Inequality in Republican Latin America: Assessing the Effects of Factor Endowments and Trade[*]

A. Leticia Arroyo Abad
Department of Economics
University of California, Davis

Abstract

Using a new dataset, this paper presents new evidence on inequality in Latin America for the 19th century and studies the effects of factor endowments and trade on inequality. Recent research has highlighted the link between the colonial origins of inequality and its persistence in Latin America. We find that inequality varied substantially throughout the century and across the region. We identify and quantify the impact of changing factor endowments and trade on inequality using a theoretical model of intertemporal inequality transmission based on asset ownership in an open economy subject to shocks. The results indicate that inequality in the Southern Cone rose during the era of globalization while it decreased in Mexico and Venezuela. The rise in inequality in Argentina and Uruguay is explained by the impact of favorable terms of trade and international migration; however, the effect was dampened by significant land annexation. On the other hand, the decline in Mexican and Venezuelan inequality is related to decreasing terms of trade amplified by the expansion of available arable land.

1 Introduction

Latin America has been famous for its unequal distribution of income and wealth. Currently, the region is the most unequal in the world. What are the causes behind this high inequality? Despite the renewed interest in explaining its recent evolution in the last decades, we know that the origins of Latin American inequality are rooted in the past. However, much is asserted but little is known about its historical evolution. Using freshly unearthed data from Latin American primary sources, this paper presents new evidence on this trajectory between 1830 and 1900, and a historically suitable theoretical model to explain these movements in Argentina, Mexico, Uruguay, and Venezuela. The new data reveal that inequality was far from stationary in early Republican times and its trajectory was not homogeneous across the region (see Figure 1). Exploiting the differences in changes in factor endowments and participation in world trade, we use counterfactual analysis to explore the alternative paths of inequality over time and within countries. Our analysis points that factor endowments and trade did matter a great deal. Rising terms of trade while increased trade, also increased inequality. So did population growth, especially due to migration. Finally, frontier expansion served to reduce inequality. Overall, this paper sheds light on the debate of the extent that inequality can be largely explained by initial historical conditions.

Two arguments dominate the current views of Latin American inequality in the very long run. The first one underlines the role of persistence of inequality in the region, strongly linking it to its colonial origins (Acemoglu et al., 2001a,b; Engerman and Sokoloff, 1997, 2000, 2002, 2004, 2005; Easterly, 2002, 2007). There is a second view that stresses transitions within the very long-run trajectory, transitions like movements into and out of the global economy (Bulmer-Thomas, 1994; Coatsworth, 2005; O'Rourke, 2001; O'Rourke et al., 1996a,b). Also known as "endowment theories", the first view states that initial endowment conditions shaped initial institutions in the new colonies. These institutions persisted over time and explain economic outcomes in the present. Engerman and Sokoloff claim that Latin American institutions are a product of initial factor endowments. Climate and soil conditions were suitable for different crops in the new colonies, giving rise to distinct concentration of wealth and institutions. These initial conditions favored institutions that perpetuated inequality over time. When comparing Latin America to the U.S., the differences in inequality and economic performance emerge from distinctive initial conditions. The egalitarian settler colonies of the north were the product of climatic and soil conditions conducive to mixed

farming with limited economies of scale. By contrast, Latin American initial factor endowments were more suitable for large scale agricultural production, historically known as plantations and haciendas. Acemoglu, Johnson, and Robinson also track inequality to colonial institutions but identify inhospitable disease environment as the main driving force behind the colonial institutional framework. Colonization strategies diverged throughout the New World and were strongly related to the feasibility of colonization. In locations where the environment was hostile to settlement, more unequal institutions were established. More generally, the environment shaped long-lasting institutions that directly affected economic development and inequality.

The second group stands in quite a different position. These authors observe changes in inequality and economic performance as the region increased its participation and integration into world markets. Looking at the post-colonial era, this view highlights the diverse Latin American economic trajectories after independence. Bulmer-Thomas stresses the role of the type of exports in the enhancing or impairing economic development after independence. Known as the "commodity lottery", exports were highly concentrated in a handful of products. Export concentration and high productivity in the export sector inaugurated the era of export-led growth just a few decades after independence. Export specialization and export-led growth had long-lasting economic development effects. Judged by the late colonial experience, the colonial institutional legacy does not hold according to Coatsworth. The GDP per capita gap in the early 19th century in the region was as wide as between the richest and poorest regions in the world. Moreover, Cuba's GDP per capita was the highest in the Spanish dominion while most likely one of the most unequal economies. Dismissing initial factor endowments as a plausible explanation, the author believes that the application and the implementation of colonial policies are much to blame for the region's institutional framework. The creole elites could have adapted the colonial institutions to their convenience; however, their power within the political and economic structure was rather weak. Concentration of wealth and power suggested by the "endowment theories" arose later in Latin American history, once independence was achieved and due to different reasons. Finally, O'Rourke, Taylor, and Williamson, using factor price ratios during the first era of globalization, found increasing inequality in the Southern cone countries. Their results indicate that both relative factor endowments and relative commodities prices matter in explaining the evolution of inequality.

The historical evidence for the colonial origins of Latin American inequality are easy to find. The Spanish and Portuguese colonization claimed the new found territory to the crown. In practice, large tracts of land were granted to conquistadors creating an unfamiliar dynamics between foreigners and the inhabitants of the region. Soon after the initial settlement, Spain devised new ways to exert control over the colonies. In the name of religion, the natives of these lands were educated in the Catholic faith and incorporated in the colonial production system.[1] Decimated mostly by European germs, the native population of Latin America could not provide enough labor to exploit the available natural resources.[2] As a consequence, a continuous flow of African slaves were employed in the most dynamic colonies in the region. Production of raw materials was how Latin America participated in a world trade, albeit controlled by the colonial metropolis. With few changes, this economic structure prevailed for three centuries.

Winds of change soon arrived to the colonies after the United States broke its ties to England and the Spanish crown itself was experiencing political turmoil at home. A chain reaction was experienced in Spanish Latin America. By early 19th century, most of the region had severed its colonial ties from Spain.[3] Although the political history of the Independence years is well-researched and documented, there is a gap in terms of economic history. With the exception of the late 19th century, most of our knowledge of this period remains in the dark. The political discontinuities experienced by the declaration of independence in these lands did not necessarily imply the same effects in the economic front. However, regardless of the efforts to maintain the prevailing structure, changes inevitably re-shaped the organization of Latin America (Haring, 1975; Skidmore and Smith, 2001). Independence allowed the modernization of the nation-states and further integration in the world economy (Coatsworth, 1993a,b). Latin American transition from colony to free state had tangible economic consequences. Each country experienced significant changes in population, land

---

[1]Three new institutions emerged: *mita, encomienda,* and *yanaconazgo. Mita* was indigenous labor assigned to mine work for a six month period. *Yanaconazgo* was applied to nomadic natives that were apportioned to Spaniards for perpetuity to facilitate their control. *Encomienda* was in theory an arrangement under which the Spaniard in charge was allocated a number (or community) of indigenous people to educate, support, and christianize them in return of labor.

[2]It is estimated that by Columbus arrival fifty million natives were living in the region, two-thirds were concentrated in Mexico and Peru. By the late seventeenth century, the population was down to three millions in the most populous areas (Livi-Bacci, 2006).

[3]In chronological order: Argentina (1810), Chile (1818), Mexico (1821), Peru (1821), Bolivia (1825), Paraguay (1825), Uruguay (1828), Republic of Colombia (Colombia, Ecuador, and Venezuela) (1829-30), Guatemala (1838), El Salvador (1838), Costa Rica (1838), Nicaragua (1838), Honduras (1838), Dominican Republic (1844), and Cuba (1902).

availability, together with ever-moving relative commodity prices, propelled shifts in inequality over time.

High economic inequality often overlaps with high social and political inequality.[4] During the early independent times, Latin American countries chose a republican system of government; however, political access was restricted. Not until the early 20th century was franchise extended to the entire male adult population. Unequal access to political representation may also have perpetuated and increased economic inequality. The exclusion of large segments of the population from political and social participation limited the economic opportunities for the lower classes. It is of partifcular interest to look at this nation-building period when political access remained in the hands of the elite while profound changes were taking place in the economic arena.

This paper provides a comparative overview of the main historical characteristics of each country's changes in population, land availability, and participation in world trade (Section 2) and a simple theoretical framework that links the effects of factor endowments and trade to inequality (Section 3). In addition, we present the first data on inequality for Argentina, Mexico, Uruguay, and Venezuela together with revised and extended figures on the labor force, land expansion, and terms of trade for the 19th century (Section 4). The theoretical model developed is then calibrated to estimate alternative counterfactual inequality trajectories. In particular, we look at the evolution of inequality taking into account different initial conditions and the effects of absence of migration to the Southern Cone countries, unfavorable terms of trade, and fixed land supply (Section 5).

2 Myths, Facts, and Conjectures on Latin American Inequality

Many of the challenges the region faces today have deep historical roots, yet it is important to take a more careful look at how far back these roots extend in each country's history. Many Latin American countries are still dependent on exporting raw materials, lack an efficient manufacturing sector, and exhibit the highest inequality rates in the world. One hundred years ago, several decades after independence, the region was also highly unequal, specialized in a handful of commodity exports, and had not made the transition to industrialization.

The contrasts among Argentina, Uruguay, Venezuela, and Mexico are particularly striking. While the two Southern cone countries exported mainly livestock byproducts and grains, Venezuela

---

[4]For a thorough discussion of inequality dimensions, see Justino and Acharya (2003).

specialized in plantations crops such as coffee and cacao, and Mexico in silver and agricultural products. In terms of factor endowments, all four countries brought large tracts of land into production throughout the 19th century. However, Argentina was the most labor scarce Latin American country throughout this period.

Table 1 sketches some of the contrasts at the end of the century of study. Unfortunately, some of the most basic indicators of development are not available for these countries for most of the 19th century. The early Republican years were plagued by internal instability as the region was attempting to shed its colonial legacy. However, by the turn of the 20th century, all four countries were on an expansionary path after embracing the well-known export-led strategy. Export specialization was the rule, as the four countries exports were concentrated in a handful of commodities. In terms of development, the differences among these four countries are striking. In 1900, the Argentine and Uruguayan levels of GDP per capita represented 71% and 54% of that of the United States, respectively; however, Mexico and Venezuela only amounted to 33% and 20% (Maddison, 2002). Looking at literacy, the picture by 1900 was quite similar: Argentina and Uruguay were the frontrunners with literacy rates of 51.5% and 59.4% respectively whereas Mexico and Venezuela lagged considerably behind (22.3% and 18.6%), far behind the United States, where 89.3% of the adult population was literate.

Looking at some measures of factor endowments, these countries inaugurated the new century exhibiting high rates of land concentration in relatively sparsely populated lands. The consolidation of the Republican era also resulted in landownership concentration: even though more households owned land in Argentina and Uruguay than in Mexico and Venezuela, independence did not achieve a more egalitarian ownership as in the United States.

2.1 Factor Endowments Affecting Inequality

Let us set the stage for new data on the historical movement of relative factor prices, by first looking at large international differences in forces that shaped the national histories of inequality. Inequality depends critically on the relative scarcity of factors of production and the distribution of their ownership. Engerman and Sokoloff (1997, 2000, 2004, 2005) have argued that the composition of factor endowments in the New World heavily influenced the shape and formation of the institutional framework. Given that the welfare state in these countries was virtually non-existent, the private

returns to land, labor, and capital are key variables to evaluate the trajectory of inequality in these times.

Domestic and external factors had sizable impacts on inequality. On one hand, the returns to factors of production were affected by their relative scarcity and by the international commodity markets. The availability and composition of factors of production changed substantially. Land was not a fixed factor of production in this part of the world: large tracts of land were added into production. In addition, the human population endured losses from violence in some cases, and major gains from immigration in others. Independence from Spain also implied increasing integration into world markets, which translated into the growth of the export sector and adaptation of the import-competing sector. On the other hand, the distribution of income was deeply influenced by colonial legacies on land access and representation. From the colonization onset, large-scale settlement was favored (Adelman, 1999). Furthermore, local representation was restricted to noble heritage and the landed elite, which in most cases overlapped.

The concentration of landownership in Latin America has deep colonial roots. Although urbanization and land reforms in the region have slightly reduced its relevance compared to the 19th and early 20th centuries, the significance of land extends beyond being a factor of production. In economies where domestic capital markets are underdeveloped and imperfect, land is the most important source of credit. It is used as collateral for financial leverage. Not having land inhibits prospects of social mobility. Latin America, today, has the most unequal distribution of land in the world.

Going back to the times of initial settlement, all land belonged to the Crown. In 1493 Pope Alexander VI granted to the Castilian crown the domain and ownership of the lands of the New World.[5] This implied that the lands were state property and could be passed to private hands only by royal mandate. Property rights were conferred to the explorers and their heirs. Conquistadors and qualified settlers received vast tracts of land as compensation for their services. Land sales were used to finance the metropolitan expenses. Lands were auctioned but required royal confirmation. Protection of the indigenous communities was at the heart of the numerous land-granting regulations but local implementation often deviated. In practice, those with political connections simply appropriated land by occupying it. An institutional arrangement dating back to pre-Columbian

---

[5]The New World was defined as the territory located one hundred leagues west of the Azores islands.

times, the *encomienda*, often translated into land ownership and facilitated further acquisition. Many haciendas were born through this system; however, land concentration was also the result of mining and trade profit investment and market production orientation (Florescano, 1978).

We often describe the ruling class in Latin America as the "landed elite". Being a landowner was indeed prestigious. It suggested economic success and social status. It also granted participation in the political system. The arrival of independence did not democratize land ownership. The new national governments hurried to determine and control their boundaries. Transferring public land into private ownership was an easy way to finance the independence wars, and vacant lands were soon brought into production. Throughout the 19th century the frontier was expanded in all Latin American countries (see Table 1). The ebb and flow of the frontier expansion acquired different forms ranging from centralized military campaigns in Argentina's Conquest of the Desert to private survey companies in Mexico. The share of the land annexed into production also differed. At the time of independence, only 6% of the total arable land in Buenos Aires province was in private hands. What followed was the most spectacular case of land incorporation in Latin America. Neighboring Uruguay transferred over 60% of its public lands to private hands in the period 1830-1900. In the more modest case of Venezuela, the frontier expanded only 12% throughout the century. (Consejo Nacional de Administración Uruguay, 1925; Infesta, 2003; Delahaye, 2003; Qamber, 1992).

The availability of labor in the New World differed considerably. Mexico and Peru had abundant indigenous labor while the Southern cone was sparsely populated. European contact severely depopulated the New World through disease, violence, and social disruption. The indigenous population shares were further reduced by the inflow of Iberian and African immigrants. The impact was not uniform in the region, and clear geographic patterns had emerged by the time of independence. The independence movements brought further human losses where violent confrontations took place, as in Haiti, Mexico, Venezuela, and Uruguay. Compared to the rest of the Spanish empire, the southern cone was underpopulated. Uruguay and Argentina combined had less than 5% of Mexico's population by the end of the 19th century. A shared characteristic for the 19th century was the centralized effort to open doors to overseas migrants. "To govern is to populate" was a common belief of the ruling class, rooted not only in economic self-interest but also in prejudice. Attracting immigrants was desirable in countries with scarce population. However, labor-abundant countries pursued an active immigration policy due to the perceived European hard-work ethic. The inflow of

7

immigrants was by far not homogeneous in these four countries. Mexico failed at the task while Uruguay consistently attracted foreign workers. From independence, circa 1830, to 1900 population nearly tripled in these four countries as a whole (see Figure 2). The most impressive increase was in Uruguay, where population increased 10-fold in a seventy-year period. The Mexican experience pales in comparison: population only doubled in the same period.

2.2 Trade and International Integration

Starting with the Bourbon reforms, colonial Latin America achieved a higher degree of free trade. In the mid-18th century the House of Bourbons introduced a wide array of reforms aimed at promoting colonial growth and at reinforcing political and economic control over the colonies. In the economic arena, the main changes were the promotion of mining and the partial liberalization of trade. Independence left the new nations in charge of their foreign trade policy. Further integration to world markets was often sought, but suffered reverses at various times in the 19th century.

Historically, vast natural resources and the colonial production system left Latin America at the eve of Independence as a world supplier of raw materials. Based on the commodity lottery, each Latin American country specialized in the production of a few primary products (see Table 3). Despite their importance in the overall world trade, most Latin American countries were not price setters and were thus subject to the volatility of world prices. Abstracting from the short-term cyclical variations of the terms of trade, the region enjoyed an upward trend during the 19th century, almost doubling between 1820 and 1890 (Bértola and Williamson, 2003). Narrowing to the four countries in this sample, two cycles emerge: in the early Republican times the terms of trade presented a very slight positive trend with a marked acceleration from 1860 onwards (see Figure 3).

3   Stylized Theoretical Framework

This section presents a stylized theoretical framework to understand the influence of factor endowments and trade on inequality. The model highlights the most salient features present in Latin American countries during the 19th century.[6] Following independence, these countries struggled between change and continuity of their inherited colonial framework. Change was particularly intense in the productive sector. The countries increasingly participated in the world economy by

---

[6]See Appendix A for a more detailed specification.

exporting raw materials while the manufacturing sector experienced heightened competition from abroad. The international capital markets also responded to the financial needs of these nascent economies. However, no single Latin American country was a big player in the global markets. The prevailing international commodity prices and interest rates were not a policy variable for them. As a consequence, we consider a small open economy with two productive sectors: agricultural (A) and manufacturing (M). While both sectors serve the domestic market, the agricultural sector also exports raw materials. We assume that land (T), labor (L), and capital (K) are used in production; however, land is specific to the agricultural sector.

$$Y_A = f(T, K, L) \tag{1}$$

$$Y_M = f(K, L) \tag{2}$$

The colonial legacy persisted in Latin American political and social structure. Although most countries hoped to achieve a more inclusive, democratic society, plans were thwarted in practice. The economic and social structure can be safely condensed into two main groups: the elite and the popular class. The elite was economically and politically powerful with access to a wider range of economic opportunities and to convenient political resources. We then assume that over time families maintain their economic status based on intergenerational transfer of assets. These societal divisions are sustained by the presence of imperfect capital markets. This imperfection inhibits social mobility: agents cannot borrow enough to carry out their optimal investment plans.

Dynamically, historical evidence indicates major fluctuations in the evolution of factor endowments and trade in nineteenth century Latin America. For example, even though population increased in all countries, internal wars claimed many lives in some countries while mass migration flooded other shores. All countries annexed land to production. Finally, terms of trade followed differentiated trends for each country.

We trace the impact of changes in factor endowments and trade through a simple supply and demand framework. Inequality can be thought as the relative income of the elite and the popular classes. The relative earnings of these two groups can be estimated by the returns to the factors of production supplied to the market. It follows that the relative returns are the result of the supply of factors and the demand schedules. We further assume that only the elite class can own land while

the popular class remains as laborers. This simplification allows use the ratio of the returns of land and labor as an indicator of inequality.

$$inequality = \frac{\rho}{w} = \frac{p_A}{p_M} \frac{f'_{AT}}{f'_{ML}} \tag{3}$$

where ρ and w are the returns to land and labor respectively, p_A and p_M are the prices of the agricultural and manufacturing goods and f'_{ij} is the marginal product of labor (L) or land (T).

The consumer and producer sides of this stylized economy are better understood if we look at their interaction in every period and over time (see Figure 4).[7] Factor returns are determined by supply-demand interactions. On the demand side, we see the influence of relative prices of goods on the derived demand of factors.[8] As the period of analysis is not short term, supply shifts play an important role. The ownership of assets and the supply and demand for factors of production yield the distribution of income in a given point in time. Dynamically, there is a feedback loop back to assets accumulations affecting the starting point for the following periods.

3.1   Model implications: Wage and Rent Evolution

This theoretical framework incorporates several innovations that connect factor returns to income distribution and inequality. First, the link between factor ownership to returns is achieved through intergenerational transmission of assets. Factor ownership also displays persistence, a feature consistent with one of the dominant views of inequality in Latin America. Moreover, it allows us to classify the society into differentiated groups based on the type of asset ownership. This feature separates population into convenient groups to calculate relative earnings based on asset ownership over time. In that sense, factor ownership acts as a class label. Of the three factors of production, land plays an influential role. In this model, land supply is not fixed. As a consequence, land is similar to capital specific to agriculture and yet different as there is an economy-wide limit.

Second, the model allows for changes in inequality based on fluctuations on the returns to factors of production. In particular, we are interested in the effects of relative factor endowments and terms of trade over time. Categorizing the society in convenient groups based on factor ownership paired with the possibility of changes in factor returns allow us to trace inequality over time. From the

---

[7]Adapted from Morley (2001).

[8]Structural changes, macroeconomic policies, and institutions can also be included.

10

historical experience of Latin America, we explore several counterfactual scenarios that illustrate the importance of the country-specific initial conditions and the impact of shocks on inequality. Three shocks are taken into account that affect inequality:

Fixed land supply: a lower growth of land supply tends to favor the landowning class. As population grows, land is relatively less abundant. Inequality increases.

Increase in labor supply: As labor becomes relatively more abundant, its wage decreases, and the returns to land and capital increase. As in the previous case, inequality worsens.

Decrease in terms of trade: It depresses the return to the specific factor in the primary sector (land). Unlike the previous cases, inequality decreases.

4   Inequality in Four Latin American Countries

Using an array of Latin American primary sources, this section presents new evidence on Latin American inequality trajectory as well as the historical evolution of factor endowments and trade in the 19th century. This unique dataset is the result of extensive data collection in Latin American national archives and numerous primary and secondary sources. The quantitative evidence presented here includes annual wages, land and commodity prices, labor force, land stock, and a variety of export and import statistics.[9]

Our working definition of inequality requires further clarification. Unlike studies on contemporary inequality that use summary indicators such as the Gini coefficient or the Theil index, we use a different indicator calculated as the ratio between land rental and unskilled wage. Although imperfect, this measure conveys meaningful information; it shows the earning power of the wealthy relative to the popular class. Historical accounts and fragmentary data support the claim that the Latin American upper class concentrated landownership. On the other hand the popular class garnered income by working in unskilled occupations. Pioneering historical works by Bértola and Williamson (2003); O'Rourke (2001) and O'Rourke et al. (1996a) used the same methodology to study trends in inequality during the first globalization wave.[10] Although imperfect, this indicator

---

[9]See the appendix for detailed description of the data sources.

[10]A recent issue in the *Australian Economic History Review* published studies using similar methodology for Australia, Canada, Ghana, India, and Sweden. See Greasly et al. (2007).

not only allows us to trace inequality over time but also is empirically friendly.[11] Moreover, studies have shown a high correlation between these ratios and Gini coefficients in pre-industrial economies (Prados de la Escosura, 2007; Williamson, 1997). In our particular formulation, this ratio literally translates as the number of full-year salaries an unskilled worker had to save in order to rent a one thousand hectare plot of land for a year.[12]

During the 19th century, Uruguay added land into production from 11% to nearly 90% of its arable area. Moreover, Uruguay was the host of significant immigration during the era of mass migration. To make this case even more interesting, shifts in the terms of trade were favorable for the country. Unlike Argentina, the agricultural sector was more developed in the early independent years. However, its growth was severely interrupted by a long-lasting struggle to control access to land. *La Guerra Grande* of 1839-1851 translated into a considerable loss of lives and cattle. After this internal war Uruguay replenished its cattle stock and continued incorporating land into production, albeit at a slower rate than population growth. Immigration further accelerated the trend making land increasingly more scarce relative to labor. An increasing labor-land ratio paired with favorable terms of trade resulted in a positive trend in inequality throughout the century (see Figure 5).

On the eve of Uruguay's independence, only one-fifth of the total land was in private hands. Before *la Guerra Grande*, the civil war of 1839-1851, the fledgling government had attempted a more egalitarian development strategy, emphasizing small and medium sized landholdings engaged in livestock raising and agriculture, along with growth in manufacturing. This project was not carried out, however, as the government opted for support from large landowners. The government, facing fiscal problems and a chaotic landownership situation, legalized landownership. The Executive acquired more power in the process as the ultimate grantor of land to private hands. By 1836, only 58% of the total territory remained under public tutelage. The access to, and maintenance of, private property rights depended on connections with the government. Landownership was not clearly demarcated until peace was achieved after the Great War. One of the strategies used during the war was the confiscation of land and livestock of the enemy forces. After the war, the previous owners regained ownership. Yet, the short-term consequences were dire: there was a virtual halt

---

[11]Most Latin American countries only carried out national censuses by the end of the 19th century. To complicate quantitative matters even further, the economic information collected was minimal.

[12]The plot size is a historical lower-end estimate. The average size of Argentinean and Uruguay was 2,500 and 1,996 hectares respectively. Mexico and Venezuela average size plots were smaller: 1,013 and 1,300 respectively.

in agricultural production, and a depletion of livestock. The postwar return of political stability allowed a rapid recovery of cattle stock and the unexpected beneficial effects of wartime fallow that nurtured pastures. The asset value of land was also raised by the inauguration of the wool era. Introducing sheep in the Uruguayan landscape brought about a diversification in production and a gain in exports. The definition of property rights by the Rural Code in the 1870s contributed to the land valorization (capital gains) and landownership concentration. Fencing raised productivity in the rural sector, but also brought undesirable consequences to small landholders as their animals could not graze in neighboring lands any longer. Fencing not only legally delimited land but also physically impeded free grazing on neighborhood fields (Sala de Touron and Eloy, 1986).

Under-population was a state matter and perceived as a major obstacle for economic and social development. Only 74,000 souls lived in Uruguay in early independent times. The civil wars did not help populate this country: Uruguay at mid-century had a population 6% smaller due to emigration and war-related deaths. In absolute terms, the bulk of migrants arrived after 1870. However the relative impact on population was much more significant a decade earlier: in 1860 the foreign-born share of the population was 34%, while by the turn of the century it fell to 23%. In the absence of migration the Uruguayan population would have "only" increased 6-fold in the 19th century.[13]

The pastoral base of the economy was already in place by early independent times. Until mid-century jerky and hides led the production sector. In the political arena, the race for political power between two competing groups evolved to an extended civil war. This extended armed conflict had a serious damaging impact: two-thirds of the existing cattle was lost, while emigration and mortality reduced population. Rising export prices and the return of peace in 1851 fostered the agricultural sector. Export diversification was mildly achieved by the increase of sheep raising, which coexisted with traditional cattle ranching but was also possible in smaller units. In addition, this activity required more manpower. An impressive recovery continued from the early 1860s until mid-1880s as a result of overstocking and depletion of grazing fields. A few years later, the sector was reinvigorated by rising export prices. Overall, the most important adaptation in the agricultural sector was the introduction of sheep in the 1860s. As a consequence, the Uruguayan economic destiny was tied to the performance of the pastoral sector.

---

[13]See appendix for discussion on migration impact on population figures.

The Argentinean journey in the 19th century presents some similarities to the path followed by its neighbor. Large tracts of land were annexed during these times. Immigration was also a characteristic of the later decades and terms of trade were also favorable. However, the initiation to independent rule coincided with a more dramatic change in the participation in world trade. On the eve of independence, in 1816, only 20% of Argentinean total exports were of agricultural origin. Indeed, Argentina's main export product was silver. Agricultural expansion went hand-in-hand with frontier expansion and landownership concentration in the following twenty year. Elite members were mostly the beneficiaries adding lands by the thousands acres.[14] The external sector played an important role in transforming Argentina into a "purely animal" economy.[15] We observe three stages in Argentinean inequality: the first decades are marked with decreasing inequality as land annexation exceeded population growth and terms of trade declined. In mid-century there was a spike in inequality fueled by the woolen fever that dwindled a decade later. Finally, during the globalization, inequality rose fed by the arrival of international migrants and favorable terms of trade (see Figure 6).

The expansion of the frontier in Argentina was a dramatic and complex enterprise. At the end of the colonial times, the productive land in use was still confined to a narrow tract by the River Plate. The 19th century saw an increase in land stock in production from a mere two million to thirty-one million hectares. During the first two decades property rights were legitimized through sales and donations from the new government. No land was sold for the next decade as it acted as collateral to public debt. The legal arrangement used was the emphyteusis (usufruct), under which the government allowed use and cultivation while retaining legal ownership of the land for an annual rental fee. In 1836, most of these lands were sold to their settlers. By mid-19th century, land became a question of national security. The national government organized military campaigns to expand and secure the frontier to stop the frequent raids from nomadic indigenous tribes. The result was an important increase in the productive land stock. Laws passed in 1864, 1867, 1871, 1876, and 1878 accelerated the transfer of rented lands to private landownership (Valencia, 2005).

The frontier expansion made the country's severe under-population increasingly evident. Hacienda owners complained about the "lack of arms" in the countryside. Promotion of immigration

---

[14]The average land sale in the 1810-1840 period in the Buenos Aires province was around 3,409 hectares (8,420 acres).

[15]See Newland and Poulson (1998).

was even a Constitutional mandate. This situation did not fully reverse until the era of mass migration. By 1900, almost 30% of the population held a foreign passport. Argentina attracted a steady flow of immigrants from 1860. Of the total net immigration experienced in the 19th century, almost half of the flow arrived in the 1880s. The Barings crisis reversed the flow in 1891 but by the next year net immigration was once again positive. As in Uruguay, the spectacular population growth during these times was fueled by the arrival and settlement of overseas workers. Had the brand-new Argentine constitutional mandate been forfeited, the country would have just quadrupled its population in the first ninety years of independent life.[16]

One of the first independent moves in the Southern Cone was to proclaim free trade. Dismembering the colonial legacy was relatively easy in this region. From a net exporter of silver, the Southern Cone became an exporter of livestock by-products. The remarkable feature of this region was its relatively earlier integration to world markets. This shift particularly benefited the Buenos Aires and Littoral areas in Argentina. The economic consequences of independence were dramatic in the first decades. The export sector expanded considerably, fueled by favorable prices: while exports only represented 1.7% of GDP in 1810, their share had tripled by 1830. The political and economic centrifugal forces of Buenos Aires were not well received in Argentina's hinterland. Despite the rapid export growth, the struggle for national political leadership created violent frictions between Buenos Aires and the provinces. Armed conflicts within the country and the French blockade in the late 1830s made a dent on the positive export trend. Protectionist spirits emanated from the manufacturing sector with the arrival of increasingly cheaper import goods. Triggered by an unfavorable balance of payments and fueled by protectionist lobbies and thirst for government revenues, Argentina introduced a new tariff scheme in 1835 with higher tariffs on several manufacturing imports to help the industrial sectors and to relieve tension between the agricultural and manufacturing sectors. Despite the protection and even with the scarcity produced by the blockade, the manufacturing sector could not meet the domestic demand.

Relative political stability was achieved by mid-19th century. The era of the merino was in full expansion as a result of growing European demand for the textile industry and the improvement of sheep breeds at home. Sheep stock quintupled by mid-1850s to reach fifteen million. By 1865, forty millions sheep grazed in the fertile Pampas. Wool exports skyrocketed, dominating exports

---

[16]See appendix for discussion on migration impact on population figures.

by mid-century. The first globalization era accelerated integration to world markets. The much needed labor arrived from overseas and capital flowed copiously to these lands. The expansionary growth that characterized the earlier period was complemented by technological advances epitomized by fencing and railroads. Argentina was the poster child of export-led growth strategy success: thousands of foreign workers eagerly migrated to the country, exports soared and, GDP growth rates escalated. It is in this period when Argentine agricultural base diversified beyond ranching. The fertile Pampas were naturally suitable for grain production and by late 1890s wheat exports surpassed 10% of total exports.

The pattern of inequality of <u>Venezuela</u> exhibits some interesting characteristics. Nearly twelve percent of the arable land was added into production during the 19th century in this country. Although Venezuela was underpopulated at the eve of independence; it failed to attract immigrants throughout the century. The inequality trajectory in this country is quite puzzling. We observe a significant decline in the first independent decades that magnified the evolution of terms of trade. Domestic instability plagued these decades as a result of frequent rebellions leading to slavery abolition by mid-century. Globalization, on the other hand, had beneficial effects on inequality as the country experienced a slight decrease in that period (see Figure 7).

The economic-social landscape in Venezuela was shaped by the needs and demands of the agricultural sector geared towards the international markets. Large colonial haciendas were initially encouraged to take advantage of cacao export opportunities. The Spanish Crown granted the Venezuelan cacao producers the monopoly to supply to New Spain during the 18th century. Until the first decade of the 19th century, cacao was the main export product, while coffee rose in importance throughout the rest of the century. Coffee plantations spread from the coastal zones into the valleys and reached the Andes by the middle of the 19th century. The privatization of public lands was already under discussion by 1830s. The incorporation of public lands into production was partly based on the government fiscal needs. Although the government could have rented the public land, public land sales were favored. It alleged that rentals were "unproductive", though in practice, land sales benefited the landed elite. The 1848 law established that prospective buyers of public lands were responsible for surveying costs and administrative fees. These upfront costs did not help to democratize land tenure. It just enabled established landowners and politically connected elite to acquire land (Brito Figueroa, 1973; Ríos and Carvallo, 1990; Yarrington, 1997).

The independence winds were costly in terms of human lives. An earthquake in 1812 and the wars of independence claimed 30% of the population. After Venezuela seceded from the failed Gran Colombia project, population increased steadily, concentrated in the coastal and mountain areas.[17] Following the Latin American trend, immigration was also favored, but with disappointing results. From mid-century onwards, population growth was more sluggish. Mortality rates were elevated by social unrest. The slave struggle culminated in abolition of slavery in 1854 with government compensation to slave-owners. The government persisted in alluring overseas workers but not even the mass migration tide brought significant foreigners to the Latin American Venice.

Of the three republics that for a short period comprised Gran Colombia, only Venezuela had a relatively strong agricultural export base. Just as cacao was the colonial export commodity of choice, coffee acquired importance after independence. As in most Latin America, integration to world markets followed independence. The central valley cacao plantations were devastated during the independence wars. Coffee offered advantages over cacao in terms of lower initial investment and shorter repayment period. In effect, coffee bushes were less expensive than cacao trees, they did not require irrigation and marketable output occurred within three or four years instead of six in the cacao case. Increasing demand for mild coffee from the U.S. and Europe also stimulated coffee expansion. While the U.S. bought around one quarter of total coffee exports by mid-century, its share increased to nearly 70% by the end of the century.

From 1830 to 1900 real exports increased eightfold. Before mid-century, Venezuela experienced the first of several crises in the century due to a drop in export prices and the exhaustion of the slave-based system. Slavery was no longer profitable: not only were rebellions more frequent but also slave-owners were not entitled to ownership of the slave offspring. Manumission ensued as a centralized and planned state enterprise. Recovery in the export sector followed, but was sidetracked by domestic instability in the 1870s. From mid-century, the dependence on coffee acquired new heights. Production increased in previous marginal regions in the Andean hillsides. In addition, the arrival of steam transportation to Lake Maracaibo decreased freight costs by 50%. By 1890, Venezuela became the third largest exporter of coffee in the world. Export prices underwent a

---

[17]The Republic of *Gran Colombia* was born in 1819 and comprised the territories of the current countries of Colombia, Ecuador, and Venezuela. It was the first attempt to consolidate and integrate the Latin American nations in one state. Also known as the 'dumb republic', it only lasted eleven years.

downslide declining more than 50% in less than twenty-five years (Carrillo Batalla, 2001; Roseberry, 1983; Yarrington, 1997).

The <u>Mexican</u> case is fairly complex. We identify an initial increase in inequality followed by a sharp decrease in Maximilian times (1864-1867). For the rest of the century, inequality trailed the movements of the terms of trade. Inequality spiked in 1870s and diminished throughout the globalization era. In terms of factor endowments, land incorporation only surpassed population growth by 1870s when the bulk of land sales took place in hands of the private survey companies.

The roots of Mexico's latifundia reach back to early colonial times. The production of jerky and hides to feed the mining labor force was a necessity in that era. Ranchers demanded legal ownership to the land where their livestock grazed, accepting an economic rate of return that was lowered by the demand for land as a ticket to prestige in an aristocratic society. By 1790 the average hacienda was mortgaged over 65% of its value, with the Catholic Church acting as the main creditor (Chevalier, 1963). In Republican times, the first major change in landownership was the confiscation of the Catholic Church landholdings in 1861. Strained by war expenses, the government sold the land at discounted values, and the hacendados benefited the most in this move. The egalitarian spirit of this land reform did not materialize. The bulk of Mexico's public land transfers took place under Porfirio Diaz late in the 19th century. Surveying companies were granted one-third of the surveyed lands as payment. From 1883 through 1900, 43.9 million hectares were transferred to private hands (Qamber, 1992). In 1906 one landowner had an estate as large as Costa Rica. In contrast, only 1.2% of the total land transferred to private hands was given as communal *ejidos* and 0.1% to the rural lower class. This was also the era of Mexico's railroad expansion, with tangible effects on the rate of land appropriation and value.

In Mexico, initial depopulation was followed by slow but continuous recovery. In early republican times, population growth was slowed by disease and violence. Two cholera outbreaks wiped out 10% of the population. With the advent of the Porfirian peace, the pace accelerated and by the turn of the century Mexico had comparable level of population as at the eve of the European encounter. During this period, overseas migration was especially encouraged. The central government promoted the inflow of foreigners to change the population composition and to colonize underpopulated regions in the country. Mexico was attempting to emulate the United States believing that the immigration would have desirable cultural effects on the native population. Immigrants were seen as

hard-working and even "culturally superior". The copious colonization and immigration legislation soon became dead letter. Mexico did not see the tide of immigration rise; the foreign population never represented more than 1% of the total Mexican population (Malvido, 2006; Sánchez Albornoz, 1974).

Mexican independence was a very destabilizing process. Its benefits were tangible as direct colonial costs were especially onerous for New Spain. However, the lack of consensus on the future direction of the nascent nation depressed the economy for most of the 19th century. GDP per capita did not regain colonial level until late in the century. The obstacles to modernization in Mexico after the independence range from the negative influence of the Catholic Church as an economic institution to the frequent foreign interventions. However, Coatsworth argued that inefficient organization of the economy and inadequate transportation were the key factors that explain Mexican backwardness. Efficient allocation of labor was undercut as the restrictions were imposed on individuals to participate on certain activities based on ethnic identification. Free access to world markets did not have an important impact on the Mexican economy. The export sector did not experience substantial growth during the first independent decades averaging 4% of the GDP. Foreign demand of Mexican products increased during the 1850s and 1860s but failed to boost the economy due to the civil unrest and the French intervention (Coatsworth, 1990).

Silver was largely the main export commodity. The wars of independence and the dependency on Spanish mercury violently disrupted mining activities. Silver production collapsed in the first decades of the 19th century and it only reached pre-independence levels in the 1870s. Diversification of the export base became a reality late in the century. The supremacy of precious metals diminished while agricultural exports such as coffee, rubber, and cotton experienced an important boost. Broadening the export base that enjoyed favorable external prices partly counteracted the fall in silver prices. Political stability and transportation expansion paved the way to the development of a more diversified export sector (Herrera Canales, 1977; Beatty, 2000).

5   Tracing Inequality: Simulations and Counterfactuals

For the purpose of this paper, we are interested in the effects of participation in world trade and movements in factor endowments on inequality. As a consequence we start our analysis from the premise of an open economy. Latin American history indicates that the region was already

participating in world trade, albeit operating within a restricted trade regime during colonial times. With independence, the opportunity to increase trade was embraced, leading towards a full-blown export-led growth strategy during the first globalization wave. The exporting sector became the dynamic engine in Latin America; however, the relationship with world markets was ever fluctuating. The factor endowment path responded to domestic and external factors. A clear example is the large migration flows to the Southern Cone. Domestically, Argentina and Uruguay were underpopulated; however, the international conditions favored emigration from Europe towards those shores.

To disentangle the role of factor endowments and terms of trade on inequality we resorted to the use of counterfactual analysis. Learning from the heterogeneous historical experiences of the four countries of study, this paper estimates the theoretical evolution of inequality under different scenarios by calibration. The parameters are drawn from accounting records of agricultural and cattle production units in each country. The calibration methodology and the parameters used are explained thoroughly in the appendix, we spell out the main features in this section.

Goods markets: agricultural and manufacturing goods are produced using labor and capital while land is only used in agriculture. Both final goods are tradable and prices are given exogenously. For convenience, Cobb-Douglas production functions are adopted.[18]

Factors markets: we assume that all markets are competitive and integrated.

- Labor: supply one unit of labor per year. Labor force growth is a function of natural population growth and net migration. We further assume migration as an exogenous shock or as an endogenous adjustment to the real wage premium between receiving and sender countries.

- Capital: Domestic households supply capital based on their optimal portfolio allocation. Foreign investors also invest in domestic capital. Based on the historical experience, the domestic interest rate includes a country premium.

- Land: The supply can be thought as an exogenous shock or as an endogenous adjustment. In the first case, the frontier is expanded based on effective control of the national territory. If endogenous, the supply responds to changes in its marginal productivity.

---

[18]Lindert and Williamson (1983) used unity elasticity of substitution in their study on American inequality and Taylor (1995)'s estimate was 0.92 in his work on Argentine migration.

Drawing from the two dominant views on Latin American inequality, we test the relevance of these hypotheses for this period. Led by Acemoglu et al and by Engerman and Sokoloff, this view claims that the initial colonial conditions are mainly responsible for the later economic and social performance of the region. In opposition stand Bulmer-Thomas, Coatsworth, and O'Rourke et al, arguing that the region's integration to world markets after independence left a powerful imprint on these economies. Armed with our theoretical framework and the new compiled data, we constructed two counterfactual scenarios for the four Latin American countries in our sample. The goal is to assess the role of factor endowments initial conditions and historical shocks on inequality. Initial conditions include inequality, relative scarcity of labor relative to land, relative prices, and productive sector parameters. We consider shocks related to changes in factor endowments and terms of trade.

The first scenario considers country-specific initial conditions and four-country average shocks throughout the century. We take 1830 as a common starting point. Each country starts off with the corresponding historical conditions. We then simulate the inequality path by assuming that each economy experienced similar shocks. These shocks are calculated as a simple average of historical land stock, labor force, and terms of trade of each country. The annual relative change for the average shocks is then applied to each country's initial conditions. The second case takes the opposite route: average initial conditions and country-specific shocks. We assume that all countries became independent sharing the same initial conditions implying identical inequality. However, we allow each country to experience its own relative historical experience. The results of these exercises are summarized in Figures 9 and 10.[19]

Average shocks on country-specific initial conditions result in a smoother inequality trajectory compared to the actual historical experience. As each country is subject to average shocks, inequality displays similar trends. Despite common trends, compared to the actual inequality path, important differences arise. For example, Mexico and Venezuela are recipients of immigrants. As land is relatively scarcer, the expected effect is an increase in inequality. The second scenario, where all countries start from identical initial conditions, illustrates the importance of historical shocks. Even though all countries start with comparable inequality, once we let history run its course, the end

---

[19]See appendix for details.

21

result tends to the actual historical experience. As can be seen, Argentina and Uruguay display rising inequality during the globalization era.

The lessons learned from these counterfactual are noteworthy. First, it is not surprising that the four countries exhibit the same trajectory throughout the century when applying the same average shocks to all four. However, the initial conditions do not yield the actual historical inequality. Second, shocks do matter. In both scenarios inequality fluctuated when changes in terms of trade and relative factor endowments took place. Yet, the second scenario highlights the overall importance of these shocks. Each country converged to its own inequality historical trend.

Having established the importance of changes in factor endowments and relative prices, we estimate their quantitative effects on inequality.[20] The first counterfactual exercise is a decline in terms of trade. Theory indicates that in this case inequality would decline. Although the returns to land and labor decreased, land rentals suffered a sharper drop due to its specific nature. We have chosen a reduction of 50% in terms of trade relative to the 1850 level. Although the magnitude seems exceptional, Latin America has experienced more significant losses during the Great Depression.[21] For dramatic purposes, let us suppose that this shock took place one time only and persisted over time. In other words, this scenario implies terms of trade peaking in 1850 followed by a 50% fall in the next decade remaining at the low level for the rest of the century. The resulting estimation is line with the expected theoretical results: all four countries would have experienced a significant decline in inequality had the terms of trade turned greatly unfavorable (see Figure 12). The extent of the decline varies depending on the land and labor supply response to this shock. The fall in inequality is more pronounced when there is no adjustment. In effect, allowing for endogenous response implies a halt or deceleration of the frontier expansion and net migration due to the decrease of the returns to land and labor.[22]

Next, we estimate the impact of international migration on inequality. To quantify the appropriate magnitude of this shock it is necessary to estimate the labor force stock in the absence of migration. We reduce our analysis to Argentina and Uruguay as neither Mexico nor Venezuela received a sizable share of immigrants in the 19th century. The salient features are presented here while the appendix provides the details of these calculations. Using yearly net migration flows and benchmark

---

[20]See Figure 11 for the goodness of fit of the basic simulated model.

[21]In the 1928-1932 period, export prices declined 64% on average (Bulmer-Thomas, 1994).

[22]The appendix explains the choice of the land and labor supply functional forms.

composition of population by origin, we have estimated upper and lower bounds for native population over time. The impact of migration on total population growth differed in Argentina and Uruguay. While the volume of migrants peaked in 1880s, 34% of the population was foreign in 1862; however the ratio shrank to 23% by the turn of the century. In Argentina, this trend is reversed: eleven percent of the population were immigrants by 1869 and they reached nearly 30% by 1900.

These data allow us to compute an upper bound of population natural growth and labor force. The lower bound was estimated by applying natural growth rates before the mass migration era. We have favored an intermediate approach that takes into account the possibility of migration crowding-out the native labor force. The simulation confirms the expected theoretical results: had Argentina and Uruguay not received immigrants, inequality would have been much lower. The mechanism is quite clear, labor would have continued to be relatively scarce. Figure 13 shows the expected changes in inequality in the counterfactual case of "no-migration". In both cases, land rental relative to wages would have been much lower. Once again we consider the adjustment of the land supply. In this case, it tones down the decline in inequality. Lack of arms translates into less land in production.

The third counterfactual scenario evaluates the impact of a fixed supply of land (see Figure 14). For that purpose we assume no land expansion post-1850. In this scenario, land became progressively scarcer over the century proving unfavorable to labor that saw its relative return lose ground. To understand the magnitude of this shock on these economies, some modern comparisons in terms of surface area seem appropriate. By 1850s, land in production in Uruguay was roughly the size of modern Ireland; however, by the turn of the century, it had expanded to half the size of Germany. Under this scenario, inequality would have increased over 50% by 1870 and increased more than 45% by 1900. In the Buenos Aires case, by mid-century it occupied an area almost equivalent to England while fifty years later land in production was slightly larger than Italy. The simulation estimations do not disappoint: inequality climbs steadily. The model predicts a very significant impact on inequality: by 1870, inequality would have escalated over 60% and thirty years later over one hundred percent. The Venezuelan experience is far less dramatic. However, inequality would have also increased if the land frontier had remained at the 1850 limit. For the Southern Cone countries we also estimated the potential labor supply adjustment due to net migration. We would expect a reduction in the real wage premium resulting in a lower migrant stock. A smaller

labor force changes the relative scarcity of factors making labor not as abundant and resulting in lower inequality.

6   Concluding Remarks

Using freshly unearthed data from Latin American primary sources, this paper traces and analyzes the evolution of Latin American inequality during the 19th century. Our work informs the ongoing debate on the impact of initial conditions on contemporary economic performance in general and on inequality in particular. Although the initial factor endowments do matter, changes in those factor endowments and in participation in trade over time have profound effects on inequality.

Two hundred years ago, the region was at the wake of severing its colonial ties and taking charge of its own destiny. Further integration to the world markets ensued, shaping the economic structure that in turn affected the distribution of income. We have learned that inequality varied substantially throughout the 19th century. Moreover, the trajectory was not uniform in all countries. While globalization worsened inequality in the Southern Cone, it had the opposite effect in Mexico and Venezuela.

Factor endowments matter and experienced sizable fluctuations in the 19th century. All countries, in different degrees, annexed land. Mass migration to the Southern cone fed the starving need of labor resulting in rising inequality. Yet, as land was annexed the overall impact was dampened. The external market conditions paired with the particular evolution of factor endowments throughout the century are decisively linked to the trajectory of inequality. Through the lens of counterfactual analysis, this paper reveals that the impacts of relative factor supplies were far from trivial.

The paper offers some answers to the historical determinants and trajectory of inequality in Latin America. A more thorough analysis would also evaluate other relevant factors such as the technological advance and institutions. The globalization era not only brought more capital to these economies but also improved production and transportation technology. Scholars argue that institutions are responsible for persistence in inequality. Taking into account these factors could have exacerbated or weakened the effects studied and deserves further research.

References

Acemoglu, Daron, Simon Johnson, and James Robinson, "The Colonial Originis of Comparative Development: An Empirical Investigation," *American Economic Review*, 2001, *91* (5), 1369–1401.

_ , _ , **and** _ , "Reversals of Fortune: Geography and Institutions in the Making of Modern World Income Distribution," *NBER Working Papers*, 2001, (w8460).

Acevedo, Eduardo, *Notas y apuntes: Contribución al estudio de la historia económica y financiera de la República Oriental del Uruguay*, Montevideo: El Siglo Ilustrado, 1903.

Adelman, Jeremy, *Colonial Legacies: The Problem of Persistence in Latin American History*, New York: Routledge, 1999.

Albornoz, Nicolás Sánchez, *The Population of Latin America: a History*, Berkeley: University of California Press, 1974.

Altonji, Joseph G., Fumio Hayashi, and Laurence J. Kotlikoff, "Parental Altruism and Inter Vivos Transfers: Theory and Evidence," *Journal of Political Economy*, December 1997, *105* (6), 1121–66.

Ardao, Alicia, *El café y las ciudades en los Andes venezolanos*, Caracas: Talleres Tipográficos Garc̀Ia e Hijo, 2002.

Baptista, Asdrúbal, *Bases cuantitativas de la economía venezolana, 1830-2002*, Caracas: Fundación Empresas Polar, 2006.

Barba, Fernando E., *Aproximación al estudio de precios y salarios en Buenos Aires desde fines del siglo XVII hasta 1860*, La Plata: Editorial de la Universidad Nacional de La Plata, 1999.

Barral, J.A., *Avenir de Grandes Explotations Agricoles Établies sur les Côtes du Vénézuéla*, Paris: G. Masson, Editeur, 1881.

Barrán, José and Benjamín Nahum, *Historia rural del Uruguay moderno*, Montevideo: Ediciones de la Banda Oriental, 1967.

Batalla, Tomás Enrique Carrillo, *Cuentas nacionales de Venezuela, 1831-1873*, Caracas: Banco Central de Venezuela, 2001.

_ , *Cuentas Nacionales de Venezuela, 1874-1914*, Caracas: Banco Central de Venezuela, 2002.

Bazant, Jan, *Cinco haciendas mexicanas: tres siglos de vida rural en San Luis Potosí, 1600-1910*, México: Colegio de México, 1980.

Beatty, Edward, "The Impact of Foreign Trade on the Mexican Economy: Terms of Trade and the Rise of Industry 1880-1923," *Journal of Latin American Studies*, 2000, *32* (2), 399–433.

Bértola, Luis and Jeffrey Williamson, "Globalization in Latin America Before 1940," *NBER Working Papers*, 2003, (w9687).

_ , **ed.**, *Ensayos de historia económica: Uruguay y la región en la economía mundial, 1870-1900*, Montevideo: Ediciones Trilce, 2000.

Brading, D.A., *Haciendas y Ranchos in the Mexican Bajío*, Cambridge: Cambridge University Press, 1978.

Bulmer-Thomas, Victor, *A Economic History of Latin America since Independence*, Cambridge: Cambridge University Press, 1994.

Buve, Raymundus, ed., *Haciendas in Central Mexico from Late Colonial Times to the Revolution: Labour Conditions, Hacienda Management, and its Relation to the State*, Amsterdam: Centre for Latin American Research and Documentation, 1984.

Canales, Inés Herrera, *El comercio exterior de México*, Mexico: El Colegio de México, 1977.

Carter, Susan B., Scott Sigmund Gartner, Michael R. Haines, Alan L. Olmstead, Richard Sutchand, and Gavin Wright, eds, *Historical Statistics of the United States: Earliest Times to the Present*, Cambridge: Cambridge University Press, 2006.

Castro, Alvaro García, *La Hacienda Carabobo: una pequeña historia de Turgua y del café en la segunda mitad del siglo XIX*, Caracas: Fundación Cisneros, 1999.

CDCH, *Materiales para el estudio de la cuestión agraria en Venezuela, 1829-1860*, Caracas: Ediciones de la Biblioteca de la UCV, 1971.

Chevalier, Francisco, "La gran propiedad en México desde el Siglo XVI hasta comienzos del Siglo XIX," *Desarrollo Económico*, 1963, *3* (1/2), 45–55.

Coatsworth, John H., *Los orígenes del atraso: nueve ensayos de historia económica de México en los siglos XVIII y XIX*, México: Alianza Editorial, 1990.

— , *Development and Underdevelopment in America: Contrasts of Economic Growth in North and Latin America in Historical Perspective*, Berlin: Walter de Gruyter, 1993.

— , *La independencia americana: consecuencias económicas*, Madrid: Alianza Editorial, 1993.

— , "Structures, Endowments, and Institutions in the Economic History of Latin America," *Latin American Research Review*, 2005, *40* (3), 3–39.

Comisión Directiva del Censo, *Segundo censo de la República Argentina, mayo 10 de 1895*, Buenos Aires: Taller Tipográficos de la Penitenciaria Nacional, 1898.

Conde, Roberto Cortés, *El progreso argentino, 1880-1914*, Buenos Aires: Editorial Sudamericana, 1979.

Consejo Nacional de Administración Uruguay, *El libro del centenario del Uruguay, 1825-1925*, Montevideo: Capurro and Co, 1925.

Deininger, Klaus and Gershon Feder, *Handbook of Agricultural Economics*, Vol. 1, New York: Elsevier,

Delahaye, Olivier, *La privatización de la tierra agrícola en Venezuela desde Cristóbal Colón*, Caracas: Fondo Editorial Tropikos, 2003.

Della Paolera, Gerardo and Alan M. Taylor, *The New Economic History of Argentina*, Cambridge: Cambridge: Cambridge University Press, 2003.

Di Tella, Guido and Manuel Zymelman, *Las etapas del desarrollo económico argentino*, Buenos Aires: Eudeba, 1967.

Dirección General de Estadística, *Censo general de la República Mexicana*, Mexico: Oficina Tipográfica de la SecretarÌa de Fomento, 1901.

— , *Extracto estadístico de la República Argentina correspondiente al año 1915*, Buenos Aires: Compañía Sud-americana de Billetes de Banco, 1916.

— , *Estadistícas sociales del Porfiriato: 1877-1910*, Mexico: Talleres Gráficos de la Nación, 1956.

Easterly, William, "Inequality *does* cause underdevelopment: New evidence," *Center for Global Development*, 2002, (1).

＿ , "Inequality does cause underdevelopment: Insights from a new instrument," *Journal of Development Economics*, 2007, *84* (2).

Engerman, Stanley and Kenneth Sokoloff, *In How Latin America Fell Behind*, Stanford: Stanford University Press, 1997.

＿ **and** ＿ , "Institutions, Factor Endowments, and Paths of Development in the New World," *Journal of Economic Perspectives*, 2000, *14* (3), 217–32.

＿ **and** ＿ , "Factor Endowments, Inequality, and Paths of Development among New World Economies," *Economia: Journal of the Latin American and Caribbean Economic Association*, 2002, *3* (1), 41–88.

＿ **and** ＿ , *Inequality in Latin America: Breaking with History?*, Washington D.C.: World Bank, 2004.

＿ **and** ＿ , "Colonialism, Inequality, and Long-Run Paths of Development," *NBER Working Papers*, 2005, (w11057).

Ferreres, Orlando, *Dos siglos de economía argentina, 1810-2004*, Buenos Aires: Verlap, 2005.

Figueroa, Federico Brito, *El problema tierra y esclavos en la historia de Venezuela*, Caracas: Ediciones Teoria y Praxis, 1973.

＿ , *Historia económica y social de Venezuela*, Caracas: Universidad Central de Venezuela, 2002.

Finch, Henry, *La economía política del Uruguay contemporáneo, 1870-2000*, Montevideo: Ediciones de la Banda Oriental, 2005.

Florescano, Enrique, *Haciendas, latifundios y plantaciones en América Latina*, Mexico: Siglo 21, 1978.

Galor, Oded and Joseph Zeira, "Income Distribution and Macroeconomics," *Review of Economic Studies*, 1993, *60*, 35–52.

＿ **and Omer Moav**, "From Physical to Human Capital Accumulation: Inequality and the Process of Development," *Review of Economic Studies*, 2004, *71*, 1001–26.

Garavaglia, Juan Carlos, *Pastores y labradores de Buenos Aires: una historia agraria de la campaña bonaerense, 1700-1830*, Buenos Aires: Ediciones de la Flor, 1999.

Greasly, David, Kris Inwood, and John Singleton, "Factor Prices and Income Distribution in Less Industrialized Economies 1870-1939," *Australian Economic History Review*, 2007, *47* (1).

Haring, C. H., *The Spanish Empire in America*, San Diego: HBJ Book, 1975.

INDEC, *La población de Argentina*, Buenos Aires: INDEC, 1975.

INEGI, *Estadísticas históricas de México*, Mexico: INEGI, 1999.

Infesta, María Elena, "La Pampa criolla. Usufructo y apropiación privada de tierras públicas en Buenos Aires, 1820-1850," *Mundo Agrario*, 2003, *4* (7).

Izard, Miguel, *Series estadísticas para la historia de Venezuela*, Mérida: Universidad de los Andes, 1970.

Jarquín, María Teresa, *Origen y evolución de la hacienda en México, siglos XVI al XX*, México: Instituto Nacional de Antropología e Historia, 1990.

Junta Directiva del Censo, *Tercer censo de la República*, Caracas: Imprenta y Litografía del Gobierno Nacional, 1891.

Justino, Patricia and Arnab Acharya, "Inequality in Latin America: Processes and Inputs," *PRUS Working Paper*, 2003, (22).

Kritz, Ernesto H., "La formación de la fuerza de trabajo en Argentina: 1869-1914," *Cuaderno del CENEP*, 1985, (30).

Lindert, Peter H. and Jeffrey G. Williamson, "English Workers' Living Standards during the Industrial Revolution: A New Look," *Economic History Review*, 1983, *36* (1), 1–25.

Livi-Bacci, Massimo, "The Depopulation of Hispanic America after the Conquest," *Population and Development Review*, June 2006, *32* (2), 199–232.

Maddison, Angus, *The World Economy: a Millennial Perspective*, Paris: OECD, 2002.

Malanima, Paolo, "Labour, Productivity, Wages in Italy, 1270-1913," *mimeo*, 2004.

Malvido, Elsa, *La población, siglos XVI al XX*, Mexico: Editorial Océano, 2006.

Morley, Samuel A., *The Income Distribution Problem in Latin America and the Caribbean*, Washington: Inter-American Development Bank, 2001.

Newland, Carlos, "Puramente animal: exportaciones y crecimiento en Argentina, 1810-1870," 1998.

_ **and Barry Poulson**, "Purely Animal: Pastoral Production and Early Argentine Economic Growth 1825-1865," *Explorations in Economic History*, 1998, *35* (3), 325–45.

O'Rourke, Kevin, Alan M. Taylor, and Jeffrey G. Williamson, "Land, Labor and the Wage-Rental Ratio: Factor Price Convergence in the Late Nineteenth Century," Working Paper 46, National Bureau of Economic Research November 1996.

O'Rourke, Kevin H., "Globalization and Inequality: Historical Trends," *NBER Working Papers*, 2001, (w8339).

_ , **Alan M. Taylor, and Jeffrey G. Williamson**, "Factor Price Convergence in the Late Nineteenth Century," *International Economic Review*, 1996, *37* (3), 499–530.

Pinero, Eugenio, *The Town of San Felipe and Colonial Cacao Economies*, Philadelphia: American Philosophical Society, 1994.

Pintos, Aníbal Barrios, *Historia de la ganadería en el Uruguay 1574-1971*, Montevideo: Talleres Gráficos de la Comunidad del Sur, 1973.

Prados de la Escosura, Leandro, "Inequality, Poverty, and The Kuznets Curve In Spain, 1850-2000," *Universidad Carlos III Working Papers in Economic History*, 2007, (07-13).

Qamber, Rukhsana, *Government Policy Towards Public Land: Mexico and Argentina, 1880-1910*, Austin: UT-Austin, 1992.

Ríos de Hernández, Josefina, *La hacienda venezolana: una visión a través de la historia oral*, Philadelphia: American Philosophical Society, 1988.

Ríos, Josefina and Gastón Carvallo, *Análisis histórico de la organización del espacio en Venezuela*, Caracas: Universidad Central de Venezuela, 1990.

Roseberry, William, *Coffee and Capitalism in the Venezuelan Andes*, Austin: University of Texas Press, 1983.

Sábato, Hilda, *Agrarian Capitalism and the World Market*, Alburquerque: University of New Mexico Press, 1990.

Sala de Touron, Lucia and Rosa Alonso Eloy, *El Uruguay comercial, pastoril y caudillesco*, Montevideo: Ediciones de la Banda Oriental, 1986.

Salvucci, Linda K. and Richard J. Salvucci, "Cuba and the Latin American Terms of Trade: Old Theories, New Evidence," *Journal of Interdisciplinary History*, 2000, *31* (2), 197–222.

Serrano, Jesús Gómez, *Haciendas y ranchos de Aguascalientes*, Aguascalientes: Universidad Autónoma de Aguascalientes, 2000.

Skidmore, Thomas and Peter Smith, *Modern Latin America*, New York: Oxford University Press, 2001.

Svec, William Rudolph, "A Study of the Socio-Economic Development of the Modern Argentine Estancia, 1852-1914." PhD dissertation, University of Texas, Austin 1966.

Tabeau, Andrzej, Bas Eickhout, and Hans van Meijl, "Endogenous agricultural land supply: estimation and implementation in the GTAP model," in "9th Annual Conference on Global Economic Analysis" 2006.

Taylor, Alan M., "Peopling the Pampas: On the Impact of Mass Migration to the River Plate,1870-1914," *NBER Working Papers*, 1995, (w68).

_ , "Peopling the Pampa: On the Impact of Mass Migration to the River Plate, 1870-1914," Working Paper 68, National Bureau of Economic Research January 2000.

_ and Jeffrey G. Williamson, "Convergence in the Age of Mass Migration," *NBER Working Papers*, 1994, (w4711).

Vaillard, Adolfo, *Población, defunciones, bautismos, matrimonios, immigración, instrucción pública, comercio exterior, rentas públicas, 1872-1877*, Montevideo: Tipografía Renaud Teynaud, 1878.

Valencia, Marta, *Tierras públicas, tierras privadas: Buenos Aires, 1852-1876*, La Plata: Editorial de la Universidad de La Plata, 2005.

Vázquez-Presedo, Vicente, *Estadísticas históricas argentinas*, Buenos Aires: Ediciones Macchi, 1971.

Wilhelm, Mark O., "Bequest Behavior and the Effect of Heirs Earnings: Testing the Altruistic Model of Bequests," *American Economic Review*, 1996, *86*, 874–92.

Williamson, Jeffrey G., "The Evolution of Global Labor Markets since 1830: Background Evidence and Hypotheses," *Explorations in Economic History*, 1995, *32* (2), 141–196.

_ , "Globalization and Inequality, Past and Present," *World Bank Research Observer*, 1997, *12* (2), 117–35.

Yarrington, Doug, *A Coffee Frontier: Land, Society, and Politics in Duaca, Venezuela, 1830-1936*, Pittsburgh: University of Pittsburgh Press, 1997.

Figure 1: Inequality in Four Latin American Countries, 1820s-1900s

Land rent to annual wage ratio, 10-year averages
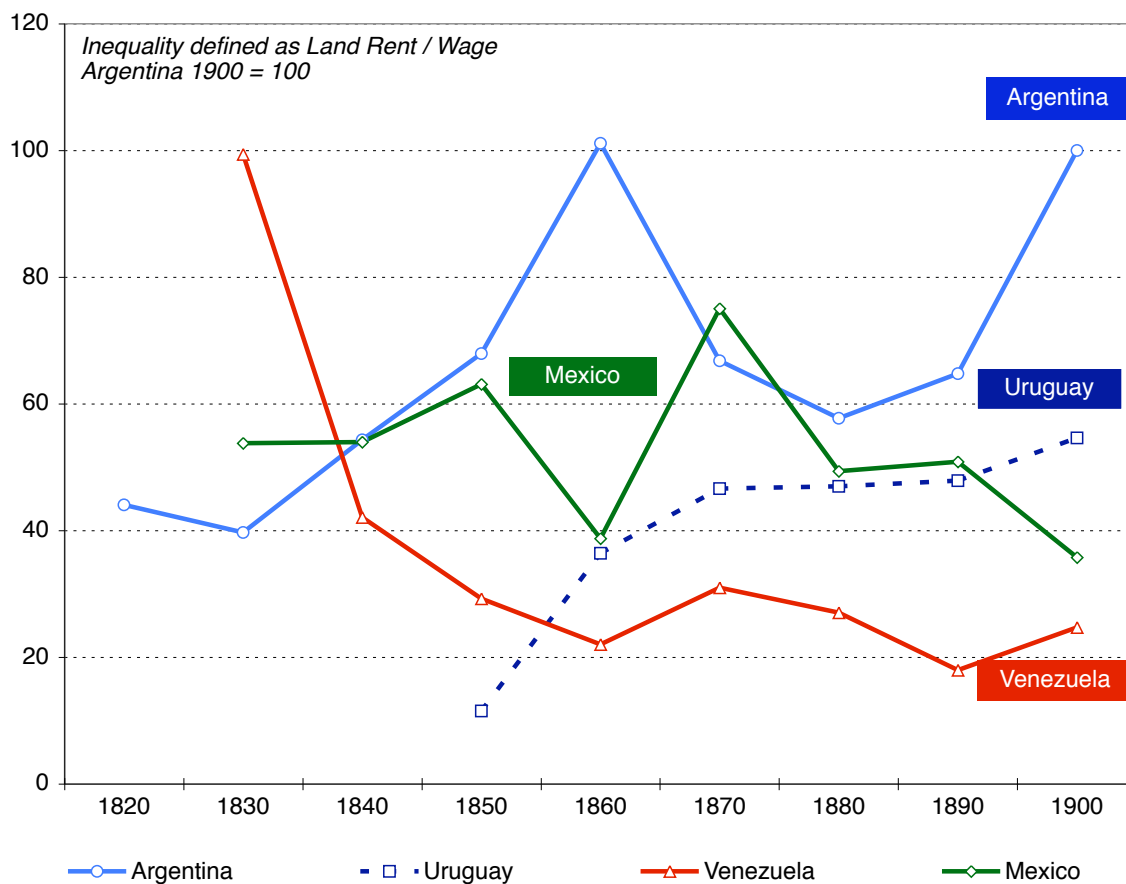
Sources:

Argentina:

Wages for Buenos Aires peons from Barba (1999), Cortés Conde (1979), and Argentine National Archives.

Land rent for Buenos Aires province from Argentine National Archives, Cortés Conde (1979), and Garavaglia (1999).

Uruguay:

Wages for Montevideo servants: from Uruguayan National Archive.

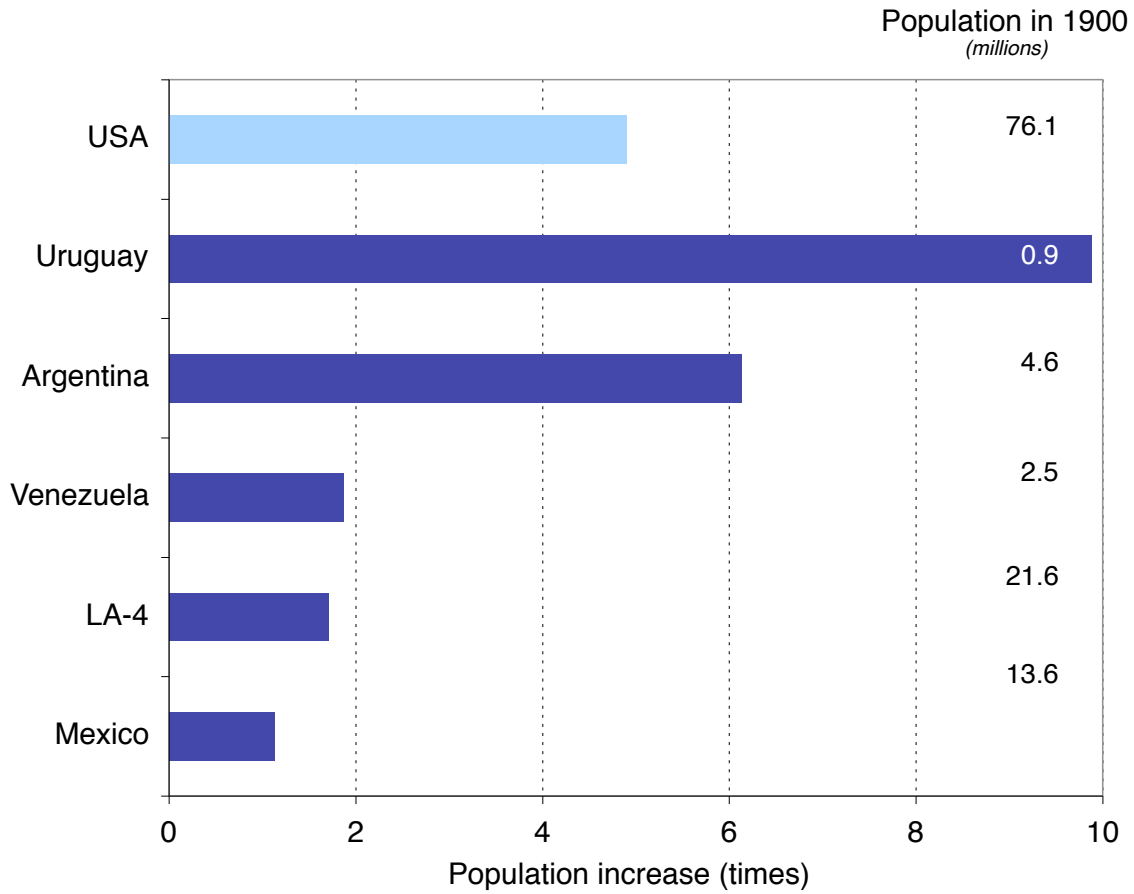Land rent for all regions in Uruguay from Barrán and Nahum (1967).

Mexico:

Wages for Mexico City servants from Mexican National Archive, Mexico City Archives, and Instituto de Historia y Antropología.

Land rent for Mexican central region from Mexican National Archive, Brading (1978), and Gómez Serrano (2000).

Venezuela:

Wages for servants in Caracas from the Venezuelan National Archive.

Land rent for main regions in Venezuela from CDCH (1971).

Figure 2: Population Growth, 1830-1900

Population in 1900
(millions)

Country	Population increase (times)	Population in 1900 (millions)
USA		76.1
Uruguay		0.9
Argentina		4.6
Venezuela		2.5
LA-4		21.6
Mexico		13.6

Population increase (times)

Sources:

Argentina: based on INDEC (1975)

Uruguay: based on Consejo Nacional de Administración Uruguay (1925)
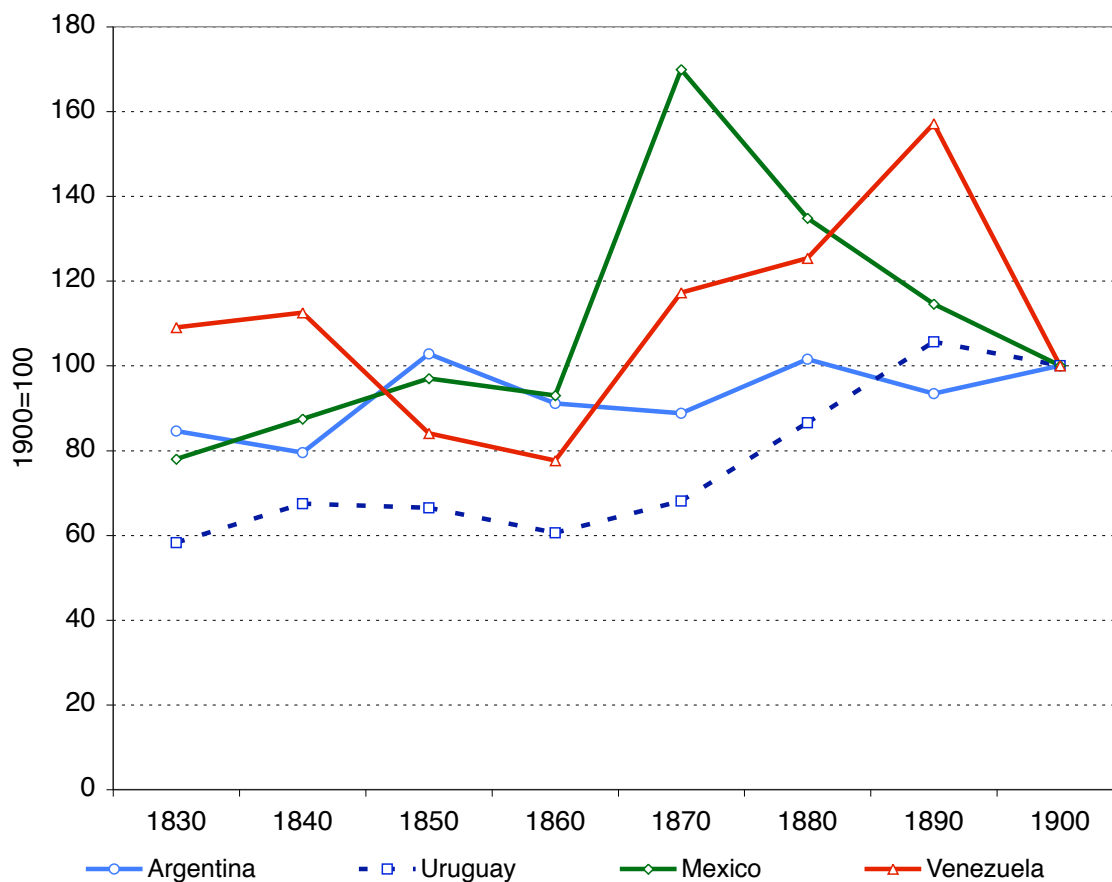
Mexico: based on Malvido (2006)

Venezuela: based on Baptista (2006)

United States: based on Carter et al., eds (2006)

LA-4: based on simple average of Argentina, Uruguay, Mexico, and Venezuela populations

Figure 3: Latin American Terms of Trade

Sources:

10-year average, year 1900=100

Argentina: 1830-1870 Newland (1998), 1870-1885: author's calculations following Newland's methodology, 1885-1900: Di Tella and Zymelman (1967)

Uruguay: 1830-1870: author's calculations following Newland's methodology, 1870-1900: Bértola, ed (2000)

Mexico: 1830-1880: Salvucci and Salvucci (2000), 1880-1900: Beatty (2000)

Venezuela: Baptista (2006)

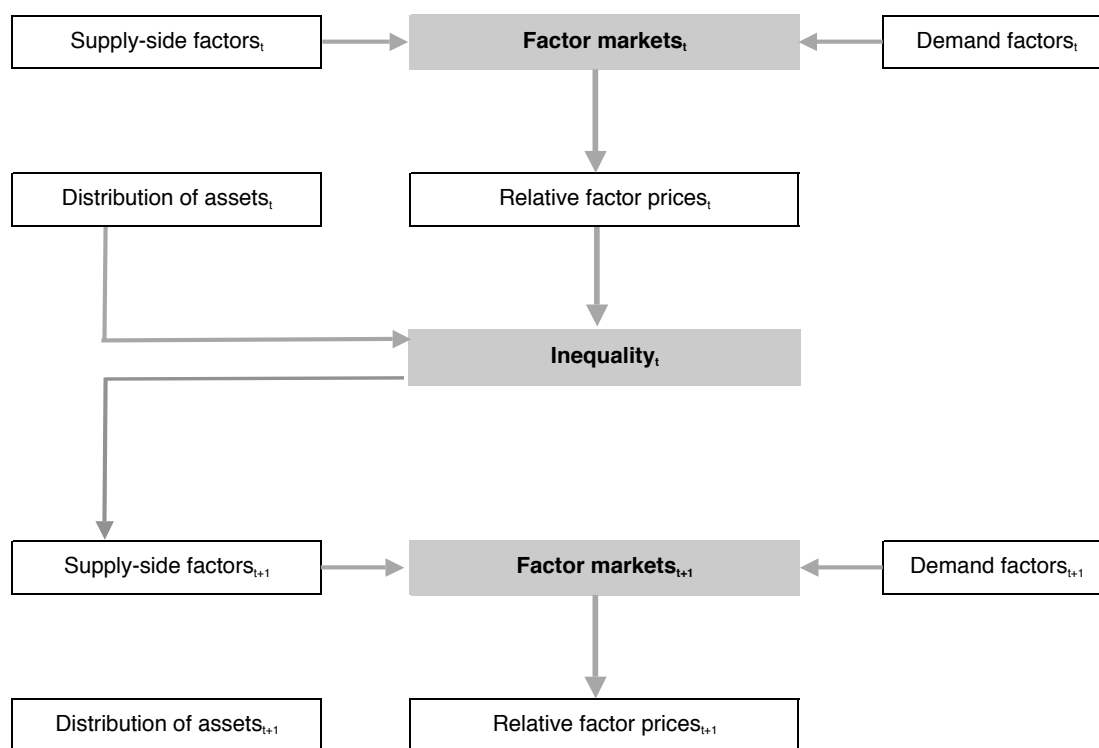**Figure 4: Distribution of Income and Production Factors**

Supply-side factors$_t$	→	**Factor markets$_t$**	← Demand factors$_t$

```
Supply-side factors_t  ──→  Factor markets_t  ←──  Demand factors_t
                                   │
                                   ↓
Distribution of assets_t      Relative factor prices_t
       │                                │
       │                                ↓
       └──────────────→         Inequality_t
       │
       ↓
Supply-side factors_{t+1}  ──→  Factor markets_{t+1}  ←──  Demand factors_{t+1}
                                       │
                                       ↓
Distribution of assets_{t+1}      Relative factor prices_{t+1}
```

Figure 5: Uruguay: Rent-Wage,* Land-Labor Ratios,** and Terms of Trade**
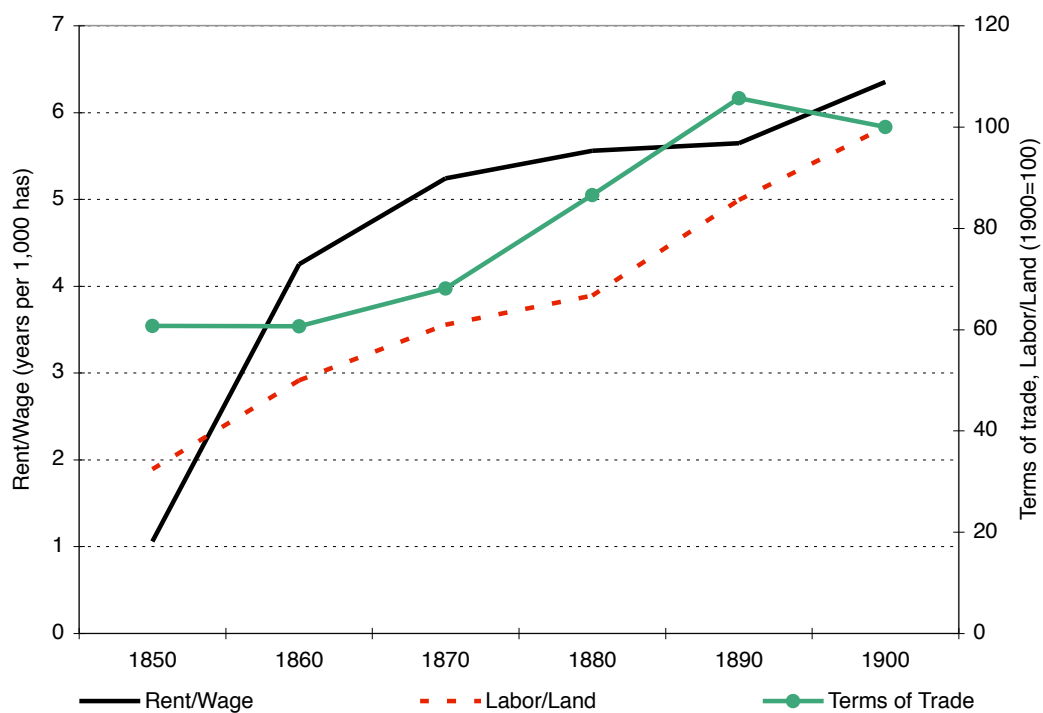
(*) Rent of a 1,000-ha plot (the "typical" hacienda in Uruguay had 1,992 hectares); Annual wage. The ratio indicates the number of years a worker has to save 100% of wages to rent a hacienda for a year. 10-year average. (**) 10-year average, year 1900=100.

Sources: see Figure 1, Table 2, Figure 2, and Table 3.

Figure 6: Argentina: Rent-Wage,* Land-Labor Ratios,** and Terms of Trade**
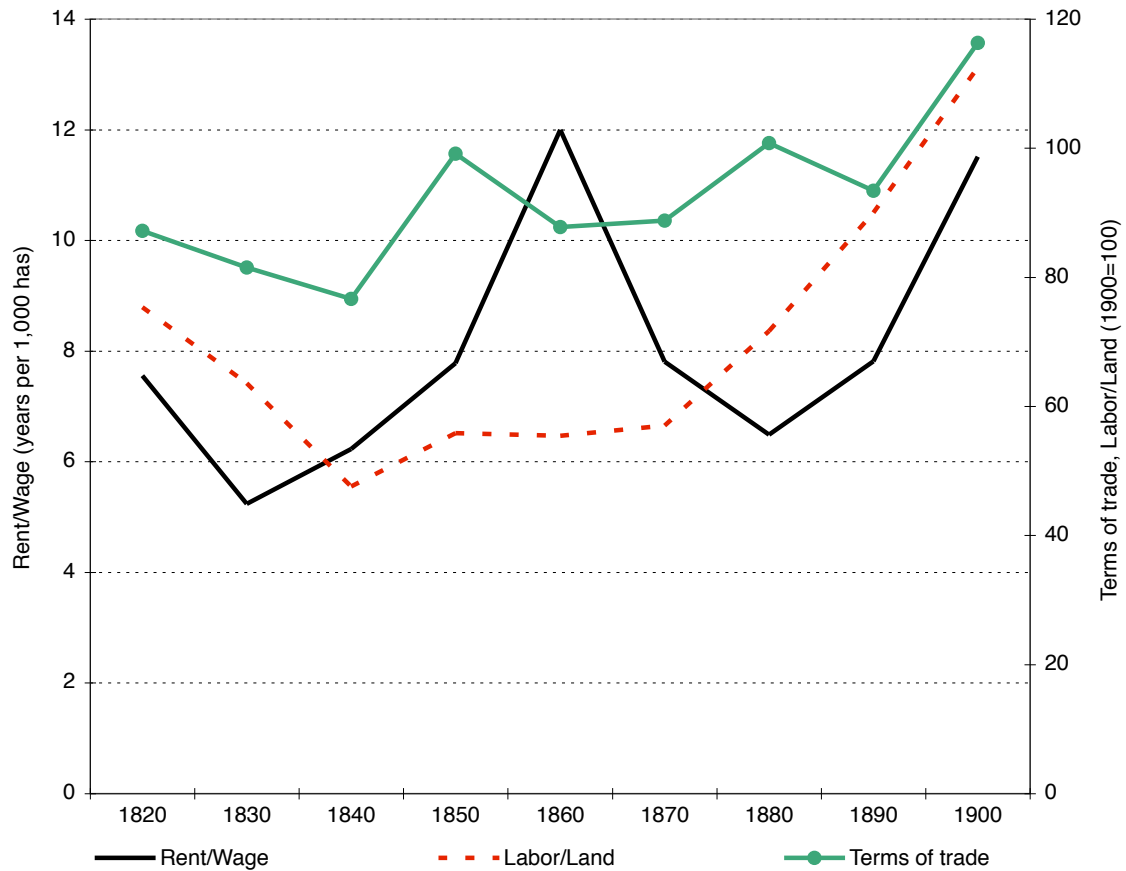
(*) Rent of a 1,000 ha-plot (the "typical" hacienda had 2,500 hectares); Annual wage. The ratio indicates the number of years a worker has to save 100% of wages to rent a hacienda for a year. 10-year average.

(**) 10-year average, year 1900=100.

Source: see Figure 1, Table 2, Figure 2, and Table 3.

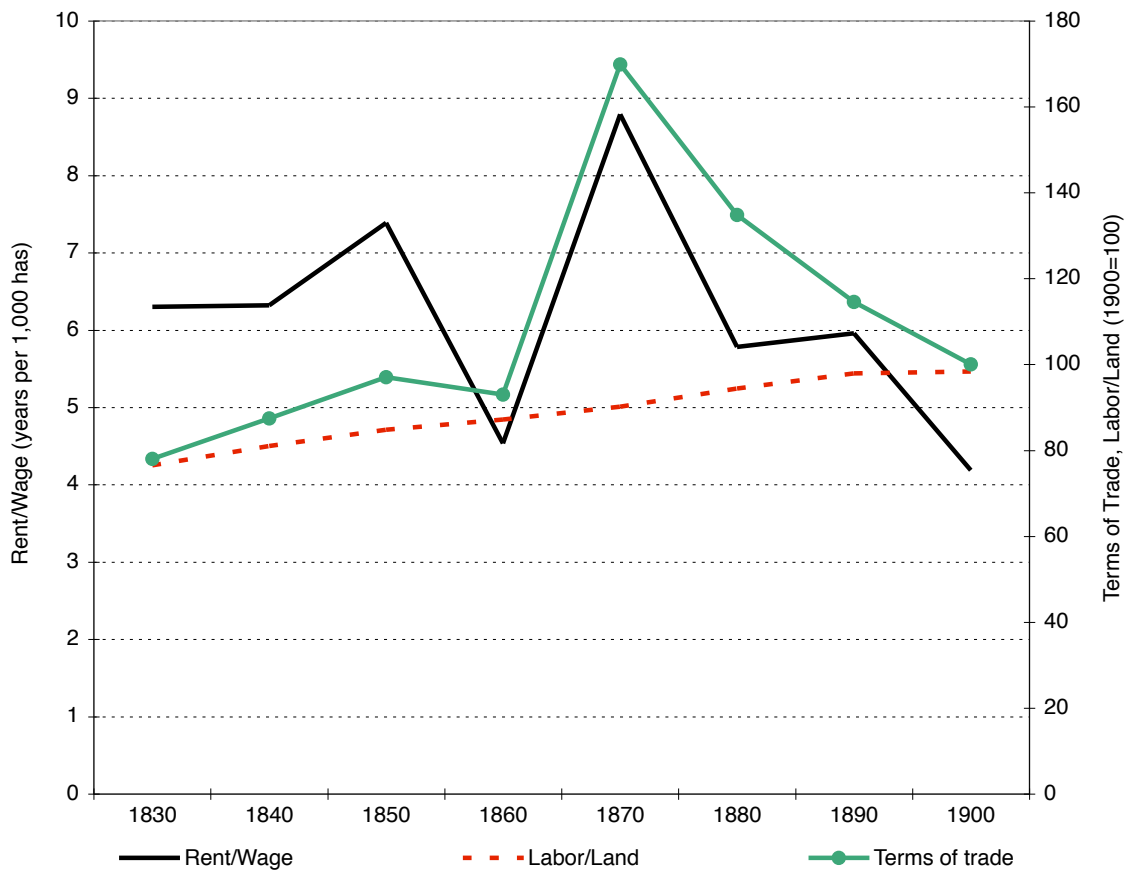**Figure 7: Venezuela: Rent-Wage,* Land-Labor Ratios,** and Terms of Trade****

(*) Rent of a 1,000-ha plot (the "typical" hacienda had 1,300 hectares); Annual wage. The ratio indicates the number of years a worker has to save 100% of wages to rent a hacienda for a year, 10-year average.

(**) 10-year average, year 1900=100.

Source: see Figure 1, Table 2, Figure 2, and Table 3.

Figure 8: Mexico: Rent-Wage*, Land-Labor Ratios**, and Terms of Trade**

(*) Rent of a 1,000-ha plot (the "typical" hacienda (ranch) had 1,100 hectares); Annual wage. The ratio indicates the number of years a worker has to save 100% of wages to rent a hacienda for a year, 10-year average.

(**) 10-year average, year 1900=100.

Source: see Figure 1, Table 2, Figure 2, and Table 3.

Figure 9: Counterfactual Inequality Path under Country-Specific Initial Conditions and Four-Country Average Shocks
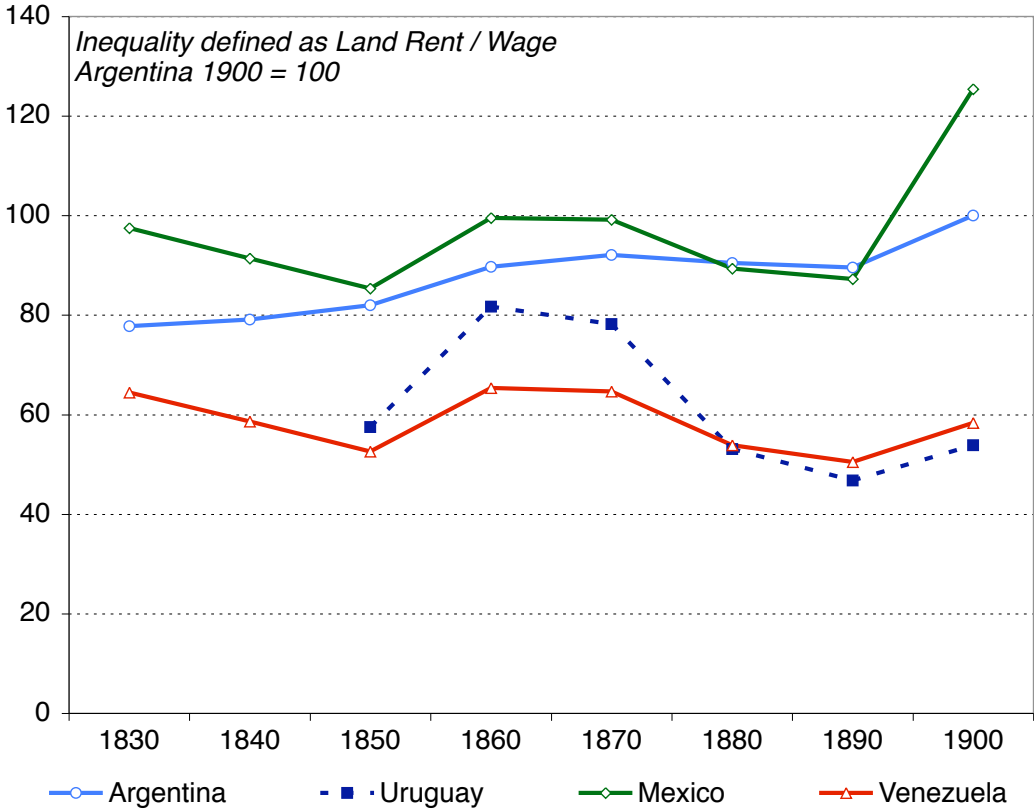
Figure 10: Shocks Matter: Counterfactual Inequality Path under Average Initial Conditions and Country-Specific Shocks
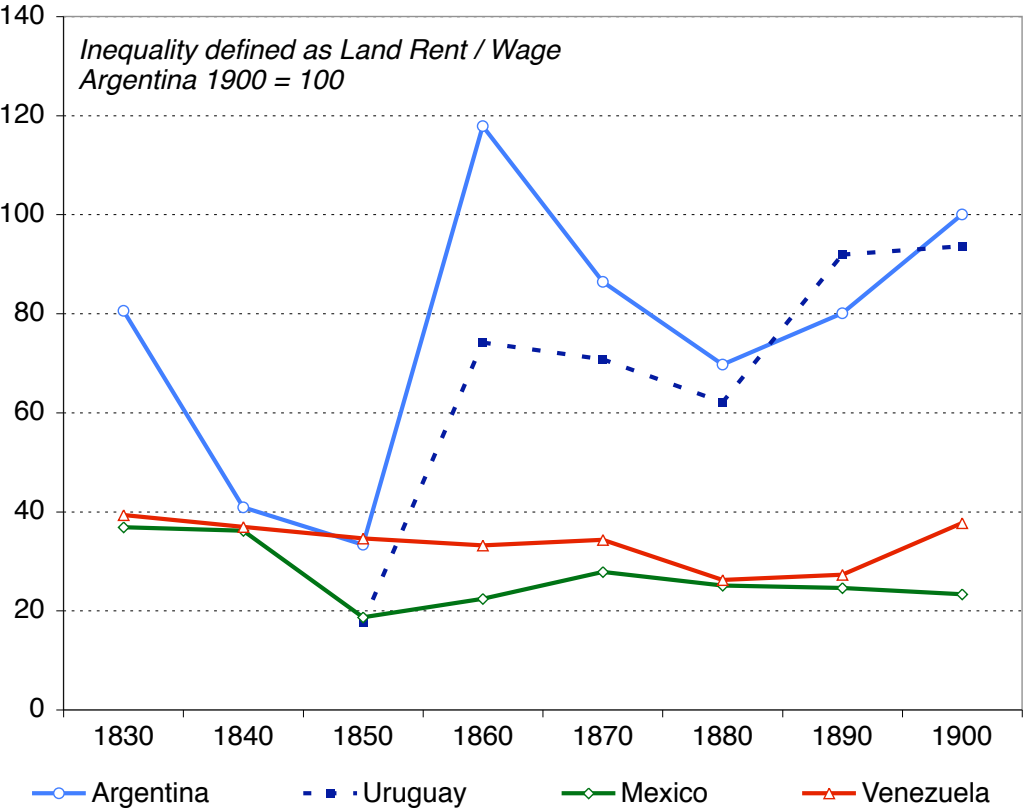
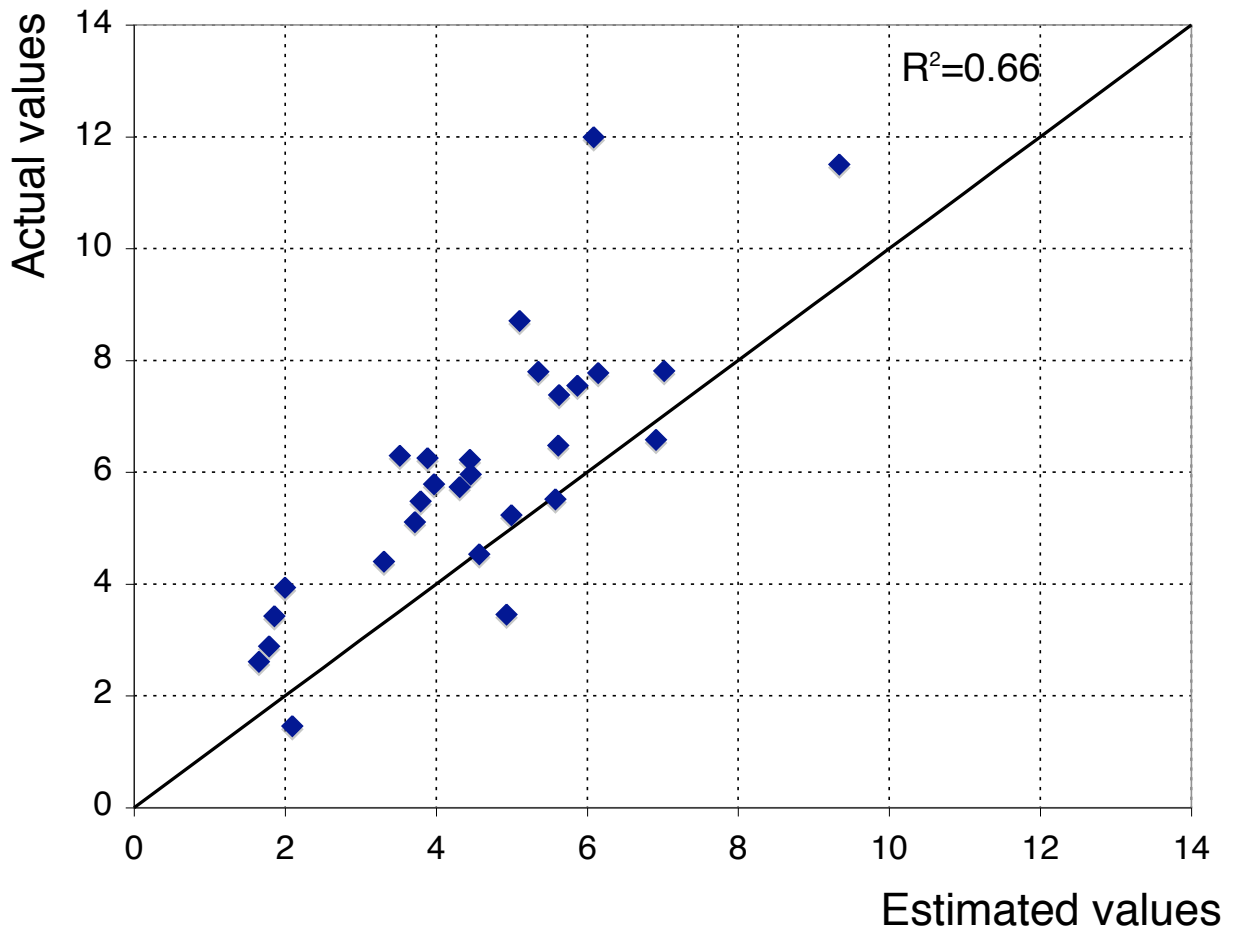Figure 11: Goodness of Fit: Real vs. Estimated Inequality

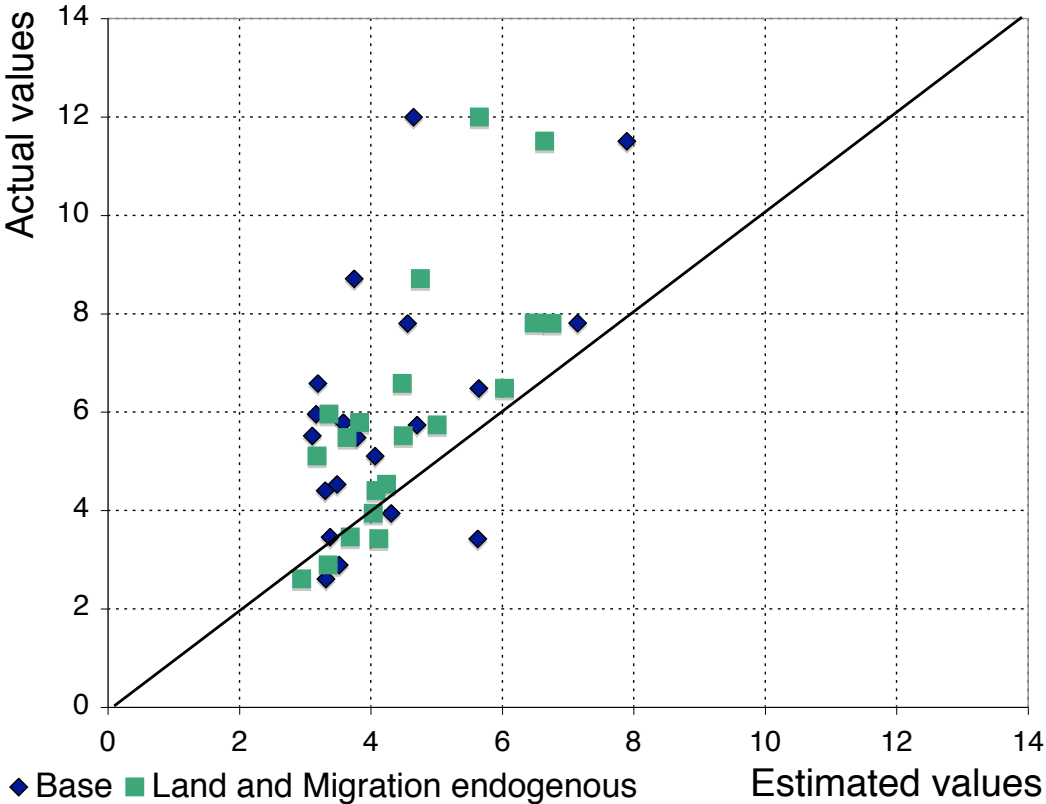**Figure 12: Counterfactual Effects of a 50-percent Decline in Terms of Trade after 1850 on Inequality**

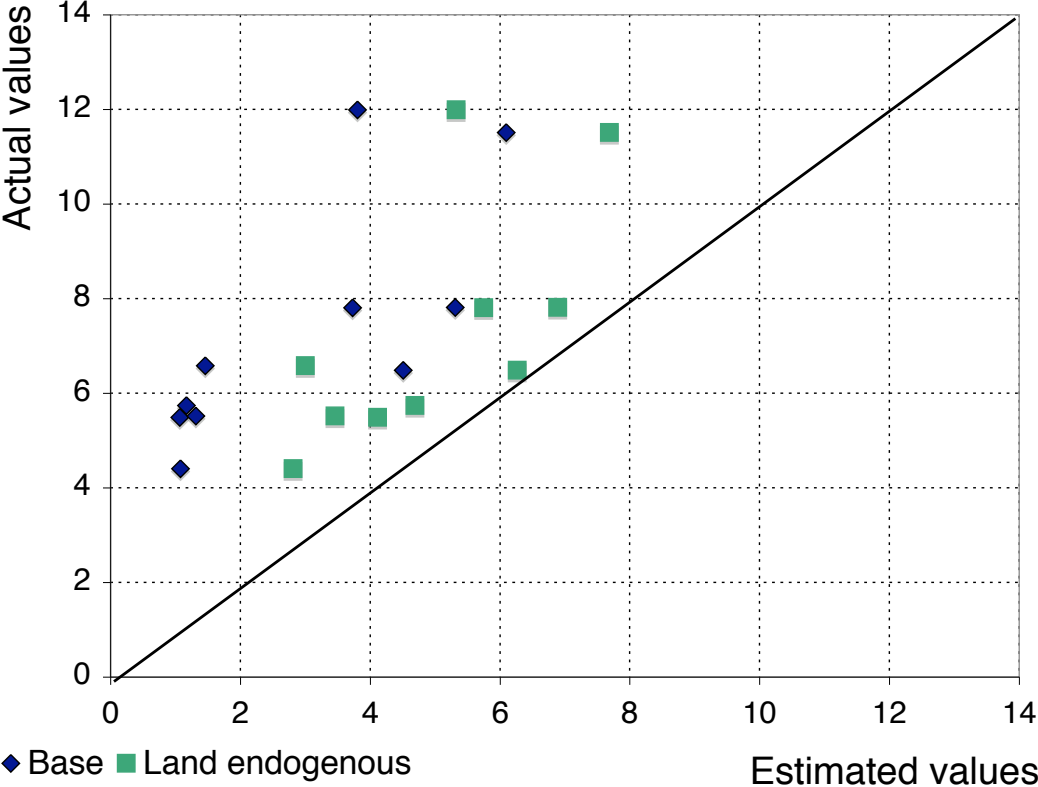**Figure 13: Counterfactual Effects on Inequality of Blocking Immigration**

Figure 14: Counterfactual Effects of No-Frontier Expansion Post-1850 on Inequality
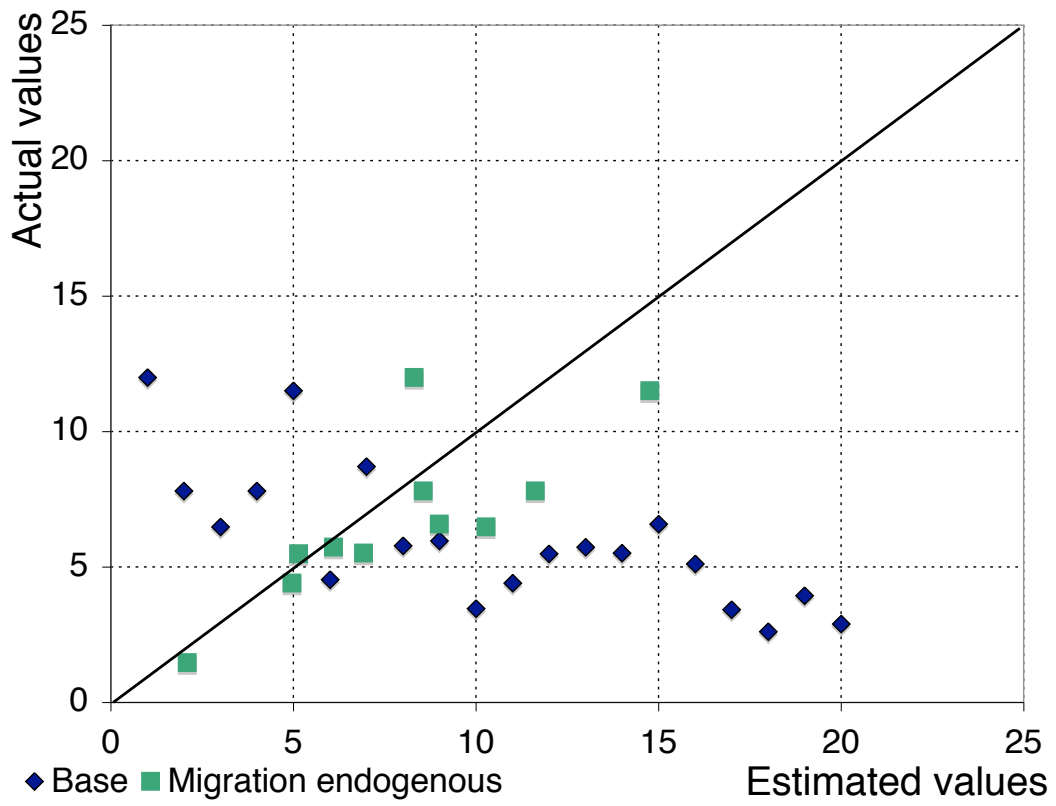
Table 1: Selected Indicators, ca. 1900s

	Argentina	Uruguay	Mexico	Venezuela	United States
GDP per capita	2,918	2,219	1,366	821	4,091
1990 International Geary-Khamis dollars					
Railways per 1,000 inhabitants	3.6	2.0	1.0	0.3	4.1
Km per 1,000 inhabitants					
Land ownership concentration	76.2%	54.5	98.3 %	94.1%	25.5%
Share of households owning NO land					
Export specialization	79.2%	86.9%	64.2%	62.8%	25.1%
Main export products as share of total exports					
Literacy	51.5%	59.4%	23.0%	18.6%	89.3%
Literate share of adult population					
Population density	1.6	5.0	6.9	2.3	9.9
Inhabitants per km^2					

Sources: **GDP per capita**: Maddison (2002)

Argentina:

Railroads: Vázquez-Presedo (1971)

Land ownership concentration: based on Comisión Directiva del Censo (1898)

Export specialization: livestock byproducts as share of total exports based on Dirección General de Estadística (1916) and Vázquez-Presedo (1971)

Literacy: literate share of population 14 years of age or older, based on Comisión Directiva del Censo (1898) and Vázquez-Presedo (1971)

Population density: from INDEC (1975)

Uruguay:

Railroads: Finch (2005) Land ownership concentration: based on Acevedo (1903)

Export specialization: livestock byproducts exports as share of total exports, based on Barrán and Nahum (1967) and Consejo Nacional de Administración Uruguay (1925)

Literacy: literate share of population 14 years of age or older from Consejo Nacional de Administración Uruguay (1925)

Population density: based on Consejo Nacional de Administración Uruguay (1925) and Finch (2005)

Mexico:

Railroads and Land ownership concentration: based on Dirección General de Estadística (1956)

Export specialization: silver and agricultural products exports as share of total exports, based on Herrera Canales (1977) and INEGI (1999)

Literacy: literate share of population 12 years of age or older, based on Dirección General de Estadística (1901)

Population density: from Dirección General de Estadística (1901)

Venezuela:

Railroads: Izard (1970) Land ownership concentration: based on Baptista (2006) and Brito Figueroa (2002)

Export specialization: cacao and coffee exports as share of total exports, based on Baptista (2006) and Izard (1970)

Literacy: literate share of population 14 years of age or older, based on Junta Directiva del Censo (1891)

Population density: from Junta Directiva del Censo (1891)

United States: Carter et al., eds (2006)

Table 2: Land Indicators

Argentina	Uruguay	Mexico	Venezuela
Frontier expansion			
(% of arable land transferred			
to private ownership, 19th century)			
93.4*	69.1	39.9	11.6
Land ownership			
(% landowning households, ca. 1900)			
23.8*	45.5	1.7	5.9

(*) Buenos Aires province

Sources:

Frontier expansion: Argentina: based on Comisión Directiva del Censo (1898) and Valencia (2005)

Uruguay: based on Consejo Nacional de Administración Uruguay (1925)

Mexico: based on Qamber (1992) and Dirección General de Estadística (1956)

Venezuela: based on Delahaye (2003)

Land ownership, see Table 1

Table 3: Export Indicators

	Argentina	Uruguay	Mexico	Venezuela
Exports per capita*				
(current U.S. dollars)				
c.1810	1.6	n.a.	2.1	n.a.
c.1850	7.6	7.7	3.2	2.3
c.1900	33.6	37.0	1.8	6.6
Exports concentration*				
(% main commodities in total exports)				
c.1850	98.6	≅ 100 .0	91.7	68.5
c.1900	79.2	86.9	64.2	62.8
Terms of trade*				
(1900=100)				
c.1830	95.0	56.2	79.3	99.5
c.1850	76.9	87.8	95.8	98.0
c.1870	79.9	65.7	116.9	120.2
c.1900	101.9	107.4	98.4	96.6

n.a.= not available;(*) Three-year average

Appendix A   A Model on Inequality Persistence and Change

We consider a small open economy populated by dynasties and two productive sectors with imperfect domestic capital markets.[23] Each dynasty lives forever, consisting of two agents who each lives for two periods: young and old. This overlapping generation framework allows connection between the new and old generations. Parents are altruistic and care about the welfare of their children: they leave an inheritance and support them in their younger years.[24] Agents when young are under the care of the adult, and the following stage of their lives is devoted to working. Happiness is achieved simply by the amounts of their consumption and their bequests to their offspring. Consumption takes place during adulthood as the parent provides for the basic needs during childhood.[25] Preferences are identical across individuals: the utility function assigns weights to consumption, c and transfers to offspring, b.[26]

$$U = \alpha \log c_{t+1} + (1 - \alpha) \log b_{t+1} \tag{A.1}$$

where $\alpha \in (0, 1)$.   Each individual in a generation faces similar constraints: consumption and transfers are financed by income flows (I) in adulthood. Transfers to the younger generation are the result of savings s_{t+1} to be transferred in the form of a bequest.

$$c_{t+1} + b_{t+1} = I_{t+1} \tag{A.2}$$

$$b_{t+1} = s_{t+1} = (1 - \alpha)I_{t+1} \tag{A.3}$$

In an egalitarian world, all generations display the same behavior. All individuals work during adulthood and leave part of their lifetime income to their children. In a more realistic setting, agents face choices and constraints. These choices are restricted by the assets inherited, those accumulated, and the functioning of the markets. In particular, this economy can transfer wealth across generations through two accumulable assets: capital and land. Intergenerational transfer implies the existence of capital markets. However, domestic capital markets are imperfect in the sense that agents are constrained in the amount of borrowing based on their collateral. It is further assumed that investment in land is lumpy. The indivisibility arises from the minimum productive scale for an agricultural productive unit. As a consequence only a share of all individuals invest in land. Society is then divided in landowners and landless workers. In other words, the distribution of wealth at a given point in time determines investment in capital and land. In non-industrialized economies, land has a preeminent economic role: not only does it function as a vehicle of wealth transference over time, but also provides the possibility of acceding to financial markets expanding investment and enabling consumption smoothing over time (Deininger and Feder, 2001). Taking into account this feature, this stylized society has two groups classified by their ownership of assets.[27]

- Landless workers or peons (P): Their income and bequest depend on the return on capital and labor.

$$b_{t+1}^P = (1 - \alpha)[w_{t+1} + (1 + r_{t+1})b_t^P] \tag{A.4}$$

---

[23]The model is based on Galor and Zeira (1993) and Galor and Moav (2004).

[24]Also known as 'joy of giving'. For evidence on bequest motives see Altonji et al. (1997) and Wilhelm (1996).

[25]The utility function is logarithmic and the discount rate is zero for simplicity.

[26]As the economy has two production sectors, consumption in this case is a composite good.

[27]The model can be expanded to allow the existence of a middle class while the main results still hold.

- Landowners or elite (R): The return to and ownership of land and capital determine their income and transfers to future generations.

$$b_{t+1}^R = (1 - \alpha)(1 + \rho_{t+1}^*)b_t^R \tag{A.5}$$

where ρ^* is the return to land and capital, and r is the exogenous return to capital.

When stationary, each of these groups converges to a unique equilibrium based on their savings alternatives and returns. The lump-sum investment requirement in the land market paired with the imperfection in capital markets shape the stationary equilibrium in this economy. The two groups or classes stylized above persist over time in the absence of shocks that can potentially induce some households to move upwards or downwards in the economic ladder.

The aggregate supply of factors of production depends on the composition of the society. The adult poor population (P) makes up the labor force (L). Land (T) is supplied depending on the saving decisions of the upper class. Given the domestic capital imperfections, the rich optimize their portfolio based on the return of land and capital while the lower class provides capital. However, capital also flows from abroad. The fact that this economy is open allows for international capital inflows (K^e).

In the case of no population growth, the supply of factors of production is given by:

$$L_t = L^P \tag{A.6}$$

$$K_t = Pb_t^P + R\mu b_t^R + K_t^e \tag{A.7}$$

$$T_t = R(1 - \mu)b_t^R \tag{A.8}$$

where μ and $1 - \mu$ are rich group's portfolio shares allocated to capital and land respectively.

Production takes place in two sectors: agriculture (A) and manufacturing (M). Not all factors are used in both sectors: manufacturing uses labor (L) and capital (K) whereas agriculture uses land (T), labor (L), and capital (K). Both sectors exhibit constant returns to scale. The small open economy assumption implies that product prices and the interest rate are given exogenously. Let Y_j represent the production of the two sectors ($j = A, M$) (we omit the time subscripts for simplicity) and a_{ij} the quantity of factor $i = T, L, K$ used per unit of output Y_j. The return to the factors of production are represented by: ρ, r, and w for land, capital, and labor respectively whereas p_A and p_M stand for the prices of the agricultural and manufacture final goods. Equations (A.9) through (A.13) describe the production and factor resources of this small economy.[28]

$$Y_A = f(L_A, K_A, T) \tag{A.9}$$

$$Y_M = f(L_M, K_M) \tag{A.10}$$

Assuming that factor markets are competitive and that all resources are exhausted in each period, the returns to factors of production will be determined by final good prices and the marginal productivity of each factor.

$$\rho = p_A f_T' \tag{A.11}$$

$$w = p_A f_{LA}' = p_M f_{LM}' \tag{A.12}$$

$$r = p_A f_{KA}' = p_M f_{KM}' \tag{A.13}$$

---

[28]Behind the scenes assumptions include: (i) the production functions are positive, concave, homogeneous of degree one for all factors and (ii) unit cost functions are also positive, non-decreasing, concave, and homogeneous of degree one for all factor returns.

Appendix B   Data Sources

B.1   Argentina

- Wages and prices: Archivo de la Nación Argentina, Hospital de Mujeres and Hospital de Hombres, Buenos Aires and Barba (1999).

- Land rental: land prices (Archivo de la Nación Argentina, Sección Catastro and Cortés Conde (1979)) adjusted by prevailing interest rate.

- Commodity prices: Di Tella and Zymelman (1967); Vázquez-Presedo (1971) and also from Asociación Rural Argentina.

- Interest rate: Della Paolera and Taylor (2003).

B.2   Uruguay

- Wages and prices: Archivo General de la Nación, Hospital de Caridad, Montevideo. Wages for the late 19th century are from Bértola and Williamson (2003).

- Land rental: land prices (Barrán and Nahum (1967) and Archivo General de la Nación) adjusted by prevailing interest rate.

- Commodity prices: several newspapers such as *Britannia*, *Comercio del Plata*, and *El Nacional*.

- Interest rate: Government bond yields from Global Financial Database.

B.3   Mexico

- Wages: Archivo General de la Nación de México, Archivo Histórico del Distrito Federal, Archivo Histórico del Instituto Nacional de Antropología e Historia, payroll records.

- Prices: Archivo Histórico del Distrito Federal, Archivo Histórico del Instituto Nacional de Antropología e Historia, accounting books.

- Land rental: land prices (Brading (1978) and Gómez Serrano (2000)) adjusted by prevailing interest rate.

- Interest rate: Government bond yields from Global Financial Database.

B.4   Venezuela

- Wages: Archivo General de la Nación de Venezuela, annual national budgets.

- Prices: Carrillo Batalla (2001) and Carrillo Batalla (2002).

- Land rental: land prices (CDCH, 1971) adjusted by prevailing interest rate.

- Commodity prices: Baptista (2006).

- Interest rate: Government bond yields from Global Financial Database (Colombian government yield was used before 1850).

Table C.1: Commodities by Country

Country	Commodities
Argentina	livestock byproducts and wool
Uruguay	livestock byproducts and wool
Mexico	silver, coffee, rubber, and cotton
Venezuela	cacao and coffee

Table C.2: Production Function Parameters

		Shares	
Country	Land	Labor	Capital
Agriculture sector			
Argentina	0.10	0.42	0.48
Uruguay	0.10	0.42	0.48
Mexico	0.10	0.60	0.30
Venezuela	0.10	0.40	0.50
Manufacturing sector			
Argentina	-	0.60	0.40
Uruguay	-	0.60	0.40
Mexico	-	0.60	0.40
Venezuela	-	0.60	0.40

Sources: Based on Argentina: Garavaglia (1999), Sábato (1990), and Svec (1966); Uruguay: Barrán and Nahum (1967) and Barrios Pintos (1973); Mexico: Buve, ed (1984), Bazant (1980), and Jarquín (1990); and Venezuela: Ardao (2002), Barral (1881) Brito Figueroa (2002), García Castro (1999), Pinero (1994), and Ríos de Hernández (1988).

Appendix C   Calibration: Sources and Methodology

The parameter and data requirements to calibrate and simulate the model on inequality presented above range from estimations on the stock of production factors to prices of export goods over time. The simulation exercise is a sequential series of static equilibria. The estimation of inequality is the endogenous result of the returns to land and labor in a two-sector open economy. To simplify the calculation, we identified the main export commodities (see Table C.1) for each country and studied the methods of production in terms of labor, land, and capital requirements (see Table C.2). We present here the calibration parameters per country in each shock analyzed.

C.1   General Parameters

Cobb Douglas production functions are adopted implying unity elasticity of substitution. Similar production shares are used for Argentina and Uruguay as both economies specialized in the same export commodities. Pastoral activities are more capital intensive than crop production. Thus, the estimated shares for Venezuela reflect a higher use of labor relative to capital.

C.2 Initial-Conditions Counterfactuals

For these two cases we assume that changes in factor endowments and terms of trade are exogenous. Taking these values as exogenous starting conditions we obtain inequality endogenously. The first counterfactual considers country-specific initial conditions and average shocks. Consider country i with initial conditions $S^i = L^i, T^i, p^i$ at $t = 0$ with corresponding inequality $ineq_0^i$ (calculated as the ratio between ρ_0^i and w_0^i). The production sector parameters are taken from Table C.2. Assume now that country i is subject to common shocks given by the relative change of the simple average of historical shocks in all the i countries. Mathematically,

$$S_t^{i^e} = S_0^i \frac{\overline{S_t}}{\overline{S_0}} \tag{C.1}$$

where S^{i^e} is the simulated shock and $\overline{S_t} = \frac{1}{i} \sum_i S_t^i$. Using the same methodology, we obtain simulated shock values for all countries. These series are used to estimate the inequality path as displayed in Figure 9.

The second counterfactual involves average initial conditions and country-specific shocks. We compute the average start-up values as a simple mean of all countries $\overline{S}_0$. The individual shocks are obtained by applying relative changes of each individual country to the initial conditions. Symbolically,

$$S_t^{i^e} = \overline{S}_0 \frac{S_t^i}{S_0^i} \tag{C.2}$$

Extending this calculation for the rest of the century, we estimate the projected inequality trajectory for the entire timeframe (see Figure 10).

C.3 Endogenizing Land and Labor

We consider the labor supply as the sum of natural population growth and net migration. Net migration is, in turn, a function of the real wage premium between the receiving and sender countries. For simplication we assumed that all migrants came from Italy and used the Italian real wage from Malanima (2004) and Williamson (1995). The net migration function was calibrated using Taylor and Williamson (1994)'s estimations on net migration - wage premium elasticity.

Land supply was estimated using a nonlinear function relating the land supply (T) to land rental (ρ) (see equation C.3) (Tabeau et al., 2006). Using annual land stock and rental for each country, we estimated the parameters b_0 and b_1.

$$T = b_0 - b_1^{\frac{1}{\rho}} \tag{C.3}$$

C.4 Decline in Terms of Trade

We have assumed that terms of trade fell 50% relative to the level achieved in 1850. The observed versus the estimated figures are presented in Table C.3.

C.5 Migration Effects

The large flows of migrants that arrived to the Southern Cone shores had a significant impact on the labor market. The "no-migration" counterfactual scenario calls for an estimation of the stock of

Table C.3: Terms of Trade Shocks

| | Terms of Trade | |
	actual	estimated
Argentina		
1850	103	103
1870	89	51
1900	100	51
Uruguay		
1850	66	66
1870	68	34
1900	100	34
Mexico		
1850	84	97
1870	170	49
1900	100	49
Venezuela		
1850	84	84
1870	117	42
1900	100	42

population and labor force in the absence of these flows. By definition, total population growth is composed of two factors: natural growth and net immigration. Simply deducting the last item from population stock by year does not provide an accurate estimate as it does not account for the indirect impact of immigration. In other words, we must take into account the migrant descendants over time. Another complication arises from the possible crowding out of the native population by immigration -known as the "Walker" effect. To address this issue, we calculated three estimations of population discounting the impact of migration (see Table C.4).

The first estimation simply ignores the "Walker effect" and applies the overall population growth rate to pre-migration phase figures. The second estimation simply subtracts the stock of foreign born from total population. Following Taylor (2000), the third approach decomposes total population growth in natural growth and migration incorporating potential crowding-out effect. The resulting estimations are presented in Table C.4 for Argentina and Uruguay. We expect the first approach to overstate the impact of migration population (upper bound) while the second one understates (lower bound) it. We favor the intermediate approach that attempts to capture the interaction between the native and the foreign population.

The next step involves calculating the labor force. Foreign and native population had different rates of participation in the labor market. This difference is explained partly by age and gender composition. The "typical" migrant in the era of mass migration was an adult male. Fortunately, for the Argentine case, Kritz (1985) has explored this issue providing age, gender, and participation of population by origin. As expected, the labor force participation rate (defined as labor force as percentage of total population) was higher for foreigns (77%) relative to natives (44%). We have used these figures to estimate the effective labor force for Argentina and Uruguay.

Table C.4: Population Estimations under No-Migration Counterfactual

Lower bound: Total Population - Stock of foreign population

Upper bound: Total Population applying natural growth rate pre-immigration era (Argentina: before 1850s; Uruguay: 1830s)

Walker effects: Based on regression $p = \alpha + \beta m_{t-1}$, where p is population growth, m_{t-1} is one-period lagged migration rate, α is the natural growth rate, and β is the estimated "Walker effect". Under no-migration, we assume that β is equal to zero. Hence, we calculated population based on α.

Argentina

	Actual	Lower bound	Upper bound	Walker effects
1875	2,197,761	1,823,330	1,889,079	1,857,989
1900	4,692,719	2,918,162	3,403,540	3,048,228
Population change				
1875-1850	92.9%	60.0%	65.8%	63.1%
1900-1875	113.5%	60.0%	80.2%	64.1%

Uruguay

	Actual	Lower bound	Upper bound	Walker effects
1875	458,354	172,707	361,595	291,207
1900	853,700	262,746	655,546	598,686
Population change				
1875-1850	243.8%	29.6%	171.3%	118.5%
1900-1875	86.3%	52.1%	81.3%	105.6%

Table C.5: Fixed Land Supply Counterfactual

	Theoretical land stock as % of actual stock
Argentina	
1850	100
1870	50
1900	38
Uruguay	
1850	100
1870	65
1900	57
Mexico	
1850	100
1870	97
1900	60
Venezuela	
1850	100
1870	96
1900	90

C.6 Fixed Land Supply

The final counterfactual scenario considers land to be fixed at the 1850 level. Table C.5 provides the calculations used in this case.