance)	cubic	cubic	cubic	cubic	cubic	cubic	cubic	linear	quadratic	quartic	none	cubic
Cubic in elevation	no	no	no	no	no	no	yes	no	no	no	no	no
Cubic in slope	no	no	no	no	no	no	yes	no	no	no	no	no
R^2	0.04	0.13	0.08	0.04	0.04	0.27	0.05	0.03	0.04	0.04	0.03	0.03
Number of clusters	53	53	58	48	52	53	53	53	53	53	53	53
Number of observations	1021	1021	1181	938	1000	1021	1021	1021	1021	1021	1021	1011

The unit of observation is the household. Robust standard errors, adjusted for clustering by district, are in parentheses. The dependent variable in columns (1) through (5) and (7) through (12) is log equivalent consumption, and the dependent variable in column (6) is log total household consumption (ENAHO, 2001). f(distance) is a polynomial in the Euclidean distance from the observation's district capital to Potosi. All regressions include soil type indicators, a boundary segment fixed effect, and an interaction between the boundary segment fixed effect and distance to Potosi. Columns (1) through (5) and (7) through (12) include demographic controls for the number of infants, children, and adults in the household, and column (6) includes controls for the log of household size and the ratio of children to household members. The samples include observations whose district capitals are less than 50 kilometers from the *mita* boundary. Coefficients that are significantly different from zero are denoted by the following system: *10%, **5%, and ***1%.

Table 4: 1572 Tribute Rate

	Dependent variable is:							
	Log 1572 tribute rate							
	All districts	In ENAHO sample	Alternative functional forms					District log equiv. consump.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mita	0.022	0.003	0.016	0.021	0.021	0.023	0.013	-0.278**
	(0.021)	(0.015)	(0.020)	(0.018)	(0.021)	(0.021)	(0.025)	(0.131)
Elevation	-0.038	0.001		-0.039	-0.038	-0.037	0.02	-0.193
	(0.040)	(0.038)		(0.040)	(0.039)	(0.040)	(0.053)	(0.188)
Slope	0.004	0.002		0.003	0.003	0.004	-0.001	0.014
	(0.006)	(0.006)		(0.006)	(0.006)	(0.007)	(0.007)	(0.019)
f(distance)	cubic	cubic	cubic	linear	quadratic	quartic	none	cubic
Cubic in elevation	no	no	yes	no	no	no	no	no
Cubic in slope	no	no	yes	no	no	no	no	no
R^2	0.71	0.83	0.74	0.70	0.70	0.71	0.55	0.43
Number of observations	67	33	67	67	67	67	67	53

The dependent variable in columns (1) through (7) is the log of the district's mean 1572/1573 tribute rate (Miranda, 1975 [1583]) and in column (8) is the log of the district's mean equivalent household consumption (ENAHO, 2001). Robust standard errors are reported in parentheses. f(distance) is a polynomial in the Euclidean distance from the district's capital to Potosi. All regressions include soil type indicators, a boundary segment fixed effect, and an interaction between the boundary segment fixed effect and distance to Potosi. The samples include districts whose capitals are less than 50 kilometers from the *mita* boundary. Columns (1) through (7) are weighted by the square root of the district's tributary population, and column (8) is weighted by the square root of the sample size in the district. Coefficients that are significantly different from zero are denoted by the following system: *10%, **5%, and ***1%.

Table 5: Land Tenure and Labor Systems

	Dependent variable is:				
	Haciendas per district in 1689	*Haciendas* per 1000 district residents in 1689	Percent of rural tributary population in *haciendas* in 1800	Percent of rural population in *haciendas* in 1940	Land gini in 1994
	(1)	(2)	(3)	(4)	(5)
Mita	-10.572***	-4.824**	-0.150**	-0.154***	0.026
	(2.315)	(2.236)	(0.061)	(0.050)	(0.019)
Elevation	-5.490	-6.825	0.171	-0.043	0.035
	(3.814)	(4.972)	(0.103)	(0.100)	(0.035)
Slope	0.272	0.178	0.009	0.026**	-0.001
	(0.525)	(0.467)	(0.011)	(0.011)	(0.003)
R^2	0.46	0.30	0.57	0.42	0.34
Number of observations	83	83	71	124	192
Mean of dep. variable	6.313	5.869	0.145	0.376	0.894

The unit of observation is the district. Robust standard errors are in parentheses. The dependent variable in column (1) is *haciendas* per district in 1689 and in column (2) is *haciendas* per 1000 district residents in 1689 (Mollinedo, 1982 [1689]). In column (3) it is the percentage of the district's tributary population residing in *haciendas* c. 1830 (Peralta Ruiz, 1991), in column (4) it is the percentage of the district's rural population residing in *haciendas* in 1940 (*Censo Nacional de Poblacion y Ocupacion*, 1944), and in column (5) it is the land gini (*Tercer Censo Nacional Agropecuario*, 1994). All regressions include soil type indicators, a cubic polynomial in Euclidean distance from the district's capital to Potosi, a boundary segment fixed effect, and an interaction between the boundary segment fixed effect and distance to Potosi. The samples include districts whose capitals are less than 50 kilometers from the *mita* boundary. Column (3) is weighted by the square root of the district's rural tributary population and column (4) is weighted by the square root of the district's rural population. Coefficients that are significantly different from zero are denoted by the following system: *10%, **5%, and ***1%.

Table 6: Education

	Dependent variable is:				
	Literacy in 1876	Mean years of education in 1940	Mean years of education in 1981	Mean years of education in 2001	Primary school student-teacher ratio in 2006
	(1)	(2)	(3)	(4)	(5)
Mita	-0.022***	-0.201**	-0.125	-0.770*	-0.128
	(0.007)	(0.088)	(0.233)	(0.448)	(0.846)
Elevation	0.021	0.057	-0.063	0.160	-1.522
	(0.014)	(0.148)	(0.379)	(0.851)	(1.633)
Slope	0.003**	0.024*	-0.008	0.059	-0.566***
	(0.001)	(0.013)	(0.034)	(0.093)	(0.142)
R^2	0.38	0.31	0.23	0.02	0.42
Number of clusters				53	
Number of observations	99	123	114	4069	194
Mean of dep. variable	0.040	0.483	3.092	4.448	21.513

The unit of observation is the district in columns (1) through (3) and (5) and is the individual in column (4). Robust standard errors, adjusted for clustering by district, are in parentheses. The dependent variable is mean literacy in 1876 in column (1) (*Censo general de la republica del Peru*, 1878), mean years of schooling in 1940 in column (2) (*Censo Nacional de Poblacion y Ocupacion*, 1944), and mean years of schooling in 1981 in column (3) (*VIII Censo de Poblacion*, 1981). In column (4), it is individual years of schooling (ENAHO, 2001), and in column (5) it is the mean primary school student-to-teacher ratio (*Censo Escolar*, 2006). All regressions include soil type indicators, a cubic polynomial in Euclidean distance to Potosi, a boundary segment fixed effect, and an interaction between the boundary segment fixed effect and distance to Potosi. The samples include districts whose capitals are less than 50 kilometers from the *mita* boundary. Columns (1) through (3) are weighted by the square root of the district's population, and column (5) is weighted by the square root of the district's state primary school enrollment. Coefficients that are significantly different from zero are denoted by the following system: *10%, **5%, and ***1%.

Table 7: Roads

	Dependent variable is:				
	Density of local road networks	Density of regional road networks	Density of paved regional roads	Density of gravel regional roads	Access to district capital via paved road
	(1)	(2)	(3)	(4)	(5)
Mita	0.970	-41.704***	-19.938***	-19.634***	-0.240***
	(13.705)	(9.935)	(6.154)	(7.429)	(0.077)
Elevation	-73.603***	-37.093**	-10.091	3.205	0.035
	(22.229)	(15.005)	(8.735)	(9.742)	(0.118)
Slope	-5.904*	-6.367***	-2.859*	-0.999	-0.012
	(3.147)	(1.876)	(1.616)	(1.159)	(0.014)
R^2	0.21	0.22	0.19	0.10	0.23
Number of observations	195	195	195	195	179
Mean of dep. variable	82.100	35.168	5.206	15.501	0.257

The unit of observation is the district. Robust standard errors are in parentheses. The road densities are defined as total length in meters of the respective road type in each district divided by the district's surface area, in kilometers^2. They are calculated using a GIS map of Peru's road networks (Ministro de Transporte, 2006). In column (5), the dependent variable is an indicator equal to one if the district capital is accessed via a paved road and equal to zero otherwise (REMANU, 2004). All regressions include soil type indicators, a cubic polynomial in Euclidean distance from the district's capital to Potosi, a boundary segment fixed effect, and an interaction between the boundary segment fixed effect and distance to Potosi. The samples include districts whose capitals are less than 50 kilometers from the *mita* boundary. Coefficients that are significantly different from zero are denoted by the following system: *10%, **5%, and ***1%.

Table 8: Consumption Channels

	Dependent variable is:		
	Percent of district labor force in agriculture - 1993	Agricultural household sells part of produce in markets - 1994	Household member employed outside the agricultural unit - 1994
	(1)	(2)	(3)
Mita	0.017	-0.196***	-0.038*
	(0.057)	(0.037)	(0.020)
Elevation	-0.136	-0.069	0.050*
	(0.086)	(0.047)	(0.028)
Slope	-0.020**	-0.006	-0.002
	(0.009)	(0.008)	(0.003)
R-Squared	0.13	0.12	0.01
Number of clusters		188	192
Number of observations	182	161132	183827
Mean of dep. variable	0.497	0.144	0.257

The unit of observation is the district in column (1) and the agricultural household in columns (2) and (3). Robust standard errors, adjusted for clustering by district in columns (2) and (3), are in parentheses. The dependent variable in column (1) is the percentage of the district's labor force engaged in agriculture as a primary occupation (*IX Censo de Poblacion*, 1993). In column (2) the dependent variable is an indicator equal to one if the agricultural unit sells at least part of its produce in markets, and in column (3), it is an indicator equal to one if at least one member of the household pursues secondary employment outside the agricultural unit (*Tercer Censo Nacional Agropecuario*, 1994). All regressions include soil type indicators, a cubic polynomial in distance to Potosi, a boundary segment fixed effect, and an interaction between the boundary segment fixed effect and distance to Potosi. The samples include districts whose capitals are less than 50 kilometers from the *mita* boundary. Column (1) is weighted by the square root of the district's population. Coefficients that are significantly different from zero are denoted by the following system: *10%, **5%, and ***1%.

Table A1: 1572 Tribute Details

Tribute type	Percent of districts contributing	Mean per capita contribution	Standard deviation of contribution	Percent of total tribute
Precious metals	100	4.151	0.591	0.816
Grains	89.6	0.666	0.451	0.120
Textiles	53.7	0.348	0.227	0.037
Animals	92.5	0.146	0.093	0.027
Total	100	5.070	0.388	1.00

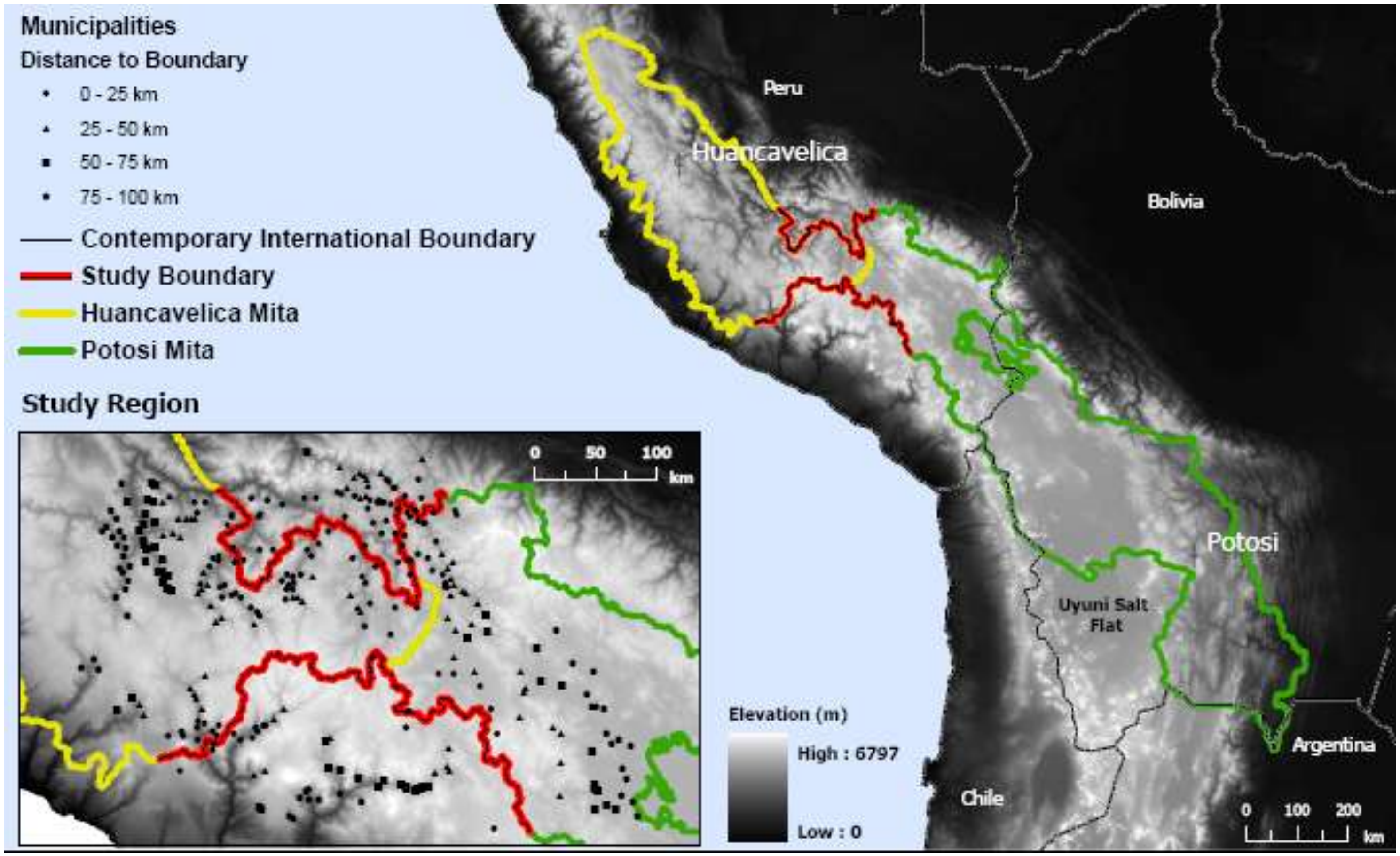
Source: Miranda (1975 [1583]). Values are in 1572 pesos. The sample is limited to fall within 100 km of the *mita* boundary

Table A2: Results Using an RD Polynomial in Distance to the *Mita* Boundary

	1572 Log Tribute Rate	1689 Haciendas	1830 Haciendas	1940 Haciendas	1876 Literacy	1940 Education	2001 Education	2006 Regional Road Density	2004 Access via Paved Road	1993 Ag. Labor Force	1994 Ag Market Particip.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Mita	0.006	-11.395***	-0.276***	-0.100*	-0.022***	-0.176**	-0.366	-46.160***	-0.255***	0.017	-0.213***
	(0.022)	(2.399)	(0.061)	(0.054)	(0.006)	(0.068)	(0.452)	(10.175)	(0.068)	(0.057)	(0.035)
Elevation	0.025	-4.433	0.223**	-0.127	0.016	0.001	-0.371	-24.005*	0.099	-0.136	-0.112***
	(0.049)	(3.993)	(0.095)	(0.127)	(0.012)	(0.124)	(0.842)	(13.649)	(0.108)	(0.086)	(0.041)
Slope	-0.005	0.092	0.028*	0.027**	0.003**	0.021*	-0.013	-7.066***	0.003	-0.020**	0.000
	(0.006)	(0.440)	(0.015)	(0.011)	(0.001)	(0.012)	(0.085)	(1.820)	(0.013)	(0.009)	(0.007)
R^2	0.64	0.45	0.49	0.40	0.38	0.39	0.01	0.22	0.26	0.13	0.13
Number of clusters	67	83	71	124	99	123	53	195	179	182	188
Number of observations	67	83	71	124	99	123	4069	195	179	182	161132

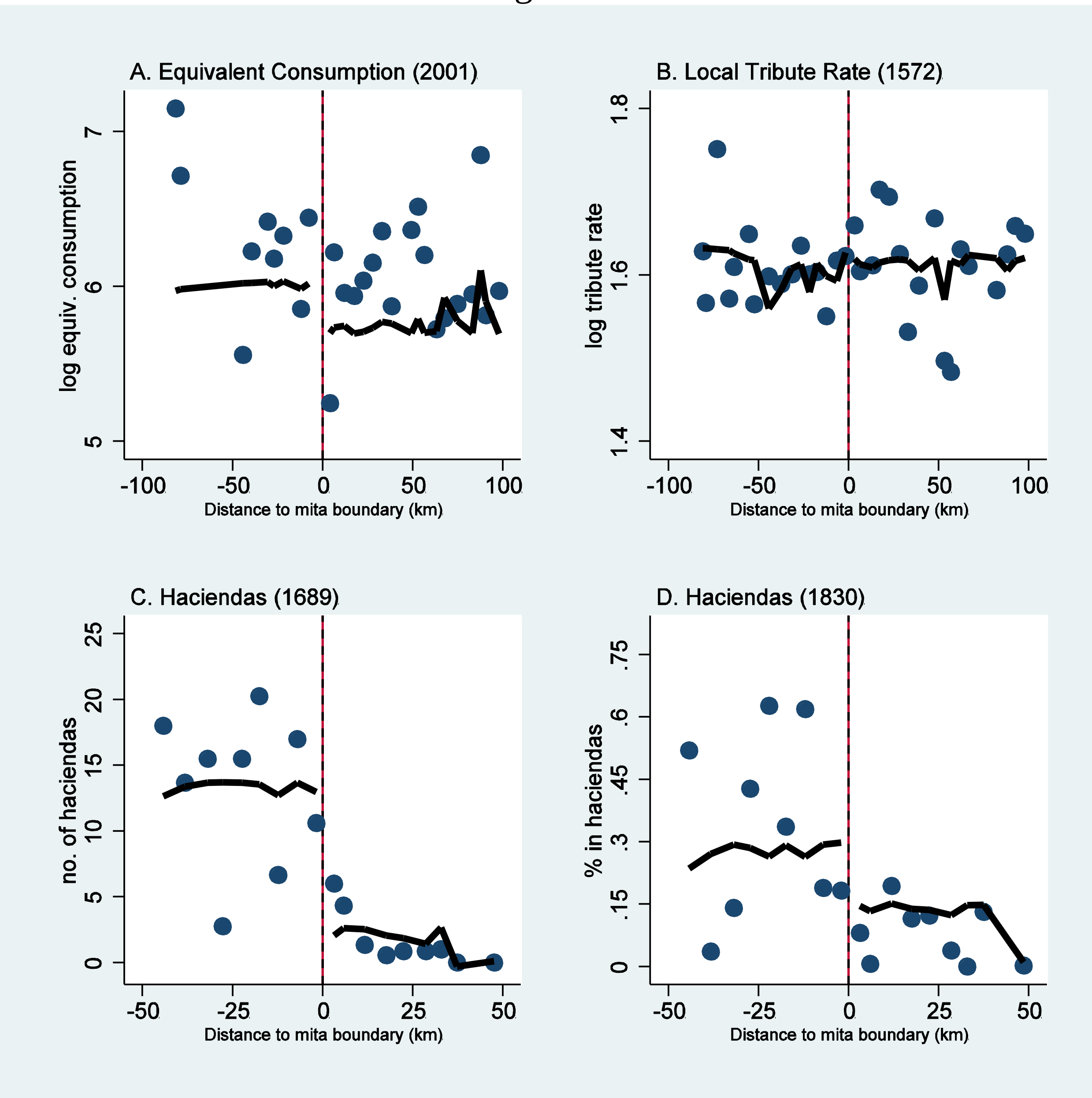
See the notes in the main tables for variable definitions and sources. All regressions include soil type indicators, a cubic polynomial in Euclidean distance from the district's capital to the nearest point on the *mita* boundary, a boundary segment fixed effect, and an interaction between the boundary segment fixed effect and distance to the *mita* boundary. The samples include districts whose capitals are less than 50 kilometers from the *mita* boundary. Coefficients that are significantly different from zero are denoted by the following system: *10%, **5%, and ***1%.

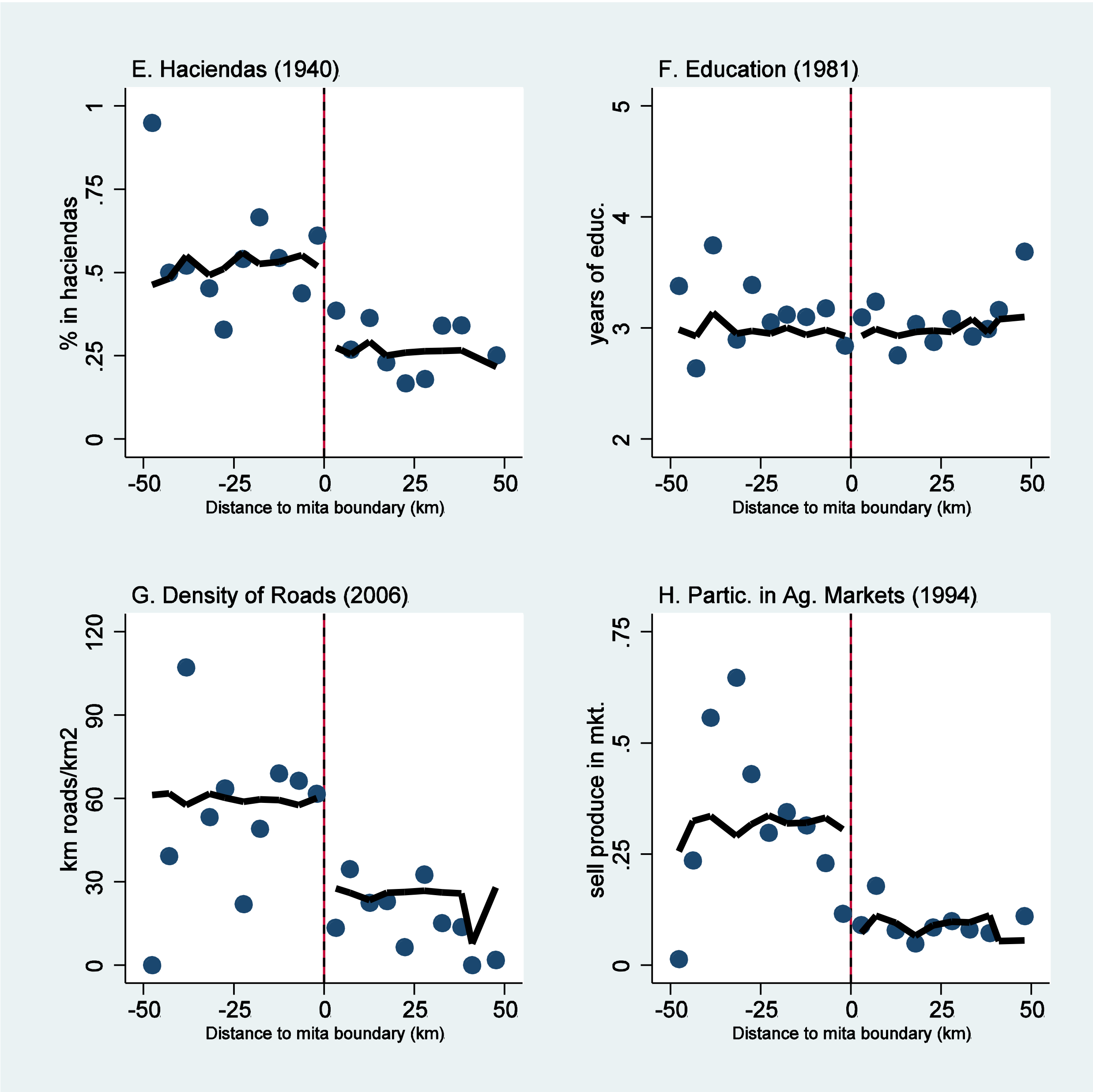
Figure 1



Municipalities
Distance to Boundary
0 - 25 km
25 - 50 km
50 - 75 km
75 - 100 km
Contemporary International Boundary
Study Boundary
Huancavelica Mita
Potosi Mita
Study Region
0 50 100 km
Elevation (m)
High : 6797
Low : 0
Peru
Huancavelica
Bolivia
Potosi
Uyuni Salt Flat
Chile
Argentina
0 100 200 km

Figure 2


A. Equivalent Consumption (2001)
log equiv. consumption
5
6
7
-100
-50
0
50
100
Distance to mita boundary (km)
B. Local Tribute Rate (1572)
log tribute rate
1.4
1.6
1.8
-100
-50
0
50
100
Distance to mita boundary (km)
C. Haciendas (1689)
no. of haciendas
0
5
10
15
20
25
-50
-25
0
25
50
Distance to mita boundary (km)
D. Haciendas (1830)
% in haciendas
0
.15
.3
.45
.6
.75
-50
-25
0
25
50
Distance to mita boundary (km)



This figure plots distance to the *mita* boundary against various outcomes. Each circle is the average outcome within 5 kilometer intervals of distance to the *mita* boundary. Circles to the left of the vertical line fall outside the *mita* catchment and circles to the right fall inside. Solid lines are fitted values from regressions that include a third order polynomial in distance to Potosi and the *mita* dummy.