Productivity Growth and Labor Reallocation: Latin America versus East Asia Online Appendix

Murat Üngör*

June 21, 2016

This is the Online Appendix for the paper, "Productivity Growth and Labor Reallocation: Latin America versus East Asia." It is posted at `http://www.muratungor.com/research`

1 Some aggregate comparisons

Figure 1 displays GDP per person employed (labor productivity) in each country relative to the U.S. between 1960 and 2010.[1] Venezuela is a notable case, since Venezuela was more productive than the U.S. in 1960. Labor productivity in Venezuela decreased dramatically relative to that of the U.S. from 113.6% in 1960 to 36.4% in 2010. Most of the countries in Latin America experienced severe crises in the early 1980s. Chile showed a recovery after the 1980s. Labor productivity in Chile decreased from 48.9% of the U.S. level in 1980 to 38.6% in 1986. Chile experienced a recovery from on as the productivity of the country increased to 52.8% of the U.S. level in 2010.[2] Today, among the nine countries in Latin America, Chile has the highest per capita GDP and the highest labor productivity.[3]

Figure 2 shows relative human capital levels in these two regions during 1960-2010.[4] Korea's (Taiwan's) human capital increased from around 57% (67%) of the U.S. level in 1960 to around 95% (91%) of the U.S. level in 2010. Argentina (around 72% of the U.S. level) and

*Department of Economics, University of Otago, PO Box 56, Dunedin 9054, New Zealand. E-mail address: murat.ungor@otago.ac.nz

[1]GDP for a given country is measured in millions of 1990 US$ (at Geary-Khamis PPPs). Data are from the Conference Board Total Economy Database (May 2015).

[2]Bergoeing et al. (2007, p. 217) summarize this as follows: "For Mexico, like much of the rest of Latin America, the 1980s were a *lost decade*-whereas for Chile they were a *found decade*..."

[3]King and Ramlogan (2008) study 18 Latin American economies individually to establish whether their level of GDP per worker (or per capita) is converging (or, at least, catching up) with that of the U.S. They find that only one country, Chile, provides evidence of catching up to a statistically and economically significant degree at the end of the sample period (1950-2000).

[4]Human capital is constructed using information on average years of schooling in the population over 25. Data on average years of schooling are from Barro and Lee (2013). These are converted into human capital following Caselli (2005). Data in Barro and Lee (2013) are constructed at 5-year intervals and I use linear interpolation in between years ending in 0 and 5 to estimate missing observations. The Barro-Lee dataset is available at `http://www.barrolee.com/`

Chile (around 70% of the U.S. level) had higher relative human capital levels in 1960 than Korea and Taiwan. However, only three Latin American countries (Argentina, Bolivia, and Chile) reached to 80% (and above) of the U.S. level by 2010. Figure 3 displays PPP physical capital-output ratios in these two regions during 1960-2000.[5] The capital-output ratio in Korea increased from 0.84 in 1960 to 2.46 in 2000. Similarly, this ratio in Taiwan increased from 0.49 in 1960 to 1.34 in 1998. Peru, initially, had a very high capital-output ratio; however, that ratio declined steadily between 1960 and 1980, and then fluctuated around 1.8 during 1980-2000 in this country. Figure 4 shows total factor productivity (TFP) levels in each country relative to the U.S. during 1960-2000.[6] Korea and Taiwan increased their TFP levels relative to the U.S. level, while the deterioration in TFP levels in Latin America is clear in the post-1980 period (see also Levy and Schady, 2013, Figure 2).

2 Productivity levels: A comparison

I present a confrontation of the obtained productivity levels in this study and those obtained from some (available) different studies. Maddison and van Ooststroom (1993, Table 7) provide a comparative perspective in agriculture in 1975 for some countries. They estimate that labor productivity in agriculture (gross value added per person engaged) in 1975 was 43.9% of the U.S. level in Argentina, 10.0% of the U.S. level in Brazil, 6.7% of the U.S. level in Mexico, and 3.6% of the U.S. level in Korea. My calculations yield the following figures in that year: 24.6% for Argentina, 8.0% for Brazil, 9.2% for Mexico, and 8.7% for Korea. The findings for agriculture are consistent with the data constructed by Restuccia et al. (2008) for 1985. According to Restuccia et al. (2008), GDP per worker in agriculture relative to the U.S. was highest in Argentina and lowest in Peru (in comparison with other Latin American countries) in 1985. I have similar observations for that year. In Restuccia et al. (2008), labor productivity in agriculture in Peru is 3.4% of the U.S. level in 1985; while my calculation is 4.9% for Peru.

Mulder et al. (2002) study the labor productivity performances of several manufacturing branches (as well as total manufacturing) in Brazil and Mexico by comparing them with the U.S. They estimate that Brazilian productivity in total manufacturing is 42.5% of the U.S. level in 1985 and that of Mexico 27.4% of the U.S. level in 1988. My calculations suggest that manufacturing labor productivity in Mexico is 29.5% of the U.S. level in 1988, close to the figure of Mulder et al. (2002). On the other hand, I calculate that labor productivity in manufacturing in Brazil is 24.8% of the U.S. level in 1985, lower than the reported figure in Mulder et al. (2002). My findings for manufacturing productivity levels in Taiwan are similar to those of Timmer (1998). Timmer (1998) estimates that in 1961, Taiwan's labor productivity in aggregate manufacturing is 11.2% of the level in the U.S., increasing to 25.7% in 1986, and to 31.3% in 1993. I find that in 1963, Taiwan's labor productivity in

[5]Data are from Hsieh and Klenow (2010). They use a measure of the capital stock at common international prices (constructed using investment rates) based on Penn World Table 6.1. Restuccia (2012, Table 3), based on Penn World Table 6.2, reports capital-output ratios for the selected Latin American countries for 1960 and 2009. The reported ratios in Hsieh and Klenow (2010) and Restuccia (2012) are comparable. For example, Peru, among all other Latin American countries, had the highest capital-output ratio in 1960.

[6]Data are from Hsieh and Klenow (2010). They use a standard growth accounting methodology. TFP is the residual after controlling for physical capital, human capital, and labor input.

manufacturing is 15.7% of the level in the U.S., increasing to 36.0% in 1986, and to 41.3% in 1993.[7] Mulder (1995) studies the productivity in the transport and communication sector in Brazil, reporting that the productivity figures in Brazil in 1975 lay in a range between 22 and 31% of the U.S. level. My figure for 1975 is around 41% in Brazil. Mulder (1995) also argues that Mexican relative productivity is higher than that of Brazil in this sector and this is in line with my findings. Mulder (1995) states that labor productivity in this sector in Brazil was rather stagnant until 1966, after which the relative performance improved very fast until 1980; in the 1980s relative productivity fluctuated and in 1990 was 30% of the U.S. level. My findings are in line with those of Mulder (1995). I find that in 1963, Brazil's labor productivity in transport and communication sector is 25.3% of the level in the U.S., it is 25.2% in 1966, increasing to 45.5% in 1978, and then declining to 35.4% in 1990. Mulder and Maddison (1993) argue that Mexican labor productivity in distribution (wholesale and retail trade) in 1975 lay in a range of 28.4 to 36.9% of the U.S. level. My calculated figure, in 1975, for wholesale and retail trade, hotels and restaurants is more than 70%, which is relatively very high compared to the estimates of Mulder and Maddison (1993).[8]

3 Model analysis, experiments and sensitivity

3.1 Model predictions for the U.S.

Figure 5 shows the model-predicted sectoral employment shares and compares them with the U.S. data between 1963 and 2010. The model predicts a decline in the agricultural employment share of 4.16 percentage points between 1963 and 2010. The actual decline is 3.58 percentage points.[9] The model over predicts the agricultural employment share by 15.7% on average during 1964-1985 and under predicts it by 15.4% on average during 1986-2010. The model over predicts the employment share of the mining sector, although it generates the shape of the evolution of the employment share of this sector. The model implies a fall in the share of employment in manufacturing from 23.3% in 1963 to 14.8% in 2010, while the actual share of employment in manufacturing is 8.7% in 2010 in the U.S.

[7] Stuivenwold and Timmer (2003) present benchmark productivity levels in manufacturing for Korea and Taiwan based on national accounts as well as census-based calculations. The census-based results suggest that labor productivity (employee based) in total manufacturing is 74.55% (42.52%) of the U.S. level in Korea (Taiwan) in 1997. The national accounts-based results suggest that labor productivity (workers based) in total manufacturing is 40.29% (54.20%) of the U.S. level in Korea (Taiwan) in 1997. They argue that the differences in census and national accounts-based comparisons are of a general nature, most probably located in the definition of value-added being used. My calculations suggest that labor productivity in manufacturing is 46.2% of the U.S. level in Taiwan in 1997.

[8] Mulder and Maddison (1993, Table 17) present Mexican labor productivity (gross value added per person engaged) as a percentage of the U.S. labor productivity in other sectors in 1975 as well. They report that labor productivity in mining is around 32% of the U.S. level, whereas my figure is 15.3% of the U.S. level. They report that labor productivity in manufacturing (construction) is around 37% (57%) of the U.S. level, whereas my figure is around 48% (71%) of the U.S. level.

[9] Incorporating land (a fixed factor) into the agricultural production function does not change the qualitative nature of the results. I let agricultural production function be $Y_A = \theta_A (L_A)^{\alpha}$, where α is the income share of labor in agriculture and I normalize land to be one. Employment share in agriculture is: $L_A = (\bar{A}/\theta_A)^{1/\alpha}$. I follow Restuccia et al. (2008) and set $\alpha = 0.7$. Agricultural employment shares generated by the model with land are slightly different than those in the model without land.

This suggests that the model over predicts the manufacturing employment share by 22.3% on average during 1964-2010. The model generates the declines in the utilities sector and it over predicts the employment share of this sector by 9.8% on average during 1964-2010. The model predicts an increase in the share of employment in construction from 5.6% in 1963 to 11.7% in 2010, while the actual share of employment in construction is 5.2% in 2010 in the U.S. The model is not to able to capture the rise of the employment share of the wholesale sector. The share of employment in wholesale increases from 20.5% in 1963 to 24.0% in 2010 in the data, while the model-predicted employment share is 17.1% in 2010. In the data, the increase in the employment share of the wholesale sector is 3.53 percentage points. The model implies a fall in the share of employment in transport from 6.2% in 1963 to 4.2% in 2010, while the actual share of employment in transport is 4.5% in 2005. The model predicts an increase in the share of employment in finance (personal services) from 8.6% (29.3%) in 1963 to 10.1% (39.8%) in 2010, while the actual share is 18.0% (37.3%) in 2010.

Next, I compare the several relative prices and observe that the model generates the changes in the relative prices. I calculate the price of a sector by dividing its value added in current prices by the value added in constant prices (using the filtered data). Figure 6 shows the model-implied relative producer prices (relative to the manufacturing) in the U.S. and compares them with the relative implicit price deflators between 1963 and 2010. Figure 6 is consistent with the argument that the relative prices and the relative productivities appear to be proportional in the long run (see Canzoneri et al., 1999). This figure is also consistent with the findings of Inklaar and Timmer (2014). They find that prices of non-market services increase rapidly, while prices of market services increase much more modestly. In Figure 6, average annual growth rate of prices of non-market services (personal services) relative to the manufacturing sector is more than 2.6% (both in the model and in the data). The corresponding figure for the price of market services (such as transport) is less than 0.25% (both in the model and in the data). Average annual growth rate of prices of finance relative to the manufacturing sector is less than 2.6% (both in the model and in the data).

3.2 Structural transformation across countries

Figures 7-17 show the model-predicted sectoral employment shares and compare with the actual data for each country. Below, I compare the model-predictions with the data for each sector and country in detail.

Agriculture. Figure 16 displays that the model explains almost all of the decline in the agricultural employment share in Korea. For example, it predicts a decline in the agricultural employment share in Korea of 54.7 percentage points between 1963 and 2010. The actual decline is 55.3 percentage points. Thus, the model accounts for 95.9% of the decline in the agricultural employment share in Korea. The model accounts for 74.5% of the decline in the agricultural employment share in Taiwan between 1963 and 2010 (Figure 17). Figures 7-15 show that the model captures the trends in the agricultural employment share for each country in Latin America. For example, the model captures 87.3% of the total decline in agriculture's share of employment in Colombia between 1963 and 2010. The model under predicts the agricultural employment share by only 0.9% on average in Bolivia during 1964-2010; and it captures 94.9% of the total decline in agriculture's share of employment in Bolivia between 1963 and 2010. It under predicts the agricultural employment share by

4.4% on average in Argentina and 3.2% on average in Brazil, and 30.7% in Chile during 1964-2010. The corresponding figure for Costa Rica is 10.5% on average during 1964-2010. On the other hand, it over predicts the agricultural employment share by 38.7% on average in Mexico, 27.4% on average in Peru and 3.9% on average in Venezuela during 1964-2010.

Mining. The model accounts for 93.7% of the decline in the employment share in mining in Argentina during 1963-2010. It over predicts the employment share in mining by 46.2% on average in Bolivia and only 0.3% on average in Brazil during 1964-2010. The model explains 40.7% of the total decline in mining's share of employment in Chile between 1963 and 2010; and it over predicts the employment share of this sector by 46% on average in Colombia during 1964-2010. The model captures 32.40% of the decline in this sector's employment share in Costa Rica between 1963 and 1981 and it over predicts the employment share of this sector by 43.7% on average between 1982 and 2010 in this country. The model captures 41.3% of the decline in this sector's employment share in Mexico during 1963-2010. The model implies a rise in the share of employment in this sector from 1.7% in 1963 to 2.0% in 2010, while the actual share is 1.3% in 2010 in Peru. The model over predicts the employment share of mining in Korea, Taiwan, and Venezuela.

Manufacturing. The model accounts for 28.7% of the decline in the employment share in manufacturing in Argentina during 1963-2010. The model captures the increase in employment share in manufacturing in Bolivia. The model implies an increase in the share of employment in this sector from 7.4% in 1963 to 15.4% in 2010, and the actual share of employment in manufacturing is 13.4% in 2010 in Bolivia. In Brazil, the model implies an increase of 7.6 percentage points for manufacturing employment share between 1963 and 2010, while in the data an increase of 0.1 percentage points is observed during 1963-2010. The model fails to catch the decline of 8.1 (1.4) percentage points during 1963-2010 in Chile (Colombia). The model accounts for 83.8% of the increase in the employment share in manufacturing in Costa Rica during 1963-2010. The model implies an increase in the share of employment in this sector from 14.7% in 1963 to 15.7% in 2010, and the actual share of employment in manufacturing is 15.4% in 2010 in Mexico. In Peru, the model replicates the decline of the manufacturing employment share between 1963 and 1980. After 1980, however, the model implies an increase for Peru's manufacturing employment share. In Venezuela, observed decline in data is 4.0 percentage points and the model predicts a decline of 0.1 percentage points during 1963-2010.

The pattern of the inverted U-shaped employment share of manufacturing in East Asia is clearly visible in the data. Figure 16 shows that the employment share in manufacturing increased from 7.9% in 1963 to 27.6% in 1989. Since then, Korea is clearly in a process of de-industrialization as the employment share in manufacturing decreased to 17.8% in 2010. The model implies a hump-shaped pattern. In the model, the employment share in manufacturing increased from 7.9% in 1963 to 10.8% in 1989; and then decreased to 6.7% in 2010. On the other hand, the differences in magnitudes between the data and the model-predictions are not small for Korea. Figure 17 shows that the employment share in manufacturing increased from 13.5% in 1963 to 32.9% in 1987. Since then, Taiwan is also in a process of de-industrialization as the employment share in manufacturing decreased to 27.3% in 2010. The model predicts a very late de-industrialization for Taiwan.

Utilities. The model implies a decrease in the share of employment in this sector from 1.5% in 1963 to 0.6% in 2010, and the actual share of employment in utilities is 0.7% in

2010 in Argentina. The model accounts for 40.7% of the increase in the employment share in utilities in Bolivia during 1963-2010; and it accounts for 30.5% of the decrease in the employment share in utilities in Brazil during 1963-2010. The model implies an increase in the share of employment in this sector from 0.9% in 1963 to 1.1% in 2010, and the actual share is 0.8% in 2010 in Chile. The model implies a decrease in the share of employment in this sector from 0.32% in 1963 to 0.30% in 2010, and the actual share of employment in utilities is 0.27% in 2010 in Colombia. The model accounts for 25.3% of the increase in the employment share in utilities in Costa Rica during 1963-2010. The model implies a fall in the share of employment in this sector from 0.43% in 1963 to 0.22% in 2010, while the actual share is 0.36% in 2010 in Mexico. The model implies a fall in the share of employment in this sector from 0.26% in 1963 to 0.23% in 2010, while the actual share is 0.42% in 2010 in Peru. The model implies a decline of 0.7 percentage points in Venezuela, while the actual decrease is 0.6 percentage points between 1963 and 2010 in Venezuela. The model predicts decreases (increases) for Korea (Taiwan), whilst the employment share in utilities increases (declines) during 1963-2010 in these two countries.

Construction. The model accounts for 49.8% of the increase in the construction employment share in Argentina between 1963 and 2010. The model captures the increase in construction employment share in Bolivia. The model implies an increase in the share of employment in this sector from 3.5% in 1963 to 10.8% in 2010, while the actual share is 9.4% in 2010 in Bolivia. The model implies an increase in the share of employment in this sector from 4.4% (5.7%) in 1963 to 8.6% (9.4%) in 2010, while the actual share is 7.4% (8.8%) in 2010 in Brazil (Chile). The model accounts for 78.5% of the increase in the construction employment share in Colombia between 1963 and 2010. The model implies an increase in the share of employment in this sector from 5.80% in 1963 to 7.4% in 2010, while the actual share is 5.76% in 2010 in Costa Rica. The model accounts for 67.8% of the increase in the construction employment share in Mexico between 1963 and 2010. The model implies an increase in the share of employment in this sector from 3.2% in 1963 to 3.9% in 2010, while the actual share is 7.1% in 2010 in Peru. The model implies an increase in the share of employment in this sector from 4.8% in 1963 to 8.6% in 2010, while the actual share of employment in construction is 8.8% in 2010 in Venezuela. The model accounts for 56.5% of the increase in the construction employment share in Korea between 1963 and 2010; and it under predicts the employment share of this sector by 12.4% on average in Taiwan between 1964 and 2010.

Wholesale. The model is quite successful in terms of changes in the directions and in magnitudes of the wholesale sector's employment share in almost all the countries presented in Figures 7-17. The model almost mimics the 6.6, 12.2, and 10.3 percentage points increases in the wholesale sector in Argentina, Brazil, and Venezuela, respectively, during 1963-2010. The model accounts for 83.3% of the increase of the employment share in wholesale in Bolivia during 1963-2010. Similarly, it accounts for 68.5%, 81.3%, 76.9%, 97.5% of the increases of the employment share in wholesale in Mexico, Colombia, Peru, and Costa Rica, respectively, during 1963-2010. The model under predicts the employment share of this sector by 8.0% on average in Chile between 1964 and 2010. The model replicates the employment share in wholesale observed in Korean data. The model predicts that employment share in this sector increased from 12.3% in 1963 to 24.9% in 2010, while in the data it increased to 23.9% in 2010. On the other hand, the model's success in replicating the wholesale employment share

in Taiwan is low in comparison with the Korean case. The model predicts that employment share in this sector in Taiwan increased from 10.7% in 1963 to 12.1% in 2010, while in the data it increased to 23.6% in 2010.

Transport. The model implies a decrease in the share of employment in this sector from 7.2% in 1963 to 4.9% in 2010, and the actual share of employment in transport is 6.0% in 2010 in Argentina. The model accounts for 51.1% of the increase in the employment share of transport in Bolivia between 1963 and 2010. The model mimics the 1.2 percentage points increase in the transport sector in Brazil during 1963-2010. The model implies a decrease in the share of employment in this sector from 5.1% in 1963 to 4.5% in 2010, while the actual share of employment in transport is 6.7% in 2010 in Chile. The model accounts for 63.8% of the increase in the employment share of transport in Colombia between 1963 and 2010. The model almost mimics the 0.5 percentage points decline in this sector's employment share in Costa Rica during 1963-1987. After that, the model fails to capture the increases in the employment share of this sector in Costa Rica. The model implies a decrease in the share of employment in this sector from 3.0% in 1963 to 2.8% in 2010, and the actual share of employment in transport is 4.8% in 2010 in Mexico. The model accounts for 50.9% of the increase in the employment share of the transport sector in Peru between 1963 and 2010. The model under predicts the employment share in this sector by 17.1% on average during 1964-2010 in Venezuela. The model under predicts (over predicts) the employment share in this sector by 27.6% (35.2%) on average during 1964-2010 in Korea (Taiwan).

Finance. The model accounts for 50.0% (60.0%) of the increase in the employment share of finance in Argentina (Bolivia) between 1963 and 2010. The model accounts for 78.8% of the increase in the employment share of finance in Brazil during 1963-2010; however, it accounts for only 39.6% of the increase in the employment share of finance in Chile during 1963-2010. The model accounts for 45.5% (50.6%) of the increase in the employment share of finance in Colombia (Costa Rica) during 1963-2010; and it accounts for 52.3% of the increase in the employment share of finance in Mexico during 1963-2010. The model accounts for 50.6% of the increase in the employment share of finance in Peru between 1963 and 2010. The model under predicts the employment share in this sector by 25% on average during 1964-2010 in Venezuela. The model accounts for 82.7% (44.4%) of the increase in the employment share of finance in Korea (Taiwan) during 1963-2010.

Personal services. The model accounts for 93.2% of the increase in the employment share of personal services in Argentina between 1963 and 2010. The model accounts for 99.1% of the increase in the employment share of personal services in Bolivia between 1963 and 1990; and it over predicts by 22.1% on average in Bolivia between 1991 and 2010. The model accounts for 86.0% of the increase in the employment share of personal services in Brazil between 1963 and 2010. The model almost mimics the 7 percentage points increase in this sector's employment share in Chile during 1963-1985. After that, the model fails to capture the declines. The model over predicts the employment share of personal services by 15% on average in Colombia between 1964 and 2010. The model over predicts the employment share in this sector by 28.1% on average during 1964-2010 in Costa Rica. The model over (under) predicts the employment share in this sector by 0.5% (4.4%) on average during 1964-2010 in Mexico (Peru); and it over predicts the employment share in this sector by 1.3% on average during 1964-2010 in Venezuela. The model over predicts the employment share in this sector by 90.8% (70.8%) on average during 1964-2010 in Korea (Taiwan).

3.3 Counterfactuals: Aggregate productivity

Table 1 (Table 2) shows the results of the experiments where I use the sectoral Korean (Taiwanese) productivity growth rates instead of the sectoral productivity growth rates in each Latin American country. The column "Data" shows the actual average annual growth rate of aggregate labor productivity for each country during the sample period. The column "B" shows the average annual growth rate of aggregate labor productivity using the employment shares of the benchmark model. The columns "E1", "E2", ..., "E12" provide the results of the counterfactuals. The column "E1" answers the following question: What would aggregate productivity growth in Latin America have been if year-by-year labor productivity growth rate in agriculture followed the path observed in Korea/Taiwan during 1963-2010? The column "E2" answers a similar question for mining. The column "E3" ("E4") shows the results of the corresponding experiment for manufacturing (utilities); the column "E5" ("E6") displays the results of the experiment for construction (wholesale); the column "E7" ("E8") reports the results of the experiment for transport (finance); and the column "E9" exhibits the results of the experiment for personal services. The column "E10" shows the results of the full counterfactual (changing all productivity paths at once). The column "E11" answers the following question: What would aggregate productivity growth in Latin America have been if year-by-year labor productivity growth rate in both manufacturing and wholesale followed the path observed in Korea/Taiwan during 1963-2010? The column "E12" answers the following question: What would aggregate productivity growth in Latin America have been if year-by-year labor productivity growth rate in all sectors (except manufacturing and wholesale) followed the path observed in Korea/Taiwan during 1963-2010? I also report results for four sub-periods: 1963-1980, 1980-1990, 1990-2000, and 2000-2010.

3.4 Counterfactuals: Employment shares

In each counterfactual scenario, sectoral employment shares are determined endogenously. It is informative to report the results for agriculture, since the agricultural employment share depends only on the agricultural productivity in the model. Figure 18 shows that if Latin America had inherited East Asian sectoral productivity growth rates from 1963 to 2010, de-agriculturalization would have been more pronounced in each country except Chile, since Chile's average annual growth of agricultural labor productivity is higher than those of Korea and Taiwan during 1963-2010. For example, if Bolivia had experienced productivity growth in agriculture equal to that of Korea (Taiwan), then the agricultural employment share in Bolivia would have been 8.5% (12.8%) in 2010 instead of 19.2%.

3.5 Role of η

I consider the implications of different values of η. The benchmark value is 0.4696. I present results with two alternative values (0.1 and 0.6) to explore the robustness of the some results. Figure 19 presents the sectoral employment shares in the U.S. with different values of η. Changing the value of η does not significantly improve the performance of the model in matching the employment share of the wholesale sector, but the model almost matches the manufacturing employment share when $\eta = 0.1$. The benchmark accounts for 46.2% of the

decline in the manufacturing employment share in the U.S. during 1963-2010. The model, when $\eta = 0.6$, explains only 32.5% of the decline in that share; whereas it explains 89.5% of the decline in that share when $\eta = 0.1$. Although the model with $\eta = 0.1$ matches the manufacturing employment share better than the benchmark, it significantly over-predicts the employment share of construction and personal services and significantly under-predicts the employment share of transport in comparison with the benchmark.

It is worth to mention the results for the manufacturing sector in East Asia, since the benchmark is not very successful in terms of the manufacturing employment share, especially in Korea. Figure 19 shows that lowering the value of η helps the model to match the employment share in manufacturing in the U.S., although failing in some other sectors. This finding motivates to look at Korea and Taiwan. The benchmark case, although creating the inverted U-shaped employment share of manufacturing, under predicts the employment share of this sector by 50% between 1964 and 2010 in Korea. Changing the value of η does not improve the model's performance in matching the manufacturing employment share in Korea. When $\eta = 0.1$ ($\eta = 0.6$), the model under predicts the manufacturing employment share by 63% (44%) between 1964 and 2010 in Korea. In Taiwan, the benchmark under predicts the manufacturing employment share by around 27% between 1964 and 2010. When $\eta = 0.1$ ($\eta = 0.6$), the model under predicts the manufacturing employment share by around 33% (25%) between 1964 and 2010 in Taiwan. Finally, Table 3 reports the sectoral productivity levels in each country based on different values of η to provide a comparison of relative productivity levels for alternative values of η.

3.6 Matching the employment share of the wholesale in the U.S.

While the benchmark captures the trends in the wholesale sector well for Latin America and East Asia (except for Taiwan), it fails to capture the direction of the change in the employment share of this sector in the U.S. I investigate one specific channel regarding the failure of the model in matching the employment share of the wholesale sector in the U.S. during 1963-2010. I only add one term into the model, which is $\bar{c}$. This changes the income elasticity of demand for the wholesale sector (see Echevarria, 1997; Kongsamut et al., 2001; Messina, 2006). The composite consumption good (C) is derived from:

$$C = (\gamma_1^{1/\eta} C_1^{(\eta-1)/\eta} + \gamma_2^{1/\eta} C_2^{(\eta-1)/\eta} + \gamma_3^{1/\eta} C_3^{(\eta-1)/\eta} + \gamma_4^{1/\eta} (C_4 + \bar{c})^{(\eta-1)/\eta} + ... + \gamma_8^{1/\eta} C_8^{(\eta-1)/\eta})^{\eta/(\eta-1)}.$$

I calibrate $\bar{c}$ and η to match the employment share of the wholesale sector in the last year and to match the average annual growth in aggregate labor productivity in the U.S. between 1963 and 2005. This is the only change in the calibration strategy. This calibration implies that $\bar{c} = 0.5072$ and $\eta = 0.2134$.[10] The model matches the employment share in the wholesale sector in the first and in the last year in this case. In other words, I impose that the model should capture the direction of the change in this sector's employment share. The results are presented in Figure 20. With this imposition, the model over predicts the employment share of the wholesale sector by only 2.5% between 1964 and 2010. Note that my purpose in this subsection is to show that it is possible, although mechanically, to match the

[10] I do not report the values for γ_j. They are not equal to the values obtained in the benchmark calibration; however, they are in line with the values reported for the benchmark calibration.

employment share of the wholesale sector in the U.S. This quantitative exercise presented in this subsection motivates research on the empirically reasonable specification of preferences in models of structural transformation (see Herrendorf et al., 2013 for a discussion).

4 Agricultural policies and distortions

Agriculture was the most important sector, in terms of employment, in 1963 in both Latin America and East Asia. Over the period 1963 to 2010, Latin American countries exhibit much slower de-agriculturalization than East Asian countries. Dennis and İşcan (2011) find that the rate of structural transformation is slow in countries with distortions in agriculture. I compare quantitative measures of distortions in agriculture in both country groups to develop a further understanding of the productivity growth differences in agriculture. The World Bank undertook a research project, *A Comparative Study of the Political Economy of Agricultural Pricing Policies*, to provide systematic estimates of the degree of price discrimination against agriculture in developing countries.[11] By "agricultural pricing policies"is meant the governmental policies that affect agricultural incomes relative to what they would be in the presence of a laissez-faire system affecting production incentives by making agriculture more or less attractive than other sectors. They include direct interventions to determine agricultural prices, such as government policies determining output prices, subsidies to inputs, and policies affecting the costs of transportation/marketing. Indirect interventions affect the prices of agricultural tradables relative to non-tradables (through their impact on the real exchange rate) or to other tradables (as a result of industrial protection).

Table 4 shows the direct, indirect, and total rates of nominal protection in agriculture (negative nominal protection rates indicate taxation of agriculture) for Argentina, Brazil, Chile, Colombia and Korea. Total interventions taxed agriculture in four Latin American countries. When all price interventions are considered, farmers in Argentina received 39% less for their output than they would have received in the absence of total price interventions. In Korea, protection through direct price interventions was larger than taxation through indirect price interventions. Direct price interventions taxed agriculture in Argentina, Chile, and Colombia and protected agriculture in Brazil and Korea. The average reduction in farm prices relative to nonfarm prices because of indirect interventions was 21.3% in Argentina, 18.4% in Brazil, 20.4% in Chile, 25.2% in Colombia and 25.8% in Korea. The average tax on agriculture from industrial protection policies was larger than the average indirect tax in all five countries implying that industrial protection policies, i.e., tariffs and quantitative restrictions, had a greater effect on the indirect tax than did overvaluation of the real exchange rate. The tax on agriculture due to industrial protection polices was above 20% in all five countries and was highest in Argentina.[12]

[11]This project is a comparative analysis for eighteen countries (Argentina, Brazil, Chile, Colombia, Côte d'Ivoire, Dominican Republic, Egypt, Ghana, Republic of Korea, Malaysia, Morocco, Pakistan, Philippines, Portugal, Sri Lanka, Thailand, Turkey, and Zambia) during 1960-1985 (see Schiff and Valdés, 1992).

[12]Kay (2002, p. 1093) notes that "the Latin American state was unable proportionally to extract such a high surplus from agriculture as in South Korea and Taiwan. Furthermore, the populist regimes in Latin America, while mainly favouring the industrialist, were unable to dictate industrial policy to them as in South Korea and Taiwan."

The World Bank's research project on "Distortions to Agricultural Incentives" provides the latest work on this topic (www.worldbank.org/agdistortions). This project has produced a core database of nominal rates of assistance to producers, together with a set of consumer tax equivalents for farm products and a set of relative rates of assistance to farmers in more than 70 countries. A variable that captures policy induced distortions to relative agricultural prices is the relative rate of assistance (RRA). This variable, in percentage terms, is defined as: $RRA = 100 * \left[\frac{100+NRA_t^{ag}}{100+NRA_t^{nonag}}\right] - 1$, where NRA_t^{ag} and NRA_t^{nonag} are the percentage NRAs for agriculture and non-agriculture, respectively. The NRA is the extent to which government-imposed distortions created a gap between domestic producer prices and what they would be under free markets. If the RRA is below (above) zero, then a country's policy regime has an anti-(pro-)agricultural bias. If both of those sectors are equally assisted, the RRA is zero (Anderson and Brückner, 2012; Anderson et al., 2013).

Table 5 displays the values of the RRAs in Argentina, Brazil, Chile, Colombia, Mexico, Korea, Taiwan, and the U.S. between 1960 and 2010. Several observations emerge from Table 5. First, there is a substantial variation across time and countries. Second, during the 1960-1980 period, there has been a strong policy bias against agriculture in Argentina, Brazil, Chile, Colombia, since the RRA is significantly negative in these four countries. Differences between Latin America and East Asia are striking. In 1970, the RRA was -42.5% in Argentina, while the corresponding figure for Korea was 38.4%. Third, Latin American countries exhibit high but declining levels of discrimination against agriculture. For example, the RRA in Argentina rose from -59.5% in 1960 to -23.7% in 2010. In Chile, the figure for 2010 is almost zero, which indicates that both agriculture and non-agriculture are equally assisted in Chile as of 2010. Colombia policy regime has been evolved from anti-agricultural bias in 1960 to pro-agricultural bias in 2010. Fourth, the RRA has been rising over time in Korea and Taiwan. In sum, Table 4 and Table 5 provide some evidence regarding the distortions in agriculture in Latin America (especially in the 1960-1980 period) that, possibly, played a role in suppressing agricultural productivity growth, and hence causing a slower pace of de-agriculturalization in Latin America.

References

Anderson, K., Brückner, M. 2012. Distortions to agriculture and economic growth in Sub-Saharan Africa. Working paper at `www.worldbank.org/agdistortions`, World Bank, Washington D.C.

Anderson, K., Martin, W., van der Mensbrugghe, D. 2013. Estimating effects of price-distorting policies using alternative distortions databases, in: P. B. Dixon, Jorgenson, D. W. (Eds.), Handbook of Computable General Equilibrium Modeling, Elsevier B. V., pp. 877-931.

Anderson, K., Nelgen, S. 2013. Updated national and global estimates of distortions to agricultural incentives, 1955 to 2011. Spreadsheet at `www.worldbank.org/agdistortions`, World Bank, Washington D.C.

Barro, R. J., Lee, J.-W. 2013. A new data set of educational attainment in the World, 1950-2010. Journal of Development Economics, 104, 184-198.

Bergoeing, R., Kehoe, P. J., Kehoe, T. J., Soto, T. 2007. A decade lost and found: Mexico and Chile in the 1980s, in: T. J. Kehoe, Prescott, E. C. (Eds.), Great Depressions of the Twentieth Century, Minneapolis, Minnesota: Federal Reserve Bank of Minneapolis, pp. 217-256.

Canzoneri, M. B., Cumby, R. E., Diba, B. 1999. Relative labor productivity and the real exchange rate in the long run: Evidence for a panel of OECD countries. Journal of International Economics, 47, 245-266.

Caselli, F. 2005. Accounting for cross-country income differences, in: P. Aghion, Durlauf, S. (Eds.), Handbook of Economic Growth, Elsevier Press, pp. 679-741.

Dennis, B. N., İşcan, T. B. 2011. Agricultural distortions, structural change, and economic growth: A cross-country analysis. American Journal of Agricultural Economics, 93, 885-905.

Echevarria, C. 1997. Changes in sectoral composition associated with economic growth. International Economic Review, 38, 431-452.

Herrendorf, B., Rogerson, R., Valentinyi, Á. 2013. Two perspectives on preferences and structural transformation. American Economic Review, 103, 2752-2789.

Hsieh, C.-T., Klenow, P. J. 2010. Development accounting. American Economic Journal: Macroeconomics, 2, 207-223.

Inklaar, R., Timmer, M. P. 2014. The relative price of services. Review of Income and Wealth, 60, 727-746.

Kay, C. 2002. Why East Asia overtook Latin America: Agrarian reform, industrialisation and development. Third World Quarterly, 23, 1073-1102.

King, A., Ramlogan, C. 2008. Is Latin America catching up? A time-series approach. Review of Development Economics, 12, 397-415.

Kongsamut, P., Rebelo, S., Xie, D. 2001. Beyond balanced growth. Review of Economic Studies, 68, 869-882.

Levy, S., Schady, N. 2013. Latin America's social policy challenge: Education, social insurance, redistribution. Journal of Economic Perspectives, 27, 193-218.

Maddison, A., van Ooststroom, H. 1993. The international comparison of value added, productivity and purchasing power parities in agriculture. Groningen Growth and Development Centre Research Memorandum GD-1.

Messina, J. 2006. The role of product market regulations in the process of structural change. European Economic Review, 50, 1863-1890.

Mulder, N. 1995. Transport and communications output and productivity in Brazil and the USA, 1950-90. Groningen Growth and Development Centre Research Memorandum GD-19.

Mulder, N., Maddison, A. 1993. The international comparison of performance in distribution: Value added, labour productivity, and PPPs in Mexican and US wholesale and retail trade 1975/7. Groningen Growth and Development Centre Research Memorandum GD-2.

Mulder, N., Montout, S., Lopes, L. P. 2002. Brazil and Mexico's manufacturing performance in international perspective, 1970-98. Groningen Growth and Development Centre Research Memorandum GD-52.

Restuccia, D. 2012. The Latin American development problem: An interpretation. University of Toronto Department of Economics Working Paper No. 466.

Restuccia, D., Yang, D. T., Zhu, X. 2008. Agriculture and aggregate productivity: A quantitative cross-country analysis. Journal of Monetary Economics, 55, 234-250.

Schiff, M., Valdés, A. 1992. The Political Economy of Agricultural Pricing Policy. Volume 4: A Synthesis of the Economics in Developing Countries. Johns Hopkins University Press, Baltimore.

Stuivenwold, E., Timmer, M. P. 2003. Manufacturing performance in Indonesia, South Korea and Taiwan before and after the Crisis. An international Perspective, 1980-2000. Groningen Growth and Development Centre Research Memorandum GD-63.

The Conference Board. 2015. The Conference Board Total Economy Database, May 2015.

Timmer, M. P. 1998. Catch up patterns in newly industrializing countries. An international comparison of manufacturing productivity in Taiwan, 1961-1993. Groningen Growth and Development Centre Research Memorandum GD-40.

Table 1: Average annual growth of aggregate labor productivity (%), 1963-2010

	Using productivity series from Korea													
	Data	B	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12
Argentina														
1963-1980	1.92	1.94	1.91	1.89	2.66	1.99	2.20	2.59	2.20	1.60	2.40	3.98	3.32	2.55
1980-1990	-1.77	-1.91	-1.35	-1.89	-0.40	-1.87	-1.54	-0.37	-1.67	-1.77	-1.36	3.33	1.15	0.03
1990-2000	2.11	1.97	1.81	2.06	3.20	2.01	1.86	2.08	2.30	1.70	2.14	3.19	3.20	2.05
2000-2010	1.10	1.18	1.15	1.25	2.18	1.19	1.19	1.51	0.96	1.10	1.03	1.83	2.39	0.75
1963-2010	0.99	0.95	1.03	0.97	2.01	0.99	1.11	1.62	1.12	0.79	1.24	3.21	2.63	1.52
Bolivia														
1963-1980	3.25	2.76	2.98	2.89	3.63	2.90	2.95	3.31	3.10	2.30	3.18	5.47	4.20	3.82
1980-1990	-2.91	-3.64	-1.63	-3.68	-2.71	-3.45	-3.22	-2.54	-3.57	-2.30	-2.56	4.81	-1.66	2.05
1990-2000	2.42	0.43	-0.18	0.55	2.81	0.78	0.65	1.71	0.71	0.09	-0.004	3.92	4.04	-0.17
2000-2010	-0.29	0.03	-0.78	-0.17	1.65	0.25	0.16	0.83	0.31	0.55	0.41	2.05	2.08	0.35
1963-2010	0.98	0.30	0.51	0.31	1.66	0.51	0.53	1.18	0.55	0.46	0.67	4.26	2.44	1.84
Brazil														
1963-1980	3.68	3.72	4.02	3.68	4.49	3.81	3.94	4.12	3.85	3.29	3.78	5.24	4.90	4.05
1980-1990	-0.77	-1.20	-0.46	-1.21	0.60	-1.22	-0.92	0.59	-0.97	-1.20	-0.69	4.42	2.47	0.56
1990-2000	0.80	1.16	0.83	1.24	2.70	1.19	1.23	1.76	1.58	1.25	1.20	3.46	3.19	1.56
2000-2010	0.69	0.67	0.34	0.64	2.22	0.69	0.72	1.05	0.95	0.40	0.71	1.95	2.43	0.39
1963-2010	1.47	1.46	1.59	1.46	2.79	1.50	1.63	2.20	1.71	1.27	1.61	3.98	3.49	1.99
Chile														
1963-1980	1.93	1.56	1.55	1.47	2.84	1.62	2.08	2.15	1.95	0.93	1.83	4.09	3.43	2.10
1980-1990	0.17	-0.28	0.01	-0.19	0.98	-0.22	-0.18	1.10	-0.10	0.06	-0.17	3.51	2.28	0.90
1990-2000	3.72	2.68	2.36	2.76	3.97	2.76	2.68	2.63	2.83	2.74	2.54	3.50	3.78	2.57
2000-2010	2.38	2.29	2.28	2.34	2.69	2.36	2.14	2.77	2.16	2.03	1.63	1.89	3.07	1.22
1963-2010	2.02	1.55	1.55	1.57	2.65	1.62	1.73	2.16	1.74	1.36	1.51	3.37	3.18	1.75
Colombia														
1963-1980	2.11	2.31	2.59	2.38	3.27	2.40	2.53	3.49	2.71	1.89	2.02	4.79	4.45	2.68
1980-1990	0.12	0.28	1.31	0.16	1.78	0.38	0.59	1.80	0.46	-0.19	0.18	4.04	3.29	1.20
1990-2000	-0.13	-0.29	-0.07	-0.17	1.90	-0.11	-0.02	0.77	0.19	-0.50	-0.48	3.35	2.82	0.54
2000-2010	0.81	1.00	0.90	1.06	2.34	1.05	0.94	1.51	1.19	0.86	0.49	1.84	2.64	0.51
1963-2010	0.93	1.04	1.39	1.08	2.46	1.14	1.23	2.12	1.37	0.71	0.77	3.69	3.47	1.44
Costa Rica														
1963-1980	2.55	2.67	2.53	2.63	3.64	2.73	2.98	3.43	2.91	2.37	3.15	5.13	4.40	3.32
1980-1990	-0.97	-1.66	-0.17	-1.70	0.21	-1.58	-1.31	-0.37	-1.58	-1.63	-1.22	4.32	1.42	0.85
1990-2000	1.40	0.69	0.21	0.89	2.47	0.78	0.68	1.78	1.22	1.05	0.57	3.63	3.34	1.22
2000-2010	2.16	1.40	1.23	1.41	2.09	1.43	1.10	2.18	1.39	1.06	1.72	2.09	2.66	0.91
1963-2010	1.46	1.04	1.18	1.07	2.32	1.11	1.16	1.99	1.26	0.95	1.35	3.98	3.16	1.83
Mexico														
1963-1980	2.19	1.83	2.38	1.80	3.02	1.90	2.15	2.47	2.23	1.50	2.14	5.06	3.67	3.12
1980-1990	-1.14	-2.17	-0.56	-2.14	-0.74	-2.07	-1.75	-0.49	-1.85	-2.24	-1.74	4.29	0.97	0.76
1990-2000	-0.39	-0.42	-0.78	-0.34	1.56	-0.28	-0.19	0.45	0.13	0.36	-0.14	3.65	2.22	1.17
2000-2010	-0.20	-0.64	-0.72	-0.63	0.86	-0.59	-0.49	-0.07	-0.54	-0.63	-0.02	2.06	1.12	0.24
1963-2010	0.42	-0.04	0.41	-0.02	1.44	0.05	0.25	0.86	0.31	-0.001	0.36	3.95	2.24	1.58
Peru														
1963-1980	1.56	0.73	2.70	0.75	1.63	0.82	0.97	1.54	1.18	0.15	1.06	5.13	2.46	3.29
1980-1990	-3.45	-3.63	-3.03	-3.56	-1.50	-3.46	-3.28	-1.29	-3.12	-3.22	-2.90	4.29	0.83	-0.67
1990-2000	-0.44	0.22	-0.41	0.27	2.56	0.46	0.19	0.89	0.89	0.27	0.89	3.63	2.91	1.11
2000-2010	3.21	4.15	2.98	4.19	4.76	4.22	4.19	4.50	4.29	3.80	3.27	1.96	4.87	1.89
1963-2010	0.39	0.39	0.85	0.43	1.81	0.52	0.55	1.41	0.83	0.21	0.63	3.95	2.71	1.68
Venezuela														
1963-1980	2.31	2.20	1.79	2.28	3.49	2.26	2.58	3.19	2.68	1.62	2.16	4.44	4.46	2.16
1980-1990	-1.95	-2.66	-1.60	-2.56	-1.02	-2.62	-2.04	-1.05	-2.28	-2.51	-2.06	3.67	0.42	0.40
1990-2000	-1.67	-1.32	-1.00	-1.19	0.99	-1.25	-1.21	0.42	-0.71	-1.19	-1.47	3.53	2.41	-0.13
2000-2010	1.18	0.88	1.00	1.23	2.59	0.89	0.88	0.78	0.90	0.50	0.50	1.97	2.22	0.67
1963-2010	0.30	0.12	0.29	0.27	1.79	0.16	0.41	1.17	0.51	-0.11	0.12	3.55	2.68	0.98

Table 2: Average annual growth of aggregate labor productivity (%), 1963-2010

	Using productivity series from Taiwan													
	Data	B	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12
Argentina														
1963-1980	1.92	1.94	2.11	1.92	2.52	1.97	2.03	3.51	1.99	2.22	3.10	5.93	4.11	3.68
1980-1990	-1.77	-1.91	-1.65	-1.83	-0.56	-1.89	-1.68	-0.25	-1.58	-1.57	-0.16	4.48	1.08	1.09
1990-2000	2.11	1.97	1.69	1.99	2.15	1.97	1.84	3.10	2.29	2.04	3.46	4.68	3.14	3.42
2000-2010	1.10	1.18	1.12	1.56	0.73	1.08	1.01	1.67	0.95	1.61	1.20	1.01	1.20	1.28
1963-2010	0.99	0.95	1.00	1.05	1.40	0.95	0.97	2.22	1.06	1.23	2.07	4.29	2.63	2.56
Bolivia														
1963-1980	3.25	2.76	3.74	2.97	3.53	2.86	2.80	4.00	2.95	3.32	3.71	8.28	4.79	5.96
1980-1990	-2.91	-3.64	-2.77	-3.65	-2.84	-3.55	-3.27	-2.35	-3.51	-2.02	-1.71	4.99	-1.65	2.14
1990-2000	2.42	0.43	-0.53	0.42	1.89	0.56	0.63	2.72	0.68	0.82	0.87	4.65	4.04	0.37
2000-2010	-0.29	0.03	-0.85	-0.06	0.19	-0.17	0.02	1.22	0.27	1.63	0.69	1.37	1.14	0.88
1963-2010	0.98	0.30	0.44	0.34	1.09	0.33	0.43	1.75	0.50	1.27	1.29	5.31	2.45	2.85
Brazil														
1963-1980	3.68	3.72	4.63	3.71	4.36	3.79	3.75	5.01	3.64	3.86	4.46	7.60	5.66	5.56
1980-1990	-0.77	-1.20	-1.39	-1.15	0.44	-1.24	-1.01	0.70	-0.90	-1.07	0.48	4.95	2.39	0.98
1990-2000	0.80	1.16	0.51	1.18	1.65	1.15	1.22	2.77	1.56	1.61	2.46	4.76	3.07	2.70
2000-2010	0.69	0.67	0.26	0.94	0.73	0.59	0.54	1.24	0.94	0.87	0.88	1.13	1.22	0.81
1963-2010	1.47	1.46	1.51	1.53	2.16	1.46	1.50	2.80	1.64	1.68	2.41	5.03	3.45	2.95
Chile														
1963-1980	1.93	1.56	1.83	1.54	2.71	1.60	1.91	3.04	1.74	1.61	2.50	6.23	4.19	3.42
1980-1990	0.17	-0.28	-0.42	-0.11	0.80	-0.26	-0.31	1.28	-0.04	0.28	1.04	4.65	2.23	1.90
1990-2000	3.72	2.68	2.19	2.60	2.88	2.70	2.65	3.71	2.81	3.07	3.92	4.72	3.71	3.78
2000-2010	2.38	2.29	2.24	2.53	1.22	2.25	1.95	2.86	2.16	2.53	1.82	1.12	1.88	1.74
1963-2010	2.02	1.55	1.51	1.62	2.02	1.57	1.60	2.77	1.68	1.83	2.34	4.47	3.18	2.81
Colombia														
1963-1980	2.11	2.31	3.09	2.42	3.13	2.37	2.36	4.43	2.50	2.48	2.70	7.21	5.24	4.11
1980-1990	0.12	0.28	0.54	0.22	1.60	0.32	0.45	1.95	0.54	-0.01	1.37	4.88	3.21	1.76
1990-2000	-0.13	-0.29	-0.34	-0.26	0.80	-0.23	-0.03	1.85	0.17	-0.19	0.66	4.79	2.71	1.49
2000-2010	0.81	1.00	0.83	1.23	0.79	0.86	0.78	1.68	1.17	1.37	0.64	1.27	1.43	0.87
1963-2010	0.93	1.04	1.33	1.12	1.81	1.05	1.10	2.76	1.30	1.14	1.54	4.91	3.45	2.36
Costa Rica														
1963-1980	2.55	2.67	3.06	2.66	3.51	2.71	2.79	4.31	2.70	2.99	3.86	7.42	5.14	4.79
1980-1990	-0.97	-1.66	-0.99	-1.62	0.04	-1.61	-1.41	-0.26	-1.51	-1.44	-0.10	4.89	1.29	1.39
1990-2000	1.40	0.69	-0.08	0.82	1.29	0.72	0.67	2.85	1.18	1.40	1.76	4.75	3.12	2.18
2000-2010	2.16	1.40	1.15	1.88	0.46	1.33	0.93	2.28	1.38	1.54	1.87	1.09	1.38	1.38
1963-2010	1.46	1.04	1.11	1.18	1.64	1.06	1.04	2.58	1.19	1.39	2.13	4.94	3.08	2.77
Mexico														
1963-1980	2.19	1.83	2.91	1.84	2.89	1.87	1.98	3.34	2.01	2.29	2.82	7.52	4.42	4.76
1980-1990	-1.14	-2.17	-1.37	-2.10	-0.90	-2.12	-1.87	-0.38	-1.78	-1.95	-0.65	4.92	0.86	1.22
1990-2000	-0.39	-0.42	-1.06	-0.41	0.47	-0.38	-0.23	1.58	0.07	0.84	1.12	4.82	2.13	2.10
2000-2010	-0.20	-0.64	-0.78	-0.44	-0.68	-0.78	-0.65	0.15	-0.58	0.11	0.11	1.18	-0.06	0.66
1963-2010	0.42	-0.04	0.35	0.02	0.79	-0.03	0.12	1.48	0.23	0.60	1.13	5.02	2.21	2.55
Peru														
1963-1980	1.56	0.73	3.23	0.79	1.50	0.78	0.80	2.42	0.97	0.68	1.73	7.54	3.20	4.76
1980-1990	-3.45	-3.63	-3.83	-3.53	-1.67	-3.54	-3.42	-1.12	-3.07	-3.11	-1.87	5.03	0.74	-0.37
1990-2000	-0.44	0.22	-0.69	0.18	1.40	0.29	0.15	2.02	0.84	0.59	2.12	4.88	2.76	1.95
2000-2010	3.21	4.15	2.90	4.36	3.09	3.99	4.03	4.66	4.28	4.33	3.50	1.25	3.63	2.33
1963-2010	0.39	0.39	0.79	0.47	1.13	0.41	0.42	2.04	0.76	0.60	1.40	5.07	2.67	2.54
Venezuela														
1963-1980	2.31	2.20	2.10	2.33	3.34	2.24	2.40	4.13	2.45	2.23	2.89	6.63	5.24	3.45
1980-1990	-1.95	-2.66	-2.08	-2.50	-1.22	-2.65	-2.18	-0.92	-2.21	-2.32	-0.90	4.77	0.26	1.30
1990-2000	-1.67	-1.32	-1.18	-1.30	-0.29	-1.31	-1.23	1.48	-0.75	-0.87	-0.36	4.80	2.09	0.79
2000-2010	1.18	0.88	0.95	1.40	0.88	0.78	0.72	0.92	0.89	0.99	0.61	1.07	0.86	1.15
1963-2010	0.30	0.12	0.25	0.31	1.06	0.11	0.28	1.79	0.43	0.32	0.90	4.64	2.55	1.93

Table 3: Calibrated productivity levels in 1963 with different values of η

	Agriculture	Mining	Manufacturing	Utilities	Construction	Wholesale	Transport	Finance	Personal
Korea									
Benchmark	0.0804	0.0672	0.2939	0.4445	0.1759	0.1013	0.1635	2.0254	0.2804
$\eta = 0.1$	0.0804	0.1253	0.2991	0.3817	0.2210	0.1597	0.2117	0.9330	0.2909
$\eta = 0.6$	0.0804	0.0366	0.2589	0.4482	0.1311	0.0631	0.1190	3.3491	0.2433
Taiwan									
Benchmark	0.1017	0.0114	0.1569	0.1095	0.2364	0.1915	0.1001	2.7339	0.1820
$\eta = 0.1$	0.1017	0.0422	0.1984	0.1605	0.2526	0.2232	0.1523	1.0694	0.2166
$\eta = 0.6$	0.1017	0.0034	0.1092	0.0678	0.1880	0.1423	0.0602	4.8324	0.1330
Argentina									
Benchmark	0.2245	0.5391	0.2906	0.0856	0.3879	0.6520	0.2536	1.8225	0.6925
$\eta = 0.1$	0.2245	0.5575	0.3873	0.1884	0.4592	0.6236	0.3574	1.1429	0.6461
$\eta = 0.6$	0.2245	0.5038	0.2220	0.0439	0.3256	0.6483	0.1853	2.5338	0.7022
Bolivia									
Benchmark	0.0719	0.0049	0.2066	1.6831	0.0575	0.4252	0.1311	11.0160	0.1769
$\eta = 0.1$	0.0719	0.0341	0.3075	1.0587	0.1448	0.4706	0.2352	3.2038	0.2807
$\eta = 0.6$	0.0719	0.0007	0.1003	1.6196	0.0184	0.2613	0.0549	19.5612	0.0817
Brazil									
Benchmark	0.0892	0.3243	0.2719	0.0462	0.1298	0.4330	0.2535	0.4025	0.5994
$\eta = 0.1$	0.0892	0.3512	0.3166	0.1113	0.2048	0.4165	0.3038	0.3989	0.5045
$\eta = 0.6$	0.0892	0.2984	0.2363	0.0225	0.0886	0.4378	0.2153	0.3974	0.6739
Chile									
Benchmark	0.1704	0.0218	0.4965	0.2172	0.2963	0.9864	0.4502	3.5159	0.4719
$\eta = 0.1$	0.1704	0.0919	0.5799	0.3562	0.4277	0.8690	0.5473	1.8379	0.5627
$\eta = 0.6$	0.1704	0.0065	0.4073	0.1360	0.2054	1.0121	0.3577	5.4601	0.3807
Colombia									
Benchmark	0.1042	0.0727	0.4506	0.6334	0.3538	0.8141	0.3750	0.3322	0.3944
$\eta = 0.1$	0.1042	0.1570	0.4601	0.5624	0.3990	0.6520	0.4129	0.3845	0.4254
$\eta = 0.6$	0.1042	0.0389	0.4366	0.6859	0.3169	0.9567	0.3423	0.2915	0.3660
Costa Rica									
Benchmark	0.0999	1.4235	0.6175	0.1264	0.1414	0.6909	0.4840	2.3077	0.4144
$\eta = 0.1$	0.0999	1.0153	0.6206	0.2437	0.2604	0.6631	0.5376	1.3498	0.4906
$\eta = 0.6$	0.0999	1.7727	0.5856	0.0715	0.0830	0.6797	0.4240	3.3641	0.3451
Mexico									
Benchmark	0.1022	0.1276	0.5001	0.5422	0.4475	0.8338	0.8208	7.4198	0.5992
$\eta = 0.1$	0.1022	0.2887	0.6458	0.6772	0.6048	0.8728	0.8647	3.1654	0.7184
$\eta = 0.6$	0.1022	0.0583	0.3570	0.3973	0.3081	0.7031	0.6886	12.7623	0.4537
Peru									
Benchmark	0.1001	0.0503	0.5420	1.0967	0.5000	0.7994	0.5934	0.8244	0.5431
$\eta = 0.1$	0.1001	0.1406	0.5710	0.8650	0.5445	0.7179	0.6023	0.7311	0.5716
$\eta = 0.6$	0.1001	0.0220	0.5163	1.3146	0.4639	0.8644	0.5822	0.9003	0.5176
Venezuela									
Benchmark	0.1587	0.1199	1.8974	0.2840	0.9494	1.6818	1.2795	3.1050	0.9707
$\eta = 0.1$	0.1587	0.3372	1.7171	0.5606	1.1417	1.5993	1.3613	2.2954	1.1568
$\eta = 0.6$	0.1587	0.0516	2.0112	0.1620	0.8029	1.7139	1.1927	3.8647	0.8270

Table 4: Direct and indirect protection of agriculture

		Period averages in percentages			
Country	Period	Indirect protection	Tax due to industrial protection	Direct protection	Total protection
Argentina	1960-84	-21.3	-39.5	-17.8	-39.1
Brazil	1969-83	-18.4	-21.4	10.1	-8.3
Chile	1960-83	-20.4	-37.4	-1.2	-21.6
Colombia	1960-83	-25.2	-37.8	-4.8	-30.0
Korea	1960-84	-25.8	-26.7	39.0	13.2

Source: Schiff and Valdés (1992, Table 2.1).

Table 5: Relative rate of assistance (RRA) (%)

Year	Argentina	Brazil	Chile	Colombia	Mexico	Korea	Taiwan	U.S.
1960	-59.5	na	-8.6	-21.6	na	-39.2	-9.7	2.7
1965	-50.9	na	-21.2	-12.5	na	-9.0	0.4	2.1
1970	-42.5	-32.7	-4.8	-33.4	na	38.4	4.7	3.0
1975	-47.0	-52.9	-22.3	-36.1	na	2.5	1.7	0.7
1980	-20.4	-49.4	0.1	-18.6	-0.1	92.4	9.3	5.5
1985	-30.4	-46.9	5.3	-17.0	19.1	125.5	18.7	12.9
1990	-31.6	-23.0	-6.2	-18.1	21.3	190.0	44.6	10.7
1995	-12.8	-2.0	2.6	-0.1	-16.9	200.1	44.7	4.8
2000	-13.0	-3.0	4.3	17.1	13.6	165.5	77.9	14.3
2005	-25.3	0.7	-0.4	13.0	3.8	165.0	50.1	14.5
2010	-23.7	-3.2	-0.4	25.3	6.9	78.7	na	2.5

Source: Anderson and Nelgen (2013). Note: "na" means not available.

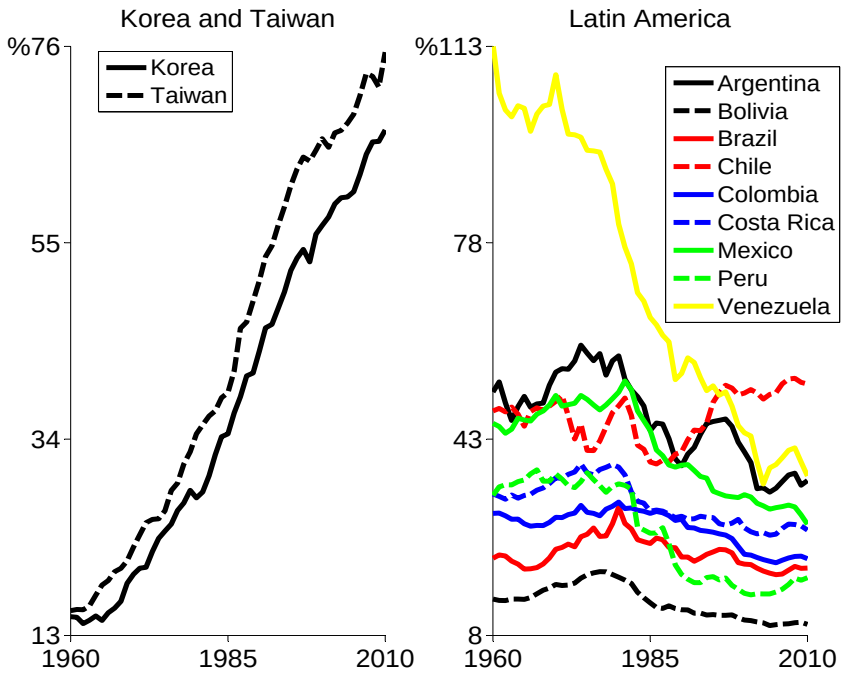

Figure 1: Labor productivity relative to the U.S. (%), 1960-2010

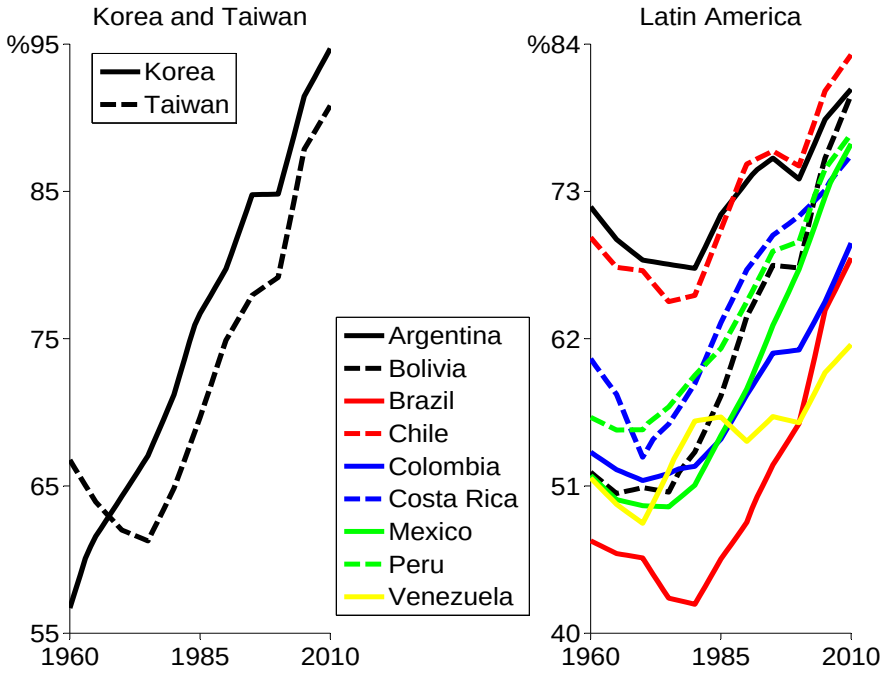

Figure 2: Human capital relative to the U.S. (%), 1960-2010

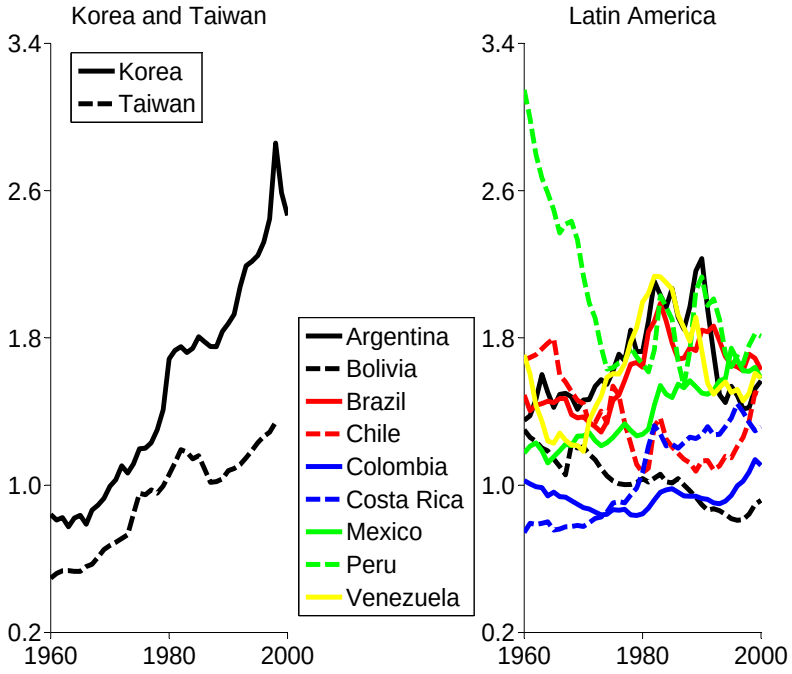

Figure 3: PPP capital-output ratio, 1960-2000

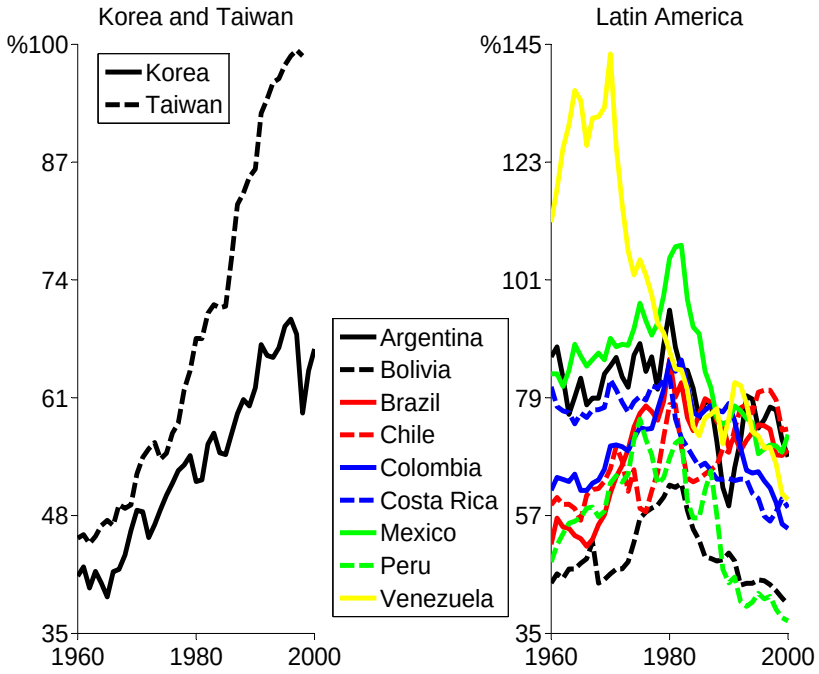

Figure 4: TFP levels relative to the U.S. (%), 1960-2000

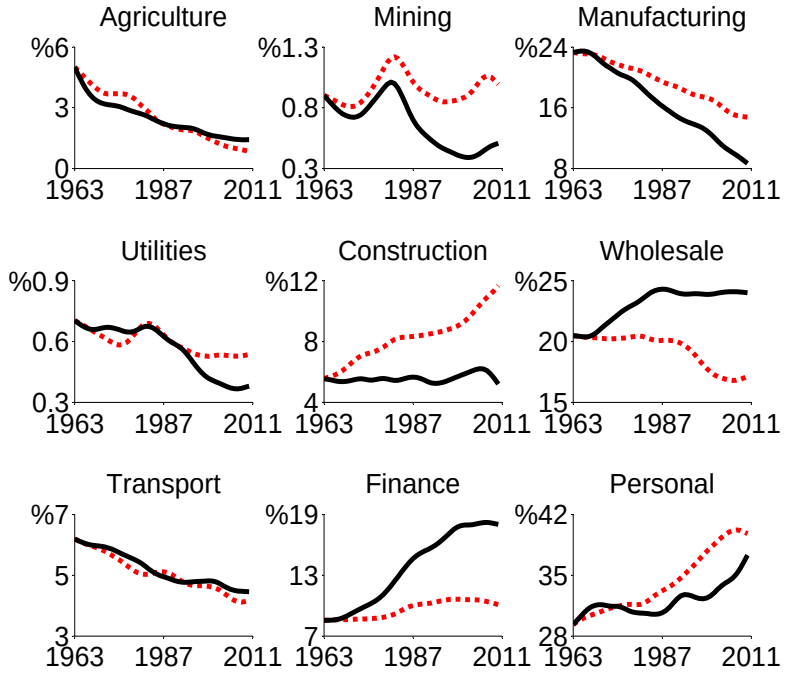

Figure 5: Sectoral employment shares, U.S., 1963-2010

(Solid: Data; Dashed: Model)

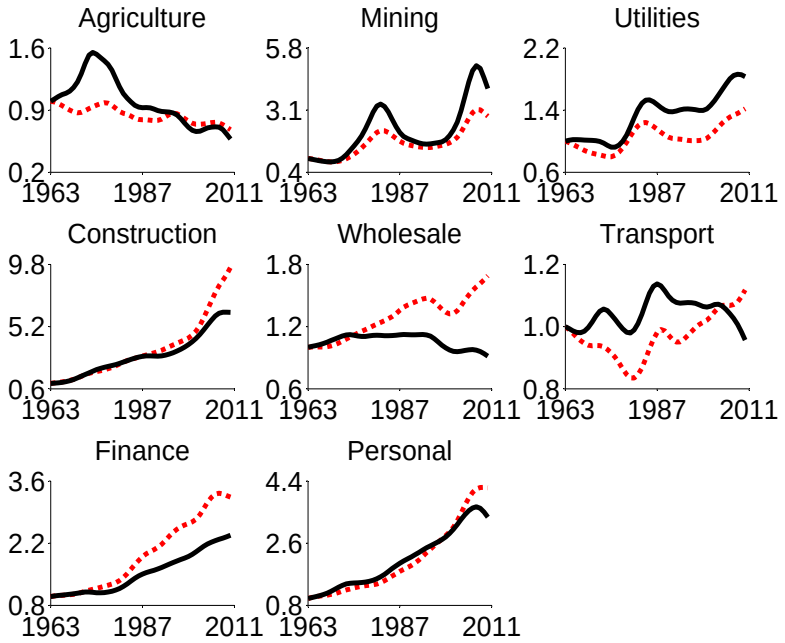

Figure 6: Relative prices (to manufacturing), 1963=1, U.S., 1963-2010

(Solid: Data; Dashed: Model)

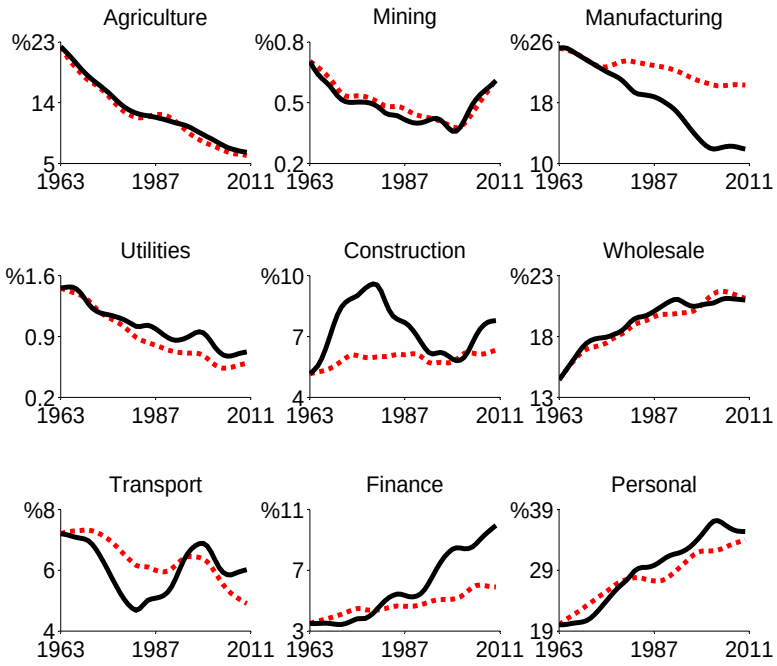

Figure 7: Sectoral employment shares, Argentina, 1963-2010
(Solid: Data; Dashed: Model)

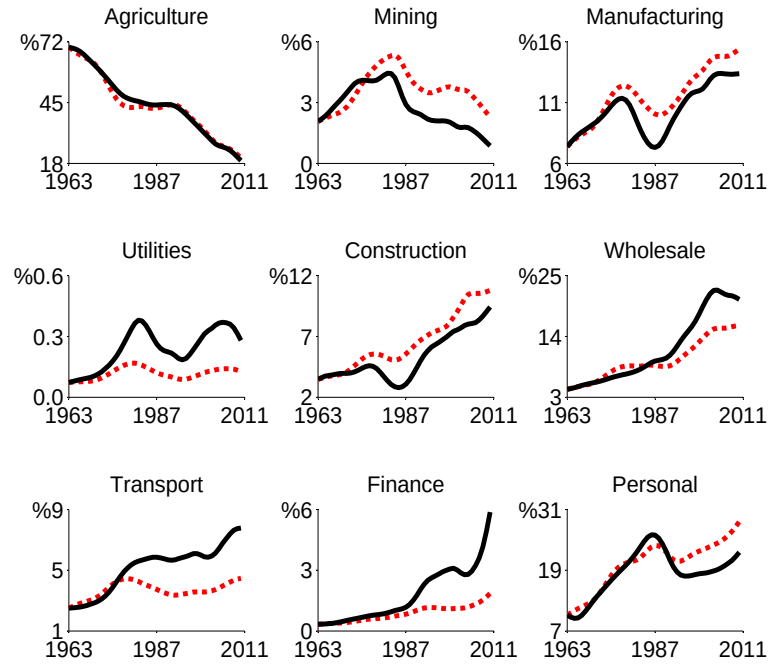

Figure 8: Sectoral employment shares, Bolivia, 1963-2010
(Solid: Data; Dashed: Model)

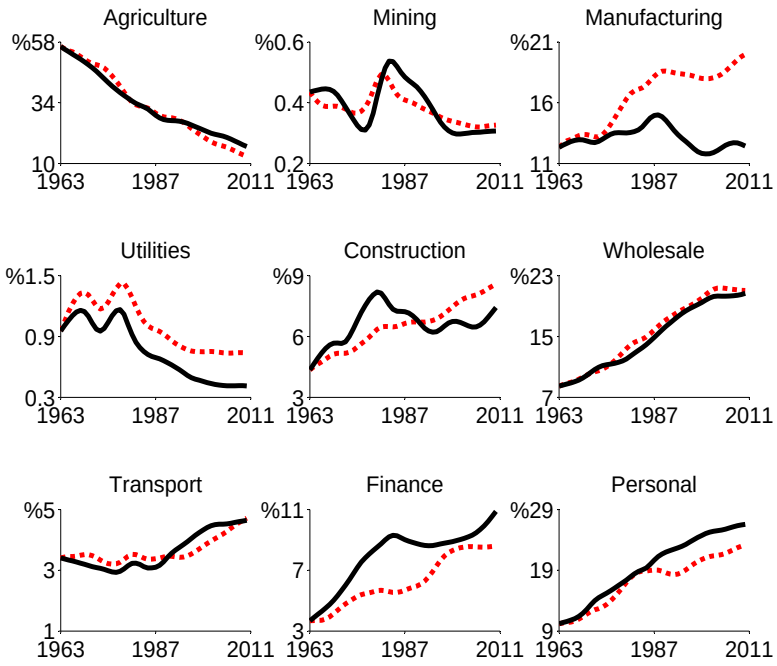

Figure 9: Sectoral employment shares, Brazil, 1963-2010
(Solid: Data; Dashed: Model)

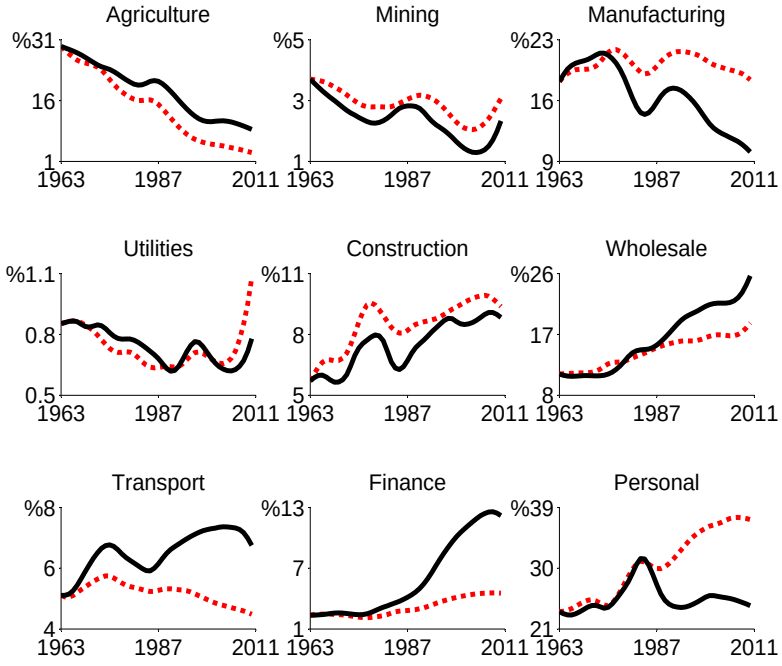

Figure 10: Sectoral employment shares, Chile, 1963-2010
(Solid: Data; Dashed: Model)

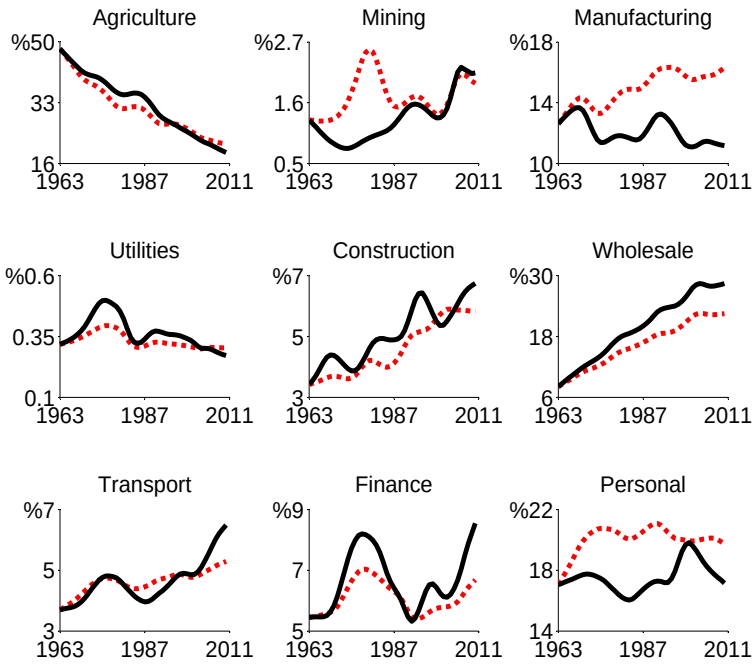

Figure 11: Sectoral employment shares, Colombia, 1963-2010
(Solid: Data; Dashed: Model)

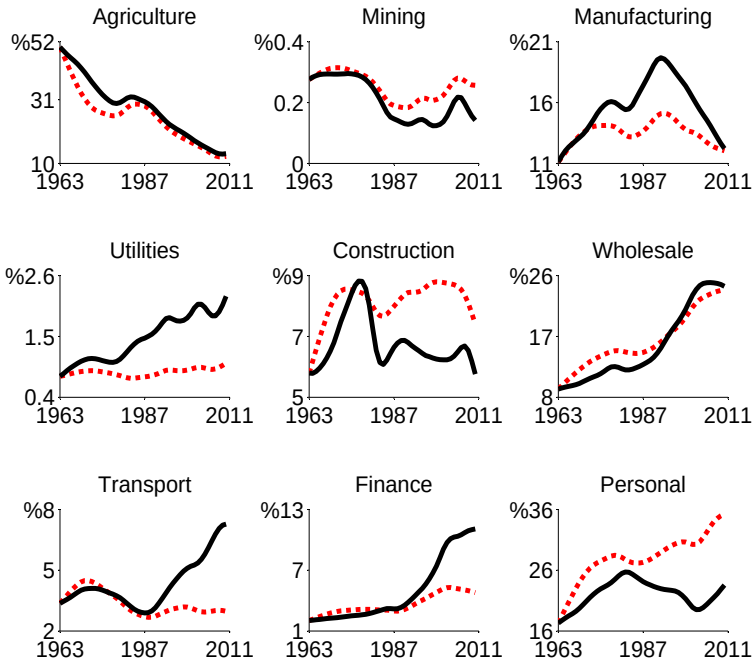

Figure 12: Sectoral employment shares, Costa Rica, 1963-2010
(Solid: Data; Dashed: Model)

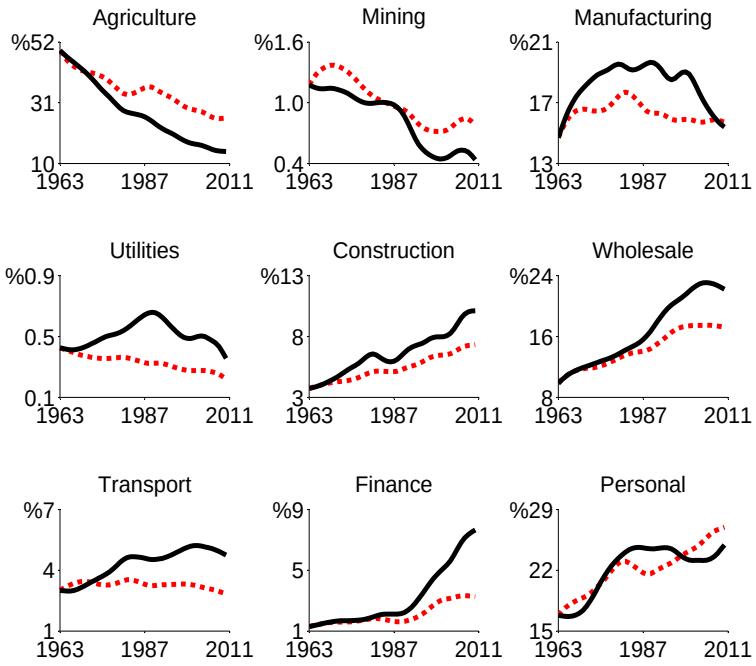

Figure 13: Sectoral employment shares, Mexico, 1963-2010
(Solid: Data; Dashed: Model)

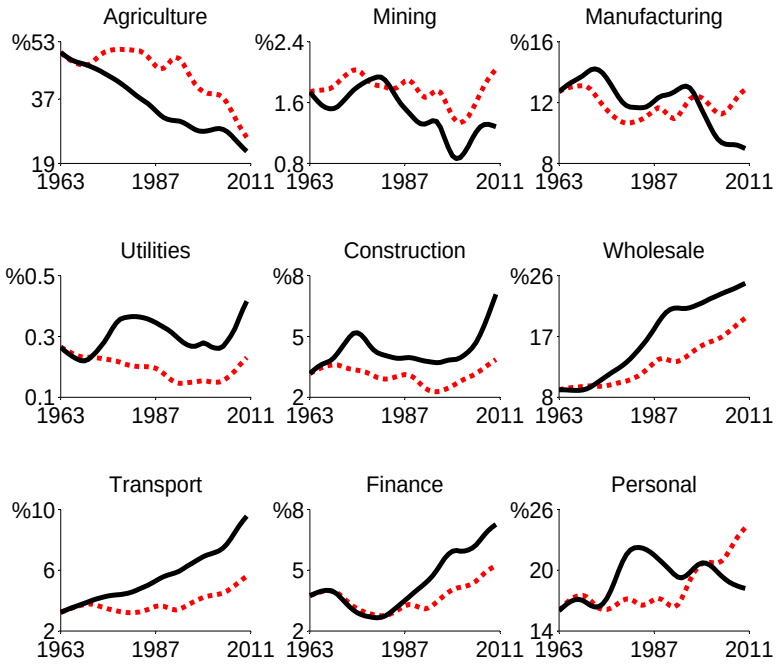

Figure 14: Sectoral employment shares, Peru, 1963-2010
(Solid: Data; Dashed: Model)

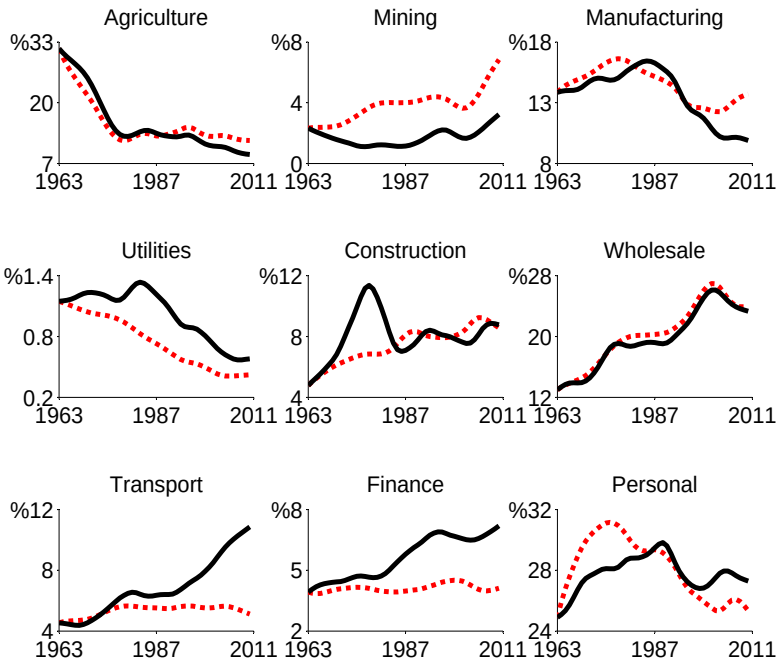

Figure 15: Sectoral employment shares, Venezuela, 1963-2010
(Solid: Data; Dashed: Model)

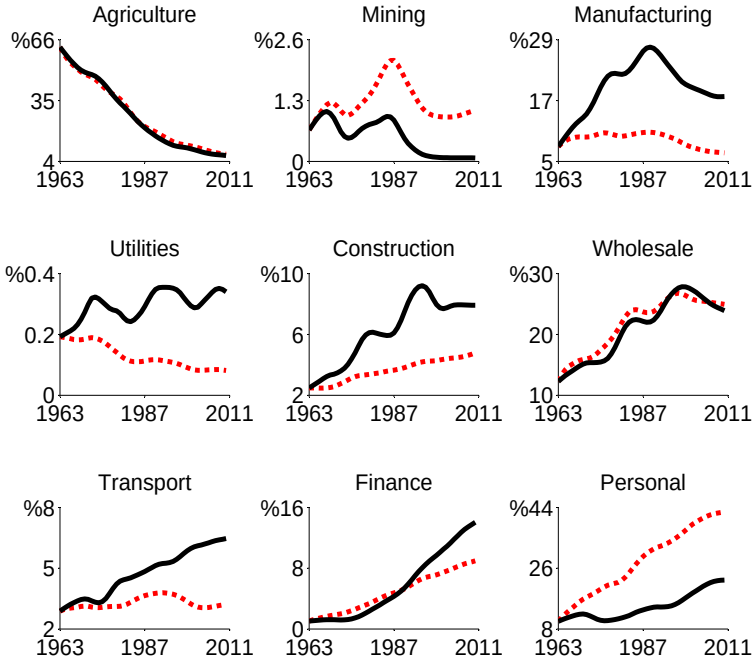

Figure 16: Sectoral employment shares, Korea, 1963-2010
(Solid: Data; Dashed: Model)

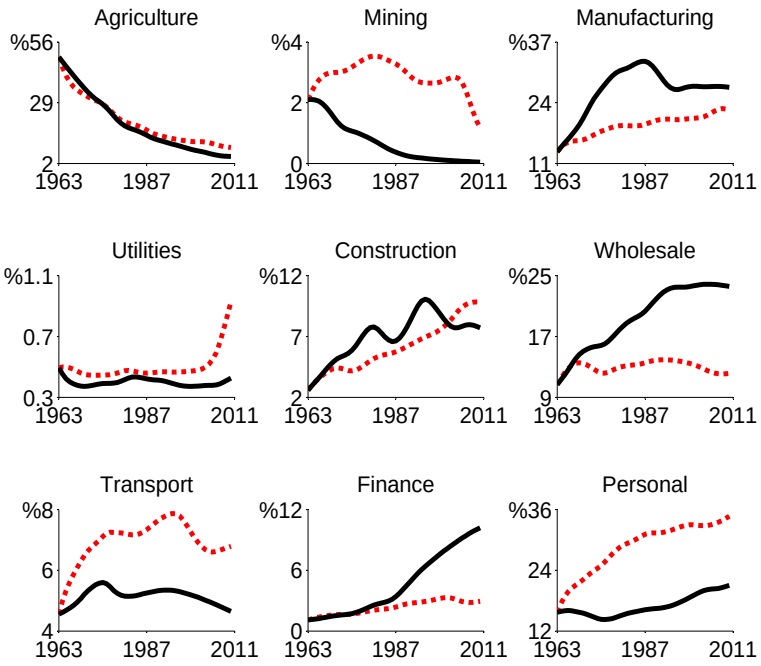

Figure 17: Sectoral employment shares, Taiwan, 1963-2010
(Solid: Data; Dashed: Model)

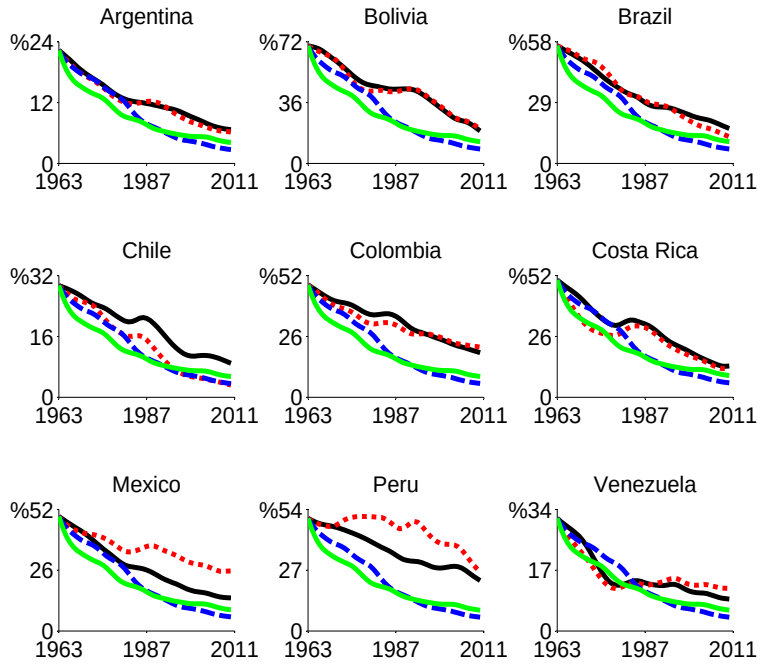

Figure 18: Counterfactuals: agricultural employment share, 1963-2010
(Black: Data; Red: Benchmark; Blue: Korean; Green: Taiwanese)

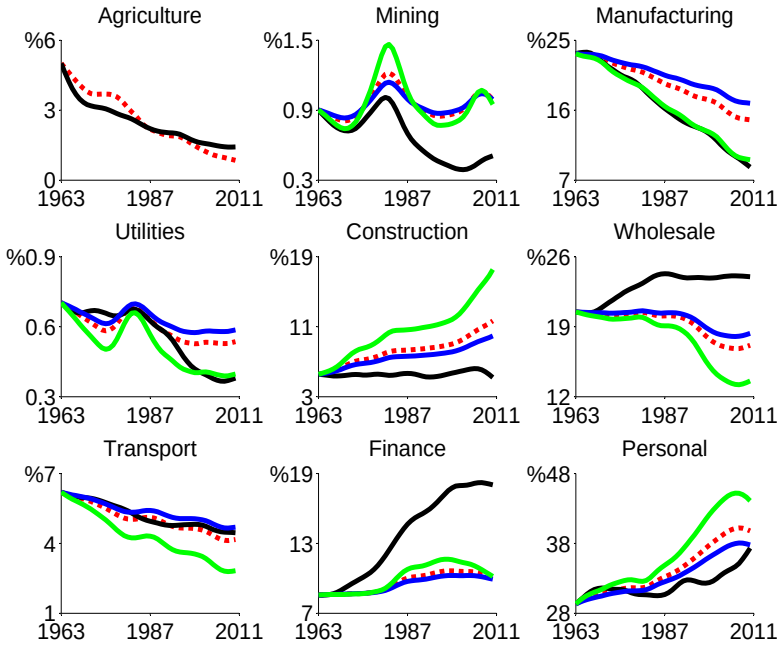

Figure 19: Role of η on the sectoral employment shares, U.S., 1963-2010
(Solid: Data; Dashed: Benchmark; Blue: η=0.6; Green: η=0.1)

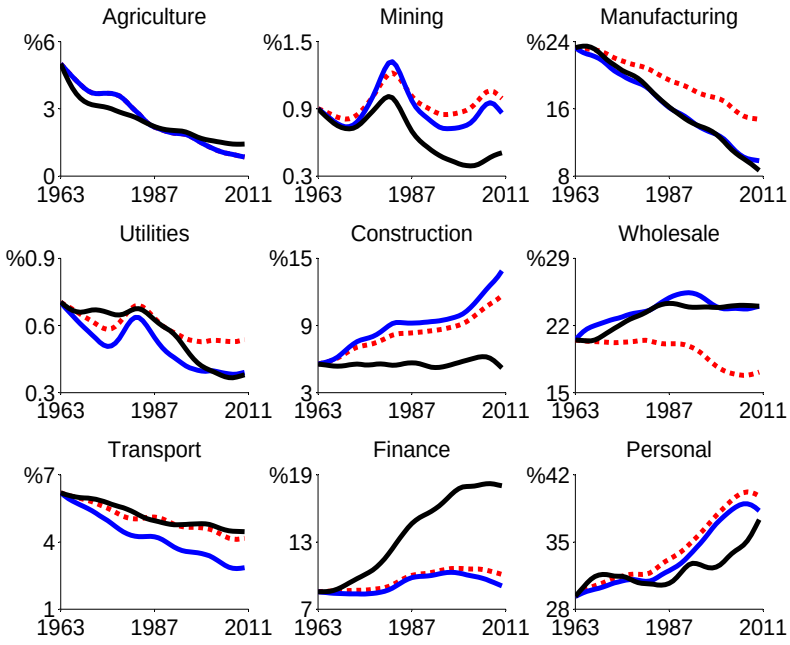

Figure 20: Role of $\bar{c}$ on the sectoral employment shares, U.S., 1963-2010
(Solid: Data; Dashed: Benchmark; Blue: Model with $\bar{c}$)