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1 Introduction

One oft-noted observation of the twentieth-century economic history of Latin America in general and of the import-substitution industrialization strategy (ISI) in particular is the neglect of agriculture and the related structural heterogeneity (Baer 1972; Kay 2002; Bertola and Ocampo 2012). In Latin America, the transformation of agriculture has not been regarded as a centerpiece of the adopted development strategies and, despite some attempts at rural reform, seldom promoted. It might be fair to say that biases against the rural sector have been a defining characteristic of Latin American economic development (Lipton 1977; Griffin et al. 2002; Johnston and Kilby 1975; Reynolds 1996). The dual structure remained even after the ISI period and the switch to the new economic model. A stylized fact is that the continent, even beyond the so-called *lost decade* of the 1980s, has been in a state of stagnation: weak structural transformation, slow growth, and consistently unequal distribution of income (Bulmer-Thomas 2005). Since the early 2000s, however, many economic indicators, as reported from Economic Outlooks and Reports by the World Bank, IMF or OECD, have been pointing in another direction: steady and relatively high income growth per capita, advances on the commodity export markets, and increasing inflows of foreign direct investments. In terms of social indicators, improvements have also been made: the number of people classified as middle class now surpasses the number of poor; poverty declined from 152 million people living below 2.5 dollars a day in 2000 to around 83 million people in 2010

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(World Bank online); and income inequality in the last decade declined in 15 out of 16 countries with comparable data at a rate of 1.1 % per year (Lustig et al. 2013).

It has been advocated that the fall in income inequality in Latin America provides support for the Kuznets curve (Tsounta and Osueke 2014; Kanbur 2011). The most cited reasons for the improvement relate to policies and political changes over the last decades such as the expansion of elementary education, reduction of the skill-premium, cash transfer programs, and macroeconomic stability (Lustig et al. 2011; Cornia 2012). No doubt, redistributive policies and changes in social spending and legislation are regarded as important proximate causes for narrowing the income distribution and lend support to the notion that income distribution might follow the inverted U-shaped pattern. True, the rise of the income share of the lower segments of the nonagricultural population was already suggested by Kuznets (1965) to be the key for narrowing the income distribution, and studies indicate that this is what we have witnessed in Latin America over the recent decades (Tsounta and Osueke 2014). However, a complementary way to assess whether Latin America is moving downward on the Kuznets curve is to capture the deeper dynamics of structural change in the form of inter-sectoral inequalities. While overall labor productivity has improved only slowly, agricultural labor productivity growth has been more impressive, suggesting a potential for diminishing the long-standing urban–rural duality in the Latin American economies.

In this study we approach the recent decline in income inequality in Latin America from the perspective of structural change with a focus on the relative performance of the agricultural sector. Our focus is on the underlying forces implied by Kuznets (1965). We zoom in on the relative performance of agriculture in the development process and the rural–urban duality and pay particular attention to the last couple of decades in relation to the entire post-1950 period. We attempt to estimate empirically possible theoretical relations with regard to these patterns by posing the following basic questions: how does the resurgence of agriculture relate to the reduction of income inequality and to what extent is this an expression of Latin America moving downward on the Kuznets curve?

The literature on agriculture's relation to the recent changes of income distribution in Latin America is quite limited. For instance, in a recent ECLAC report titled "Structural change for equality" (2012), the role of agriculture is not even mentioned. By agriculture we mean both farming and agro-business that processes and transports that output. To our knowledge, this paper is the first attempt to investigate this relationship for the recent decades in the perspective of structural change in Latin America. There are strong theoretical reasons to connect agricultural development to income distribution. The closing of the rural–urban income gap reflects what Reynolds (1975) called a "dynamic" transformation of agriculture and relates to the contribution agriculture provides for overall growth of the economy. In addition, the elasticity of poverty reduction with respect to growth is estimated to be stronger when growth emanates in the agricultural sector (Ravallion and Chen 2007; De Janvry and Sadoulet 2009). Productivity growth in the lagging sector should also contribute to sectoral labor productivity to convergence and thus helps to reduce inequality (Timmer 1988). For these reasons, the resurgence of agriculture driven

partly by improving commodity prices should be given due attention when assessing the decline in income inequality in Latin America. According to the logic of the Kuznets curve, the hypothesized "turning point" of the inverted U-curve is generated by a reduction of income inequality in one or both of the sectors and/*or* a reduction of the rural–urban income gap as the weight of the agricultural sector diminishes, and the income per capita gap between them declines.

We find that the recent decline in income inequality is related to the recent resurgence of Latin American agriculture, and, by inference, its lack of decline across most of the twentieth century must be related to a lack of productivity change in agriculture. We provide estimates showing that during the recent decades intersectoral duality has been reduced by agricultural productivity growth. The duality expressed as an inter-sectoral Gini shows the shape of an inverted U-curve and as such the closing of the rural–urban income gap corroborates with the theoretical expectations postulated by Kuznets. The wider implication of the study is, however, that with slower growth in agricultural labor productivity, continuing improvement in the income distribution becomes more difficult. In the absence of strong manufacturing growth, agriculture might be able to reduce income inequality further if agro-industries remain unskilled labor intensive, thus raising the opportunity cost of unskilled workers. On the other hand, the traditional service sector has perhaps become the "new agricultural sector" in terms of productivity and labor surplus. In other words, the source of the remaining dualism does not come only from rural areas, but also from urban areas.

In the next section, we relate the current agricultural resurgence to previous periods, in particular the so-called *belle époque*, and we discuss some possible differences between these periods. We then explore theoretically the structural relationship between agricultural development and income distribution. The subsequent sections contain the data and the methodology that we use for OLS (and fixed effects) regressions related to sectoral income inequality and a simple decomposition of agricultural labor productivity. We concluded with a summary of the main findings and the conclusions.

2 Commodity Export Booms, Land Inequality, and Development in Latin America

The economic history of Latin America indicates that commodity export booms and busts have been an important component of its development: in the nineteenth century sugar in Cuba and guano in Peru stand out, later nitrates in Chile, coffee in Colombia, Brazil, and Costa Rica, and in the twentieth century oil in Ecuador and Venezuela, just to mention a few cases (Bulmer-Thomas 1994). The export booms have indeed triggered growth spells, but no country in Latin America has experienced sustained structural transformation and industrialization (Sachs and Warner 1999; Bertola and Ocampo 2012).

The commodity export boom over the last decade seems to have been driven by demand from China and other emerging markets. Many Latin American countries such as Argentina, Brazil, Chile, Colombia, and Peru, among others, experienced a large increase in investment in land and agriculture (Borras et al. 2012)[1] in response to a rising terms of trade in spite of the sharp, but temporary, decline of prices during the 2009–2011 crisis (FAO 2014). The wave of rising terms of trade lasted 7 years compared to 3 years in past episodes in the 1970s and 1980s (Adler and Magud 2013),[2] and its timing coincided with the recent improvement of the income distribution in Latin America. Poverty and income inequality fell simultaneously in most countries of the region while other developing regions experienced the opposite (Lustig et al. 2011). In Latin America this stands in sharp contrast to the commodity boom period of the late nineteenth century. What might be different today in Latin America allowing improvements in the income distribution?

Land inequality has been regarded as one of the main historical determinants of the income distribution in Latin America (Engerman and Sokoloff 1997). Measured by Gini coefficients, land inequality has remained high over time and larger than income inequality (Solbrig 2006; Frankema 2009; World Development Report 2008). Likewise, estimates based on agricultural census data indicate that small farms in Latin America have less than 1 % of total land while the same statistics is around 15 % in East Asia and 55 % in sub-Saharan Africa (Anríquez and Bonomi 2007). Attempts to redistribute land have been many, but with varying degrees of success (Solbrig 2006).[3] The recent commodity boom has made land reforms less appealing because land prices went up with the recent large increase of land and agricultural investments in the region (Borras et al. 2012).

At the same time the impact of land distribution on income inequality is dependent on a variety of factors such as the weight of agriculture in the total economy and inter-sectoral linkages. The contribution of agriculture in total GDP and labor employment has been in relative decline. The manufacturing and service sectors depend less on land than does agriculture, and therefore labor has increased its share of total income. Gasparini et al. (2011a) provide evidence that 81 % of total income in the region comes from labor for the period 1992–2006. The remaining 19 % is nonlabor income, which includes income from capital, rents and profits, pensions,

[1] Borras et al. (2012) indicate that the presence of recent large foreign investment in land occurred in Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay Mexico, Nicaragua, the Dominican Republic, Guyana, Costa Rica, Panama, and Guatemala.

[2] Sachs and Warner (1999) developed a theoretical model to study when and how increases in commodity prices, including minerals, benefitted or damaged nine Latin American countries for the period 1960–1994. They found that on average countries with commodity booms longer than 3 years did not experience an increase of GDP in the years after, with the exception of Ecuador. Countries like Bolivia, Peru, Mexico, and Venezuela even saw a decline in their GDP during and after the boom.

[3] Mexico in 1917, Bolivia in 1952, Cuba in 1959, Chile in 1965, and Peru in 1971; Venezuela and Brazil had minor attempts that can be summarized as colonization policies rather than land reforms, and Argentina did not have the need to pursue it because the agricultural sector was the most advanced in the economy and the share of landless peasants was small.

inter-household transfers and remittances, government transfers, and the implicit rent from owned property.

There are reasons to believe that the recent boom has provided more room to stimulate inter-sectoral linkages today than in previous episodes. During the so-called *belle époque* (1860–1929) the commodity boom enriched the landowning elite and marked a turning point upward in the evolution of income inequality in the region (Williamson 2010a). During the period increasing international demand and declining costs of transportation promoted the expansion of the export sector, but labor mobility was constrained by the residuals of slavery and *encomienda* systems, let alone the repression of organized labor and the impact of European immigration in the Southern cone (Frankema 2009; Kay 2001; Williamson 1999; Bulmer-Thomas 1994, p. 87; Bauer 1975). Not surprisingly, in a period of stable farm wages, the landowning elite and the holders of capital reaped bigger benefits, and income inequality rose during the period, arguably to Gini levels around 0.60 (Williamson 2010b; Bertola et al. 2008; Rodriquez Weber 2014).

The main difference between the recent boom and the *belle époque* might be that agriculture is not isolated anymore and that improved terms of trade has translated into higher value not only for land but also for rural labor. Since the 1960s, it seems as if the emergence of linkages between the rural and urban economies in the region became apparent with the massive reallocation of agricultural labor into other sectors of the economy. The positive impact on rural labor may also have been stimulated by the demand of more commodity processing and internal transport. While agricultural employment recorded negative growth rates as the sector shrank, nonagricultural employment in rural areas has been growing since the 1970s and continues doing so in the 1990s in Ecuador, Chile, Colombia, Costa Rica, Mexico, and elsewhere (Reardon et al. 2001; Haggblade et al. 2010). On average, 40 % of rural income in the late 1990s came from rural nonagricultural employment. Hence, there is reason to believe that an agricultural sector fuelled by improved terms of trade would today promote the expansion of the rural service sector. Indeed, low unemployment rate in the region has been driven by the service sector, which has employed an increasing number of workers, including the rural service sector (World Bank 2012).

In addition, the recent commodity boom is also related to the emergence of "flex crops." Flex crops include soya, sugarcane, oil palm, and corn, among others. Their main trait is the multiplicity of their uses (food, feed, fuel, industrial material), which can be interchanged (Da Silva et al. 2010). For instance, soya can be used for feed, food, and biodiesel. In other words, the reliance on few export products, which has been historically prevalent in the agricultural export sector of Latin America, makes their economies less vulnerable to price fluctuations when the final use can be altered. As an example, the area planted to soya in hectares has risen in Bolivia from 172,354 in 1990 to one million in 2009 (Urioste 2011). In short, technological development has allowed agriculture to diversify their risks even within a single crop sector (Borras et al. 2012).

Also, the urban bias has receded in most countries for domestic policy reasons. After the 1980s price distortions on tradable products fell and enabled producers to exploit economic opportunities (Eastwood and Lipton 2004). Brazil, Chile, Peru,

and Mexico are good examples of the trend, where the new economic model allowed regional groups, which were less able to reap the benefits of their comparative advantages before, to benefit from positive changes in factor and product markets, and political disposition to invest in health, education, and infrastructure (Da Silva et al. 2010; David et al. 2000). The overall urban–rural income gap in the region fell from 2.5 in 2002 to 2.2 in 2006 (Gasparini et al. 2011b). Furthermore, even though there are few studies linking the role of agriculture in reducing poverty at the country level, recent estimates indicate that rural poverty fell more than urban poverty for the period 2005–2012 in every country (ECLAC 2014). However, there is some contrasting evidence that even though the floor has been lifted, the spatial gap in the human development index has remained stable (for Mexico, Campos-Vazquez et al. 2014).

In short, in the first decade of the twenty-first century we have witnessed one of the longest commodity price booms and the fall of income inequality in the region. The *belle époque*, however, marked the upswing of income inequality. The landed elite was the winner from the rising terms of trade and rural labor was excluded. While land was the main source of income in preindustrial Latin America, it remains highly concentrated as before, with land Ginis that go beyond 60 % in most countries. However, land has lost weight as the agricultural share of labor and GDP has fallen over time. Labor benefitted from the boom this time because labor markets are less segmented than they used to be, linkages between rural and urban activities have opened new job opportunities in the service and construction sectors, and safety nets and redistribution policies have protected people against income volatility. All these changes have an impact on the sectoral structure of the economy and therefore on wage inequality marking a turning point in the evolution of income inequality in the region.

3 Agricultural Productivity and the Kuznets Curve

It is almost a truism that a sustained increase in living standards requires increased productivity in the economy as a whole. Long-term gains in productivity imply structural change, which has been forcefully argued by Kuznets (1966), Syrquin (2006), and Timmer (2007). One of the major structural changes is the sectoral reallocation of labor into more productive sectors. However, less straightforward is the net effect of the different forces of structural change on income inequality. In this section we will present some of the theoretical and empirical avenues of how structural change, here mainly discussed in a two-sector perspective (agriculture and nonagriculture), affects income inequality. One of the reasons why agricultural development is relevant for inequality is the observation that the elasticity of poverty reduction with respect to growth is typically higher for agriculture than nonagriculture. Timmer, for instance, suggests that growth "originating in agriculture contributes to a more equal distribution of income" (2007: 60, drawing on the work of Kuznets 1955 and Chenery and Syrquin 1975).

Kuznets (1965, 1966) argued that both reallocation of agricultural labor into more productive sectors constitute the major structural change in a developing economy, plausibly leading to long-term inter-sectoral convergence in productivity. The whole process has repercussions on the pattern of income distribution. According to the Kuznets-curve logic, in the initial stages of development the reallocation of agricultural labor into the nonagricultural sector reduces both the relative share of people employed in agriculture and its share of total GDP without any significant increase in agricultural productivity. As a result, the rural–urban income gap widens along with the urban intra-sectoral inequality. Later on, the productivity (or income) gap between sectors converges as the productivity in agriculture improves. When the inter-sectoral convergence gets stronger, and as labor mobility increases, the overall income distribution improves. By then, the absolute number of employed agriculture falls with rural–urban migration. The inequality is also strengthened by distributive policies and legislation following the increasing importance of the political voice of both urban and rural lower-income classes. This ideal model represents a dynamic transformation of agriculture as opposed to a static one. Agriculture is mostly driven by its productivity dynamics (Johnston and Mellor 1961). In the latter, agriculture is instead squeezed out of its resources and inter-sectoral linkages are weak (cf. Reynolds 1975).

The Kuznets hypothesis provides broad ideas for thinking about changes in the long run income distribution. In a two-sector economy, when the majority at first resides in the agricultural sector and the nonagricultural sector is small, average income per worker is low as is the variance of the income distribution. When people leave agriculture, the average per capita income in the agricultural sector may rise but since the more unequal sector will gain in relative importance the overall income distribution might become more widespread.

The overall income distribution is the net effect of intra-sector distribution, inter-sector income differences, and sector weights. In some cases, the process of structural change might create forces working in opposite directions. Yet structural changes in a two-sector model may increase inequality in five possible ways: (1) income inequality is increased in both sectors simultaneously; (2) income inequality is increased in the agricultural sector only; (3) income inequality is increased in the nonagricultural sector only; (4) a divergence of average income between the poor agricultural sector and the rich nonagricultural sector; or (5) shifting weights in the more unequal nonagricultural sector. Estimating such a complex socioeconomic process is difficult. However, given the resurgence of Latin American agriculture, we may address the inter-sectoral productivity differences and weights. It should be emphasized that Kuznets was very careful to discuss the caveats of his hypothesized inverted U-curve; that it was a historical–theoretical speculation rather than an established empirical law.

One way of relating the rise of agricultural productivity with the income distribution is suggested by Timmer (2004), who argues that the turning point of the Kuznets hypothesis can be also associated with the closing gap between the share of GDP and employment in agriculture. He has estimated the gap in a sample of eight Asian countries (Indonesia, Malaysia, the Philippines, Thailand, India, Pakistan, South Korea, and China) for the period 1960–2000 by using the “inter-sectoral Gini

coefficient" as a proxy for the inequality of labor productivity (or income) between agriculture and nonagriculture. His results show that the inter-sectoral Gini is positively associated with the overall Gini and captures one-third of its variation, controlling for relative labor productivity, the GDP share of the service sector, savings, rice prices, and other variables.

Using evidence from 86 countries between 1965 and 2000, Timmer and Akkus (2008) show that the gap between the GDP and employment shares in agriculture does narrow with higher incomes and explains that this convergence is part of the structural change, reflecting better financial and labor markets. Furthermore, the agricultural productivity gap widens during the early stages of development and reaches a turning point at the per capita level of GDP above US 5063 in the year 2000, controlling for terms of trade, and US 9255 without controlling for them. The main implication of these findings is that agricultural price policy can be used to influence their domestic terms of trade, connect the agricultural labor to the rest of the economy, and thus reduce inequality.

4 Data and Methods

The aim here is to study the relationship between income inequality and agricultural development in nine Latin American countries: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Mexico, Peru, and Venezuela. These countries cover more than 82 % of the total GDP of LAC and more than 91 % of the population in 2012. The period covered 1950/1960–2010, which we divide into three subperiods that reflect alternative policy views: the import substitution (ISI) period between 1960 and 1975, the turmoil period between 1975 and 1995, and the agricultural resurgence/fall in income inequality period between 1995 and 2010.

We decompose aggregate labor productivity change to identify the contribution of agriculture relative to other sectors of the economy. Labor productivity is an indicator of real income per capita, and its change over time can be decomposed into sectoral productivity change and the reallocation between sectors. We follow the approach taken by Ocampo et al. (2009) and Roncolato and Kucera (2013). This can be expressed as follows:

$$\text{Labor productivity growth} = \sum \left\{ \varphi_{i0} \left(g_i - e_i \right) + e_i \left(\varphi_{i0} - \left(\frac{q_1}{q_0} \right) \lambda_{i0} \right) \right\}$$

The sectoral productivity growth is the difference between the growth rate of sectoral value added g_i and the growth rate of sectoral employment e_i, weighted by the sectoral output share φ_{i0}. Sectoral productivity growth (within) reflects technological change and rates of investment. Sectoral reallocation is the difference between sectoral output share φ_{i0} and sectoral employment share λ_{i0} adjusted by the ratio of labor productivity multiplied by the growth rate of sectoral employment e_i.

Reallocation is usually the most common term to capture structural change. However we view structural change as the interplay of both terms. We agree with the idea that reallocation of agricultural labor is indeed the major structural change in economic development, but realize that without increases in overall sectoral productivity reallocation might not contribute to growth as labor can end up in low productivity nonagricultural sectors.

To implement the decomposition, we use the Groningen Growth and Development Centre Data (GGDC) that contains data on sectoral value added and employment for nine Latin American countries. The data cover the period 1950–2010 for all countries, except Bolivia, Peru, and Venezuela. Their series start from the 1960s onward. We convert local currency value added at 1990 prices to dollars using 2005 deflators by sectors and exchange rates. Labor productivity is computed dividing sectoral value added by employment.[4] Note that unemployed people are not available in the GGDC data. We combine two of the original sectors (Government services and community, Social and personal services) into a single one, leaving the sample with nine sectors. The sectoral distribution and details on the sources of the data are available at the GGDC website.

The Gini coefficient is used as our measure of income distribution. We build on the work of Timmer (2004) to compute the inter-sectoral Gini from the share of the agricultural economy in overall economic activity in relation to its share of the labor force. Note that the inter-sectoral Gini is not the Gini of the agricultural sector, but the Gini coefficient of the agricultural sector compared with the nonagricultural sector. The inter-sectoral Gini coefficient should be positively related to the overall Gini coefficient.

The inter-sectoral Gini coefficient is computed as

$$\text{Inter}-\text{sectoral Gini} = 1 - p_{\text{agri}} S_{\text{agri}} - 2S_{\text{agri}}\left(1 - p_{\text{agri}}\right) - \left(1 - p_{\text{agri}}\right)\left(1 - S_{\text{agri}}\right),$$

p is the share of the labor force in agriculture, and S is its share of economy-wide income.

$$\text{Gini} = \text{constant} + \text{Intersectoral Gini} + \text{controls}$$

The Gini coefficient is the version 5.0 of the Solt[5] dataset that provides inequality measures for 153 developing and advanced countries for the period 1960–2010. The Gini coefficient we use as the dependent variable is the pre-fisc or market inequality[6] or inequality before taxes and transfers. The literature indicates that taxation

[4] The sectoral distribution is composed of nine sectors: agriculture, hunting, forestry, fishing; mining; manufacturing; public utilities; construction; wholesale and retail trade, restaurants, hotels; transport, storage, communication; financial services, real estate, insurance; other services (community and personal and government services).

[5] Solt (2014) produced the dataset of comparable series of Gini coefficient for net and market inequality.

[6] Missing data is completed through linearized estimates, in particular for the 1960s and 1970s.

policies in Latin America have little impact on market inequality (Goñi et al. 2008; ECLAC 2012). However, we use the difference between market and net (or post-fisc) inequality to capture redistribution in the period 1995–2010. The latter period has been characterized by an expansion of redistribution schemes, including non-contributory pensions, health insurance, and cash transfers to the poor, which have been widely praised.

We also recognize that there are many forces acting upon the Gini. The first of them is the distribution and changes in value assets or wealth over time. They should be studied jointly with the income Gini because the distribution of wealth is the result of past income distributions and savings rates. Furthermore, there is evidence that on average aggregate savings grew more than in previous boom episodes, and that the public sector contributed more to savings than the private sector (Adler and Magud 2013).[7] In this line, we borrow the idea from Timmer (2004), who studies the inter-sectoral Gini in eight Asian countries, that gross domestic savings are a crude proxy of nonlabor income. Savings rate in the full sample range from 11 % of GDP in Bolivia to 21 % in Chile and 31 % in Venezuela (see descriptive statistics in the Appendix). Likewise, we examine the impact of the service sector GDP on the Gini coefficient. The decomposition literature indicates that agricultural labor is released mostly into the traditional service sector, where productivities are low, and in many cases informal.

We examine the hypothesis that increases in agricultural labor productivity has a direct impact on the inter-sectoral Gini through its inner components: land productivity and land/labor ratio. On one hand, the identity below captures increases in efficiency that relates to improvements in the agricultural production such as quality of crops, or use of fertilizer, but also other effects such as improvement in the organization of production or institutional changes. On the other hand, the identity accounts for changes in the resource endowments such as increases in relative abundance of land relative to labor that can impact income during a commodity boom, given that land frontier can be expanded and high yield technology can be used. We take the data of arable[8] and agricultural[9] land from the World Development Indicators. We use both datasets, but the results here are presented based on arable land alone. The estimates do not vary much.

$$\frac{\text{Value added in agriculture}}{\text{Labor force in agriculture}} = \frac{\text{Value added}}{\text{Land}} \times \frac{\text{Land}}{\text{Labor}}$$

[7] Bolivia, Colombia, and Peru saved more out of the boom than the rest, while Chile and Brazil stand out on the other extreme with lower marginal saving rates.

[8] Arable land defined by the FAO as land under temporary crops (double-cropped areas are counted once), temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow. Land abandoned as a result of shifting cultivation is excluded.

[9] Agricultural land is the share of land area that is permanent pastures, arable, or under permanent crops. Permanent pasture is land used for 5 or more years for forage, including natural and cultivated crops.

Combining the GGDC data of agricultural value added and employment with the land data from the World Bank Indicators, we run an OLS regression with country and year dummies. All variables are logged, and land productivity and land-labor ratio are regressed on the inter-sectorial Gini. Finally, we contrast the results with the sectoral decomposition, which identifies sectoral productivity and reallocation.

5 Results

The first sign of an agricultural resurgence in Latin America was the rise in agricultural productivity relative to economy-wide productivity. The ratio has been growing at an unweighted average rate of 1.6 % per year for the period 1960–2010 but our results indicate that the period 1995–2010 accounts for 43 % of that impressive growth rate.[10] Some countries record a faster growth than others like Bolivia and Brazil in contrast with Chile and Costa Rica, but the gap between agriculture and nonagriculture was closing from 1995 to 2010 in every country in the sample.[11]

Agriculture has indeed been no obstacle to growth during the last 50 years and an engine of growth during the last two decades. In Table 1 we show that since the

Table 1 Closing the gap: the agricultural resurgence in Latin America between 1995 and 2010

Country	Agri. (%)	Manuf. (%)	Trad. serv. (%)	Finance (%)	Other sectors (%)	Economy-wide labor productivity growth (%)
Argentina	0.32	0.40	0.03	−0.14	0.32	0.93
Bolivia	1.58	−0.01	−0.84	0.13	0.05	0.91
Brazil	1.14	0.31	0.01	0.17	−0.69	0.93
Chile	0.64	0.56	−0.50	0.48	1.15	2.33
Colombia	0.43	0.19	−0.88	0.14	0.62	0.51
Costa Rica	0.43	0.73	−0.52	0.12	0.48	1.24
Peru	0.76	0.42	0.07	0.38	0.41	2.03
México	0.26	0.13	−0.18	0.31	−1.04	−0.53
Venezuela	0.20	0.03	−0.68	−0.12	−0.23	−0.80

Source: Labor productivity growth decomposition estimated with yearly data from the Groningen Growth and Development Centre (GGDC)

[10] The growth rate of the ratio for the period 1960–2010 is 1.8 % (40 % in the period 1995–2010) in Argentina, 1.8 % (68 % in the period 1995–2010) in Bolivia, 1.5 % (73 % in the period 1995–2010) in Brazil, 2.7 % (34 % in the period 1995–2010) in Chile, 0.6 % (33 % in the period 1995–2010) in Colombia, 1.5 % (29 % in the period 1995–2010) in Costa Rica, 0.8 % (58 % in the period 1995–2010) in Peru, 0.9 % (58 % in the period 1995–2010) in Mexico, 3.6 % (25 % in the period 1995–2010) in Venezuela.

[11] We examined the finding further by trying different specifications of the ratio such as manufacturing over agriculture, labor-intensive services over agriculture and even their marginal productivities, and excluding Argentina, whose agricultural productivity has been larger than the average in the economy and in the region.

Table 2 Testing the inter-sectoral Gini in nine Latin American countries between 1960 and 2010

Inter-sectoral Gini	1	2	3	4
Ln (income per head)	2.951***	2.494***	1.560***	1.561***
Ln (square income per head)	−0.144***	−0.122***	−0.080	−0.084***
Terms of trade				−0.00017
Year		X	X	X
Country			X	X
Constant	X	X	X	X
R-squared	20 %	55 %	92 %	92 %
Number of obs.	459	459	459	459

Note: Statistical significance is indicated as * at the 10, ** at the 5, and *** at the 1 % levels

mid-1990s the agricultural contribution lies ahead that of manufacturing, with the exception of Argentina and Costa Rica. In other words, during the period 1995–2010 the agricultural sector has consistently contributed more than manufacturing to aggregate labor productivity in seven out of nine countries in the sample. We also confirm the pattern that traditional services such as wholesale retail and trade, hotels and restaurants reduce aggregate labor productivity while dynamic services such as financial services enhance it, but not to the same extent as agriculture. For instance, Chile is a country with low agricultural GDP (5 %) and employment (9 %) shares compared to other middle-income countries, but most of the decline in poverty seems to be attributed to agricultural productivity growth. Anríquez and López (2007) estimate the unskilled labor demand elasticity of agricultural output to be three times larger than that of skilled labor. In general, even though our results do not account for the informal sector, the falling productivity in the service sector is a clear indication that the manufacturing sector cannot fully cope with the reallocation of agricultural labor and therefore the conditions for relatively high inequality will probably persist in the region.

Agricultural productivity has a role to play in closing the inter-sectoral labor productivity gap. Even though labor productivity does not necessarily translate into income in imperfect markets, we think that our estimates of the negative association between the inter-sectorial Gini and higher levels of income per head are appearing in many Latin American countries. Table 2 indicates that the income elasticity is 1.56 and the square of income is −0.08. In other words, the gap closes with rising income, and the turning point was 17.154 dollars per head at 2013 EKS PPP prices. We added the terms of trade[12] to check whether increasing trade would reduce the turning point, and the result was 10.847 dollars per head at 2013 prices. Argentina, Chile, Costa Rica, and Venezuela surpassed that threshold around 2000, and Mexico in the early 1980s. Brazil, Colombia, and Peru are coming closer to 10.000 dollars per head, and Bolivia is on 4.517 dollars by 2010 (see Table 5 in Appendix).

The literature has ambiguous results with respect to the association between terms of trade and inequality during the recent commodity boom. For instance,

[12] We combined the series of terms of trade from the World Bank and the Montevideo-Oxford Latin American Economic History Database (Moxlad). GDP per head at 2013 prices is taken from the Conference Board Total Economy Database (TED-GDCD).

Table 3 Explaining the log of the Gini coefficient across time and countries in Latin America

	1960–2010			1995–2010
Logged Gini	1	2	2a: excluding Argentina	3
Inter-sectoral Gini	0.078***	−0.018*	0.044***	0.03**
GDP service		0.055	0.202	−0.70***
Saving		−0.001*	−0.0002	−0.003***
Redistribution		1.438***	1.554***	−0.72
Time period		X	X	X
Country		X	X	X
Constant	X	X	X	X
R-squared	21 %	76 %	76 %	87 %
Number of obs.	411	411	374	131

Note: Statistical significance is indicated as * at the 10, ** at the 5, and *** at the 1 % levels. The coefficients of the inter-sectoral Gini for the *period 1960–2010* is 0.078*** for Bolivia, 0.092* for Brazil, 0.035*** for Chile, −0.035 for Colombia, −0.019 for Costa Rica, 0.098* for Peru, 0.069 for Mexico, and 0.072* for Venezuela. The coefficients for the *period 1995–2010* is 2.04 for Argentina, 0.14*** for Bolivia, 0.10*** for Brazil, 0.05*** for Chile, 0.005 for Colombia, −0.043 for Costa Rica, 0.11* for Peru, −0.024 for Mexico, and 0.09** for Venezuela

Astorga (2014) finds no evidence that the commodity price boom has favored unskilled labor, but Gasparini et al. (2011a) find that it has shifted resources, including labor, toward non-tradable sectors such as construction and services and favored the employment of unskilled labor in these sectors. Timmer and Akkus (2008) report that as in the case of East Asia the negative association between terms of trade and inequality indicate some room to design agricultural policies that improve the well-being of the rural population in the income distribution. Our estimates show a small and negative coefficient for terms of trade, and even if it is statistically insignificant, it seems to support the findings of Timmer and Akkus.

Table 1 shows that the inter-sectoral Gini is positively related to the overall Gini. Model 1 indicates that a 1 % increase in the inter-sectoral Gini raises the overall Gini by 0.08 %. Adding the controls, the inter-sectoral Gini in model 2 is −0.018 % and significant at the 10 % level. We examined the result by running separate regressions for every country and found that the downward bias comes from Argentina. Model 2a excludes Argentina and yields a coefficient of 0.04 %. Note that the coefficient is small relative to our first model, but the coefficient is larger and significant at the country level: 0.08 % in Bolivia, 0.09 % in Brazil and Peru (see note in Table 1). The inter-sectoral Gini explains 21 % and 25 % of the variation in the overall Gini coefficient for the period 1960–2010 and 1995–2010, respectively. It is worth noting that Timmer (2004) found that the inter-sectoral Gini in eight Asian countries for the period 1960–1999 accounted for 25 % of the variation of the overall Gini, but the beta coefficient of the inter-sectoral Gini was around 0.43. We did not get coefficients that high in any of the Latin American countries. One wonders which Asian country has driven the results: South Korea, with low inequality and rapid industrialization; the Philippines and Malaysia with high and relatively stable income inequality; or Thailand and China, with high income inequality today in comparison with the 1960s. Inequality in Latin America has been very stable and high in most countries regardless of their initial or current conditions.

Model 3 estimates the inter-sectoral Gini to be 0.031 % in the period 1995–2010,[13] during which the decline in income inequality became clear in most countries of the region. The larger coefficients of the inter-sectorial Gini are found in Bolivia (0.14 %), Peru (0.11 %), and Brazil (0.10 %), (see note in Table 1). We control for GDP service, savings and redistribution, and all coefficients are significant, and of the right sign. They all reduce income inequality. This would lead us to think that even though the service sector has some low productivity segments, it is absorbing labor and providing levels of income that might at least be better than in agriculture.

Our findings also show that the inter-sectoral Gini contributes to reduced income inequality and that the inter-sectorial gap is closing. The decomposition exercise presents evidence of the agricultural productivity growth having a larger impact on aggregate labor productivity growth than manufacturing or services. The inter-sectoral Gini for the most recent period explains around one-fourth of the variation in the overall Gini coefficient. We think that this supports the case for the renewed role of agriculture in Latin American development. We decompose agricultural productivity into land productivity and the land/labor ratio to connect both pieces of evidence, and examine their impact on the inter-sectoral Gini.

For the period 1960–2010, land productivity and land/labor ratio explain around 86 % of the variation in the inter-sectorial Gini (results not shown here). Both coefficients are highly significant, but land/labor ratio is higher than land productivity in every model estimated over the entire period. An increase of 1 % in land productivity reduces the inter-sectorial Gini by 0.23 %. For the ISI period, only 20 % of the variation in the inter-sectoral Gini coefficient can be explained by labor productivity. For instance, Reis (2014, p. 10) writes that "ISI in Brazil is associated with urban concentration, economies of scale and agglomeration and therefore a slow decrease in the spatial inequality of labor productivity." In other words, land productivity was still overwhelmed by the abundance of labor in rural areas in spite of rural–urban migration. However, in the 1995–2010 period the effect of land productivity gets stronger, which coincides with the commodity export boom. Over this period it seems as if land productivity and the factor endowments reinforce each other: the land/labor ratio has increased and so has the productivity per unit of land. Reis (2014) confirms the trend in Brazil, where intense use of land and other natural resources led to the spatial dispersion of economic activities and faster convergence of labor productivity across regions.

Land productivity has played a larger role in the recent period. A look at the agricultural productivity in the initial decomposition exercise presents the increase in agricultural productivity reliant on technological and institutional changes rather than crude reallocation of labor. In other words, as the inter-sectoral Gini is falling, the potential for reallocation is diminishing, which is a clear sign of the transition toward development. We interpret this as a sign of a more dynamic transformation of agriculture not mainly driven by extensive growth and rural to urban migration but also internal productivity growth in the sector.

[13] The coefficients for the inter-sectorial Gini are not statistically significant during the 1960–1975 and 1975–1995 periods.

6 Conclusions

This study explores the agricultural resurgence of the recent decades in a Kuznetsian structural change perspective and how it relates to the observed reduction in income inequality. We first establish that agricultures' relative labor productivity growth has improved over the last 15 years. Inspired by a recent literature on the role of agriculture and Kuznets' seminal discussion of how the forces of economic change might influence the income distribution, we focus on the part of overall income inequality made up by rural–urban duality, proxied by inter-sectoral income difference. According to our estimates the inter-sectoral Gini explains 20–25 % of overall inequality in Latin America over the entire period. We find that the long-term pattern of sectoral inequality declines with increase in per capita income. Based on this, we find support for income equalization due to inter-sectoral income convergence. Narrowing of the sectoral productivity gap suggests stronger inter-sectoral linkages and together with the expansion of agriculture-related employment opportunities it is likely that the opportunity cost of unskilled labor has been raised. This is consistent with the finding that the effect of agricultural productivity stemming from land productivity growth, rather than only changes in land/labor ratio, has grown in importance over the last 15 years. Compared to the *belle époque*, it seems as if improved terms of trade for agriculture not only increased the value of land but also rural labor and possibly also the political commitment to invest in rural areas. Interpreted in the framework of the Kuznets curve we have only addressed part of the dynamics and can therefore neither prove nor disprove whether the decline of inequality over the last decades constitutes the downturn of the Kuznets curve. The agriculture-led reduction of inter-sectoral productivity is however consistent with Kuznetsian forces bending the curve downward.

We also note that while agriculture has emerged as a stronger contributor to overall productivity growth, there has been a large expansion of low-productivity employment in parts of the service sector. This expansion seems to have contributed to the decline in overall income inequality, consistent with the implementation of policies directed toward the lower income segments of the urban population over the last decades. However, the rural–urban duality has transformed into an urban one. A remaining caveat is that even if agriculture has started to close the gap to other sectors, it is probable that productivity gains have been stronger among large capital-intensive agricultural units than smallholders. In this sense, the income distribution might not have been substantially narrowed within the agricultural sector.

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Appendix

Table 4 Descriptive statistics by country (standard deviations in parentheses)

	Argentina	Bolivia	Brazil	Chile	Colombia	Costa Rica	Peru	Mexico	Venezuela	Full Sample
Gini coefficient	39.5	39.6	56.1	42.6	53.1	46.9	57.4	47.4	41.7	47.0
	(6.7)	(18.0)	(10.2)	(18.6)	(5.4)	(7.7)	(10.8)	(12.5)	(9.0)	(13.4)
Inter-sector Gini	2.8	30.9	28.3	15.0	22.2	19.5	29.7	23.9	13.0	20.6
	(4.1)	(13.8)	(11.9)	(7.2)	(7.2)	(10.2)	(8.5)	(10.4)	(8.1)	(12.7)
Share of GDP from services	48.6 %	51.1 %	62.2 %	54.7 %	51.0 %	63.5 %	59.6 %	58.5 %	30.8 %	53.3 %
	(2.2)	(3.7)	(1.9)	(1.6)	(2.2)	(2.1)	(1.7)	(1.0)	(6.5)	(9.8)
Savings rate	21.2 %	11.8 %	20.2 %	21.5 %	18.7 %	16.1 %	22.3 %	21.0 %	31.7 %	21.0 %
	(5.8)	(7.3)	(2.9)	(6.3)	(2.8)	(3.2)	(7.5)	(3.2)	(6.5)	(6.7)
Redistribution	0.000196	0.3	4.5	1.9	3.4	3.0	3.7	2.2	2.0	2.3
	(0.0024)	(1.9)	(1.3)	(1.6)	(3.4)	(1.9)	(3.6)	(1.0)	(1.1)	(2.5)
Births per woman	2.9	5.2	3.6	3.0	4.0	3.7	4.5	4.4	4.1	3.9
	(0.3)	(1.0)	(1.3)	(1.1)	(1.4)	(1.6)	(1.5)	(1.7)	(1.3)	(1.5)
Agr. Share of labor	13.1 %	45.9 %	34.6 %	19.2 %	33.6 %	30.3 %	36.9 %	28.9 %	16.7 %	28.8 %
	(4.6)	(14.9)	(12.9)	(6.9)	(9.1)	(11.5)	(8.9)	(11.8)	(7.5)	(14.3)
Arable land (millions of ha)	26.3	2.2	48.2	2.9	3.1	0.25	3.2	20.6	2.7	12.2
	(5.4)	(0.7)	(13.3)	(1.0)	(0.6)	(0.03)	(0.6)	(2.7)	(0.1)	(1.6)

Table 5 GDP per capita in 2013 US$ (converted to 2013 price level with updated 2005 EKS PPPs)

GDP per Capita, in 2013 EKS$									
Latin America									
	Argentina	Bolivia	Brazil	Chile	Colombia	Costa Rica	Mexico	Peru	Venezuela
1950	6679	2829	2460	4164	2802	3254	4345	3598	8424
1951	6795	2967	2505	4233	2798	3235	4551	3782	8651
1952	6318	2993	2578	4417	2882	3504	4600	3878	9022
1953	6529	2653	2625	4666	2963	3900	4481	4020	8982
1954	6670	2651	2719	4433	3069	3795	4786	4027	9503
1955	7014	2732	2834	4510	3088	4078	5038	4214	9878
1956	7079	2514	2791	4489	3111	3815	5222	4289	10,300
1957	7314	2379	2934	4838	3123	3988	5446	4380	11,355
1958	7632	2382	3107	4983	3101	4318	5557	4276	11,082
1959	7020	2322	3268	4586	3219	4307	5541	4182	11,286
1960	7446	2368	3436	4845	3249	4502	5796	4629	10,890
1961	7851	2363	3586	4954	3305	4513	5827	4899	10,162
1962	7604	2438	3695	5066	3375	4616	5899	5114	10,226
1963	7307	2536	3625	5264	3380	4839	6140	5198	10,312
1964	7937	2597	3638	5263	3481	4909	6602	5402	10,795
1965	8533	2662	3603	5193	3499	5183	6801	5603	11,110
1966	8466	2787	3718	5655	3579	5402	7004	5906	10,925
1967	8571	2892	3758	5725	3623	5551	7206	5972	11,201
1968	8810	3064	3979	5818	3740	5798	7481	5746	11,571
1969	9426	3124	4208	5923	3873	6005	7689	5732	11,586
1970	9780	3208	4498	5936	4027	6223	7935	6009	12,048
1971	10,086	3249	4824	6351	4157	6448	8018	6105	11,793
1972	10,226	3332	5206	6159	4366	6827	8454	6126	11,566
1973	10,664	3474	5710	5711	4554	7159	8914	6272	11,995
1974	11,163	3564	6005	5664	4708	7344	9209	6422	11,862
1975	10,879	3708	6162	4848	4712	7288	9476	6744	11,822
1976	10,668	3902	6577	4932	4832	7470	9633	6658	12,338
1977	11,123	3967	6718	5333	4936	7906	9724	6481	12,701
1978	10,457	4001	6884	5685	5260	8074	10,278	6312	12,604
1979	11,019	3908	7195	6064	5436	8222	10,963	6518	12,327
1980	10,991	3791	7644	6445	5540	8141	11,611	6646	11,446
1981	10,188	3754	7136	6731	5537	7760	12,339	6770	11,110
1982	9705	3529	7008	5713	5469	7020	11,966	6621	10,562
1983	9894	3315	6619	5458	5433	7012	11,183	5603	9873
1984	9946	3293	6832	5685	5503	7347	11,321	5730	9735
1985	9155	3214	7231	5707	5559	7195	11,379	5715	9620
1986	9675	3057	7654	5931	5772	7371	10,718	6152	9849
1987	9775	3079	7754	6218	5957	7510	10,688	6536	9940
1988	9449	3131	7585	6558	6077	7561	10,601	5872	10,251

(continued)

(continued)

GDP per Capita, in 2013 EKS$									
Latin America									
	Argentina	Bolivia	Brazil	Chile	Colombia	Costa Rica	Mexico	Peru	Venezuela
1989	8733	3152	7687	7129	6150	7789	10,836	5046	9138
1990	8616	3239	7240	7263	6280	7869	11,178	4690	9385
1991	9315	3330	7192	7698	6299	7866	11,438	4721	10,056
1992	9890	3305	7037	8490	6442	8382	11,635	4603	10,425
1993	10,378	3368	7265	8929	6677	8760	11,645	4724	10,229
1994	10,885	3446	7571	9283	6888	8915	11,948	5225	9783
1995	10,442	3529	7770	10,110	7118	9013	11,025	5570	9970
1996	10,861	3605	7818	10,700	7154	8858	11,407	5611	9764
1997	11,565	3705	7963	11,245	7296	9122	11,989	5897	10,199
1998	11,932	3810	7849	11,449	7239	9652	12,407	5768	10,054
1999	11,448	3747	7755	11,213	6857	10,208	12,705	5737	9300
2000	11,264	3761	7938	11,574	6995	10,172	13,364	5826	9493
2001	10,681	3746	7939	11,830	7040	10,090	13,186	5761	9671
2002	9451	3760	8076	11,958	7127	10,215	13,128	5973	8688
2003	10,108	3784	8070	12,299	7306	10,702	13,151	6138	7898
2004	10,732	3864	8417	12,916	7588	10,989	13,525	6367	9208
2005	11,508	3956	8564	13,505	7837	11,465	13,804	6724	10,012
2006	12,272	4066	8779	13,993	8251	12,293	14,334	7165	10,840
2007	13,105	4172	9191	14,499	8706	13,080	14,646	7716	11,616
2008	13,432	4348	9530	14,886	8901	13,247	14,655	8380	12,048
2009	12,861	4414	9405	14,589	8937	12,931	13,620	8368	11,488
2010	13,787	4517	9958	15,284	9181	13,388	14,185	9009	11,147
2011	14,397	4670	10,139	16,030	9677	13,797	14,578	9534	11,440
2012	14,467	4830	10,139	16,769	9950	14,318	14,965	10,032	11,896
2013	14,683	5007	10,254	17,437	10,206	14,631	15,027	10,468	11,841

Source: The Conference Board Total Economy Database™, January 2014, http://www.conference-board.org/data/economydatabase/

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