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Rajat Acharyya, Shrimoyee Ganguly
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1 Introduction

New evidence emerging over the last two decades reveals the importance of non-price dimensions in the export performances of developing countries and in export-led growth. The most important of such non-price dimensions is quality of exports, which has emerged as one of the key competitive variables of marketing strategy. For example, using Chinese firm-level export prices, Manova and Zhang (2012) find some evidence of quality sorting in exports. Dongwen et al. (2016), in their study on China's agri-food export, find that the exporters with higher product quality capture more demand and opportunities in the world market. The findings of AbdGhani, NikMat and Sulaiman (2019) reveal that the role of product quality is important in influencing the export performance of Malaysian electric and electronic goods. Similarly, the survey of export manufacturers in New Zealand by Thirkell and Dau (1998) finds that product quality significantly affects their export performance. Fischer (2010) estimates that European Union (EU) agribusiness competitiveness can be enhanced by exporting better-quality products to the increasingly liberalised and quality-conscious markets. Evidence from India's manufacturing sector in 1989–97 also supports the notion that *quality matters in the export market under perceived quality uncertainty* (Das and Bandyopadhyay, 2003). On the other hand, Verhoogen (2008) argues that higher-productivity firms in comparison to low-productivity firms in the same industries would gain more export opportunities by improving product quality.

Evidence from cross-country studies on export-led growth also suggests that what matters is not *how much* a country exports but *what* it exports. Growth rates are observed to be much higher for countries that export high-quality, high-technology-intensive and sophisticated products than countries exporting low-quality products (Hausmann and Klinger, 2006; Rodrik, 2006; Hausmann, Hwang and Rodrik, 2007; Bayudan-Dacuycuy and Lim, 2014). Similarly, simulation results by Hidalgo et al. (2007) suggest that the exports of the lagging developing countries will not be as sophisticated as the exports of industrialised economies. Didier and Pinat (2013), on the other hand, observe that higher human capital intensity of traded goods creates a positive spillover effect on economic growth.

There are both demand and supply sides to this quality dimension determining export performance and export-led growth. On the demand side, with the rise in income levels, buyers in the advanced industrialised world have become more quality-conscious and are more sensitive to quality variations than to the price variations of the goods they consume. Accordingly, they prefer to buy goods of higher quality at higher prices than to compromise on lower quality for

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cheaper prices. An earlier postulate in this regard was the Linder (1961) hypothesis: richer countries spend a larger proportion of their income on high-quality goods, and this makes them producers of high-quality goods. More recent evidence is provided by Hallak (2006), who finds that richer countries have a relatively stronger demand for high-unit-value imports – usually considered an indirect measure of export quality – and that these higher-quality goods are imported disproportionately from the higher-income countries. Other studies suggest that wealthier households typically consume goods of higher quality (Bils and Klenow, 2001; Broda and Romalis, 2011). This sets a demand constraint for goods being exported by developing countries to advanced industrialised countries.

On the supply side, developing countries typically produce cheaper goods of lower quality. For example, the findings of many studies indicate a positive association between per capita income and quality of exports (Schott, 2004; Hummels and Klenow, 2005; Hallak and Schott, 2011). This sets a quality constraint and induces richer countries to impose minimum quality standards on goods imported from developing countries. There are a variety of reasons for the low-export-quality phenomenon in developing countries: major explanations include backward technologies and low rates of innovation; highly skewed income distribution and corresponding low domestic demand for higher-quality varieties; and asymmetric information regarding product quality and foreign buyers' poor country-of-origin perception of goods imported from low-income developing countries. In many cases, by eliminating foreign competition, restrictive trade policies in developing counties discourage the domestic firms from undertaking in-house quality-upgrading innovations.

These demand and supply constraints on export growth for developing countries, together with the quality regulations imposed by developed countries, render traditional cost-reducing and demand-generating export-promotion policies (such as export subsidies, tariff reductions and devaluation) mostly ineffective. For policies to successfully promote exports, developing countries now need to focus on the quality dimension, instead of the price dimension, of their export goods. Moreover, given the recent evidence on the importance of the availability of specific skills and of capital and consequent domestic-factor costs for the quality choices made by exporting firms (Brambilla, Lederman and Porto, 2012, 2019; Brambilla and Porto, 2016), any export-promotion policy must affect the domestic factor cost of quality favourably. Since often any policy change causes prices of capital and skill to vary in opposite directions, the specific technology underlying quality upgrading holds the key in this context. For example, if higher-quality varieties of an export good require more intensive use of skilled labour relative to capital, then a policy that lowers

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the skilled wage relative to the rate of return to capital will lower the marginal cost of quality and consequently incentivise quality upgrading. This suggests that a trade policy would affect the quality of export goods by changing relative factor prices and, correspondingly, redistributing factor incomes. This supply-side link between domestic income distribution and export quality is the central theme of the analysis of Acharyya and Jones (2001). At the same time, since technological requirements for upgrading the quality of different export goods may vary, a policy may have an asymmetric impact on these goods' quality levels, as has been demonstrated in Ganguly and Acharyya (2021, 2022a) of late. This lends a theoretical justification to the observed asymmetric variations in quality of goods for countries such as Brazil, China and India, during their liberalisation periods.

There is also a reverse causality between export quality and within-country income distribution. Since higher-quality varieties usually require more intensive use of skilled labour than do lower-quality varieties, quality upgrading induced by an export-promotion policy raises the demand for skilled labour and, correspondingly, the skilled labour wage. This may accentuate wage inequality between skilled and unskilled workers. Moreover, if quality upgrading and production expansion of export goods require more capital as well, production in the rest of the economy may contract due to the overall scarcity of capital. Unskilled workers employed in other sectors thus may be adversely hit. Jobs lost for them either cannot be compensated through employment elsewhere if there are already unemployed workers in the economy due to downward rigid wages, or may be compensated through low-wage jobs in the informal labour markets, a typical feature of the segmented labour markets in developing countries. In either case, the wage inequality worsens. This reverse causality has been recently formalised in Ganguly and Acharyya (2021). Consequently, export-promotion policies may be difficult to sustain, particularly in large democracies where political risks from inequality-driven conflict are quite high.

In this Element we put together this two-way causality and the development paradox in a comprehensive analytical framework. We highlight the underlying causes of the low-export-quality phenomenon, the nature of export-promotion policies to incentivise quality upgrading, and the labour market implications thereof. In Section 2 we discuss the measurement issues and document the wide variations in export quality across countries. Section 3 elaborates upon different theoretical explanations for the low-export-quality phenomenon and related empirical evidence. Trade and export-promotion policies affecting export quality through redistribution of factor incomes are discussed in Section 4. In Section 5 we analyse the reverse causation, namely, whether and how quality variations affect domestic income distribution and, more precisely, wage

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inequality between skilled and unskilled workers. In this context we highlight the segmented labour markets – coexistence of formal and informal labour markets – that are typical in most of the developing countries. Section 6 examines the role of domestic demand for quality-differentiated export goods; monopoly production of such goods; and implications of policies affecting the choice of export quality for the level of employment of unskilled workers when they are not fully employed. Finally, Section 7 summarises the discussions.

2 Export Quality: Measurement Issues and Cross-Country Estimates

The emerging role of export quality as one of the key determinants for export performance and consequent growth prospects has brought to the forefront the need for empirical estimates of policy effects on export quality and how those can be designed to promote quality upgrading. The biggest challenge for researchers and analysts in this regard has been measuring and quantifying product quality appropriate for cross-country comparisons. The quality of a product is often subjective, multidimensional and, most importantly, relative.[1] Each product is characterised by a number of specific features concerning its reliability, brand, design, performance, durability and safety, among others. Moreover, the level of quality of one product is usually defined in relative terms, i.e. by drawing reference to the quality levels of other, comparable products.

This section begins with a brief review of the expanding literature on these measurement issues concerning export quality. Next we present a series of stylised facts about export quality and how it varies across rich and poor nations. This helps us to reflect upon the low-export-quality phenomenon in developing countries.

2.1 Measuring Product Quality

The earliest attempts to measure quality wereby Feenstra (1994) and, subsequently, Broda and Weinstein (2006). Using constant elasticity of substitution (CES)–type utility functions, Feenstra (1994) constructed a price index allowing for different sets of product varieties and quality variations in them over time. However, in a demand and supply equilibrium, if the new varieties are not taken into account it results in a bias; the extent of the bias depends on the elasticity of substitution between all the varieties. Feenstra's (1994) solution was to estimate the elasticity of substitution between varieties from each

[1] There is also the problem of observability. While the quality of some goods can be discerned at the time of purchase, that of many other products, particularly durables, cannot be judged a priori.

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country using the generalised method of moments.[2] In contrast, Schott (2004), Hummels and Klenow (2005), Hallak (2006) and, more recently, Fan, Li and Yeaple (2018) use as a proxy for product quality the unit value, i.e. the observable average trade price for each product category. The idea here is that higher-quality goods sell at higher prices and higher price signals higher quality. However, unit values are noisy proxies as they are driven by a series of other factors, including production cost differences such as wage differentials. Moreover, changes in unit values over time may reflect changes in quality-adjusted prices (owing to supply or demand shocks), rather than changes in quality itself. So unit-value-equivalent quality estimates fail to differentiate across the vertical (e.g., comfort) and horizontal (e.g., style) attributes that products possess. This is what Amiti and Khandelwal (2009) and Khandelwal (2010) built upon. In their measure of quality, when two products have identical unit values, the product with the higher market share is assigned higher quality, the amount depending on the slope of the demand schedule. To estimate quality, they use a nested logit demand framework based on Berry (1994), where they define quality as the vertical component of the model and assign astructural definition to it as the mean valuation that US consumers attach to an imported product. In a discrete-choice framework, higher quality identified with higher market share will act as a parallel demand shifter. However, what they missed out is that other factors such as changes in tastes will also affect export market shares. That is, there may be shifts in the demand curve *not* induced by a change in export quality. As pointed out by Vandenbussche (2014), a product of a certain quality exported by a country could have different market shares in two destination countries due to the differences in preferences among the consumers in the two markets. So, taking into account additional demand-shifting parameters gives a more unbiased measure of quality. When there is a change in the market share of two different varieties of a product in the destination country, one can thus differentiate whether it is due to a change in the quality (if there is a vertical demand shift) or to a change in tastes (if there is a slope shift).[3]

Vandenbussche (2014) also criticised the earlier CES approach of Feenstra (1994) by arguing that CES across varieties fails to distinguish between vertical and horizontal differentiation. Despite introducing a firm-product-specific

[2] Later, Benkovskis and Wörz (2012) pointed out a shortcoming of the CES estimation procedure, i.e. that it is likely that the substitution elasticity between the product varieties is overestimated, which further leads to excessive volatility on quality.

[3] The market share of high-quality goods such as Apple's iPhone or MacBook may also be low in developing countries because very few people there can afford to buy them. Thus, market share may not be an appropriate indicator of quality. We will return to this ability-to-pay argument as a plausible cause of inferior qualities being produced in poor countries in Section 3.

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demand shock that accounts for sales variation of the same firm-product across countries without affecting prices (Bernard, Redding and Schott, 2011), this issue remains unresolved. So a well-defined set of consumer preferences is necessary to clearly differentiate quality differences from taste differences across product varieties. Di Comite, Thisse and Vandenbussche (2014) came up with a clearer approach in which they tried to disentangle the interplay of horizontal and vertical differentiation to infer which shifts in demand are actually attributable to changes in quality. They argued that changes in taste will induce variations in the quantities of the variety demanded but not affect the willingness to pay. Using an extended Melitz–Ottaviano (2008) model and Belgian firm-product data, they considered quality differences between firms as firm-specific parallel demand shocks, in addition to productivity differences, that determine firms' export market performance. They generated an indicator for unobservable quality using export prices (unit values) and product-level mark-ups created from firm-level data on variable input costs and sales. They also captured competition effects in the destination market as the consumption of all substitute products available to consumers there. However, as they could not meet the data requirements to assign a quality level to each product, the quality measure obtained by them is only a relative quality ranking of each product as compared to other competitors of the same product in Europe.

Other strategies for quality estimation looked at addressing country-specific issues for short periods of time and few product varieties. For example, Khandelwal (2010) analysed the effect of import competition on quality upgrading in the United States, mainly aiming to establish that low wage competition in the United States causes bigger losses in employment and output levels for US sectors with short quality ladders. Following Khandelwal (2010) and Hallak and Sivadasan (2013), Hu, Parsely and Tan (2017) defined quality as any attribute other than price that raises consumers' demand, to examine the effect of appreciation of domestic currency relative to that of the source country on exported product quality using Chinese Customs data between 2000 and 2006. Similarly, while examining the effects of changes in real exchange rates using Argentinean firm-level wine export values and volumes between 2002 and 2009, Chen and Juvenal (2014) took wine ratings by two global rating systems as a measure of quality. To address the potential endogeneity of quality in explaining unit values and export volumes, they further used appropriate instruments for quality based on geography and weather-related factors.

Another novel approach was taken up more recently by Piveteau and Smagghue (2019), who attempted to identify quality from the demand side at the firm-product-destination-year level. Similar to Khandelwal (2010), they used a CES demand system but identified the quality of a product as a utility

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shifter, which implies that it is variations in sales and not price movements that explain export quality variations over time and across firms. They presented a new instrument for obtaining the price of firms' exports; it works by interacting firm-specific importing shares with real exchange rates and then identifying firm-level quality from residual export variations, after controlling for prices. They argue that this instrument is exogenous to both the quality choices that firms make and measurement errors on prices, which constitutes an improvement relative to the existing instruments in the literature, thereby providing consistent estimates of the demand functions using trade data. However, the methodology was applied only to French firms for a short period, from 1997 to 2010; such country-specific estimation is not suitable for making cross-country comparisons, especially those incorporating developing countries.

Henn, Papageorgiou and Spatafora (2013) fill this gap with a parallel endeavour to develop new estimates of quality taken up under the World Trade Organization (WTO) Economic Research and Statistics Division, as an International Monetary Fund–Department for Internatinal Development (IMF–DFID) research collaboration. Extending the UN–National Bureau of Economic Research (NBER) dataset, they provide us with the most extensive quality indices for 200 countries for the period 1962–2014, and covering 851 products at the United Nations (UN) Standard International Trade Classificaiton (SITC) four-digit level. The trade dataset is constructed by supplementing importer-reported data with exporter-reported data where the former does not exist. The dataset contains 45.3 million observations on bilateral trade values and quantities at the SITC four-digit level. The estimation methodology derives quality from unit values, but with two important adjustments. The methodology is a modified version of Hallak (2006). As a first step, it determines the trade price (equivalently, the unit value) for any given product. Prices reflect three factors: unobservable quality, per capita exporter income and distance between exporter and importer. This accounts for selection bias. Typically, the composition of exports to more distant destinations is tilted towards higher-priced goods because of higher shipping costs. Next, a quality-augmented gravity equation is specified, separately for each product, because preferences for quality and trade costs may vary across products. The estimation equation is then obtained by substituting observables for the unobservable quality parameter in the gravity equation. It is estimated separately for each of the 851 product categories at the SITC four-digit level. Regression coefficients are used to calculate a comprehensive set of quality estimates which are then aggregated across all importers, using current trade values as weights, and then to SITC three-digit, two-digit, one-digit and country-level aggregates. Such an extensive and detailed methodology significantly contributes to bridging the large gap that

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the existing methodologies have left behind. It provides a set of quality estimates with country, product and time coverage that is as wide as possible, which not only makes country-specific empirical studies comparable in terms of unified quality estimates but also creates scope for examining the underlying causal factors in a cross-country study.

2.2 Cross-Country Quality Dispersions

Henn et al. (2013) identify significant cross-country heterogeneity in the growth rate of quality. Stylised facts put forth suggest that reducing barriers to entry into new sectors can allow economies to benefit from rapid quality convergence over time. Their findings that quality upgrading is particularly rapid during the early stages of development, with the process largely completed as a country reaches upper-middle-income status, is a learning lesson for developing countries. While low-income countries suffer from the poor quality of their export products, a similar low-export-quality phenomenon can be observed for many lower-middle- and upper-middle-income countries as well.

Figure 1 reflects upon this by comparing the export quality indices of manufactured goods of some sample countries from different income subgroups with those of the United States for the period 1963–2010.[4] Note that the quality levels of primary goods such as mining extractions, tea, coffee, rice, etc., are often reflections of climatic and other natural causes, which may not be changed through subsequent processing.[5] Thus, comparisons of quality across developed and developing countries are relevant for manufactured goods for which there is scope for substantial transformations of the attributes of the basic inputs. If we look at the range of quality indices in the four panels in Figure 1, it clearly brings out the stark gap in the quality of manufactured goods between the rich and developed North and the less-developed South. Panel (a) reveals that the quality indices for Australia, Japan and the UK were at par with those of the United States in the 1960s and early 1970s, but thereafter, while Japan produced marginally better-quality manufactured goods than the United States, Australia and the UK fell behind. On the other hand, for low-income countries such as the four African countries reported in panel (d), as well as for lower-middle-income countries such as India, Indonesia, Morocco and Sri Lanka, as reported in panel (c), lower

[4] We consider the United States to be the benchmark country for comparing the situation in the other countries given that the United States has been a consistent producer and exporter of high-quality products with its average quality (aggregate) index always among the top three during the entire period of analysis (1962–2014).

[5] For example, tea grown in India or Sri Lanka and coffee beans grown in Uganda may be of better quality than tea and coffee beans grown elsewhere.

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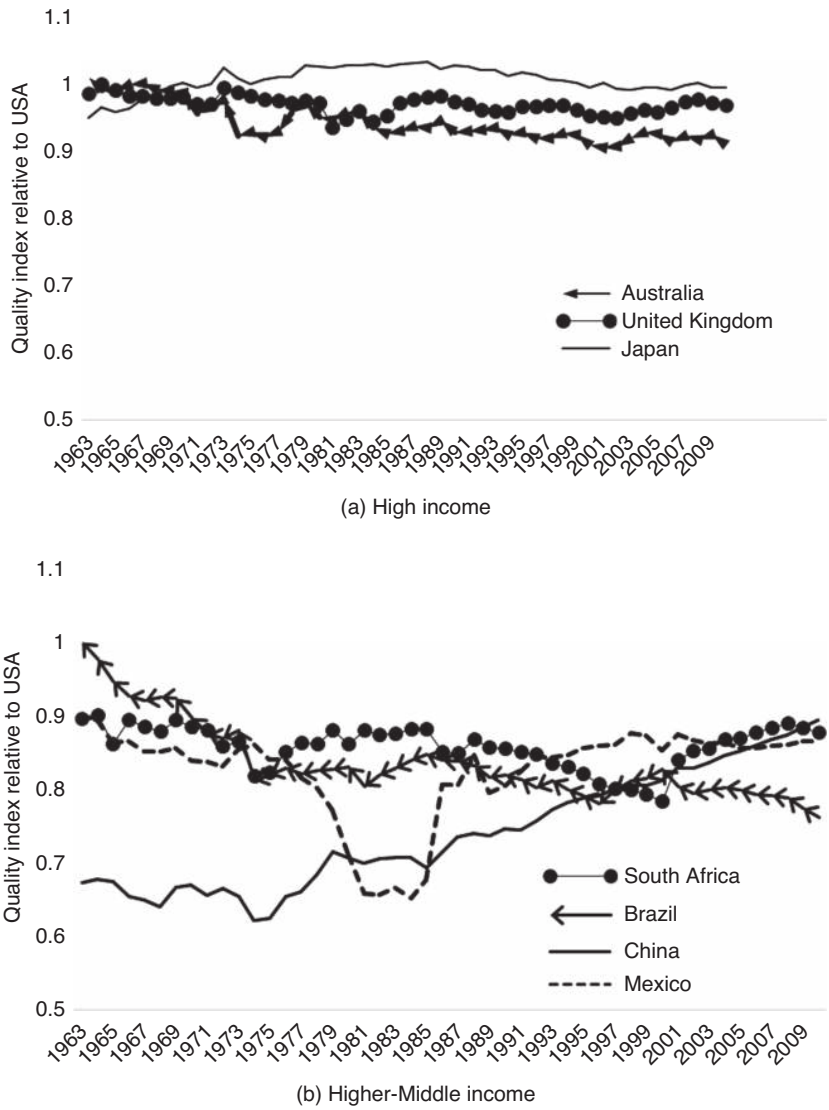

Figure 1 Quality indices of manufactured goods relative to those of the USA (1963–2010)

Source: Authors' calculation based on IMF data, 2014 (www.imf.org/external/np/res/dfidimf/diversification.htm).

average quality of manufactured exports is evident. Of course, low-income countries lag behind to a larger extent than lower-middle-income countries. However, the striking similarity among these four low-income countries is that the quality levels of their manufactured goods have worsened steadily since the late 1970s. In contrast, India, Indonesia and Sri Lanka have improved the quality

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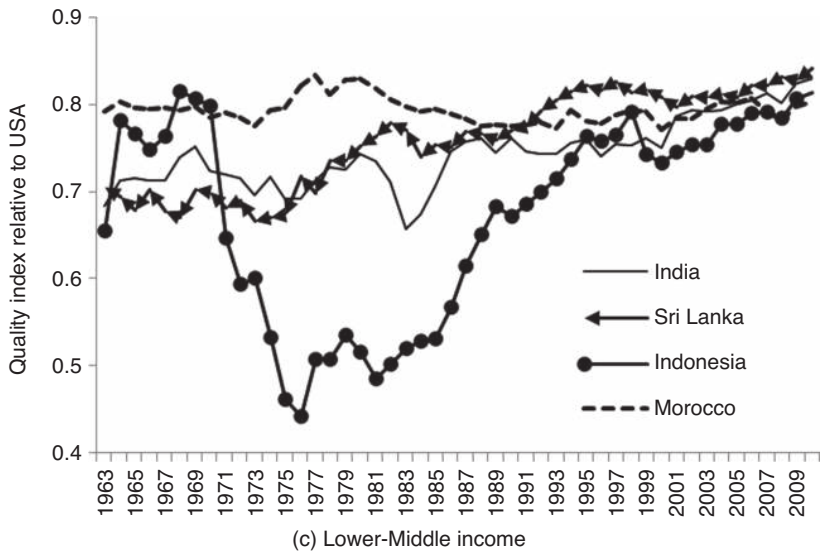
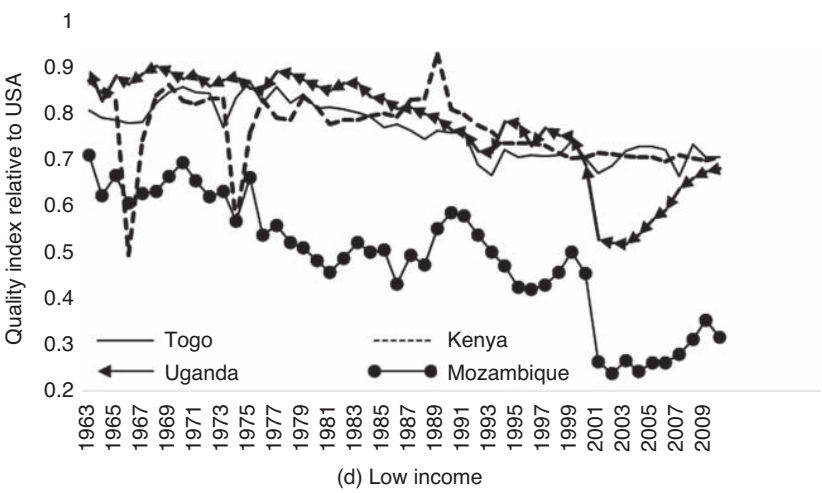


(c) Lower-Middle income



(d) Low income

Figure 1 (cont.)

of their manufactured goods since the late 1970s, with quality upgrading being most spectacular in Indonesia, although the average quality of the manufactured exports of these countries remains well below that of the United States and other rich countries. An interesting observation that we can make here is that Uganda produced better-quality manufactured goods, on average, than all these four lower-middle-income countries during the 1960s and 1970s. Lower average quality for the four upper-middle-income countries – Brazil, China, Mexico and

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