Urbanization with and without Industrialization*

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Abstract: We document several new facts regarding urbanization and structural change in developing countries and develop a model that can account for them. Most developing countries follow a standard pattern: urbanization is a by-product of either a "push" from agricultural productivity growth or a "pull" from industrial productivity growth. In these countries urbanization occurs *with* structural transformation and cities are "production cities", with a mix of workers in tradable and non-tradable sectors. For a distinct subset of countries that rely on natural resource exports, however, urbanization has increased at an equally rapid pace, but it is not associated with an increased importance of manufacturing and services in GDP. In these countries urbanization has taken place in "consumption cities" where the mix of workers is heavily skewed towards non-tradable services. We adapt a standard model of structural transformation to explain how natural resources can both drive urbanization as well as shift the composition of the urban labor force. The model may help explain why natural resource exporters - and Sub-Saharan Africa in particular - have experienced urbanization without structural transformation, which has implications for the pace of long-run growth in these areas.

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1. INTRODUCTION

Urbanization is typically seen as a consequence of economic development, to the point that urbanization rates are often used as a proxy for income per capita. As a country develops, the process of structural transformation from agriculture into manufacturing and services involves a shift of labor out of rural areas and into urban ones. In typical closed-economy models of this process, urbanization and the structural transformation are mechanically linked through a combination of a low income elasticity for food and the assumption that manufacturing and services are predominantly or exclusively urban activities.

However, across countries today there is not a particularly strong association between urbanization and the fraction of economic activity engaged in manufacturing and services. Figure 1 plots these values for the year 2000 for 119 developing countries, along with a quadratic fit. As can be seen, there are a number of countries that are highly urbanized without having seen a large shift of economic activity towards manufacturing and services. The data even point towards a *negative* relationship for countries that are at particularly low levels of manufacturing and services in GDP.

An explanation for this muddled relationship can be seen by breaking up the sample based on the importance of natural resources exports – a term that we define here as including agricultural exports.[1] Within figure 2 countries with natural resources exports as a percent of GDP over 10% are denoted in grey. They make up the vast majority of the countries that do not conform to the standard model of urbanization being coincident with increasing manufacturing and services in GDP. This can be seen more clearly in figures 3 and figures 4. The first shows only those countries for which natural resource exports make up less than 10% of GDP. Here we see, aside from the outlier of Sierra Leone, countries that line up neatly with the expectations of standard models of structural change. The increased importance of manufacturing and services in output is tightly associated with a greater fraction of population living in urban areas. Figure 4, by contrast, shows that among countries with large natural resource export shares, there is no significant relationship between manufacturing and services and the urbanization rate. Many of these countries have achieved high levels of urbanization without an associated structural transformation towards manufacturing and services. Figure 5 confirms that their urbanization process is positively associated with the export of natural resources.

One reason for this pattern might be that natural resource production or exports are themselves large employers of urban workers. But particularly given our measure of resource exports, which includes agriculture, this is almost certainly not the case. Urbanization in these countries is not driven by meaningful shifts of labor into urban areas to work in the natural resource sector. Point-source natural resources (e.g., oil and minerals) are highly capital-intensive, and production of these commodities creates very little direct employment. For example, Angola's urbanization rate was 15% before oil was discovered in the 1960's, but it was 60% in 2010. While crude oil now accounts for over 50% of GDP it employs fewer than 10,000 nationals and a small number of expatriates. Botswana has a similar urbanization rate to Angola, and while the diamond sector accounts for 36% of GDP, it only provides employment for approximately 13,000 people. Cash crops and timber in other countries are produced in rural areas and contribute to *rural* employment, rather than urban employment.

In this paper we study the role of natural resources in creating a divergence between the processes of urbanization and structural transformation. We first establish that the patterns seen in figures 1, 2, 3, 4 and 5 are robust relative to other determinants of urbanization. In addition, we document a distinct difference in the composition of urban labor in countries related to the importance of natural resources in output. For countries in which resources are unimportant, we see what we term "production cities". Consistent with standard models of structural transformation, these cities have a sizable share of labor producing tradable goods such as manufactures. In contrast, for countries that do have significant natural resource exports, urbanization involves "consumption cities", where almost none of the labor is engaged in producing tradable goods, but instead works in non-tradable sectors such as personal services.

[1] Our category of "natural resource exports" could thus be more appropriately characterized as "primary product exports," in keeping with a longstanding tradition. In fact, the agriculture share of natural resource exports is quite large for many of our countries.

The first part of the paper establishes some empirical regularities with respect to urbanization and economic structure. An important contribution of our paper is purely to point out the flaws in standard assumptions that urbanization is accompanied by manufacturing or industrialization. This seems to have been an accurate depiction of urbanization in many of today's rich countries, and it also seems to have characterized patterns of development in much of East and Southeast Asia. It does not, however, provide an accurate picture of urbanization in sub-Saharan Africa. We believe that documenting the differential patterns of urbanization is important for both economic theory and policy.

The second part of our paper offers a theoretical framework for thinking about the different paths to urbanization. To account for the patterns in the data, we modify a standard model of structural change along several dimensions. The two main changes are to allow for an explicit natural resource sector and to allow for the possibility that our model economy is open to trade. Our model economy has multiple goods: natural resources and food are assumed to be produced in rural areas. Resources are considered tradable, while we treat food as non-tradable. Two other goods are produced in cities. We define one to be a tradable urban sector, corresponding loosely to manufacturing plus tradable services – an increasingly important sector in some developing countries. The other we define as a non-tradable sector, corresponding loosely to urban services. Like many models of structural transformation, we assume a form for preferences that gives rise to non-homotheticities in demand. Specifically, rising incomes are associated with increasing budget shares for the goods produced in urban areas.

In the equilibrium with trade, economies with relatively high productivity in the resource sector will have a comparative advantage in that good. They will thus shift labor towards the resource sector and out of the urban tradables sector. This implies that the composition of urban activity shifts to non-tradable goods, leading to the "consumption cities" we see in the data. Although high levels of productivity in the resource sector do induce some shift of labor towards the natural resource sector, urbanization can still increase as the additional income earned through selling resources at high world prices shifts domestic demand towards urban goods. Hence resource-rich economies can experience urbanization without significant improvements in either agricultural, manufacturing, or service sector productivity.

Within the framework of our model, we consider the consequences of the different types of urbanization on long-run outcomes. Many economists have argued that tradable manufacturing sectors are capable of higher labor productivity growth than non-tradable services (Timmer & Vries, 2007; Duarte & Restuccia, 2010; Rodrik, 2011). In this case, the economic composition of urban areas may matter for aggregate productivity growth. Natural resource exporters that urbanize through "consumption cities" will experience slower productivity growth than countries urbanizing according to the standard model. By skewing the urban mix away from faster-growing sectors, in the long-run resource-rich countries may end up urbanized but relatively poor.

This paper is related to a large body of work on the role of sectoral labor productivity in driving structural change; i.e. the decline in agriculture, the rise and fall of manufacturing, and the rise of services (see Herrendorf, Rogerson & Valentinyi 2011*a* for a survey of the literature). A first strand of the literature looks at the origins of structural change in developed countries. The "labor push" approach shows how a rise in agricultural productivity (what we might think of as a *Green Revolution*) reduces the "food problem" and releases labor for the modern sector (Schultz, 1953; Gollin, Parente & Rogerson, 2002, 2007; Nunn & Qian, 2011; Michaels, Rauch & Redding, 2012). The "labor pull" approach describes how a rise in non-agricultural productivity (an *industrial revolution*) attracts underemployed labor from agriculture into the modern sector (Lewis, 1954; Harris & Todaro, 1970; Hansen & Prescott, 2002; Lucas, 2004; Alvarez-Cuadrado & Poschke, 2011). A second strand of the literature studies whether income effects or price effects explain structural change. Non-homothetic preferences and rising incomes mean a reallocation of expenditure shares towards non-agricultural goods (Caselli & Coleman II, 2001; Gollin, Parente & Rogerson, 2002, 2007; Matsuyama, 1992, 2002; Voigtländer & Voth, 2006; Galor & Mountford, 2008; Duarte & Restuccia, 2010; Alvarez-Cuadrado & Poschke, 2011). Ngai & Pissarides (2007) and Acemoglu & Guerrieri (2008) see structural change as a consequence of price effects: assuming a low elasticity of substitution across consumption goods, any relative increase in the productivity of one sector leads to a relative decrease in its employment share. Buera & Kaboski (2009), Yi & Zhang (2011), Herrendorf, Rogerson & Valentinyi (2011*b*) and Michaels, Rauch & Redding (2012) adopt or compare both approaches. According to the income effects approach, any rise in sectoral productivity leads to a reallocation of labor from inferior goods to superior goods. According to the price effects approach, the patterns in structural change can only be explained by a rise in agricultural productivity followed by a rise in manufacturing productivity.

We make several contributions to this literature. First, we document that the processes of urbanization and structural change are not entirely synonymous. It is quite possible for an economy to urbanize without any change in agricultural and manufacturing productivity, which are the only sources of structural change in standard models.(Corden & Neary, 1982; Matsuyama, 1992; Echevarria, 2008; Galor & Mountford, 2008; Teigner, 2011; Yi & Zhang, 2011). Our second contribution relates to the literature on urbanization in developing countries. The economic geography literature suggests that agglomeration promotes growth, in both developed countries (Rosenthal & Strange, 2004; Henderson, 2005) and developing countries (Overman & Venables, 2005; Henderson, 2010; Felkner & Townsend, 2011). Given that urbanization is a form of agglomeration, it has been argued that cities could promote growth in developing countries (Duranton, 2008; Venables, 2010; World Bank, 2009; McKinsey, 2011).[2] What we show here is that the composition of urban areas differs based on the source of the urbanization, and we propose that the "consumption cities" found in natural resource exporters may well be less effective at promoting developing than standard "production cities". By showing that urbanization need not be universally positive, our setting provides an explanation for the growing "urbanization of global poverty" (Ravallion, Chen & Sangraula, 2007).

Finally, this paper contributes to the literature on Dutch disease and the resource curse (Corden & Neary, 1982; Matsuyama, 1992; Sachs & Warner, 2001; Robinson, Torvik & Verdier, 2006; Angrist & Kugler, 2008; Michaels, 2011; Caselli & Michaels, 2012). Dutch disease models suggest that a country is likely to deindustrialize when its resource sector booms. The boom shifts labor and other resources away from the manufacturing sector into the non-tradable service sector. But the net effect on urbanization is ambiguous. These models do not explain why resource-rich developing countries have urbanized with almost no industrialization. In some sense, we highlight a new dimension of the resource curse – the rise of "consumption cities" that do not produce the same agglomeration economies that are found in typical urban areas.

The paper is organized as follows: Section 2 describes in greater detail the differential patterns of structural transformation in Asia and Africa and provides a more detailed motivation for examining the differences between the two. Section 3 outlines a model of structural transformation in a closed economy. Section 4 extends this model to an open economy. Section 5 examines the dynamics of the structural transformation process. Section 6 concludes.

2. PATTERNS OF URBANIZATION IN DEVELOPING COUNTRIES

Figures 1, 2, 3, 4, and 5 showed simple cross-sectional correlations between urbanization and the share of manufacturing and services in GDP for a sample of developing countries. It is useful to consider patterns within specific regions of the world, as they display the correlations more starkly.

First consider figure 6, which plots population-weighted urbanization rates for four regions of the world from 1950–2010. Latin America and the Middle-East/North Africa have consistently had higher urbanization rates than Sub-Saharan Africa and Asia the entire period, but in all regions the urbanization rate roughly doubled over the last sixty years. Particularly interesting is that Sub-Saharan Africa and Asia track each other quite closely in terms of urbanization rates. Both regions are near 40 percent urbanization in 2010, despite the fact that Asia contains a number of the fastest growing nations in history (e.g. South Korea and China), while Sub-Saharan Africa has seen very little growth in income per capita over this period.

[2]For instance, McKinsey (2011) writes (p.3-19): "Africa's long-term growth also will increasingly reflect interrelated social and demographic trends that are creating new engines of domestic growth. Chief among these are urbanization and the rise of the middle-class African consumer. [...] In many African countries, urbanization is boosting productivity (which rises as workers move from agricultural work into urban jobs), demand and investment."

Urban growth has taken place in both Asia and Africa in cities of all sizes. Although the literature emphasizes the growth of the largest cities in the developing world, urban growth has in fact taken place in cities of all sizes - large, medium, and small. The distribution of city size across regions is quite similar, too. For example, in 2010, there were 257 Asian and 60 African "mega-cities" with over 750,000 inhabitants. Since Asia is roughly four times more populous than Africa, this means that Africa and Asia have approximately the same number of megacities per capita. The megacities represent around 40% of the urban population in both continents.

Asia is an example of the standard story of urbanization *with* structural transformation. The successful Asian economies typically went through both a Green Revolution and an industrial revolution, with urbanization following along as their economic activity shifted away from agricultural activitites (Evenson & Gollin, 2003; Young, 2003; Bosworth & Collins, 2008; Brandt, Hsieh & Zhu, 2008; McMillan & Rodrik, 2011). Figure 7 shows that within Asia the expected pattern of urbanization and the share of manufacturing and services in GDP holds up well. The only exceptions are Brunei and Mongolia, which in contrast to most of Asia are heavily dependent on natural resource production.

In contrast, Africa offers a perfect example of urbanization *without* structural transformation. First, there has been little evidence of a Green Revolution in Africa. Its food yields have remained low (Evenson & Gollin, 2003; Caselli, 2005; Restuccia, Yang & Zhu, 2008); in 2009, cereal yields were 2.8 times lower than in Asia, while yields were 2.1 times lower for starchy roots. Second, there has been no industrial revolution in Africa. Its manufacturing and service sectors are relatively small and unproductive (McMillan & Rodrik, 2011; Badiane, 2011); in 2007, employment shares in industry and services were 10% and 26% for Africa, but 24% and 35% for Asia, and African labor productivity was 1.7 and 3.5 times lower in industry and services, respectively (World Bank, 2010).

Yet despite the lack of the standard "push" out of agriculture or "pull" from industry, Africa has urbanized to the same level as Asia over the last half-century. As can be seen in figure 8, there is no tendency for countries that are urbanized to be heavily involved in manufacturing and services. However, figure 9 shows that urbanization in Africa is positively associated with the importance of natural resources exports in GDP. As noted previously, there is little evidence that this relationship is driven by increased numbers of resource workers in urban areas. Rather, Africa's urbanization appears to be driven by a *natural resource revolution* that provides a different origin for a "push" into urban areas as the increased purchasing power made available from resources increases demand for urban goods (Jedwab, 2012). We find an "Asian" pattern for Latin American and Caribbean countries and an "African" pattern for Middle-East and Northern African countries.[3]

Within Africa, the importance of natural resources to the process of urbanization can be seen over time. Figure 10 plots population-weighted urbanization rates from 1950–2000 for four groups of African countries. The groups are based on the average share of natural resources in total exports in 1960–2000. As can be seen, those countries that rely more heavily on resources are more highly urbanized over this entire period, and the relationship is essentially monotonic within each year.

2.1 Cross-sectional Robustness Checks

Table 1 presents results of cross-sectional regressions using a sample of 119 developing countries from the year 2000. The first five columns use the urbanization rate as the dependent variable, regressed on the share of manufacturing and services in GDP as well as the share of natural resource exports in GDP. The regressions in Table 1 are all population weighted.

Column (1) shows that across the entire sample, with no other control variables, both variables have a significant positive relationship with urbanization. The positive effect of manufacturing and services fits with the standard model of structural change. However, the positive association of natural resource exports to urbanization is less obvious, given that natural resources employ very few workers directly

[3] See appendix for plots of these relationships.

and/or are based in rural areas (i.e. cocoa). The positive effects of both persist when we include regional fixed effects in column (2).

There are several alternative theories for urbanization in developing countries - and particularly in Sub-Saharan Africa - that may make the results in columns (1) and (2) spurious. A few studies argue that Africa has urbanized without it being fully explained by economic development (Bairoch, 1988; Fay & Opal, 2000). This excessive urbanization is attributed to pull and push factors feeding rural exodus. Some argue that Africa's urban growth can be attributed to rural poverty (Barrios, Bertinelli & Strobl, 2006; Poelhekke, 2010; de Janvry & Sadoulet, 2010). Others have focused on theories of urban bias, arguing that urban-biased policies have led to overurbanization and primacy in poor countries (Lipton, 1977; Bates, 1981; Ades & Glaeser, 1995; Davis & Henderson, 2003). Furthermore, if natural resource exporters systematically use different methods for calculating urbanization rates, the results may simply reflect measurement errors.

In column (3) we incorporate a number of other controls to account for several of these alternative theories as well as the possibility of measurement errors. These are country area in square kilometers, population in thousands, rural density, population growth from 1950–2000 (in percent), a dummy if a country is considered an autocracy, and a dummy for whether the country has experienced an interstate or civil conflict since independence. In addition, we include dummies for four different types of urban definitions used by developing countries. As can be seen in the table, the inclusion of these controls does not alter the positive association of natural resource exports with urbanization rates.[4]

The importance of natural resources for urbanization appears to depend, however, on the scale of natural resource exports, as in the figures shown in the introduction. In column (4) we run the same regression as in column (3), with all controls, but only for the 49 countries that have natural resource exports less than 10% of GDP. For these countries, one can see that manufacturing and services are strongly associated with urbanization, but that there now is no significant relationship to resource exports. In fact the coefficient has become negative. These countries fit the standard model of structural change and urbanization.

In column (5), the 70 countries that do have meaningful natural resource exports are used instead, and here one can see the strong positive effect of those exports on urbanization rates. There remains a positive effect of manufacturing and services in these countries, but the size of the effect is approximately half of the non-resource sample, and the significance has declined. For these countries, natural resource exports are a stronger predictor of urbanization rates that manufacturing and services.

Table 2 presents a set of further robustness checks and alternative specifications regarding the urbanization rate. Column (1) simply repeats our main specification for comparison purposes. Column (2) allows for non-linear effects of the control variables by using their squares in the regression. In column (3) the standard errors are clustered at the region level, where regions refer to groupings below the continent level (see the appendix for a full description). Column (4) uses equal weightings for each country, as opposed to population weights, while column (5) introduces region fixed effects, where regions also refer to the groupings mentioned above. As can be seen, in no case does the overall story of a positive effect of natural resources on urbanization change, although the coefficient dips in size in columns (4) and (5).

The relationship between resource and urbanization changes when we look within specific regions, however. For Asia, where in general countries rely little on natural resource exports, manufacturing and services are significantly related to urbanization and there is a negative (but insignificant) relationship with natural resource exports. In contrast, in column (7) one can see that for African countries there is a very strong relationship between resource exports and urbanization, while there is no effect of manufacturing and services. Within Africa, then, we do not see a coincidence of manufacturing/services and urbanization that is expected in standard models of structural change.

Finally, columns (8) and (9) show that the overall results for urbanization hold even if we only consider the primate city in each country, or if we only consider all but the primate city. Interestingly, natural resource exports do not increase urban primacy more than manufacturing and services.

[4]See the data appendix for a full description of the sources for all of these variables.

2.2 Composition of Urban Workforce

The evidence of the prior section established that natural resources are strongly associated with urbanization, particularly when we exclude nations for which resources are a small share of exports. Here we establish the second important fact regarding resources and urbanization, related to the composition of labor in urban areas.

At the aggregate level, we measure the importance of manufacturing work in urban areas by taking the ratio of manufacturing labor in all labor to the urbanization rate. Roughly, this gives us a measure of manufacturing labor relative to the total urban population. Obviously, this presumes that all manufacturing labor is urban, which is not necessarily true. So long as there are not systematic differences in the location of manufacturing work across countries, this should only result in additional noise in our regressions, raising the standard errors.

Table 1, columns (6)–(8) report the results of regressing the manufacturing employment to urban population ratio against our standard controls. As can be seen, there is no significant relationship between the manufacturing and services share of GDP with manufacturing employment. There is not much to make of this, given that the share in manufacturing and services is not necessarily monotonically related to the size of the manufacturing sector.

What we do see, however, is that an increased share of natural resources in exports has a significant negative relationship to manufacturing employment relative to urban population. The implication is that, for a given urban population, there are fewer manufacturing workers when resources increase in importance. Urbanization in these countries occurs with a smaller proportion of workers in manufacturing, and this differs distinctly from other places that conform to standard models. Natural resource exporters have fewer manufacturing workers in their urban areas.

We then use IPUMS census data to recreate the sectoral composition of the urban sector for selected developing countries around 2000. IPUMS uses a general recode of 12 industries, but we only focus on urban tradables, i.e. manufacturing (Mfg) and finance, insurance, real estate and business services (Fire). Table A.2 lists all the countries and years for which we estimated the employment share of urban tradables in total urban employment (%). First, using the IPUMS data figure 11 shows the relationship between the employment share of urban tradables in total urban employment (%) and the contribution of natural resource exports to GDP (%) for selected developing countries around 2000. We only select countries for which the urbanization rate is higher than 20% in 2000, so as to compare countries that have begun to experience a shift out of agriculture. As expected, we find a strong negative relationship between urban tradables employment and natural resource exports. Second, if many countries use different urban definitions, this could affect the employment share of urban tradables and the graphic analysis above. For example, a restrictive urban definition would mechanically exclude the small-sized agrotowns, while a narrow urban definition would only select large cities with a strong manufacturing sector. That is why we verify that we obtain the same negative relationship if we study the employment share of urban tradables for the largest city only. Table A.3 lists all the countries and years for which we estimated the employment share of urban tradables in total employment for the largest city (%). Figure 12 shows that this negative relationship is robust to using the largest city only. All in all, this confirms that cities in resource rich countries have less urban tradables, and are more “consumption cities” than “production cities”.

3. A MODEL OF STRUCTURAL CHANGE

Most developing countries conform to a standard model of structural transformation. Shifts of economic activity into urban areas are essentially synonymous with shifts into the manufacturing and service sectors. The source of these shifts, according to the standard models, are either agricultural productivity improvements that “push” labor into urban activities, or improvements in non-agricultural productivity that “pull” labor into urban areas. Our data show that a subset of countries - notably sub-Saharan Africa - are inconsistent with this standard model. They have urbanized to the same extent as other developing countries, but unlike most areas this urbanization is associated with an increased importance of natural resources.

In addition, the composition of urban activity in these areas is tilted towards non-tradable goods, "consumption cities" as we have termed them. In this section we present a simple model of structural change that sincorporate features allowing us to account for the alternative path towards urbanization followed by resource-rich areas such as Sub-Saharan Africa.

A key component of the model is the inclusion of two different urban sectors, tradable goods and non-tradable goods. This allows us to capture the possibility that urbanization can increase without an increase in employment in the tradable goods sector (a structural transformation). Rather, urbanization can proceed through an increase in non-tradable sector workers alone. The second component of the model that drives this urbanization without structural transformation is the inclusion of an explicit natural resource producing sector that exports the output to the world market. The ability to produce this resource provides an outside income source for the economy, which increases demand for all goods. A Rybczynski effect implies that labor flows out of rural food production and urban tradable goods, and into resource production and urban non-tradables. We show that for conditions typical of developing countries, there will be a net increase in urbanization, but that the composition of urban workers tilts towards non-tradables. Finally, we explicitly allow for different degrees of labor intensity in resource production so that our model encompasses resources such as oil (where little labor is required) as well as cash crops (which require a large labor force to produce).

3.1 Individual Utility and Budgets

We assume that individuals have a log-linear utility function over three goods: food (c_f), tradable goods (c_d), and non-tradable goods (c_n),

$$U = \beta_f \ln c_f + \beta_d \ln c_d + \beta_n \ln c_n \tag{1}$$

where β_f, β_d, and β_n are all between zero and one, and $\beta_f + \beta_d + \beta_n = 1$. This utility function is homothetic, unlike those typically used in models of structural change. One could include non-homotheticities (such as having utility over $c_f - \bar{c}_f$ for food) and this would allow for structural change to occur with a general increase in income. Our interest is in how varying endowments of natural resources change economic structure and urbanization, and so for simplicity we ignore the non-homotheticities. They could be incorporated easily at the cost of additional notation, but our overall results would not be affected.

Individuals earn an income m. Their budget is

$$p_f c_f + p_d c_d + p_n c_n = m, \tag{2}$$

where p_j is the price of good j. Given the log-linear utility, the optimal choice for individuals is for expenditure on good j to equal its weight in the utility function, β_j,

$$p_j c_j = \beta_j m. \tag{3}$$

The income of individuals is made up of four components: wages, resource rents, capital rents, and land rents. Wages are denoted by w. Individuals earn a return ω_r on R/L units of the resource, a return ω_k on K/L units of capital, and a return ω_x on X/L units of land. Income is therefore

$$m = w + \omega_r \frac{R}{L} + \omega_k \frac{K}{L} + \omega_x \frac{X}{L}. \tag{4}$$

We assume that the resource (as well as capital and land) is split evenly across individuals. One could introduce inequality in resource rent earnings, but given the log-linear utility the aggregate expenditure share on each good would still be β_j.[5]

[5]Alternatively, one can think of the β_j values as representing aggregate expenditure shares consistent with heterogenous individuals with different preferences and wealth, or as representing aggregate expenditure shares consistent with a central government that earns the resource rents and makes decisions regarding how to spend those rents. Changing the β_j shares will alter the ultimate labor allocation in the economy, but not change our results regarding the influence of resources on those

3.2 Production, Factor Payments, and Trade

There are domestic sectors producing each of the three goods. Production in the three sectors is described by

$$
\begin{aligned}
Y_d &= A_d K^\alpha L_d^{1-\alpha} && (5)\\
Y_f &= A_f X^\alpha L_f^{1-\alpha} && (6)\\
Y_n &= A_n L_n && (7)
\end{aligned}
$$

where $A_j \in (f,d,n)$ is productivity in sector j, and L_j is the labor used in that sector. Tradable goods are produced using capital, K, while food goods are produced using land, X. Non-tradables use only labor.[6] The value of α is assumed to be identical between the tradable and food sectors for simplicity.

In addition to these three sectors, there is a resource sector that produces a good that can be sold internationally, but has no domestic market. It has a production function of

$$Y_r = A_r R^\gamma L_r^{1-\gamma}, \tag{8}$$

where A_r is total factor productivity, R is the size of the resource base, and L_r is the amount of labor used in the sector. γ is purposely allowed to be different from α. The value of γ is a way of parametrically distinguishing between different types of resources. As γ goes to one, the output of the resource sector becomes like "manna from heaven" and no labor effort is required to extract it. This would be the case for resources like oil or diamonds, where the labor force necessary is very small relative to the population. As γ gets closer to α, labor is more important for the extraction of the resource, consistent with the production of cash crops like cocoa or coffee. When we examine the comparative statics, we will show how the size of γ dictates how responsive urbanization and structural change are to changes in the resource base.

The economy is assumed to face world markets for the resource good, the tradable good, and food. Their prices are exogenous to the economy, and given by p_r^*, p_d^*, and p_f^*, respectively. The price of non-tradable goods is p_n and is determined endogenously.

The sectors are all assumed to operate competitively, so that the stocks of resources, capital, and land all earn their marginal products,

$$
\begin{aligned}
\omega_r &= \gamma p_r^* A_r \left(\frac{L_r}{R}\right)^{1-\gamma} && (9)\\
\omega_k &= \alpha p_d^* A_d \left(\frac{L_d}{K}\right)^{1-\alpha}\\
\omega_x &= \alpha p_f^* A_f \left(\frac{L_f}{X}\right)^{1-\alpha}.
\end{aligned}
$$

Labor is assumed to be mobile between sectors so that wages are equalized,

$$w = p_n A_n = p_d^* A_d K^\alpha L_d^{-\alpha} = p_f^* A_f X^\alpha L_f^{-\alpha} = p_r^* A_r R^\gamma L_r^{-\gamma}. \tag{10}$$

Labor mobility establishes several conditions regarding how the fraction of labor engaged in the food,

allocations.

[6]The non-tradable sector could be modelled as using capital as well, but for clarity we focus on the labor-only case.

tradable, and resource sectors are related to each other.

$$\begin{aligned}\frac{L_f/L}{L_d/L} &= \frac{X}{K}\left(\frac{p_f^* A_f}{p_d^* A_d}\right)^{1/\alpha} \\ \frac{(L_d/L)^\alpha}{(L_r/L)^\gamma} &= \frac{p_d^* A_d (K/L)^\alpha}{p_r^* A_r (R/L)^\gamma} \\ \frac{(L_f/L)^\alpha}{(L_r/L)^\gamma} &= \frac{p_f^* A_f (X/L)^\alpha}{p_r^* A_r (R/L)^\gamma}.\end{aligned} \tag{11}$$

While the possible difference between γ and α complicates the second two relationships, the conditions are straightforward. Labor allocations between these three sectors depend on the relative productivity of the different sectors. If the world price or productivity of a sector rises, then it's fraction of the labor force rises relative to the other two. In particular, note that an increase in either p_r^*, A_r, or R will increase the relative size of the resource labor force.

To establish the size of these sectors relative to the non-tradable sector requires further conditions, as the price of non-tradables in endogenous. Given that non-tradables are by definition only produced domestically, it must be that

$$\beta_n mL = p_n Y_n. \tag{12}$$

The other three goods can be produced domestically and also imported or exported to the world market. Assuming balanced trade yields the following condition

$$(\beta_f + \beta_d) mL = p_r^* Y_r + p_d^* Y_d + p_f^* Y_f. \tag{13}$$

This states simply that total expenditure on food and tradable goods must be equal to the total value of production in the tradable sectors.

To solve for the fraction of labor engaged in non-tradable production, divide (12) by (13), yielding

$$\frac{\beta_n}{\beta_f + \beta_d} = \frac{p_n Y_n}{p_r^* Y_r + p_d^* Y_d + p_f^* Y_f}. \tag{14}$$

Using the definitions of the production functions, and the fact that wages are equalized between sectors, this can be re-written as

$$\frac{\beta_n}{\beta_f + \beta_d} = \frac{L_n}{L_r/(1-\gamma) + L_d/(1-\alpha) + L_f/(1-\alpha)}. \tag{15}$$

Given that $L = L_n + L_d + L_f + L_r$, this can be transformed to

$$\frac{L_n}{L} = \frac{\beta_n}{1-\alpha(\beta_d + \beta_f)}\left(1 + \frac{\gamma - \alpha}{1-\gamma}\frac{L_r}{L}\right), \tag{16}$$

which gives the level of L_n as a positive function of the level of L_r. From this expression one can begin to see how resources will influence urbanization and structural change. Anything that raises the fraction of labor engaged in resource production will increase non-tradable employment. If there are no resources in the economy, then $L_r/L = 0$, and the model reduces to the typical result that the labor share depends on the expenditure share for non-tradables.[7]

We define the urbanization rate, u, as the sum of the fraction of workers in the tradable and non-tradable sectors:

$$u = \frac{L_d}{L} + \frac{L_n}{L}. \tag{17}$$

[7] The leading fraction $\beta_n/(1-\alpha(\beta_d + \beta_f))$ reflects the expenditure share on non-tradables, β_n, but is adjusted by the term in the denominator because the labor elasticity of production differs between sectors. As there are not diminishing returns to labor in non-tradables, the economy will tend to put more labor in that sector in equilibrium.

Because there are two sectors living in urban areas, it is possible for the urbanization rate to move one direction while the share of labor in the tradable sector moves in the opposite. In this situation we will have urbanization without structural transformation.

Consistent with the empirical regularities documented earlier, in our model an increased stock of natural resources (or an increased price for those resources on the world market) will generate exactly urbanization without structural transformation. When resource labor productivity goes up (whether through p_r^*, A_r, or R), then L_r/L will rise as well relative to both the food and tradable sectors, as seen in (12). Increased resource productivity raises the wage in the resource sector, and the only way to restore equilibrium is for labor to flow out of food and tradables and into the resource sector. This is a classic Rybczynski effect.

The non-tradable sector responds differently precisely because it is non-tradable. The increased labor productivity in resources represents a real increase in earnings, and so individuals demand more of each of the consumed goods. The only way to provide more non-tradable goods is to increase the fraction of workers in that sector, which is what equation (16) captures. With labor flowing into non-tradables, it must be that the price p_n is rising as well to ensure that the wage remains identical to the alternatives. When resource productivity increases the economy can increase its consumption of food and tradables by imports, and so those sectors can shrink relative to resources and non-tradables.

Note that the size of the effect on L_n/L in equation (16) depends on the size of γ relative to α. For economies with resources with a large γ, such as oil, a relatively small change in the labor share in resources will produce a large shift towards non-tradable work. When γ is very close to α, which may occur when the resource is produced using an identical technology to that in agriculture, then the effect of resources on non-tradable labor falls to zero. The reason is that there are two effects at work when resource productivity increases. First, the increased productivity induces labor to move into resource production. Second, the increased income due to the productivity improvement raises demand for non-tradable goods, which pulls labor out of the other sectors. When γ approaches α, the first effect offsets the second, and there is no net change in labor in non-tradables. When γ approaches one, then a very small shift of labor into resources is sufficient to equalized wages across sectors, and so on net the second effect dominates the first.

As we will show shortly, under conditions that seem to be a reasonable description of most developing countries, the flow of labor into non-tradables will outweigh the flow of labor out of tradables, and so urbanization will increase on net. In this way the model captures the process of urbanization without structural transformation. Additionally, as non-tradable labor replaces tradable labor in urban areas, we have the rise of "consumption cities" as we have described them, based mainly on non-tradable work. To show the more formally, we present the following proposition and corollary.

Proposition 1. *Given the labor market equilibrium conditions given in (12) and (16), and an increase in the price of the resource (p_r^*), the productivity of the resource sector (A_r), or the size of the resource base (R), it will be true that:*

(A) L_r/L *increases*

(B) L_n/L *increases*

(C) L_f/L *and* L_d/L *decrease*

(D) The ratio of non-tradable to tradable employment - L_n/L_d *- will increase*

(E) The price of non-tradable goods, p_n*, increases*

Proof. (A) follows from the labor market conditions in (12), the relationship of non-tradable to resource labor in (16), and the adding up constraint $L_f + L_d + L_r + L_n = 1$. Using (12) and (16), one can write the adding up constraint in terms of only L_r. This is an implicit function determining L_r. Using the implicit function theorem, the derivative $\partial L_r/\partial A_r > 0$. The partial derivative with respect to p_r^* and R follows from the same implicit function. (B) follows directly from (16) and part (A). (C) follows by noting that if both L_n/L and L_r/L increase, then the sum $L_f/L + L_d/L$ must decrease. From (12) the ratio of L_f/L_d does not change when A_r, p_r^*, or R increases, so both L_f/L and L_d/L must actually fall. (D) follows from parts (B) and (C). (E) can be seen from the equalization of wages between non-tradables and tradables. Given that L_d/L falls, it must be that the wage paid in the tradables sector rises. The wage in the non-tradables sector is $p_n A_n$, so the only way for this wage to rise to keep the labor market in equilibrium is for p_n to rise. □

The proposition establishes the shift in labor allocations that take place with higher productivity in the resource sector (whether through an increase in the endowment, actual productivity, or the world price). This change in labor allocations is not a structural transformation as we described it previously: labor is actively moving *out* of tradable good production.

While L_n/L is increasing with resource productivity, L_d/L is decreasing, and cities are becoming "consumption cities". However, the overall effect on the urbanization rate is ambiguous. The next corollary establishes that urbanization in the economy increases so long as the initial fraction of labor in tradables is sufficiently small.

Corollary 1. *If the following condition holds:*

$$\frac{1-\alpha(\beta_d+\beta_f)}{\beta_n}\frac{1-\gamma}{\gamma-\alpha} < \frac{L_f}{L_d} \tag{18}$$

then an increase in p_r^*, A_r, or R will result in a net increase in the urbanization rate u.

Proof. See appendix □

When resource productivity rises, labor is pulled out of both the food and tradable sectors. As the ratio of L_f/L_d must remain constant, the absolute change in L_d depends on how much tradable labor there is to begin with. The condition in the corollary states that so long as L_d is sufficiently small (meaning the ratio L_f/L_d is sufficiently large) then the loss of labor in tradables will not offset the rise of labor in non-tradables, and urbanization will increase. Practically, for countries that have little to no tradable sector to begin with, increasing resources will increase urbanization.[8]

Note that the condition depends upon the size of γ. The larger is γ, the easier it is for the economy to meet this condition. It is easiest to see this by considering the extreme values of γ. If γ goes to one, and resources are like "manna from heaven", then no labor is required in the resource sector. When resource productivity rises, all the labor that shifts out of food and tradables goes directly into non-tradable employment, and hence the urbanization rate must rise. As γ gets closer to α, then resources are labor-intense and when resource productivity goes up most of the labor released from food and tradables goes into resources. The increase in non-tradable workers is too small to offset the loss of tradable workers from urban areas.

The effect of resources on urbanization thus depends on the type of resources considered. For a large γ, such as with oil, a larger stock R will result in greater urbanization than in an economy with a small γ, such as with cash crops.

It is worth considering an economy without any resources as a comparison. If we set $R = 0$, then the resource sector is shut down completely, and $L_r/L = 0$. From (16) the fraction of labor in the non-tradable sector is given by $L_n/L = \beta_n/(1-\alpha(\beta_d+\beta_f))$, which is fixed by the expenditure shares.[9]. For the non-resource economy, the only way that urbanization proceeds is for the ratio of tradable labor to food

[8] While there is technically "de-industrialization" going on here, as in a typical Dutch Disease model, our results regarding urbanization distinguish the two theories. The initial conditions are such that L_d/L begins at a relatively low level. With greater resource income the tradable sector remains very small, but despite that there is a distinct shift of economic activity out of rural areas and into urban ones. The typical Dutch Disease model emphasizes the opposite end of the spectrum, a rapidly declining tradable sector and possibly even a net shift of labor into rural areas.

[9] If we incorporated a subsistence constraint, or an endowment of non-tradable goods, then this would respond to income changes in a manner typical to models of structural change.

labor, L_d/L_f, to increase. This occurs, from (12), only if A_d increases relative to A_f. Without resources, the process of urbanization is thus entirely coincident with the process of structural transformation. In addition, note that in these economies urbanization takes place with "production cities" that have tradable labor as an increasing fraction of total urban employment. As seen in the data, countries that do not have significant natural resource exports trace out just such a relationship.

3.3 Subsistence Constraints

Incorporation a subsistence constraint for food consumption, and thus introducing an income elasticity for food less than one, is straightforward. Let $\bar{c}_f$ be the subsistence requirement for individual food consumption, and utility be

$$U = \beta_f \ln(c_f - \bar{c}_f) + \beta_d \ln c_d + \beta_n \ln c_n. \tag{19}$$

The budget constraint for individuals can be written in the following manner

$$p_f(c_f - \bar{c}_f) + p_d c_d + p_n c_n = m - p_f \bar{c}_f, \tag{20}$$

where the term on the right is now *surplus* income. The preferences are such that individuals will consume a fraction β_j of their surplus income on good j, as before. The difference for food is that individuals consume fraction β_f of their surplus income on *surplus* food, $(c_f - \bar{c}_f)$. So total expenditures on food are $\beta_f(m - p_f\bar{c}_f) + p_f\bar{c}_f$.

Combining these preferences with the production structure outlined above, we have similar conditions regarding total expenditures and total production of the non-traded good,

$$\beta_n(m - p_f\bar{c}_f)L = p_n Y_n. \tag{21}$$

Again, the other three goods are internationally tradable, and balanced trade dictates the following relationship

$$(\beta_f + \beta_d)(m - p_f\bar{c}_f)L + p_f\bar{c}_f L = p_r^* Y_r + p_d^* Y_d + p_f^* Y_f. \tag{22}$$

Solving these together as before yields a relationship between L_n/L and L_r/L,

$$\frac{L_n}{L} = \frac{\beta_n}{1-\alpha(\beta_d+\beta_f)}\left(1 + \frac{\gamma-\alpha}{1-\gamma}\frac{L_r}{L} - \frac{p_f\bar{c}_f}{p_n A_n}\right). \tag{23}$$

As can be seen, the relationship is similar to what we found without the subsistence constraint. However, there is now an additional term - the fraction $p_f\bar{c}_f/p_n A_n$ - that will act to determine the size of the non-tradable sector.

This additional term will exaggerate the effect of resources on the fraction of labor in the non-tradable sector. Mechanically, when resource productivity rises the fraction L_r/L will go up, as already established. The Balassa/Samuelson effect dictates that p_n will rise as well. As p_f is fixed, that means that the additional term in (23) falls in absolute value. Given that it enters the equation negatively, this results in an additional increase in L_n/L. More intuitively, when resource productivity rises individuals in the economy have become richer. The subsistence constraint ensures that the income elasticity for food is less than one, and hence the additional income is spent disproportionately on non-food goods like non-tradables. Note that this effect will arise no matter the source of the income gain. Increases in tradable or food productivity will increase the fraction of labor in non-tradables, as in typical models of structural change.

3.4 Inequality in Spending Patterns

In the model so far we have assumed log-linear preferences that ensure all individuals spend the same fraction of their income on each good. Practically, this means that the distribution of resource rents (or of income in general) did not influence the allocation of labor across sectors.

However, there is certainly reason to believe that resource rents are concentrated on a small number of individuals, and that these individuals may have different expenditure patterns than the typical individual. To allow for this in the model, consider the following modification of the model. Let there be a class of individuals that earn wages, capital returns, and land returns as before. These individuals have preferences over the three goods as before, with weights β_f, β_d, and β_n.

In addition, there is some group for that earns wages, capital returns, and land returns as before. However, this group also earns all of the resource rents in the economy. This group has a set of preferences that is log-linear as before, but with weights θ_f, θ_d, and θ_n. The idea is that these individuals will, due to their resource rents, prefer more urban goods. Additionally, they are likely to disproportionately spend their income on non-tradable goods such as personal or government services. So presumably $\theta_n > \beta_n$.

Let the group of resource owners be a fraction λ of the total population, and hence the non-resource owners are a fraction $1-\lambda$. With these two groups, the condition relating expenditures and production in the non-tradable sector is

$$\hat{\beta}_n \left(wL + \omega_k K + \omega_x X\right) + \theta_n \omega_r R = p_n Y_n, \tag{24}$$

where $\hat{\beta}_n = \beta_n(1-\lambda) + \theta_n \lambda$ is simply the weighted average of the two expenditure shares. In a similar manner, the condition for the food and tradable sectors, given balanced trade, is

$$(\hat{\beta}_f + \hat{\beta}_d)\left(wL + \omega_k K + \omega_x X\right) + (\theta_f + \theta_d)\omega_r R = p_r^* Y_r + p_d^* Y_d + p_f^* Y_f. \tag{25}$$

Here, $\hat{\beta}_f$ and $\hat{\beta}_d$ are defined similarly to $\hat{\beta}_n$, as the weighted average of the expenditure shares of the two different groups.

These conditions can be solved together similar to before, yielding the following relationship between non-tradable labor and resource labor,

$$\frac{L_n}{L} = \frac{\hat{\beta}_n}{1-\alpha(\hat{\beta}_d + \hat{\beta}_f)}\left(1 + \frac{\gamma-\alpha}{1-\gamma}\frac{L_r}{L}\right) + \frac{1-\alpha}{1-\alpha(\hat{\beta}_d + \hat{\beta}_f)}\frac{\gamma}{1-\gamma}(\theta_n - \hat{\beta}_n)\frac{L_r}{L}. \tag{26}$$

Again, the relationship present here is similar to the baseline model, but the expenditure shares are the $\hat{\beta}_j$ terms, reflecting the weighted average of expenditure shares of the two types of people. This simply reflects the heterogeneity in preferences. The second term on the right hand side of (26) reflects the fact that one group of people has a disproportionate share of the resource income. The key part of this new term is $(\theta_n - \hat{\beta}_n)$, which is the difference in the expenditure share of resource-owners and the weighted average across all individuals. Assuming that resource-owners prefer non-tradable goods more than the average, then anything that raises L_r/L will have an even stronger effect on L_n/L than in our baseline model. Simply, the only reason L_r/L will rise is if the productivity of the resource sector increases, and this implies that the rents accruing to resource-owners are increasing as well. As they demand non-tradables more than the average person, this skews demand towards non-tradable goods and L_n/L rises.[10]

The implication of (26) is that the increase in urbanization following a positive shock to resource productivity depends on the degree of inequality and the difference in preferences across groups. The difference $\theta_n - \hat{\beta}_n$ is maximized when λ goes to zero, or there is a vanishingly small group of people who earn the resource rents. Hence inequality in the earning of resource rents will likely exaggerate the urbanization effects of resources.

An additional factor to note is that resources with a high γ, such as oil, are likely to also have a high degree of inequality in the distribution of rents. High γ resources are likely "point" resources where an elite can control the rents better than they can for "disperse" resources like cash crops. High inequality, meaning a large gap $\theta_n - \hat{\beta}_n$, combined with a high value of γ, would lead to a very large effect of resource productivity on L_n/L, given (26).

[10] Note that this set-up nests our baseline model. If there is no inequality, or $\lambda = 1$, then θ_n will be identical to $\hat{\beta}_n$, and the second term in (26) goes to zero. Alternatively, if both groups have identical preferences, then regardless of the distribution of resource rents θ_n will be equal to $\hat{\beta}_n$.

3.5 Implications for Growth

It is commonly assumed that urban agglomerations are centers of productivity growth, both in developing and developed countries (Rosenthal & Strange, 2004; Henderson, 2005; Overman & Venables, 2005; Henderson, 2010; Felkner & Townsend, 2011). Greater urbanization should therefore lead to faster growth (Duranton, 2008; Venables, 2010; World Bank, 2009; McKinsey, 2011). This expected relationship has been embedded into growth models to describe the divergence in output per capita across countries (Lucas, 2009).

However, this literature presumes that urban areas are essentially identical across countries in their economic structure. In our terms, the underlying assumption is that cities are "production cities", with a mix of tradable good production (often manufacturing) and non-tradable production (often services). However, as we have documented, for a large group of countries urban areas are skewed towards non-tradable production in "consumption cities". This has the possibility of altering the long-run productivity gains available from increased urbanization.

Recent research suggests that tradable goods have a greater tendency towards productivity growth than non-tradables. Galdon-Sanchez & Schmitz (2002) and Schmitz (2005) document that the threat or actual presence of competition is key to productivity improvements. Tradable goods face global competitors that non-tradable goods do not, and so the incentives for productivity improvement are greater. Reallocations of inputs from low- to high-productivity firms, as well as exit of firms with the lowest productivity, appears to be a significant source of the productivity advantage for the tradable sector (Clerides, Lach & Tybout, 1998; Aw, Chung & Roberts, 2000; Pavcnik, 2002).

More broadly, Duarte & Restuccia (2010) document that services (generally non-tradable) labor productivity growth was much slower than manufacturing labor productivity growth across a sample of countries in the post-war era. In their panel manufacturing labor productivity growth averaged 4.0% per year while services only 1.3%. Timmer & Vries (2007) find that non-market services (similar to our notion of non-tradables) contribute very little to growth in developing countries 1950–2005, while manufacturing is the dominant source.

Individual manufacturing sectors also exhibit a tendency towards unconditional convergence in labor productivity across all countries; sectors with low productivity grow faster. Rodrik (2011) documents the robustness of this relationship across a range of developing and developed countries. There appear to be strong spillover effects at work within manufacturing that lead to rapid productivity growth for those country/sectors that begin with low productivity. Similar effects are not apparent for services.

We do not take a stand here on the exact micro-foundations of endogenous productivity growth that lead to this advantage for tradable manufacturing goods. Rather, we simply note that whatever the underlying model, the available evidence indicates that the tradable sector will be capable of sustaining higher productivity growth than the non-tradable sector, all else being equal.

Within our model, this implies that the composition of urban areas is relevant to aggregate productivity growth. In those places with a comparative advantage in natural resources, urbanization occurs solely through the expansion of non-tradables, and hence their productivity growth will lag behind countries whose urbanization follows a more standard path.

4. CONCLUSION

This paper documents several new facts regarding the process of structural transformation and urbanization in developing economies using both cross-country data as well as micro-level surveys. Most developing countries, particularly those in Asia, have experienced urbanization *with* structural transformation and growth in incomes. Urbanization takes place in what we term "production cities", where labor is mixed between tradable and non-tradable work. For these countries, urbanization is closely related to the share of manufacturing and services in GDP, and they conform closely to standard models of structural transformation.

In contrast, we show that natural resource exporters - with Sub-Saharan Africa as a particularly sharp example - have experienced urbanization *without* structural transformation. Natural resources provided surplus income to these countries that shifted population to urban areas. However, with a comparative advantage in resources, these countries have not needed to develop tradable goods sectors, and so their cities are what we term "consumption cities", composed only of those working in the non-tradable sector.

We adapt a simple model of structural change to explain the different path taken towards urbanization in the natural resource exporting countries. Introducing resources explicitly allows us to show that productivity increases in that sector (a proxy for new finds of oil, for example) will increase urbanization through non-homotheticities in demand. Allowing for international trade ensures that the urbanization is in "consumption cities" as these countries find it more efficient to import tradable goods than to produce them domestically. In the long run, non-tradables are less amenable to productivity growth and so the natural resource exporters are not able to match the aggregate labor productivity growth of other developing countries.

This paper leaves several open questions. The first is why resource exporting countries have been unable to acquire or develop a comparative advantage in sectors other than those based on resource extraction. We acknowledge the possibility that institutions and colonial history, as well as resource endowments, may have driven this initial specialization. But we do not attempt to model this directly. A second question that we leave unanswered is whether consumption cities will evolve into production cities over time, as they did in the United States or Australia, and appear to be doing in South Africa and Botswana. Our model does not allow for this, and we view it as an important question that warrants further study.

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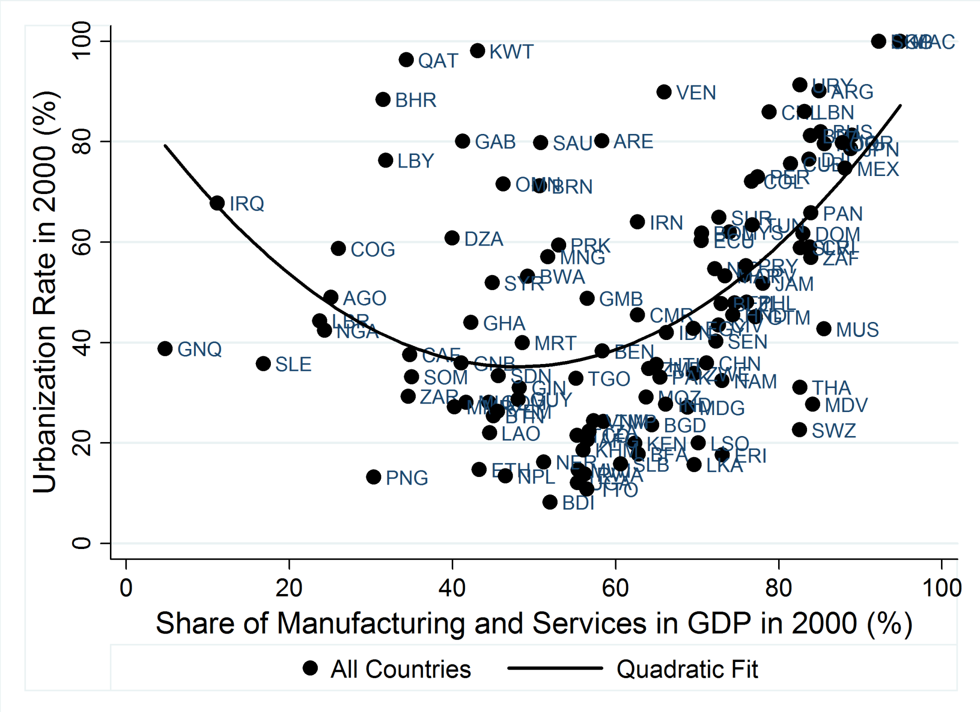
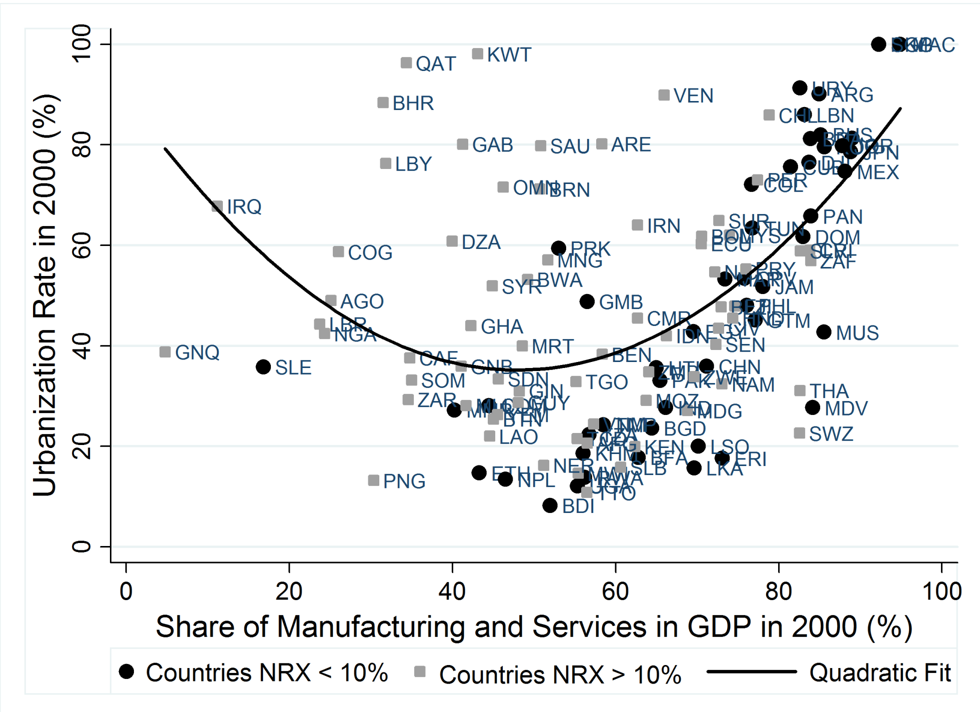
FIGURES

Figure 1: Urbanization and the Contribution of Manufacturing and Services to GDP for Developing Countries, 2000



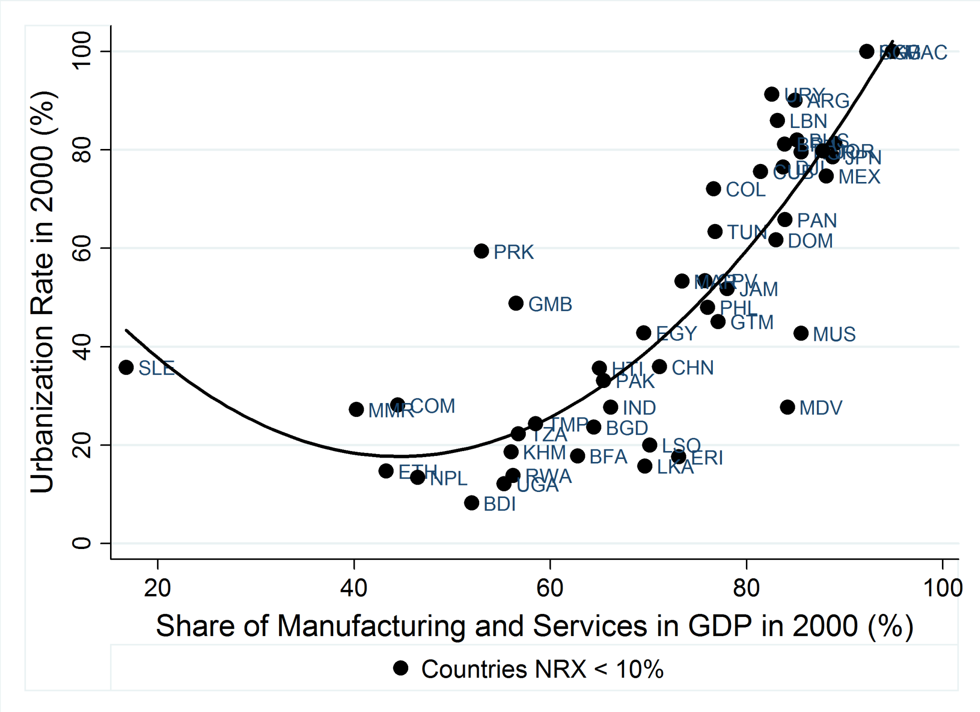
Notes: This figure shows the relationship between the urbanization rate (%) and the contribution of manufacturing and services to GDP (%) for 119 developing countries across four areas in 2000: Asia, Latin American and the Caribbean, Africa, and Middle-East and North Africa. See Data Appendix for data sources.

Figure 2: Urbanization and the Contribution of Manufacturing and Services to GDP for Developing Countries, by Type of Countries, 2000



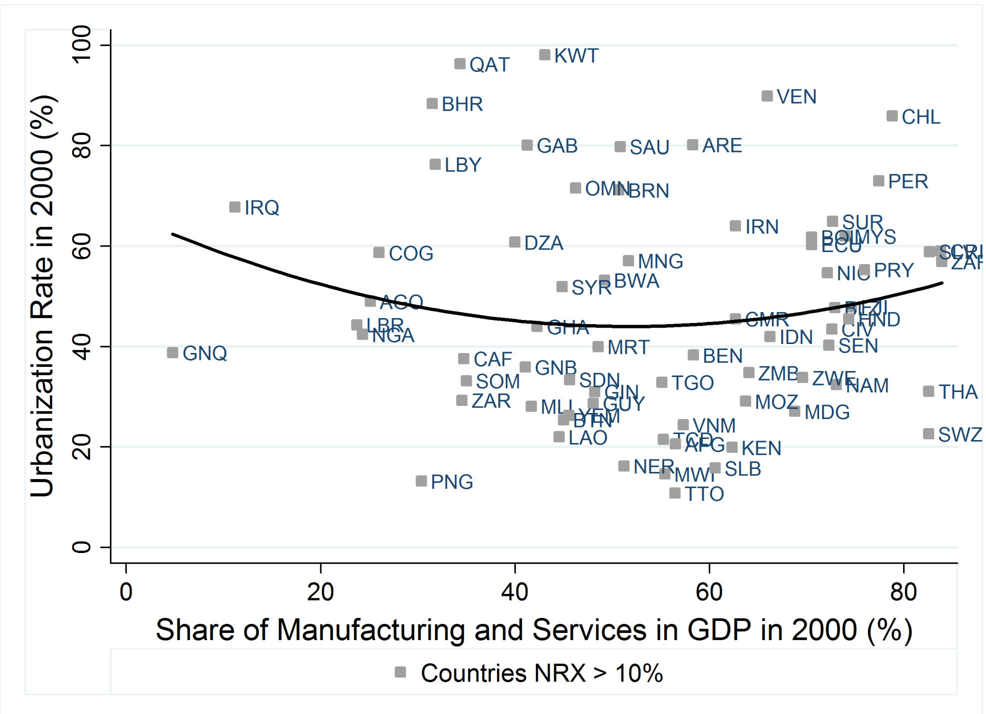
Notes: This figure shows the relationship between the urbanization rate (%) and the contribution of manufacturing and services to GDP (%) for 119 developing countries across four areas in 2000: Asia, Latin American and the Caribbean, Africa, and Middle-East and North Africa. Countries for which natural resource exports NRX (fuel, mining, cash crop, food crop and forestry exports) account for less than 10% of GDP are in black. Countries for which natural resource exports NRX account for more than 10% of GDP are in grey. See Data Appendix for data sources.

Figure 3: Urbanization and the Contribution of Manufacturing and Services to GDP for Resource Poor Countries, 2000



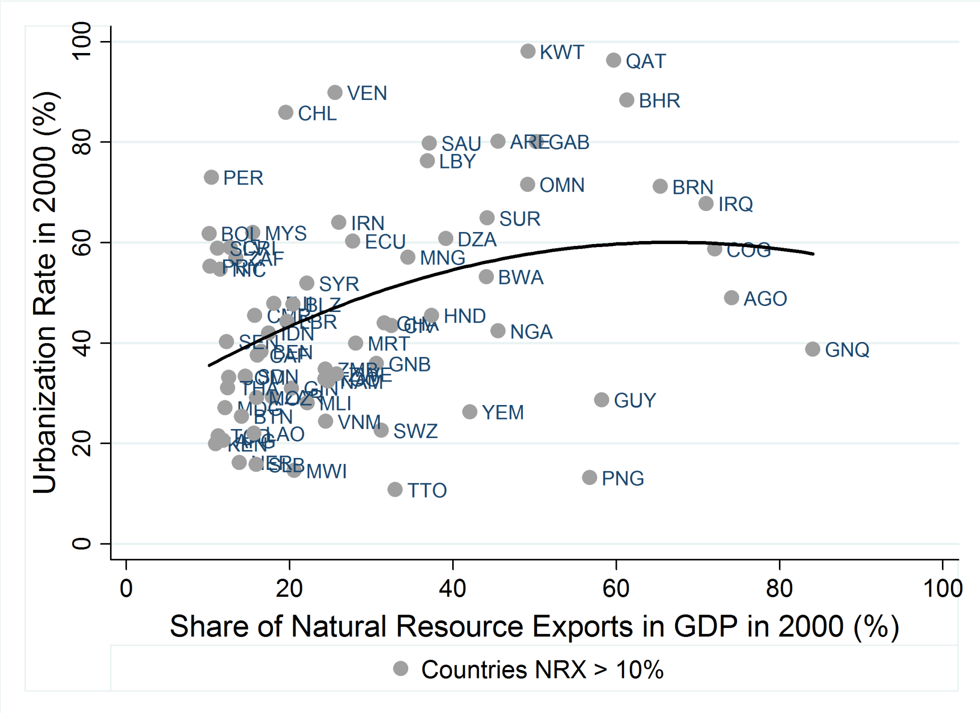
Notes: This figure shows the relationship between the urbanization rate (%) and the contribution of manufacturing and services to GDP (%) for 49 resource poor countries in 2000 (natural resource exports NRX < 10% of GDP). Sierra Leone (SLE) has been the resource rich country for most of the 20th century. The civil war in 1991-2002 led to a collapse of its natural resource exports and their contribution to GDP decreased below 10% for 2000 only. See Data Appendix for data sources.

Figure 4: Urbanization and the Contribution of Manufacturing and Services to GDP for Resource Rich Countries, 2000



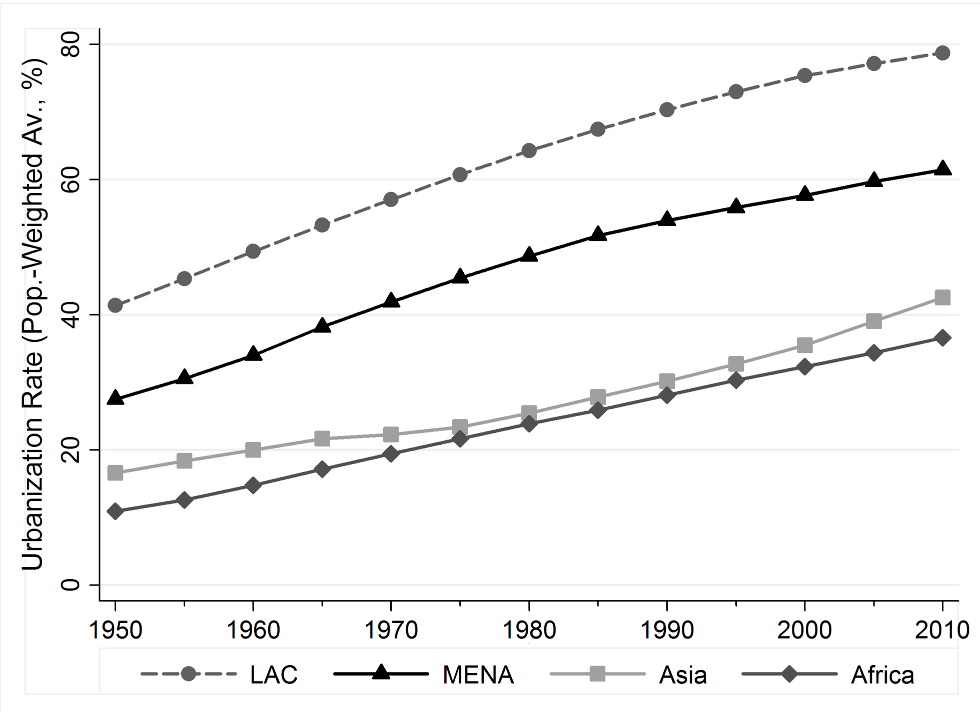
Notes: This figure shows the relationship between the urbanization rate (%) and the contribution of manufacturing and services to GDP (%) for 70 resource rich countries in 2000 (natural resource exports NRX ≥ 10% of GDP). See Data Appendix for data sources.

Figure 5: Urbanization and the Contribution of Natural Resource Exports to GDP for Resource Rich Countries, 2000



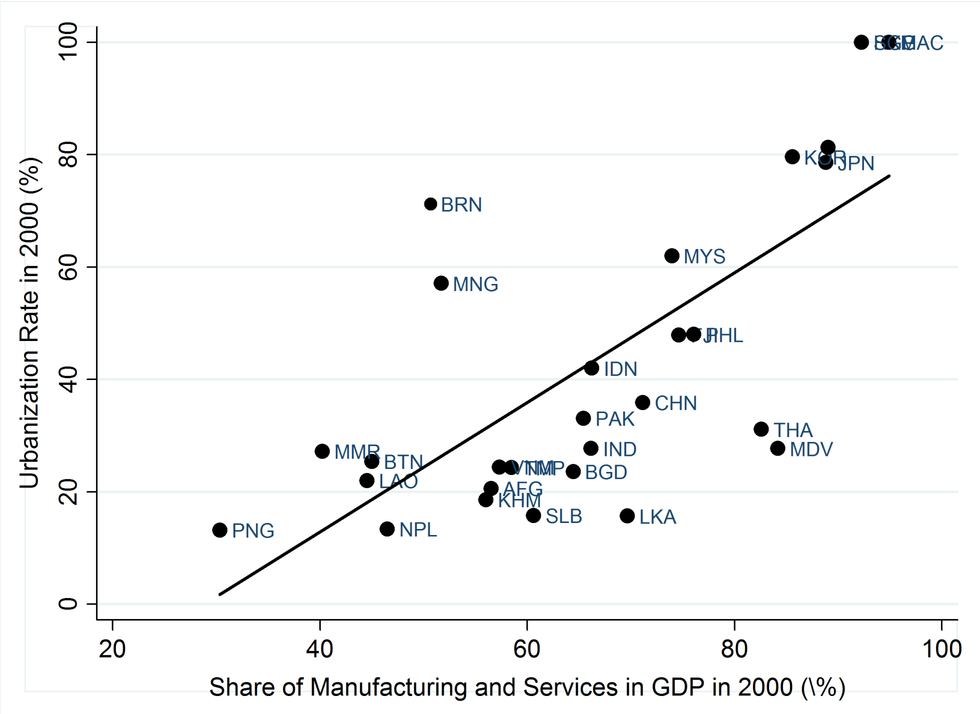
Notes: This figure shows the relationship between the urbanization rate (%) and the contribution of natural resource exports to GDP (%) for 70 resource rich countries in 2000 (natural resource exports NRX ≥ 10% of GDP). See Data Appendix for data sources.

Figure 6: Urbanization Rate for Four Groups of Countries, 1950-2010



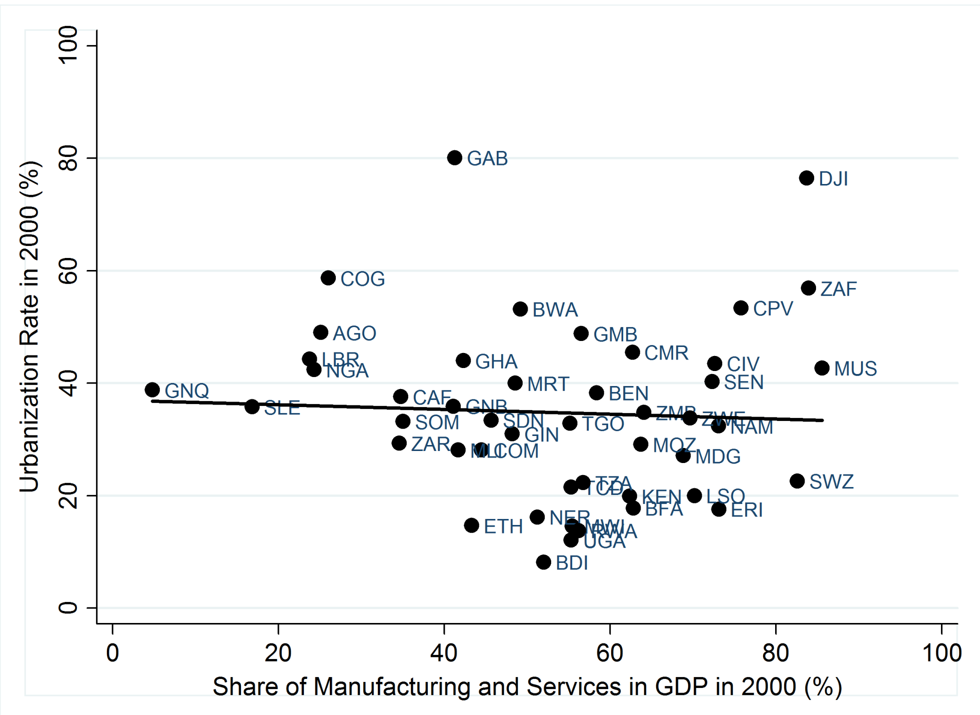
Notes: This figure plots the average urbanization rate (%) for four groups of countries in 1950-2010: Asia (30 countries), Africa (46 countries), Latin America and the Caribbean (26 countries) and Middle-East and North Africa (17 countries). Averages are estimated using the population weights for the same year. See Data Appendix for data sources.

Figure 7: Urbanization and the Contribution of Manufacturing and Service Exports to GDP in Asia, 2000



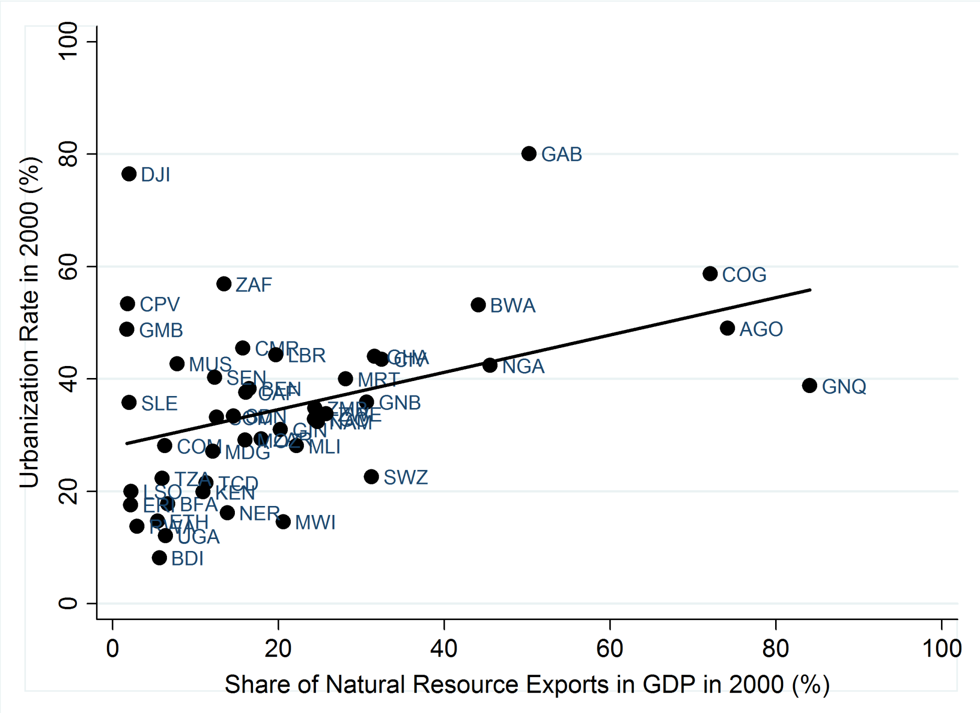
Notes: This figure shows the relationship between the urbanization rate (%) and the contribution of manufacturing and services to GDP (%) for 29 Asian countries. See Data Appendix for data sources.

Figure 8: Urbanization and the Contribution of Manufacturing and Service Exports to GDP in Africa, 2000



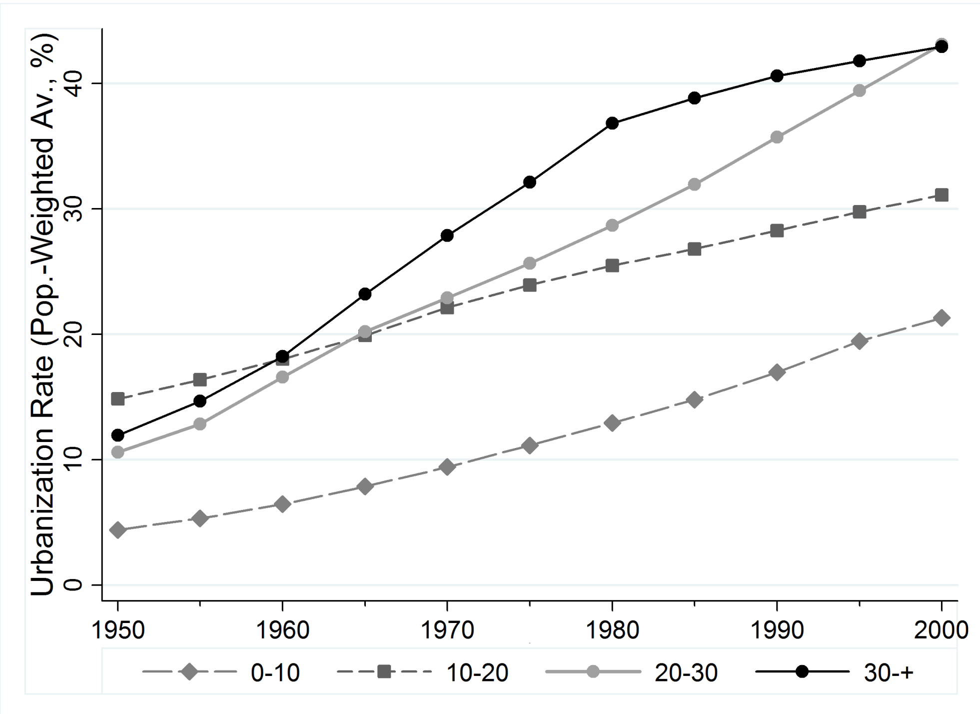
Notes: This figure shows the relationship between the urbanization rate (%) and the contribution of manufacturing and services to GDP (%) for 46 African countries. See Data Appendix for data sources.

Figure 9: Urbanization and the Contribution of Natural Resource Exports to GDP in Africa, 2000



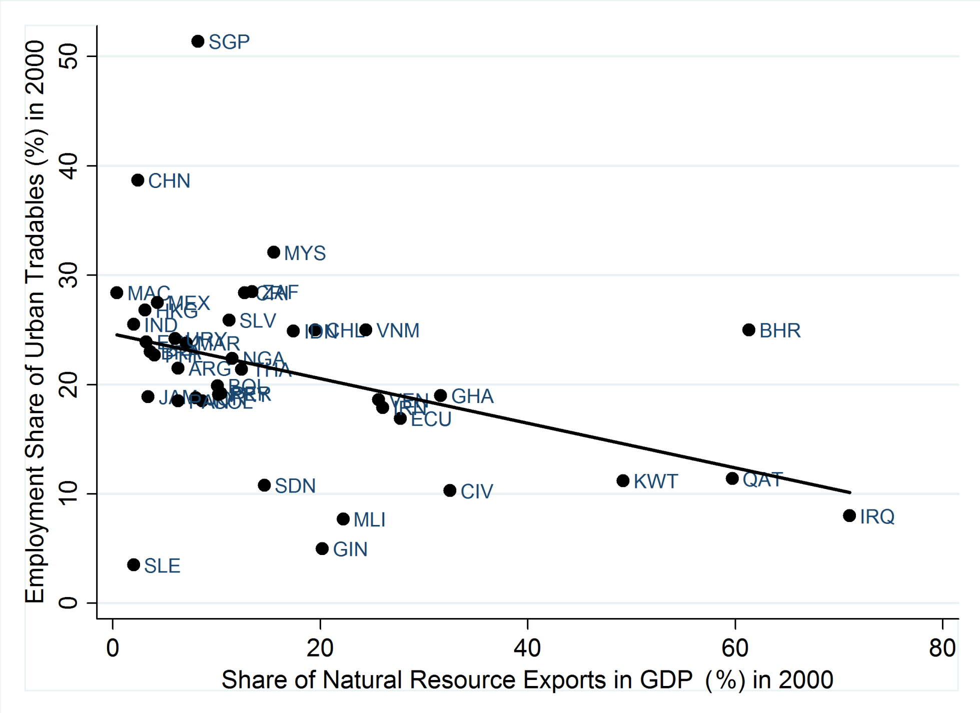
Notes: This figure shows the relationship between the urbanization rate (%) and the contribution of natural resource exports (fuel, mining, cash crop, food crop and forestry exports) to GDP (%) for 46 African countries. See Data Appendix for data sources.

Figure 10: Urbanization by Importance of Natural Resources in Africa, 1960-2000



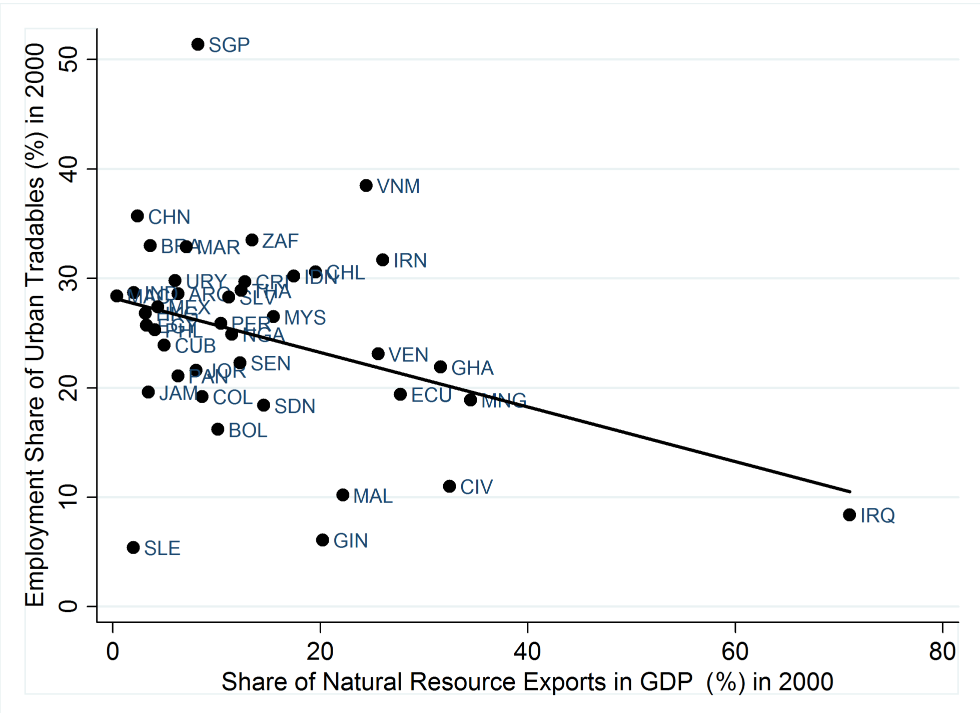
Notes: This figure shows the population-weighted rate of urbanization (%) over time for four groups of African countries based on the share of natural resources in total exports on average in 1960-2010: 0-10%, 10-20%, 20-30%, and more than 30%. See Data Appendix for data sources.

Figure 11: Natural Resource Exports and the Sectoral Composition of the Urban Sector, around 2000



Notes: This figure shows the relationship between the employment share of urban tradables in total urban employment (%) and the contribution of natural resource exports (fuel, mining, cash crop, food crop and forestry exports) to GDP (%) for 41 developing countries around 2000. We use only one observation for each country, the closest to the year 2000. We only select countries for which the urbanization rate is higher than 20% in 2000, so as to compare countries that have begun their transition away from subsistence agriculture. We have no data for 68 countries. Urban tradables consist of manufacturing employment (Mfg.) and finance, insurance, real estate and business services (Fire). See Data Appendix for data sources.

Figure 12: Natural Resource Exports and the Sectoral Composition of the Largest City, around 2000



Notes: This figure shows the relationship between the employment share of urban tradables in total employment for the largest city (%) and the contribution of natural resource exports (fuel, mining, cash crop, food crop and forestry exports) to GDP (%) for 41 developing countries around 2000. We use only one observation for each country, the closest to the year 2000. We only select countries for which the urbanization rate is higher than 20% in 2000, so as to compare countries that have begun their transition away from subsistence agriculture. We have no data for 68 countries. Urban tradables consist of manufacturing employment (Mfg.) and finance, insurance, real estate and business services (Fire). See Data Appendix for data sources.

TABLE 1: CROSS-SECTIONAL REGRESSION IN 2000, MAIN RESULTS

Dependent Variable:	Urbanization Rate (%)					Mfg. Empl. Share / Urbanization Rate		
Sample:				NRX/GDP (%) < 10	NRX/GDP (%) ≥ 10			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Manufacturing & Services (% of GDP)	1.22***	0.83***	0.53***	0.64***	0.32*	-0.09	-0.09	0.02
	[0.214]	[0.238]	[0.145]	[0.194]	[0.189]	[0.136]	[0.114]	[0.112]
Natural Resource Exports (% of GDP)	1.17***	0.76***	0.64***	-0.16	0.55***	-0.50***	-0.22*	-0.19*
	[0.201]	[0.180]	[0.163]	[1.000]	[0.143]	[0.157]	[0.111]	[0.099]
Area Fixed Effects (4)	N	Y	Y	Y	Y	N	Y	Y
Controls	N	N	Y	Y	Y	N	N	Y
Observations	119	119	119	49	70	119	119	119
R-squared	0.49	0.65	0.72	0.92	0.67	0.21	0.47	0.55

Notes: Robust standard errors are reported in parentheses; * p<0.10, ** p<0.05, *** p<0.01. The sample consists of 119 developing countries across four areas: 30 in Asia, 26 in Latin America and the Caribbean, 46 in Sub-Saharan Africa and 17 in the Middle-East and North Africa. The dependent variable in columns (1)-(5) is the urbanization rate (%) in 2000. The dependent variable in columns (6)-(8) is the ratio of the employment share of manufacturing in total employment (%) in 2000 to the urbanization rate (%) in 2000 times 100. All regressions are population-weighted. Columns (2)-(5) and (7)-(8) include area fixed effects. Columns (3)-(5) and (8) include the following controls at the country level: area (sq km), population (1000s), rural density (1000s of rural population per sq km of arable area), population growth in 1950-2000 (%), four dummies for each type of urban definition (administrative, threshold, threshold and administrative, and threshold plus condition) and a dummy if the threshold is lower than 2,500 inhabitants, a dummy equal to one if the country is a small island (< 50,000 sq km), a dummy equal to one if the country's average combined polity score since independence is lower than -5 (the country is then considered as autocratic), and a dummy equal to one if the country has experienced an interstate or civil conflict since independence. See Data Appendix for data sources.

TABLE 2: CROSS-SECTIONAL REGRESSION IN 2000, ROBUSTNESS

Dependent Variable:	Urbanization Rate (%)								
		Controls Squared	Cluster Region	No Pop. Weight.	Region FE (13)	Asia Only	Africa Only	Largest City	Other Cities
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Manufacturing & Services (% of GDP)	0.53***	0.52***	0.53***	0.53***	0.41***	1.06**	0.17	0.16*	0.38***
	[0.145]	[0.145]	[0.145]	[0.157]	[0.119]	[0.443]	[0.191]	[0.081]	[0.130]
Natural Resource Exports (% of GDP)	0.64***	0.63***	0.64***	0.36***	0.33***	-0.56	0.62***	0.18**	0.46***
	[0.163]	[0.153]	[0.149]	[0.131]	[0.112]	[0.707]	[0.143]	[0.075]	[0.125]
Area Fixed Effects (4)	Y	Y	Y	Y	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	119	119	119	119	119	28	46	119	119
R-squared	0.72	0.74	0.72	0.45	0.81	0.68	0.64	0.52	0.67

Notes: Robust standard errors are reported in parentheses; * p<0.10, ** p<0.05, *** p<0.01. The sample consists of 119 developing countries across four areas: 30 in Asia, 26 in Latin America and the Caribbean, 46 in Sub-Saharan Africa and 17 in the Middle-East and North Africa. All regressions include area fixed controls and the same controls as listed in the footnote of Table 1. All regressions are population-weighted, except in Column (4). Column (1) shows the main results from Table 1 (Column (3)). Column (2) also includes the square of country area, population, rural density and population growth. Columns (3) cluster observations at the region level (N = 13). Column (4) does not use population weighting. Column (5) includes region fixed effects (N = 13). Column (6) restricts the sample to Asian countries only. Column (7) restricts the sample to African countries. In Column (8), the dependent variable is the urbanization rate using the largest city in the country only, i.e. the share of the population of the largest city in total population in 2000 (%). In Column (9), the dependent variable is the urbanization rate using the other cities in the country only, i.e. the share of the urban population that is not in the largest city in total population in 2000 (%). See Data Appendix for data sources.

APPENDIX

A-1. PROOF OF COROLLARY 1

Beginning with the adding up constraint, $L_r/L+L_d/L+L_f/L+L_n/L=1$, one can use the labor conditions in (12) and (16) to write this entirely in terms of L_d/L,

$$\frac{(L_d/L)^{\alpha/\gamma}}{\Omega_{dr}^{1/\gamma}}+\frac{L_d}{L}+\beta+\beta\frac{\gamma-\alpha}{1-\gamma}\frac{(L_d/L)^{\alpha/\gamma}}{\Omega_{dr}^{1/\gamma}}+\Omega_{fd}\frac{L_d}{L}=1 \tag{27}$$

where $\beta=\beta_n/(1-\alpha(\beta_f+\beta_d))$, $\Omega_{dr}=p_d^*A_d(K/L)^\alpha/p_r^*A_r(R/L)^\gamma$, and $\Omega_{fd}=p_f^*A_f(X/L)^\alpha/p_d^*A_d(K/L)^\alpha$. Using the implicit function theorem, the following is the derivative of L_d/L with respect to Ω_{dr},

$$\frac{\partial L_d/L}{\partial\Omega_{dr}}=\frac{\frac{L_r/L}{\gamma}\frac{L_d/L}{\Omega_{dr}}\left(1+\beta\frac{\gamma-\alpha}{1-\gamma}\right)}{\frac{\alpha}{\gamma}\left(L_r/L+\frac{\gamma}{\alpha}L_d/L+\frac{\gamma}{\alpha}L_f/L+L_n/L-\beta\right)}. \tag{28}$$

Similarly, one can write the adding up constraint in terms of L_r/L, and get the following derivative

$$\frac{\partial L_r/L}{\partial\Omega_{dr}}=\frac{-\frac{L_r/L}{\alpha}\frac{L_d/L}{\Omega_{dr}}\left(1+\Omega_{fd}\right)}{\left(L_r/L+\frac{\gamma}{\alpha}L_d/L+\frac{\gamma}{\alpha}L_f/L+L_n/L-\beta\right)}. \tag{29}$$

The derivative of L_n/L with respect to Ω_{dr} is

$$\frac{\partial L_n/L}{\partial\Omega_{dr}}=\beta\frac{\gamma-\alpha}{1-\gamma}\frac{\partial L_r/L}{\partial\Omega_{dr}}. \tag{30}$$

Note that the derivative of L_d/L is positive, while that of L_r/L is negative. For an increase in R (or A_r and p_r^*), Ω_{dr} will fall, and so L_d/L will fall and L_r/L will rise. Thus L_n/L will rise as well. Comparing the partial derivatives in (28) and (30), the reaction of L_n/L to any change in Ω_{dr} will be larger in absolute value than the reaction of L_d/L so long as

$$\Omega_{fd}>\frac{1-\gamma}{\beta(\gamma-\alpha)}. \tag{31}$$

Given that Ω_{fd} can also be expressed as L_f/L_d, this yields the condition given in the corollary. So long as this holds, it will be that L_n/L changes by more than L_d/L in response to Ω_{dr}.

A-2. DATA CONSTRUCTION

This appendix describes in details the data we use in our analysis.

Spatial Units:
We assemble data for 119 developing countries from 1950 to 2010. The list of countries is reported below in table A.1. These developing countries belong to four areas: Latin America (LAC), Middle-East and North Africa (MENA), Asia and Africa. We also classify them into 13 regions: South America, Central America, Caribbean, Southern Africa, Western Africa, Central Africa, Eastern Africa, Northern Africa, Middle-East, South Asia, South-East Asia, East Asia, and Oceania.

Urbanization and Population Data:
We use WUP (2011) to study urbanization rates for 119 developing countries in 1950-2010. The urbanization rate is defined as the share of the urban population in total population (%). From the same sources, we obtain the urbanization rate of the largest city, i.e. the share of the largest city in the total population

(%) of the country. The urbanization rate for other cities is deduced by subtracting the urbanization rate of the largest city of the aggregate urbanization rate. The 119 countries use four different types of urban definition for their most recent census: (i) “administrative”: cities are administrative centers of territorial units (e.g., provinces, districts, “communes”, etc.), (ii) “threshold”: cities are localities whose population is superior to a population threshold of X inhabitants (e.g., 10,000, 5,000 or 2,500), (iii) “administrative or threshold”: cities are either administrative centers or localities whose population is superior to a population threshold, and (iv) “threshold with condition”: cities are localities whose population is superior to a population threshold and whose a large share of the labor force is engaged in non-agricultural activities. For each country using a population threshold, we know the threshold and create a dummy if it is less than 2,500 inhabitants. We also use WUP (2011) to obtain a list of Asian and African megacities (> 750,000 inh.). WUP (2011) also reports total population for each country every year 1950-2010.

Manufacturing and Service GDP and Employment Data:
We use WB (2012) to estimate the contribution of manufacturing and services to GDP for 119 developing countries in 2000. Using the same source and ILO (2012), we reconstruct the employment share of the manufacturing sector for the 119 countries around 2000. When the data was not reported by WB (2012) and ILO (2012), we used census and/or labor force survey reports available on the website of the statistical institute of the country to fill the missing gaps. Data on the employment structure of the urban sector and largest city in selected developing countries was recreated using the IPUMS 10%, 5% or 1% census sample for the most recent census years (IPUMS 2012). We also used various *Labor Force Survey* (LFS) reports for a few countries. IPUMS uses a standard general recode of 12 industries, which allows us to focus on manufacturing (Mfg) and finance, insurance, real estate and business services (Fire). Table A.2 lists all the countries and years for which we have the sectoral composition of the urban sector, and the contribution of Mfg and Fire. Table A.3 lists all the countries and years for which we have the sectoral composition of the largest city.

Natural Resource Exports:
Natural resource exports consist of fuel, mineral, cash crop, food crop and forestry exports. We use WB (2012) and USGS (2012) to estimate the share of fuel and mineral exports in total exports (%) for the 119 countries every five years in 1960-2010. We use FAO (2012) to obtain the export shares of cash and food crops and forestry for the 119 countries every five years in 1960-2010. Lastly, we use Maddison (2008) and WDI (2012) to obtain the share of merchandise exports in GDP for the 119 countries every five years in 1960-2010. Knowing the share of merchandise exports in GDP (%), we can easily reconstruct the contribution of natural resource exports to GDP (%).

Controls:
We use various sources to reconstruct a range of controls at the country-level. Country area (sq km) is obtained from WB (2012). Rural density is defined as the ratio of rural population (1000s) to arable area (sq km) in 2000. The arable area of each country is reported by FAO (2012). Population growth is calculated as the percentage change in country population between 1950 and 2010. We create a dummy if the country is a small island. From wikipedia, we obtain a list of all the island countries in the world. An island country is “small" if its area is smaller than 50,000 sq km. We use the Polity IV data series to calculate the average combined polity score for each country from independence to 2000 (Polity IV 2012a). We then create a dummy if the average combined polity score is lower than -5, the threshold for not being considered as autocratic. Lastly, the Polity IV data series also include a measure of political violence for each country from 1964 to date. We create a dummy if the country has ever experienced an interstate or civil conflict from independence to 2000 (Polity IV 2012b).

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TABLE A.1: LIST OF COUNTRIES USED IN THE ANALYSIS

Area	Region	Country Name	Country Code
Africa	Central Africa	Angola	AGO
Africa	Central Africa	CAR	CAF
Africa	Central Africa	Cameroon	CMR
Africa	Central Africa	Chad	TCD
Africa	Central Africa	Congo	COG
Africa	Central Africa	DRC	ZAR
Africa	Central Africa	Eq. Guinea	GNQ
Africa	Central Africa	Gabon	GAB
Africa	Eastern Africa	Burundi	BDI
Africa	Eastern Africa	Comoros	COM
Africa	Eastern Africa	Djibouti	DJI
Africa	Eastern Africa	Eritrea	ERI
Africa	Eastern Africa	Ethiopia	ETH
Africa	Eastern Africa	Kenya	KEN
Africa	Eastern Africa	Madagascar	MDG
Africa	Eastern Africa	Malawi	MWI
Africa	Eastern Africa	Mauritius	MUS
Africa	Eastern Africa	Mozambique	MOZ
Africa	Eastern Africa	Rwanda	RWA
Africa	Eastern Africa	Somalia	SOM
Africa	Eastern Africa	Sudan	SDN
Africa	Eastern Africa	Tanzania	TZA
Africa	Eastern Africa	Uganda	UGA
Africa	Eastern Africa	Zambia	ZMB
Africa	Eastern Africa	Zimbabwe	ZWE
Africa	Southern Africa	Botswana	BWA
Africa	Southern Africa	Lesotho	LSO
Africa	Southern Africa	Namibia	NAM
Africa	Southern Africa	South Africa	ZAF
Africa	Southern Africa	Swaziland	SWZ
Africa	Western Africa	Benin	BEN
Africa	Western Africa	Burkina-Faso	BFA
Africa	Western Africa	Cape Verde	CPV
Africa	Western Africa	Gambia	GMB
Africa	Western Africa	Ghana	GHA
Africa	Western Africa	Guinea	GIN
Africa	Western Africa	Guinea-Bissau	GNB
Africa	Western Africa	Ivory Coast	CIV
Africa	Western Africa	Liberia	LBR
Africa	Western Africa	Mali	MLI
Africa	Western Africa	Mauritania	MRT
Africa	Western Africa	Niger	NER
Africa	Western Africa	Nigeria	NGA
Africa	Western Africa	Senegal	SEN
Africa	Western Africa	Sierra Leone	SLE
Africa	Western Africa	Togo	TGO
Asia	East Asia	China	CHN
Asia	East Asia	Hong Kong	HKG
Asia	East Asia	Japan	JPN
Asia	East Asia	Macao	MAC
Asia	East Asia	Mongolia	MNG
Asia	East Asia	North Korea	PRK
Asia	East Asia	South Korea	KOR
Asia	East Asia	Taiwan	TWN
Asia	Oceania	Fiji	FJI
Asia	Oceania	Papua NG	PNG
Asia	Oceania	Solomon Islands	SLB
Asia	South Asia	Afghanistan	AFG
Asia	South Asia	Bangladesh	BGD

Area	Region	Country Name	Country Code
Asia	South Asia	Bhutan	BTN
Asia	South Asia	India	IND
Asia	South Asia	Maldives	MDV
Asia	South Asia	Nepal	NPL
Asia	South Asia	Pakistan	PAK
Asia	South Asia	Sri Lanka	LKA
Asia	South-East Asia	Brunei	BRN
Asia	South-East Asia	Cambodia	KHM
Asia	South-East Asia	Indonesia	IDN
Asia	South-East Asia	Laos	LAO
Asia	South-East Asia	Malaysia	MYS
Asia	South-East Asia	Myanmar	MMR
Asia	South-East Asia	Philippines	PHL
Asia	South-East Asia	Singapore	SGP
Asia	South-East Asia	Thailand	THA
Asia	South-East Asia	Timor-Leste	TMP
Asia	South-East Asia	Vietnam	VNM
LAC	Caribbean	Bahamas	BHS
LAC	Caribbean	Cuba	CUB
LAC	Caribbean	Dominican Rep.	DOM
LAC	Caribbean	Haiti	HTI
LAC	Caribbean	Jamaica	JAM
LAC	Caribbean	Trinidad	TTO
LAC	Central America	Belize	BLZ
LAC	Central America	Costa Rica	CRI
LAC	Central America	El Salvador	SLV
LAC	Central America	Guatemala	GTM
LAC	Central America	Honduras	HND
LAC	Central America	Mexico	MEX
LAC	Central America	Nicaragua	NIC
LAC	Central America	Panama	PAN
LAC	South America	Argentina	ARG
LAC	South America	Bolivia	BOL
LAC	South America	Brazil	BRA
LAC	South America	Chile	CHL
LAC	South America	Colombia	COL
LAC	South America	Ecuador	ECU
LAC	South America	Guyana	GUY
LAC	South America	Paraguay	PRY
LAC	South America	Peru	PER
LAC	South America	Suriname	SUR
LAC	South America	Uruguay	URY
LAC	South America	Venezuela	VEN
MENA	Middle East	Bahrain	BHR
MENA	Middle East	Iran	IRN
MENA	Middle East	Iraq	IRQ
MENA	Middle East	Jordan	JOR
MENA	Middle East	Kuwait	KWT
MENA	Middle East	Lebanon	LBN
MENA	Middle East	Oman	OMN
MENA	Middle East	Qatar	QAT
MENA	Middle East	Saudi Arabia	SAU
MENA	Middle East	Syria	SYR
MENA	Middle East	UAE	ARE
MENA	Middle East	Yemen	YEM
MENA	North Africa	Algeria	DZA
MENA	North Africa	Egypt	EGY
MENA	North Africa	Libya	LBY
MENA	North Africa	Morocco	MAR
MENA	North Africa	Tunisia	TUN

Notes: This table shows the countries we use in our analysis. LAC = Latin America and the Caribbean. MENA = Middle-East and North Africa. See Data Appendix for data sources.

TABLE A.2: URBAN SECTORAL COMPOSITION FOR SELECTED COUNTRIES

Area	Country-Year	Urbanization Rate (%)	NRX/GDP (%)	Mfg & Fire Empl. Share (%)
Africa	South Africa 2006	56.9	13.4	25.7
Africa	South Africa 2001	56.9	13.4	28.5
Africa	South Africa 1996	56.9	13.4	28
Africa	Ghana 2000	44	31.6	19
Africa	Ethiopia 2004	14.7	5.4	18
Africa	Guinea 1983	31	20.2	5
Africa	Malawi 1987	14.6	20.6	13.7
Africa	Malawi 1998	14.6	20.6	11.5
Africa	Malawi 2008	14.6	20.6	15.9
Africa	Mali 1998	28.1	22.2	7.7
Africa	Rwanda 2002	13.8	2.9	5.1
Africa	Sierra Leone 2004	35.8	2.0	3.5
Africa	Sudan 2008	33.41	14.6	10.8
Africa	Uganda 2002	12.1	6.3	14.4
Africa	Senegal 1988	40.3	12.3	_
Africa	Ivory Coast 2002	43.5	32.5	10.3
Asia	Indonesia 1995	42	17.4	24.9
Asia	Indonesia 2005	42	17.4	17.9
Asia	Malaysia 2000	62	15.5	32.1
Asia	Mongolia 2000	57.1	34.5	_
Asia	Nepal 2001	13.4	3.4	14.7
Asia	The Philippines 1990	48	4.0	22.7
Asia	The Philippines 2000	48	4.0	_
Asia	Vietnam 1999	24.4	24.4	25
Asia	Thailand 2000	31.1	12.4	21.4
Asia	China 1990	35.9	2.4	_
Asia	China 2000	35.9	2.4	38.7
Asia	Cambodia 1998	18.6	1.5	8.1
Asia	India 1999	27.7	2.0	25.5
Asia	India 2004	27.7	2.0	29.5
Asia	Hong Kong 2000	100	3.1	26.8
Asia	Macao 2000	100	0.4	28.4
Asia	Singapore 2000	100	8.2	51.4
LAC	Argentina 2001	90.1	6.3	21.5
LAC	Bolivia 2001	61.8	10.1	19.9
LAC	Brazil 2000	81.2	3.6	23
LAC	Chile 2002	85.9	19.5	25
LAC	El Salvador 2007	58.9	11.2	25.9
LAC	Jamaica 2001	51.8	3.4	18.9
LAC	Mexico 2000	74.7	4.3	27.5
LAC	Nicaragua 2005	54.7	11.5	22.4
LAC	Colombia 1993	72.1	8.6	24.1
LAC	Colombia 2005	72.1	8.6	18.5
LAC	Costa Rica 2000	59	12.7	28.4
LAC	Ecuador 2001	60.3	27.7	16.9
LAC	Cuba 2002	75.6	5.0	_
LAC	Panama 2000	65.8	6.3	18.5
LAC	Paraguay 1996	55.3	10.2	19.1
LAC	Peru 1993	73	10.4	21.9
LAC	Peru 2007	73	10.4	19.2
LAC	Uruguay 1996	91.3	6.0	24.2
LAC	Uruguay 2006	91.3	6.0	22
LAC	Venezuela 2001	89.9	25.6	18.6
MENA	Iran 2006	64	26.0	17.9
MENA	Iraq 1997	67.8	71.0	8
MENA	Jordan 2004	79.8	8.0	18.8
MENA	Egypt 1996	42.8	3.2	23.8
MENA	Egypt 2006	42.8	3.2	23.9
MENA	Morocco 2000	53.3	7.1	23.8
MENA	Kuwait 2005	98.1	49.2	11.2
MENA	Qatar 1998	96.3	59.7	11.4
MENA	Bahrain 2002	88.4	61.3	25

Notes: This table shows the employment share of urban tradables in total urban employment (%) for selected countries around 2000. Urban tradable consists of manufacturing employment (Mfg.) and finance, insurance, real estate and business services (Fire). See Data Appendix for data sources.

TABLE A.3: SECTORAL COMPOSITION OF THE LARGEST CITY FOR SELECTED COUNTRIES

Area	Country-Year	Largest City	Urbanization Rate (%)	NRX/GDP (%)	Mfg & Fire Empl. Share (%)
Africa	South Africa 2006	Johannesburg	56.9	13.4	29.9
Africa	South Africa 2001	Johannesburg	56.9	13.4	33.5
Africa	South Africa 1996	Johannesburg	56.9	13.4	32
Africa	Ghana 2000	Accra	44	31.6	21.9
Africa	Ethiopia 2004	Addis Ababa	14.7	5.4	19.7
Africa	Guinea 1983	Conakry	31	20.2	6.1
Africa	Malawi 1987	Lilongwe	14.6	20.6	2.4
Africa	Malawi 1998	Lilongwe	14.6	20.6	4
Africa	Malawi 2008	Lilongwe	14.6	20.6	7.7
Africa	Mali 1998	Bamako	28.1	22.2	10.2
Africa	Rwanda 2002	Kigali	13.8	2.9	7.7
Africa	Sierra Leone 2004	Freetown	35.8	2.0	5.4
Africa	Sudan 2008	Khartoum	33.41	14.6	18.4
Africa	Uganda 2002	Kampala	12.1	6.3	9.7
Africa	Senegal 1988	Dakar	40.3	12.3	22.3
Africa	Ivory Coast 2002	Abidjan	43.5	32.5	11
Asia	Indonesia 1995	Jakarta	42	17.4	30.2
Asia	Indonesia 2005	Jakarta	42	17.4	25.4
Asia	Malaysia 2000	Kuala Lumpur	62	15.5	26.5
Asia	Mongolia 2000	Ulan Bator	57.1	34.5	18.9
Asia	Nepal 2001	Kathmandu	13.4	3.4	23.6
Asia	The Philippines 1990	Manila	48	4.0	28.3
Asia	The Philippines 2000	Manila	48	4.0	25.3
Asia	Vietnam 1999	Ho Chi Minh	24.4	24.4	38.5
Asia	Thailand 2000	Bangkok	31.1	12.4	28.9
Asia	China 1990	Beijing	35.9	2.4	42.5
Asia	China 2000	Beijing	35.9	2.4	35.7
Asia	Cambodia 1998	Phnom Penh	18.6	1.5	17.4
Asia	India 1999	Mumbay	27.7	2.0	28.7
Asia	India 2004	Mumbay	27.7	2.0	31.6
Asia	Hong Kong 2000	Hong Kong	100	3.1	26.8
Asia	Macao 2000	Macao	100	0.4	28.4
Asia	Singapore 2000	Singapore	100	8.2	51.4
LAC	Argentina 2001	Buenos Aires	90.1	6.3	28.6
LAC	Bolivia 2001	La Paz	61.8	10.1	16.2
LAC	Brazil 2000	Sao Paulo	81.2	3.6	33
LAC	Chile 2002	Chile	85.9	19.5	30.6
LAC	El Salvador 2007	San Salvador	58.9	11.2	28.3
LAC	Jamaica 2001	Kingston	51.8	3.4	19.6
LAC	Mexico 2000	Mexico City	74.7	4.3	27.4
LAC	Nicaragua 2005	Managua	54.7	11.5	24.9
LAC	Colombia 1993	Bogota	72.1	8.6	32
LAC	Colombia 2005	Bogota	72.1	8.6	19.2
LAC	Costa Rica 2000	San Jose	59	12.7	29.7
LAC	Ecuador 2001	Quito	60.3	27.7	19.4
LAC	Cuba 2002	Havana	75.6	5.0	23.9
LAC	Panama 2000	Panama City	65.8	6.3	21.1
LAC	Paraguay 1996	Asuncion	55.3	10.2	_
LAC	Peru 1993	Lima	73	10.4	27.1
LAC	Peru 2007	Lima	73	10.4	25.9
LAC	Uruguay 1996	Montevideo	91.3	6.0	29.8
LAC	Uruguay 2006	Montevideo	91.3	6.0	24.9
LAC	Venezuela 2001	Caracas	89.9	25.6	23.1
MENA	Iran 2006	Teheran	64	26.0	31.7
MENA	Iraq 1997	Baghdad	67.8	71.0	8.4
MENA	Jordan 2004	Amman	79.8	8.0	21.6
MENA	Egypt 1996	Cairo	42.8	3.2	29
MENA	Egypt 2006	Cairo	42.8	3.2	25.7
MENA	Morocco 2000	Casablanca	53.3	7.1	32.9
MENA	Kuwait 2005	Kuwait City	98.1	49.2	_
MENA	Qatar 1998	Doha	96.3	59.7	_
MENA	Bahrain 2002	Manama	88.4	61.3	_

Notes: This table shows the employment share of urban tradables in total employment (%) for the largest city for selected countries around 2000. Urban tradables consist of manufacturing employment (Mfg.) and finance, insurance, real estate and business services (Fire). See Data Appendix for data sources.