W. Arthur Lewis in retrospect

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Abstract: This paper reviews several themes from the writings of W. Arthur Lewis, both the first black Nobel Laureate in Economics and the first from a developing country, and examines them from the perspective of two to five decades of hindsight. The paper emphasizes three main interrelated aspects; economic growth, economic dualism, and "the evolution of the economic order" – the forces that drive the prices of goods and relative incomes across countries. Lewis' messages still resonate today, as he foresaw the rise of industrial exports from developing countries – and also that it would not end the large gaps among nations' standards of living. The paper both documents these rises and asks whether one could have predicted it from information available in the 1960s, or whether additional prescience was necessary.

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INTRODUCTION

This paper provides a brief overview of some of W. Arthur Lewis' main work, but does not attempt to be comprehensive. This disclaimer stems from the breadth of Lewis' work – his scholarly writings cover industrial economics (his first field), economic history (his long-time obsession), economic development, economic planning, and international trade. It is difficult to claim expertise in all of those areas, or to cover them in a single paper, and we do not. Moreover, two of the most distinguished economists in the past half-century, Ronald Findlay (1982, 1984) and Jagdish Bhagwati (1982) already have written thoughtful assessments of Lewis' work. Darity (1984) also provides an excellent overview of Lewis' political and policy writings that are not touched on here. More recent assessments include Darity and Davis (2005), Fields (2004), Figueroa (2004), Kirkpatrick and Barrientos (2004), and Ranis (2004). However, none of these papers focuses on the predicted rise of developing country manufactures as one of Lewis' major insights, and we seek to remedy that absence in the pages that follow.

Rather, this paper seeks to take advantage of hindsight, and ask which of Lewis' main contributions in economic development have stood the test of time – that is, which messages remain important today. It is unreasonable to expect that many would have done so, and it does not diminish the importance of Lewis' work if all paradigms have been altered substantially or discarded. The process of the advancement of knowledge involves building on and refining older models, and in the social sciences, nearly all save the most basic models are ultimately abandoned. However, the dual economy paradigm (Lewis, 1954) remains an enduring framework, and the patterns of trade and the international distribution of income outlined in Lewis's Janeway Lectures (1978) were written with prescient clarity. As the dual economy framework remains widely known, if not always attributed to Lewis, we present it briefly and move to the equally important and far less appreciated analysis of trade patterns and, in particular, the rise of exports of manufactures in developing countries.[1]

Indeed, a key motive of this paper is to acquaint modern technical economists with W. Arthur Lewis. Lewis was not highly mathematical, and his main ideas were formed prior to the

[1] Among the recent surveys, Kirkpatrick and Barirentos (2004) and, especially, Darity and Davis (2005) and Figueroa (2004) emphasize this contribution.

emergence of vast household and firm micro data sets, or carefully constructed cross-country macro data sets, and hence in the emergence econometric techniques to deal with this information. Beyond a few exceptions (notably, W.A. Darity, Ronald Findlay, and Jeffrey Williamson), modern students of economic development and international trade therefore rarely read Lewis or his contemporaries, such as Kuznets, and hence fail to develop an appreciation for his ideas.[2] Yet, many of the debates that flourished when Lewis wrote remain alive today, and many of his perspectives remain pertinent.

It is also obvious that Lewis is an unusual role model. Since the Nobel Prize in Economics was first awarded in 1969, there have been 57 laureates (all male). Of these, 54 were white North Americans or Western Europeans (including Israelis). The remaining three include the Russian Leonid V. Kantorovich (1975, in honor of his work on input-output modeling), and the Indian Amartya K. Sen (1998, for his work on famine and economic demography). Moreover, ignoring the usual Scandinavian home court advantage, this striking concentration of Nobel Laureates is not *prima facie* evidence of discriminatory bias in selection, but rather reflects the profession's dominance by white North American and European men.

Lewis was conscious of his status as a role model, both to Black Americans and to people from developing countries of all races. But he did not dwell on it, and was not self-promoting. Indeed, Lewis was rather shy around undergraduate students – he was clearly more at home talking with world leaders than sophomores.[3] Thus, he was a quiet role model, and one who commanded respect by deeds and research. He was highly accessible (always important from a student's perspective), encouraging to those interested in his fields, thoughtful, patient, gentle, and, most of all, gracious. Princeton's assistant professors, who were uneasy with many senior colleagues, were intensely fond of Lewis, and formed a coterie around him.

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[2] Thus, neither Lewis nor Kuznets are mentioned in Barro (1997), and receive scant mention in Barro and Sala-i-Martin (2004), which manages to mention Lewis (1954) but, in so doing, focuses on the "big push" approach, which did **not** originate with Lewis, rather than on the paper's fundamental dualist contribution (p.74). Ranis (2004) provides a more detailed discussion of the tendency by neoclassical growth economists to overlook Lewis.

[3] These claims are based on observations from 1979-81, when Becker was Lewis's student and later teaching assistant.

Although Lewis was born in the British Empire (in St. Lucia, in the British West Indies, on January 23, 1915), and was eventually knighted (in 1963, in recognition of serving as Vice Chancellor of the University of the West Indies), he never wished to be addressed as "Sir Arthur" or "Sir Arthur Lewis." Lewis came to teach at Princeton University in 1963, and remained a resident of Princeton, NJ until his death in 1991. Somewhat Americanized and politically a social democrat, Lewis did not refuse the title, but downplayed his knighthood (sadly, both the Nobel website and virtually all biographies seem compelled to address him formally). The best way to get a sense of Arthur Lewis as a person is to go to his terse, modest autobiography at www.nobel.se/economics/laureates/1979/lewis-autobio.html and read between the lines. Kirkpatrick and Barrientos (2004) provide a brief biography, and Darity (1984) provides excellent insights.

Lewis' goal was the alleviation of poverty, especially in developing countries. His academic triumphs obviously were pleasing, and he both fit in and enjoyed the academic environment, but he also spent long times away from research and teaching. In 1957 he became the UN Economic Advisor to the Prime Minister of newly independent Ghana, Kwame Nkrumah, and followed this by serving as Deputy Managing Director of the UN Special Fund, and then Vice Chancellor of UWI (by convention, the Prime Minister is the titular Chancellor). Lewis then spent six years at Princeton (1963-69), but took a leave from 1970-74 to set up and direct the Caribbean Development Bank. During his regular academic stints (at LSE from 1938-47, Manchester from 1948-57, and Princeton from 1963-69 and 1975-91, formally retiring around 1985), Lewis also spent much time abroad, giving lectures and advising governments. This pattern in which academics keep one foot in the "real world" is fairly common today, but was somewhat rarer during Lewis's era.

I. Economic growth

Along with most of his contemporaries, Lewis (1955, 1965) adhered to the notion that accumulation was an essential component of economic growth. As noted in section III, Lewis also emphasized transfers of labor from slow growing and low-productivity to high productivity sectors, and this is an important distinction. Lewis further emphasized institutions, preconditions for the rise of entrepreneurial and trading-oriented populations, and the development of international trade relationships (Reidel, 1984) – a pattern seen as inevitable from his work in economic history.

In his early writings, Lewis emphasizes capital accumulation, with models akin to Kaldor, Harrod-Domar and Solow-Swan clearly in mind.[4] Yet unlike some contemporaries, Lewis was concerned with the *incremental capital: output ratio* that linked investment to growth, realizing that this ratio was in fact anything but stable, as simple growth presentations assumed. Nonetheless, with the advantage of a half-century of hindsight, it is evident that Lewis and virtually all others who explored determinants of economic growth in the 1950s overemphasized the role of physical capital accumulation, as modern growth texts (*e.g.,* Barro and Sala-i-Martin, 2004) offer far more sophisticated interpretations. Lewis also appears to accept the "big push" or "take-off" models of growth stemming from Nelson (1956) and other s such as Rosenstein-Rodin, Gerschenkron, and Rostow (Emmerij, 2002), but which have little adherence today.

By the time Lewis wrote his 1965 Ely Lecture, he was even more cognizant of an array of forces driving economic growth. Capital productivity receives attention, as does the role of public physical infrastructure, and "social" infrastructure (education and public health). So does the need for entrepreneurship. Several key points emerge to stand the test of time. The first (as Ranis, 2004, also notes) involves recognition of government's limitations – an important perspective during the mid-1960s, before disillusionment with public sector inefficiency became widespread, and during a period of tiny private sectors in many less developed countries, thereby encouraging governments to step in and effectively replace the absent private economy. But Lewis (1965:5) cautions:

> *Governments have done better at stimulating the private sector than controlling it, not surprisingly, since both the statistics and the personnel for efficient control are lacking. Many controls have hindered more than helped, especially by restricting the smaller businessmen, some of whom are the hope for the future. Also, the new states often begin with hostility between politicians and administrators, and need to find a new equilibrium which will reduce corruption and arbitrary decisions... Most governments have development plans, but few take their own plans seriously… Governments have first to learn to control the public sector before they can hope usefully to control the private sector.*

This is hardly a surprising point to make today, but at the time it sounded markedly pessimistic, as there was great optimism about state capacity, and little concern about the negative effects of corruption – or that it would eventually be handled. Moreover, Lewis also emphasized the

[4] Fields (2004) and Ranis (2004) provide a more detailed discussion of Lewis's theory of economic growth and its context relative to other contemporaries. Its context is also well-situated in Emmerij (2002). His open-economy perspective on development is formalized in Darity (1982).

importance of ethnic enclaves and culture long before the force received empirical backing from Easterly and Levine (1997) and hence widespread acknowledgement in the profession.[5]

Even more prescient commentary centers on the role of foreign trade, and export-led growth. The Ely Lecture (an address given by the President of the American Economic Association) was written during the peak of import-substitution industrialization's (ISI) popularity. Lewis downplays deliberate ISI as a deliberate strategy, noting that industrialization of successful developing countries will happen inevitably, and regardless of whether the industrialization is aimed at meeting internal demand or export needs. Lewis does not attack ISI directly – from his perspective as an historian it is not of great importance. Rather, Lewis notes (1965:8) that *"Foreign trade has played its customary role as the engine of growth in most*" but not all countries, and is more concerned about declining import demand in developed countries, a theme to which he returns in his Nobel Lecture. But Lewis does not stop at that, and instead goes on to assert (p.9)

> *Some of us believe even that the time is not far off when the underdeveloped will be net importers of primary products and net exporters of manufactures. This is not only because of high population growth, which the new techniques of family limitation will soon begin to control. More fundamentally, it is arguable that the competitive advantage of temperate countries is in agriculture…*[6]

This statement would evoke little surprise today, certainly from an audience living in the world's largest agricultural exporting country, wearing clothes and using electronic goods for the most part produced in developing or "emerging market" nations. But in 1965, when manufactured exports from the third world to the first were minimal, the sentence sounded fanciful, much as it would have for a writer a century before to have claimed *"Some of us believe even that the time is not far off when man will fly…"* But the nearly unbelievable has come to pass, driven by basic forces of international trade that Lewis understood well. After surveying Lewis' other major contributions to

[5] We are grateful to William Darity for this point.

[6] Lewis' belief that developing countries would become large manufacturers' exporters was already well-developed by the time of the Ely Lecture, and appear to date to the early 1950s. The earliest statement we can find dates from his 1957 *AER* article, referring to an earlier 1954 paper:

> *In fact, I have suggested in a recent article (in* Capital, *Bombay, December, 1954) that current Indian aspirations will involve India's capturing an extra 6 per cent of world trade in manufactures during the next twenty-five years.* (Lewis, 1957: 578)

economic development, we return to this theme in Section IV, and ask whether an economist writing more than four decades ago could have reasonably anticipated the rise of developing country manufactured exports.

The extent to which Lewis' prediction has been realized can be seen from Table 1, which shows patterns of exports and imports of food and other agricultural products, fuels and minerals, manufactures, and services for 20 countries, for 1980, 1997, and 2003. The developed countries with large endowments of arable farmland were large net exporters of agricultural products in 1997, but they were in 1980 as well. Among the developing countries, only the Philippines, Mexico, and Pakistan went from being net agricultural exporters in 1980 to net importers in 1997 (though Korea and Senegal were net importers in both years). For manufacturing, all of the developing countries save Korea were net importers in 1980; by 1997, Korea was joined by India and Pakistan, and Mexico was nearly in balance. The late Sanjaya Lall (1998) provides a much more detailed analysis of developing countries' manufactures' exports. Lewis himself was writing in part from the perspective of an economic historian, and an exceptionally valuable summary of the information on historic trade patterns – only pieces of which would have been available to Lewis – is now available in Blattman, Hwang, and Williamson (2005).

This description, however, does not do justice to the extraordinary rise in manufactured exports from the underdeveloped world. For the East Asian countries listed, the unweighted manufactures' export index rose by 1546% during this 17-year period. For the less-heralded group of India, Pakistan, Tunisia, and Turkey, the manufactures' export index rose by 938%. In 1980, Mexico's manufactured exports were only 6% of those from Canada and 40% of Australia's; by 1997 (2003), Mexico had reached 67% (81%) and 546% (625%) of the Canadian and Australian levels, respectively. Given such growth, it is hardly surprising that, by 1997, several developing countries had become net exporters of manufactures. These include East Asian countries pursuing export-oriented policies (to the point where several are now regarded as developed countries), and South Asian countries with cheap labor and import restrictions. But manufacturing export growth from the developing world is a nearly global phenomenon, and it has clearly been an important engine of economic growth in a broad array of countries.[7] The 2003 data show a continuation of earlier

[7] The exceptions include most of sub-Saharan Africa and some small Latin American, Middle Eastern and North African, and former Soviet states, along with failed nations such as Burma or Somalia. It is also true

patterns, with manufactured goods' exports from major developing countries growing more rapidly both than their primary goods' exports and manufactures' exports from developed countries.

This Lewis foresaw with remarkable clarity. By 1997, exports of manufactured goods had become an important engine of growth (arbitrarily defined to be a sector that grows more rapidly than GNP and accounts for more than 10% of GNP) in Costa Rica (11.5% of GNP), Pakistan (11.5%), the Southern Africa Customs Union area (12.6%), the Philippines (12.7%), Tunisia (22.4%), Thailand (24.7%), Mexico (25.5%), Korea (25.8%), and, in a league of its own, Malaysia (60.3%). Turkey (9.9%) just misses the cut-off.

Lewis also recognized that successful developing countries would be those trade grew rapidly overall. Developing countries that failed to become large manufacturers' exporters generally have not succeeded elsewhere, especially excluding those such as Botswana that have grown from exports of processed minerals. Those developing countries in Table 1 with low ratios of manufactured exports to GDP (including Kenya, 5.1%; Senegal, 4.2%; Cameroon, 1.7%; and Peru, 1.6%) tended to have had stagnant or declining real per capita incomes during the past quarter century; only countries with large internal markets (India, 6.5%; Brazil, 3.6%) do not appear to be so trapped.

The debate over the viability of import substitution strategies was conclusively answered during the 1970s in favor of those advocating export-led growth.[8] The decisive analysis was that provided by Hollis Chenery and associates in their work on patterns of economic growth (for example, Chenery and Syrquin, 1975). However, these patterns merely confirmed Lewis' claims a decade prior, although they added irrefutable empirical evidence.[9]

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that the total growth has been highly concentrated geographically, with China, Mexico, and Tigers old (Korea, Taiwan, Singapore, and Hong Kong) and new (the "MIT" countries: Malaysia, Thailand, and, depending on when one is writing, Indonesia) dominating (Lall, 1998).

[8] Of course, in economics there is rarely a final word. For a far more nuanced view that dispels the notion that a low tariff regime is invariably the dominant strategy, see Williamson (2002).

[9] These remarks should not be taken to imply that Lewis or Chenery *et al.* anticipated the exceptional growth that did take place. Lewis was deeply nervous about prospects for trade growth, especially as his last productive decade as a researcher occurred in the aftermath of the 1974 OPEC-led oil price shock, and the second oil price shock and world recession in the early 1980s. Darity (1982) provides both a detailed discussion of Lewis' expectations of "north-south" trade relations, as outlined in his Wicksell lectures, and a

The critical insight driving Lewis's vision was his realization, demonstrated in the Ely Lecture, that an undeveloped country can easily have a comparative advantage in manufactures, despite being the relatively capital scarce region (which would lead to the prediction of exporting labor-intensive agricultural goods, along Heckscher-Ohlin lines). With differences in productivity of different factors across different countries, it is possible for capital productivity gaps to be much narrower than (skilled) labor productivity gaps if machinery use can be learned by relatively unskilled labor. In such a setting, an underdeveloped country may have a comparative advantage in capital – and unskilled labor–intensive goods, even if the cost of capital is relatively high.[10] Thus, Lewis would not have been surprised by the sector specific patterns of developing country manufactures' exports, with growing skills embodiment and higher levels of technological content accompanying traditional labor-intensive and resource processing manufacturing (for detailed patterns, see Lall, 1998; for detailed patterns from three Latin American countries, see Londero and Teitel, 1996).

II. DUALISM AND DEVELOPMENT

The concept most strongly associated today with Arthur Lewis is the notion of dualistic development, or economic growth under conditions of unlimited supply of labor. The argument was first developed in his seminal *Manchester School* article (1954), and it set off a storm.[11] The basic idea is simple. Lewis divided poor economies into two sectors, a "modern"/capitalist/ industrial sector, and a backward/traditional/agricultural (and traditional services') sector. Labor migrates across

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formal mathematical model. It is deeply pessimistic in nature, with constrained northern import growth limiting southern growth.

Nor does it seem likely that Lewis possibly could have anticipated simultaneous improvements in manufacturing trade balances (relative to GNP) in developing countries and a rising share of manufactured imports to GNP. Yet this has clearly happened in virtually all of the successful developing country exporters, led by Malaysia, where manufacturing imports equaled 69% of GNP in 1997. Put differently, virtually no one writing between 1960 and 1985 imagined the stunning rise in world trade of manufactures. Between 1980 and 1997, world trade in manufactures rose 258% (an annual growth rate of nearly 8%); for countries classified as upper middle income the increase in exports was 538%, while manufactured imports grew 257% (calculated from World Bank, 1999).

[10] This argument also antedated the important work of Fallon and Layard (1975), who estimated three factor (capital, skilled labor, and unskilled labor) nested CES production functions in the first recognized empirical analysis that distinguished two groups of labor. They, however, concluded that skilled (rather than unskilled) labor and capital were complements.

[11] The ensuing debates and a critique of the model are presented in Fields (2004) and Ranis (2004).

sectors to equate expected utility from each activity. In modern industry, labor is paid the value of its marginal product. The difference between the net value of output and the wage bill equals profits, some fraction of which is reinvested. In the traditional sector, farmers, artisans, and traders effectively behave as tiny monopolistic competitors, each receiving an average product. For other than a few fortunate individuals, the amount earned is equal to a subsistence-plus level that is roughly constant, while marginal product is zero. Economic growth thus occurs by reinvestment of modern sector profits and drawing workers from the traditional to the modern sector.

The *Manchester School* paper followed "classical" rather than "neoclassical" tradition in that it followed a two-sector framework, but did not seek to formally explain how earnings were determined in the traditional setting. This limitation set off a series of recriminations from neoclassical economists, who wondered why earnings would not rise if labor were withdrawn, or why they would not fall if population growth exceeded the rate of out-migration to the modern sector. Lewis himself answered (1958), in effect arguing that institutions adjusted, and that the precise mechanism was not all that important in any event. Sen (1966) provided conditions under which "unlimited labor" could be generated in a neoclassical setting; Hansen (1979) showed that in an African context with unlimited supply of low quality land, the Lewis model would also emerge in a neoclassical world.

The standard diagrammatic depiction of what has become known as "the Lewis model" appears in Figure 1. During initial phases of economic development at employment levels up to L^* (corresponding to Figures 1-3 in Lewis, 1954), labor is available to the modern sector at a fixed wage rate, both in real and nominal terms. Migration of labor from traditional (and rural) pursuits to modern sector jobs in urban areas results in no loss of rural output; since workers are paid a wage little in excess of the value of their rural consumption, aggregate demand for food is essentially unchanged, in which case the price also remains stable. This era is one of high profits (the shaded area in the diagram, ignoring fixed costs). Assuming that a fixed proportion of profits are reinvested and that workers do not save, the VMPL curve will shift to the northeast over time (assuming the cross partial derivative in the modern sector production function, f_{KL}, is positive).[12] Since wage rates

[12] Lewis does discuss the possibility of labor-saving investments that would actually cause labor demand to decline, but the main story is one of modern sector investment leading to employment growth.

are fixed, factor shares and profit rates should be constant even in a closed economy with constant returns to scale technology; if the modern sector exhibits increasing returns or growing export demand, profit rates may well rise over time.

At some point, capitalist expansion begins to exhaust the supply of labor, and the effective labor supply curve becomes positively sloped. We follow Fei and Ranis (1963) and distinguish first an era in which the price of food and agricultural goods rises, even though the wage in terms of food goods is fixed, so that the wage in terms of modern sector goods begins to rise. This will occur when enough labor is withdrawn from agriculture so that the marginal product of labor becomes positive, but remains below the institutionally fixed level. A variety of other stories (for example, skills' accumulation, and rising inframarginal modern sector wages, leading to an increase in aggregate food demand) can also generate a period of modern sector expansion (corresponding to employment between L^* and L^{**}) in which real agricultural wages remain constant, but the labor supply curve to the modern sector in terms of the price of its own produce is upward sloping.[13]

Finally, at some point the unlimited supply is truly exhausted, and wages are bid up in real terms above the institutional level. The world becomes neoclassical in both sectors as workers receive the values of their marginal products. In a closed economy, modern sector profit rates are likely to fall, the consequence of being choked off by rising wages and rising prices of agricultural goods, which in turn reflects low rates of productivity growth and capital formation in the relatively stagnant rural economy. In an open economy, world prices are fixed, and imported agricultural products supplement rural surpluses, thereby helping to maintain profit rates.[14]

Lewis focused on the unlimited labor phase – surely the relevant part of the labor supply curve for most countries in the early 1950s. He was also concerned that Keynesian analysis not be applied indiscriminately to developing countries. Indeed, a key motivation for his initial work was the unpalatable choice between a neoclassical paradigm in which all factor prices were determined by values of marginal products (in which case, an emerging capitalist sector would be quickly dulled by

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[13] As Dixit (1969) shows, from an optimal planning standpoint, it then becomes desirable to give capital or infrastructure to the traditional sector in order to suppress price increases.

declining profitability), and a Keynesian demand-driven world. Neither of these looked similar to the Ghana, Thailand, and Caribbean that Lewis saw in the 1940s and 1950s. Lewis saw instead a small neoclassical economy floating in a larger economy constrained by insufficient demand. This paradigm is one that has renewed appeal today to analysts of formerly socialist "transition" economies, with input-constrained sectors (in which, however, scarce working capital, foreign exchange, or essential infrastructure may be more critical than physical capital) coexisting along side moribund industrial and demand-constrained agricultural economies.

Lewis also saw the rise of the modern sector as the key to general economic development, rather than broad skills and productivity growth serving to lift all sectors simultaneously. In his model, the national savings rate s must equal the share of profits in modern sector activity π_M times the share of rate of savings out of profit income s_π times the share of modern sector value added in GNP, σ_M. As long as π_M and s_π are roughly constant, then s will rise with modern sector expansion. This is the core process by which an economy overcomes the central problem of economic growth:

> *The central problem in the theory of economic development is to understand the process by which a community which was previously saving and investing 4 or 5 per cent of its national income or less, converts itself into an economy where voluntary saving is running at about 12 or 15 per cent of national income or more. This is the central problem because the central fact of economic development is rapid capital accumulation (including knowledge and skills with capital).* (Lewis, 1954: 155).

The Lewis paradigm represented a dramatic conceptual advance at the time, but was not without detractors. In addition to the neoclassical critics, the implicit emphasis on modern, industrial sector accumulation and investment as the engine of growth did not appeal to those who advocated balanced growth, or who saw agricultural productivity gains and reducing rural poverty as the appropriate strategy in a third world that was (in the 1950s and 1960s) overwhelmingly rural. Still others feared that the model would be taken as justification for ISI orientation and, worse, pouring funds into white elephant state enterprises. While these fears were justified, Lewis clearly warned against inward-looking, statist development strategies. Moreover, his entire development thesis rests on the need to raise rural productivity, a point many critics never fully grasped.

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[14] These points are elaborated in Becker, Williamson and Mills (1992), who contrast findings from open and

What the Lewis model seemed to miss was the emergence of widespread urban unemployment. This unemployment became increasingly visible as urban populations grew, and many associated it with rapid urbanization driven by migration from rural areas to towns and cities. The employment and earnings' expectations models of Todaro (1969) and Harris and Todaro (1970) that modified the Lewis model emerged as the initial consensus response. These "HT" models posited an institutionally determined modern sector wage above the (usually, but not necessarily) neoclassical rural wage; migration then served to equate expected earnings. This model retained the Lewis dualistic framework, but reversed the institutional wage assumption, thereby generating open urban unemployment (in contrast to hidden rural unemployment). A long literature on non-institutional urban wages followed – indeed, it occurred concurrently, since among the luminaries (John Harris and James Tobin) and bright young minds (Michael Todaro) hanging out at the University of Nairobi in the late 1960s was a graduate student, who had great reservations about the HT framework (Stiglitz, 1969). The essence of Joseph Stiglitz's work is that there are a multitude of labor market factors dealing with family structure and risk aversion that can cause intersectoral wage gaps as well as affecting the utility generated by a job, thus generating far more complex labor supply curves. While Stiglitz did not seek to reconcile classical and neoclassical paradigms (indeed, he did not like institutional assumptions at all), the effect was to do just that, since these more complex stories undercut the simple neoclassical model, making it possible to treat classical stories as a first approximation.

What does the historical record have to say about all this? The dualistic paradigm (albeit with different divisions in different places) is without doubt the main contribution, for it continues to frame the way in which most development economists tend to view the world. The notion of a very low-cost, essentially infinitely elastic labor supply at early stages of industrial growth remains a compelling one as well. If one adds mechanisms along the lines of HT or Stiglitz, or the nutrition-productivity story dating from Bliss and Stern (1978), then it is easy to generate a story in which modern sector employers face no pressure to increase wages as employment expands. Surely, the dramatic industrial employment growth in Indonesia, Mexico, Turkey, Thailand, and much of East Asia fit this story well.

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closed neoclassical computable general equilibrium models.

Yet the story does not coincide with the facts. During periods of economic crisis, real wages in urban areas tend to crash in many developing countries – this has certainly been true throughout the failed urban economies in Africa (Jamal and Weeks, 1988). It has long been established that earnings reflect human capital endowments, and there is also ample evidence of labor market segmentation (for a survey of recent econometric work, see Becker and Morrison 1999). Lewis does not address segmentation, and the unlimited labor supply reservation wage is not discussed in the context of being downwardly mobile. To put a more positive spin on it, the Lewis model seems to broadly describe the development of rapidly growing nations, but does not offer an explanation for those that fail to grow.

Nor does the evidence suggest that rural earnings have been stagnant in countries where conditions have changed. The most compelling evidence for this comes from India, where there has been dramatic divergence in real living standards across states during the past 40 years. Much if this appears to reflect differential rates of adoption of high yield seeds and "green revolution" seed-fertilizer-irrigation packages, which have been far easier to introduce in some regions than others. Today, some parts of rural India have substantial labor shortages (notably, in Punjab and Haryana), and attract migrants from poorer rural areas. But even elsewhere, rising rural education, sharply falling infant and child mortality, and declining rural fertility all suggest changing rural conditions and, in many places, rising welfare levels.

III. The International Economic Order

W. Arthur Lewis' interest in economic development stemmed from his concern over how to raise living standards among the third world's poor. His answer was given as early as 1954 (p.191), though he devoted a great deal of his empirical study of global trading patterns to establish this point more firmly:

> *The main reason why tropical* commercial *produce is so cheap, in terms of the standard of living it produces, is the inefficiency of tropical* food *production per man. Practically all the benefit of increasing efficiency in export industries goes to the foreign consumer; whereas raising efficiency in subsistence food production would automatically make commercial produce dearer.*

This result emerges from the dualistic development model. The opportunity cost of labor is driven by average earnings in the traditional/agricultural sector. Productivity gains and reinvestment in the

modern sector will lead to growth in aggregate supply. If the modern sector produces goods for domestic consumption in a closed economy, the benefits of growth are distributed fairly rapidly throughout the economy, but only at the cost of long-term growth, since the surplus labor era will evaporate fairly rapidly as agricultural prices and eventually incomes rise. It follows as well that broadly rising prosperity requires concurrent productivity growth in agriculture and industry, and it was this joint success that for Lewis distinguished the temperate from the tropical world (Lewis, 1954, as quoted and discussed in Figueroa, 2004:742-3).

In an open economy in which the modern sector (now redefined to include export-oriented agriculture) produces tradeables, the surplus labor era lasts longer to the extent that goods produced by the traditional sector can be imported at fixed world prices. But there is a pitfall here as well. Rapid increases in supply (of, say, coffee) from Vietnam do not occur in isolation – the same incentives hold for supply increases from Kenya, Côte d'Ivoire, Indonesia, and Brazil. Since aggregate demand is downward sloping – and for many tropical goods is quite inelastic – prices will fall, most likely by proportionately more than the increase in aggregate supply, so that earnings will fall as well. In this unhappy setting, development is something of a mirage. Determined efforts by export-oriented modern sectors in developing countries seem doomed to frustration. Yet failure on the part of an individual firm or country to reinvest will be even more damaging, since the individual entity will have only a tiny impact on price.[15]

The only way out of this conundrum is to raise traditional – typically foodstuffs' – productivity. This raises the opportunity cost of labor, shifting up cost curves faced by modern manufacturing and primary products' exporters, ultimately curtailing supply and raising prices (and revenues, if demand is inelastic). The low productivity, low earnings' surplus labor pool is thus the factor driving low prices for third world exports.

> *The division of the world into developing countries that export agricultural products and import manufactures and developed countries that do the reverse is on the verge of ending…The ending of this division exposes the fallacy that the division was based in unfavorable terms of trade for*

[15] While we cannot find reference to it in Lewis' 1978 Janeway Lectures (though the comments on pp.28-28 come close) or elsewhere, we believe Lewis remarked in lecture that it was no accident that the developed world was far more eager to assist research centers aimed at raising the productivity of tropical crops than those aimed at improving the competitiveness of developing countries in manufactures currently produced in the developed world.

> *agriculture as against industry. If 60 percent of the tropical labor forces is in low-productivity food, the rest of the labor force will get low prices whether it exports agricultural or industrial products…It is not true that the terms of trade are bad for all agriculture…The terms of trade are bad only for tropical products, whether agricultural or industrial, and are bad because the market pays tropical unskilled labor, whatever it may be producing, a wage that is based on an unlimited reservoir of low-productivity food producers.* (Lewis, 1978:36-37)

Thus, Lewis has no patience for conventional dependency theory, nor does he see the great transformation in developing countries' exports as an answer by itself.[16] Clearly, it helps develop domestic capacity, and ultimately hastens the end of the era of unlimited labor. But, *"when the LDCs switch from exporting primary products to exporting manufactures to the rich countries, they exchange one dependence for another"* (1978: 70). The potential for expansion is much vaster, of course, and demand curves are far more elastic. But ultimately, the prices of manufactured exports from developing countries must fall as competition and low production costs cause aggregate supply curves to shift outward.

By 1978, Lewis sensed that his predictions of the early 1960s were being realized. He notes in the Janeway Lectures (p.36) that *"by 1975 manufactures were already 33 percent of the exports of developing countries, excluding the oil countries, and if current trends continue, by 1985 more than half the exports of developing countries will be manufactures."* To return to Table 1, it is clear that his exuberant prediction has in fact been exceeded dramatically in successfully developing countries. By 1997, manufactures accounted for a majority of foreign exchange earnings in Korea (78%), Mexico (73%), Pakistan (71%), Malaysia (64%), Thailand (57%), India (56%), Tunisia (54%), and the SACU region (50.1%), and would have comprised a majority in Turkey, Brazil, and the Philippines were it not for large service sector earnings. Using UNCTAD data, Reidel (1984) documents a rise in share of manufactured exports in total developing country exports from 10% in 1955 to 13% in 1960, 26% in 1970, and 44% in 1978. During this period, the share of LDC manufactured exports going to developed countries also rose gradually, from 46% to 63%. On the other hand, these LDC manufactures' exports were still

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[16] His answer to dependency theorists is clear:

> *The factorial terms available to the tropics, on the other hand, offered the opportunity to stay poor – at any rate until such time as the labor reservoirs of India and China might be exhausted. A farmer in Nigeria might tend his peanuts with as much diligence and skill as a farmer in Australia tended his sheep, but the return would be very different…not because of marginal utilities or productivities in peanuts or wool, but because these were the respective amounts of food that their cousins could produce on the family farms. This is the fundamental sense in which the leaders of the less developed world denounce the current international economic order as unjust, namely that the factoral terms of trade are based on the market forces of opportunity cost and not on the just principle of equal pay for equal work.* (1978: 19).

insignificant prior to 1980 as a share of developed consumption, rising from a tiny 1.7% in 1970 to a still very small 3.4% in 1979 (Reidel, 1984:65). But growth has since accelerated, especially with the emergence of China as a major exporter. Lall (1998) documents an annual rate of growth of 14% of LDC manufacturers' exports between 1980 and 1996, with the share of global manufactures' rising from 9.8% (note the inconsistency with Reidel) to 23.0% during this period. Insofar as Lewis' vision was off mark, it comes in his (and everyone else's) failure to foresee the extraordinary rise in incomes from services (largely but not exclusively remittances and tourism) in several countries, along with the surprisingly heterogeneous performance of different developing countries.

Lewis also understood that raising living standards in the tropical world meant raising foodstuffs' productivity essentially everywhere. Much of Africa's problem is not that its subsistence sector productivity is too low, but rather that it is too high. Low population density and a high opportunity cost of labor relative to parts of Southeast Asia and China made Africa an unattractive location for low-skill manufacturing. That in turn limited exports and savings, thereby restricting any true economic development.

Development economists today tend to emphasize the role of small internal markets and an inability to realize scale economies, limited state capacity to deliver essential legal and economic infrastructure, political instability, corruption, and low levels of human capital as forces limiting economic growth in poor African and Latin American nations. To some extent, these features are symptomatic of deeper problems, as they all require resources generated by a nascent modern sector. Nonetheless, it is difficult to accept Lewis's story without some caveats: those parts of the developing world where rural productivity has grown do not seem to have had industry choked off (think of Haryana, Karnataka, or Andhra Pradesh in India). On the contrary, rapid productivity rural growth provides an outlet for local markets, and thus spurs the development of local industry and services. At the same time, as Ranis (2004) emphasizes, these and other additional points do not upset the core Lewis vision, nor could they have been foreseen in an era with virtually no micro data.

IV. What could Lewis reasonably have foreseen?

While it seems remarkable that Lewis anticipated the rise of manufactured exports from developing countries, it remains to be determined whether he was slightly or greatly ahead of his

time. To address this, we inquire as to what might have been conjectured reasonably by someone writing in the early 1960s.

The conjectural game we play has three steps. The first is to use data from the period to estimate a relationship between manufactured exports and level of economic development, controlling for other explanatory variables. The second is to provide counterfactual forecasts of manufactured exports from developing countries, conditional on the explanatory variables taking actually observed values for particular countries from "future" years – 1970, 1980, 1990, and 2000. Finally, we compare these counterfactual values with actual ones. The differences reflect structural shifts not discernable from 1960s data – the shifts that Lewis but virtually no one else anticipated.

Even prior to addressing estimation issues, limitations to this approach should be noted. An obvious problem is that of endogeneity: after all, a long literature suggests that export growth and the conditions that give rise to that growth together influence economic development. While this problem merits attention (in a separate paper), for our purposes here it is not a fatal matter: to the extent that manufactured export growth raises real GDP, it will provide an upward bias to the counterfactual forecasts, since manufactured exports rise with real GDP.

The greater problem is that of determining how much of the differences between actual and 1960s era forecast values was foreseen by Lewis. Lewis did not have perfect foresight, and, as noted by Reidel (1984:56), was frustrated by and pessimistic about developed country protectionism. It seems fair to argue that he expected rich countries as a group to continue to behave in a manner similar to France or Japan today, and did not fully anticipate the extent of trade liberalization that has taken place through GATT and the WTO.[17] Nor did Lewis in the early 1960s predict the sharp decline of international transportation costs that contributed greatly to the rise in general trade flows: containerization was still two decades off, and the major transportation achievement of the

[17] While Lewis was quite aware of the protectionist atmosphere surrounding the industrial sectors in developing economies that were substantial, we do not believe he emphasized this as a barrier to export growth. Nor did he emphasize the Dutch disease effects caused by improved primary export products' terms of trade in 19th century Latin America as a barrier to industrial growth and export orientation (Bértola and Williamson, 2003). Indeed, Lewis was profoundly pessimistic about terms of trade for primary exports, and, like others at the time, appears not to have realized the extent to which terms of trade improved for primary exporters in the century prior to the First World War (Williamson, 2002: 20).

era was the near-completion of America's interstate highway system. The great liberalization of international financial flows as it has played out also was unanticipated: no one in the early 1960s could have imagined the extent to which America would absorb the world's savings, nor that it would use much of its borrowing to import manufactures. Finally, Lewis does not seem to have predicted that China, at that time still recovering from the Great Leap Forward, would begin a dramatic redirection of economic policy some 15 years hence.[18]

In short, the rise of manufactured exports from developing countries has many causal factors. Lewis explained the economic rationale that would serve as an impetus for the transformation. The institutional changes – from international trade agreements to China's emergence as a quasi-market economy – can be seen as endogenous forces responding to underlying economic forces. Nonetheless, a fair interpretation would be that Lewis simply anticipated a much greater level of developing count12ry manufactured exports as a share of GDP than was the case in the early 1960s, but that he did not have particular insight as to the pace at which this rise would occur, since the pace itself would depend on institutional changes unlikely to occur at a smooth, predicable rate.

This counterfactual experiment as set forth is certainly not biased toward Lewis. It turns out that even the 1960s were years of rapid growth of LDC manufactures' exports (Reidel, 1984). But this was not widely recognized at the time. That is, even if Lewis *should* have recognized the transformation, so should have others, but, to our knowledge, no one else did. Furthermore, we use a considerably better data set than in fact was available at the time.

IV.1 The patterns

Table 1 has demonstrated the rise in trade in the latter part of the 20th century. Figures 2-6 show patterns of manufactured exports/GDP for five types of countries. The first set comprises

[18] Yet another possibility, and one not anticipated by Lewis, is that manufacturing and export efforts generate learning-by-doing skill acquisition, and thereby have accelerator effects absent in standard economic models. Clerides, Lach, and Tybout (1998) examine the link between exporting and firm efficiency using firm-level data for Mexican, Colombian, and Moroccan manufacturers, and conclude that the positive relationship is due to self-selection of the more efficient firms into export activities, and that learning-by-exporting does not appear to be highly important.

economically advanced nations. Taken as a group, which includes countries of different sizes, with large primary product endowments and those with limited natural resources, their trade patterns can be thought of as reflecting long run upper bounds for developing countries at various point in time. Figure 3 provides the great contrast, showing the rise of manufactured exports from the Asian Tigers, which have largely made the transition to being economically advanced nations. The figure also includes China, which has made the greatest transition of all, although it remains a middle-middle income nation. Figures 4 and 5 then show the patterns of less dramatically transforming developing countries, dividing them into large and small economies, and including nations from Latin America, the Caribbean, South Asia, and the Middle East and North Africa. Finally, Figure 6 presents the great exception: patterns from sub-Saharan Africa (and for one of the exceptions within the exception, Botswana).

The lessons from these figures are apparent. Figure 2 shows the transformation from the perspective of developed countries. In 1960, "industrialized" developed nations exported about twice as many manufactures as they imported (with those imports coming mainly from each other). By 2000, while *MSX* had increased modestly from its 1960 value, the trade surplus in manufactures had disappeared entirely. The almost incredible rise for the Asian Tigers and China is documented in Figure 3, but from Figure 4 it can be seen that the growth for many large developing countries outside the region is of the same order of magnitude. On (unweighted) average, both sets of countries start out with *MSX* of about 15% of GDP. For China and East Asia, the share rises to nearly 80%, but even for the other large developing countries, the share grows to neatly 65%. Note as well that this increase is not driven by import substitution industrialization: manufactured imports as a share of GDP more than doubled between 1960 and 2000 in most of the countries depicted.

The evidence both for African and other small developing countries is far more mixed. While there are some striking exceptions, most small developing countries remained fairly insignificant exporters of manufactured goods, with limited time trends. Moreover, their manufactured goods' trade deficits have remained large: there has been little effective import substitution. While one should beware of reading too much into simple graphs, it is difficult to escape the impression that a small market base has made it difficult, at least historically, to launch manufacture export-oriented growth. This difficulty may reflect the greater inefficiencies of protected industries in small markets, since few scale economies are realized, coupled with the

greater riskiness of setting up enterprises aimed exclusively at exporting, especially in countries that do not have an initial manufactured export base.[19]

IV.2 The counterfactual forecasts

To anticipate what an economist of the early 1960s might reasonably have anticipated, we begin by modeling the production process. Specifically, we assume manufacturing production at the firm level *j* depends on capital, labor, infrastructure, and intermediate inputs:

$$Q_M = f(K_M, L_M, KPUB_M, II_M) \quad \textbf{(1)}$$

Profit maximizing behavior leads to an aggregate manufacturing supply function that depends on the prices of the good in question and its factor inputs: capital, labor, and intermediate inputs – which in turn depend on domestic prices and on the exchange rate – and on level of infrastructure $KPUB_M$, as well as on the quality of inputs and the level of technology II_M, which are related to overall education, *ED*, and the extent of urbanization, *URB*. The aggregate supply function also depends on industry (localization) and region (urbanization) agglomeration economies, which in turn are related to *URB*:

$$S_M = f(r_M, w_M, KPUB_M, e, P_M, P_{IM}, ED, URB) \quad \textbf{(2)}$$

Some of this sector's output will be consumed locally; the rest will be exported. Domestic demand depends on overall level of development, as proxied for by *GDP*, the share of government in GDP, *G*, since government is a major source of "modern sector" demand, both directly and indirectly, through the domestic price relative to world price, P_M, and through the exchange rate *e*, defined here as the number of units of domestic currency per USD.

$$DD_M = d(GDP, G, e, P_M) \quad \textbf{(3)}$$

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[19] Temple (1998) links slow growth in sub-Saharan Africa to high levels of minerals' exports, among other forces. Minerals' exports directly crowd out manufactures' exports to some extent, both via competition for scarce factors and from Dutch disease forces. Furthermore, by reducing economic growth, minerals orientation keeps markets small and further reduces manufacturing sector development. While not all of the small countries listed are minerals exporters, sub-Saharan Africa in particular and Latin America (and Jamaica) are more minerals-oriented than most of the large developing countries, Asian Tigers, or China. The obvious exception to this statement is Malaysia, which has managed to combine substantial minerals-orientation with agricultural exports and the rise of manufactured exports.

Then exports are:

$$\begin{aligned} MSX &= f(r_M, w_M, KPUB_M, e, P_M, P_{IM}, ED, URB) - d(GDP, G, e, P_M) \\ &= x(r_M, w_M, KPUB_M, e, P_M, P_{IM}, ED, URB, GDP, G) \end{aligned} \quad \textbf{(4)}$$

The likely signs are:

r	-	
w	-	
$KPUB$	+	
e	+	probably: in theory, indeterminate
P_M	+	
P_{IM}	-	
ED	+	
URB	+	probably; indeterminate if demand also depends on URB
GDP	-	probably; indeterminate if supply also depends on GDP
G	-	

Several problems emerge in estimating equation (4). Data problems are obvious, especially since we are restricting our information set to what is known from 1960 or, at the latest, 1965. Moreover, (4) is a single reduced form equation in what is properly a much larger macroeconometric model. Thus, the right-hand side terms are not independent of one another. *GDP* depends on *URB* and *ED*; *URB* depends on *G* and *e*, *G* depends on *GDP* and *URB*, *w* depends on *GDP* and *ED*, and *KPUB* depends on *G* and *URB*. This is not deeply problematic if we are simply trying to forecast manufactured exports, but it makes significance levels difficult to interpret. More critically, as we lack data on all of the variables, omitted variables' problems seem inevitable, and even signs are hard to interpret. The longer-term solution (again, a topic for a subsequent paper) is to hunt for instruments and estimate a multiple equations model.

Some of the explanatory terms also depend on *MSX*. We expect that *e* and *GDP* are the most important of these, but again defer simultaneous equations modeling to a later paper. One of the reasons for doing so is that there are multiple exchange rate regimes in operation, and the particular one in force in a given country will affect the nature of outcomes. If exchange rates are fixed, then standard small, open economy (SOE) conditions hold: increases in capacity will not face a downward sloping global demand curve because of exchange rate appreciation that would make

exports more expensive in foreign currency terms. If *e* is flexible, then booms will be choked off more rapidly. However, determining which regime was in force in a given country at a particular time is a painstaking process, especially given the existence of dirty floats and currency bands, and that analysis, plus accompanying estimation strategies, merit an entirely separate paper. For the purposes here, we will simply note that in the early 1960s, most exchange rates were (officially) fixed, and that the sort of econometric techniques needed to handle multiple types were not available to Lewis or others. One modest correction we do make is to subtract manufactured exports from the GDP measure we do use (termed *GDPA*, for "adjusted GDP"), since these exports are a component of GDP, and failure to subtract them would invite spurious correlation.

On the other hand, we recognize that Lewis did not engage in econometric research, and that he would have had to perceive patterns through a sense of the data and insights gleaned from histories of individual countries or regions, rather than formal hypothesis testing based on data compilations, or on atheoretic data-mining. Therefore, we do not restrict our own empirical work to simple OLS patterns regressions. Nor do we impose a particular model, but rather seek to determine whether the data reveal any *reasonably* discernable patterns. We therefore turn to estimate single equation models based on (4), but with several modifications. For the most part, the estimates are based on fixed effects models, as we wish to pick up country specificity. However, results without fixed effects also are reported, as are regressions from first differences. Many structural differences – urbanization, for example, disappear or become less important this way. But the main reason to look at first differences' models is that lags could be important, and there also might be convergence. This convergence could matter both in terms of *GDP* growth and trade structure. This again leads to questions of simultaneity, and eventually to a system of equations with a first differences version of (4) that includes a *GDP* level term to pick up convergence effects. To that would be added a *GDPA* growth equation that depends on *MXS* and *GDPA* levels for convergence reasons. First differences regressions also reduce problems of PPP vs. non-PPP real *GDP*, though they are not completely eliminated. The data we use are restricted to 1960, 1965, and 1970 (on the assumption that future outcomes were becoming evident in advance). Since fixed effects models have little variation in them because of the short time series, we also present simple snapshot cross-section regressions for 1960.

To summarize, then, this paper focuses on single-equation, cross-country regressions using data from 1960-1965 or 1960-1965-1970. There are three variants: 1960 levels regressions, 1960-65-70 fixed effects regressions, and 1960-65 first differences' growth regressions. The first two roughly take the form of (4.1), while the growth equation takes form (4.2):

$$XMS = x(INV_M, GDPA, URB, G, ADLIT, DISTORT, FDI) \quad \textbf{4.1}$$

$$\Delta XMS = x(\Delta INV_M, \Delta GDPA, \Delta URB, \Delta G, \Delta ADLIT, \Delta e) \quad \textbf{4.2}$$

ADLIT is the adult literacy rate – an easily obtainable proxy for labor force skill level. *INV* is manufacturing sector investment/GDP. In the absence of interest rate data, one can presume that investment rises as interest rates decline, so that high investment rates signal low costs of capital. *DISTORT* is a measure of trade distortions, such as import and export tariff revenue/GDP. *FDI* is foreign direct investment/GDP. The reason for including these terms in place of *e* is that in levels' equations, *e* is a non-normalized price, and so will have no meaning. It can, however, be used in differences' equations. There were no PPP estimates when Lewis wrote, so values are converted into US dollars for a base year, and then deflated by a GDP deflator thereafter.

This does not exhaust Lewis's potential knowledge, since he also was aware of historical patterns. A comprehensive analysis – again, awaiting a subsequent paper – would include single-equation, time-series analysis for particular countries, using data from 1950-1965 or (a bit outside the era) 1950-1973. Likely candidate countries include India, Pakistan, Malaysia, Thailand, Egypt, Venezuela, Brazil, Mexico, Chile, Argentina, Jamaica, and Japan. With time series regressions, we cannot include terms that exhibit very strong serial correlation, especially if they are not independently estimated every year, like *URB* or *ADLIT*, and also must worry about lags.

Obviously, the rise of developing countries' manufactured exports has not gone unnoticed, and several others have examined their patterns and determinants. Our regressions are differ from other studies in design, since we focus on developing country conditions rather than developed country demand side factors, and also since we intentionally restrict the data set to information from the 1960s. Our choice of focus is driven in part by the radically different export experiences of

different developing countries, suggesting the importance of domestic policy and capacity factors. It also appears to be consistent with Lewis's own emphasis, which favored the impact of transformations in developing countries on exports (see, for example, Lewis, 1957: 585-7). This is not to say that demand forces are unimportant – the next step is to endogenize both demand and supply, much as Athukorala and Reidel (1996) have done for Korea – but rather it seems difficult to explain the growth of LDC manufactured exports solely or even largely by growth in MDC demand. Surely, the high income elasticities of MDC demand reported below do not mean that textiles are luxury goods, but rather than there is a switch in demand to the production of developing countries as the latter's capacity grows.

Among the earliest empirical papers on the topic is Reidel (1984). He uses unmodified OLS regressions with time series data for all LDCs from 1960-78, and regresses the natural logarithm of export volumes on developed country real GDP. This regression is not generated by a formal model, but it is the obvious reduced form to a simple demand model. Insofar as one should believe regressions at such a high level of aggregation, the elasticity of LDC manufactured exports with respect to developed country real GDP is slightly less than unity, decreasing in developed country GDP growth, but with a positive 1970s decade dummy. Marquez and McNeilly (1988) provide a survey of other early empirical studies. Using quarterly data from 1974-1984 for several developed countries on imports for different SITC codes from developing countries, Marquez and McNeilly employ 2SLS estimates under a variety of alternative adjustment mechanisms (Shiller's distributed lags, Engle's spectral band estimator, and a partial adjustment model). Their trade-weighted income elasticities for OECD imports from developing countries range from -0.1 to +0.5 for food, -0.8 to -0.4 for raw materials, and +2.4 to +3.0 for manufactures (but with a price elasticity below -1). These estimates are somewhat below in absolute value terms the small-country models income elasticities of demand for Korean exports from Athukorala and Reidel (1996), who present alternately Phillips-Hansen cointegration and standard error-correction model (ECM) estimates, with a range of 3.0 to 9.8. This finding seems broadly plausible, as Korean exports are far more skill and technology-intensive than most LDC exports. Their price elasticity estimates range from -6.7 to -11.8, which again is plausible for a single country relative to all LDCs. Their estimates of supply capacity elasticities range from 0 to 1.4.

The model closest to that presented below is Wood and Berge (1997), who regress developing country exports and imports of manufactures relative to primary products on skill/land and skill/labor ratios in a cross-country panel setting. They also emphasize the dramatic differences across regions/country types in terms of both schooling/land ratios and manufactures/primary export ratios. Put differently, simple regressions result in great fits, but the pattern mainly reflects differences in different types of countries, creating a potential observational equivalence problem. However, regional dummies prove insignificant. They also seek to determine whether trade policy, either as reflected in tariff differences or overall trade orientation, matters for the manufactures/resource-based export ratio. Briefly, while orientation and tariff variables are not significant, they find that manufactures' exports are depressed by price distortion variability and the black market exchange rate discount do depress manufactured exports. However, these "policy" variables are secondary in importance to endowment measures. By implication, the rapid growth in manufactured exports exhibited by many but not all developing countries in large part should reflect rapid skills accumulation – both directly, and, as suggested by Athukorala and Reidel (1996), because of its contribution to overall economic growth. But these sophisticated measures of skill intensity and policy were not available to Lewis and his peers, and we maintain a simpler model.

IV.3 Comparing manufactures' exports forecast from 1960s data with actual outcomes

While we would like to estimate (4.1) and (4.2), possibly with a global demand side that would endogenize exchange rates (or allow us to keep price terms from equation 4), the information set available in the 1960s was far more limited. Information was available on GDP for different countries, together with data on gross domestic savings. The range of distortion variables used by Wood and Berge (1997) was beyond reach, but economists from the era could have derived indirect estimates of trade distortions, at least for a subset of countries. The easiest way to do this would have been to construct a measure of trade openness, as the amount of trade will be inversely related to the level of trade barriers. Furthermore, data on government budgets and population structure were not available systematically, but could be obtained for many countries. What emerges in a single equation model, with further paring down to reduce multicollinearity, are the regressions in Table 2.

The top part of the table presents estimates and their fully robust standard errors (underneath) using fixed effects and first-differencing estimation techniques. All variables are weighted by PPP-adjusted exchange rates (LCU per US$, period average) and the US GDP deflator. Time aggregates are included in each regression but not presented. The second half of the table presents the actual mean and fitted mean values for manufactured exports in 1970, 1980, 1990 and 2000.

As other empirical work has confirmed, *XMS* rises with *GDP-Exports*. To allow for nonlinearities, we add a quadratic term and, indeed, the gradient diminishes as level of economic development increases. Our simple trade openness (*TO*) measure, the sum of total exports and imports as a percentage of GDP, has a consistently positive sign, though we must acknowledge a positive bias, since *XMS* is a component of *TO*. However, we anticipate that the main force in this positive sign is the impact of fewer trade distortions in increasing both trade orientation generally, and manufactured exports specifically. Note that this effect has a similar coefficient regardless of regression technique, so that it does not simply pick up a selection effect (with small countries having little choice but to follow an export-oriented strategy). However, since the literature (especially Londero and Teitel, 1996, and Lall, 1998) suggests that export patterns vary greatly for different types of countries, an obvious extension would be to examine subsamples. We do not do so here, as our early 1960s total data set is already quite small.

The urbanization variable also reflects a country's production structure to a large extent. Other than some mining countries, developing countries with large urban population shares tended to have historically protectionist, import-substitution oriented development strategies. In contrasting continents: relatively protectionist Latin America has consistently been far more urbanized than East Asia, the epicenter of developing country manufactured exports. High rates of urbanization are thus associated with low manufactured export shares. Savings has a positive impact, controlling for fixed effects, or looking at first differences. There is also evidence of convergence.

The next step is to ask what these regressions would have predicted for the future. To our delight, the predictions are terrible. For the full sample (using data from 1960 to 2003), it is apparent that the extent of underprediction grows over time in both the OLS and fixed effects estimates. By implication, actual manufactured exports as a share of GDP in developing countries consistently

surpasses levels (or growth) that would be predicted by information available from the early 1960s. Thus, the LDC manufactures' export explosion that has followed could not have been divined from data available to Lewis and his peers, even had they made the effort to collect information that 40 years ago was not assembled as a matter of course by the World Bank or United Nations.

V. Summing up

History is often a harsh judge, and by economists' standards, Lewis appears to have done exceedingly well. The dualistic development model remains a reference point nearly half a century after it was introduced. Developing countries are making the trade pattern Lewis predicted more than four decades ago, and at a pace even he might find surprising. Real living standards have indeed risen in many countries that have made the switch, but the fall in real prices of basic traded manufactures certainly has been realized. Lewis' claim that it is the opportunity cost of labor rather than the nature of the traded good that determines its price surely has been borne out.

Furthermore, while living standards of industrial workers in Korea, Malaysia and Thailand have risen far more than Lewis might have anticipated, the fundamental message remains intact. As long as a reservoir of surplus labor remains in the interior of China and in much of India or Bangladesh, wage growth in newly industrialized countries (NICs) and in near-NICs will be limited. Rising production costs in Korea or Malaysia threaten to induce producers to set up future factories in lower cost settings, thereby curbing labor demand. This is well understood by growth-oriented leaders in East and Southeast Asia. Their response is to invest in infrastructure and education, hoping to jump to new, more skill-intensive industries before losing the old ones. This is a strategy that Lewis would have predicted, and applauded.

Reading Lewis remains a rewarding exercise. Hindsight suggests that the role of physical capital accumulation as a force in economic development could be deemphasized. This, of course, is a sign of the period in which he wrote, as is his pessimism over the potential for developed country import growth. Lewis could not have foreseen the great liberalization of trade and capital flows that has taken place in the past two decades, or the extraordinary growth of the US economy during the 1990s that enabled the developing world's export surge. Thus, we can interpret Lewis' encouragement of intra-LDC trade as a logical response to an anticipated sluggish market for exports to developed countries. There is no way to read Lewis without seeing him as an enthusiastic

supporter of trade growth (and hence institutions such as WTO) – though with the caveat that equal priority must be given to raising foodstuff productivity and skills in the developing world.

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Table 1
PATTERNS OF MERCHANDISE AND SERVICE TRADE, 1980, 1997, AND 2003
(in current US $ billion)

Country	1980				1997				2003			
	Food & Agriculture	Fuels & Minerals	Manufactures	Services	Food & Agriculture	Fuels & Minerals	Manufactures	Services	Food & Agriculture	Fuels	Manufactures	Services
United States												
Exports	49.0	19.2	140.5	47.6	76.5	25.5	516.4	256.2	63.3	15.1	582.0	304.0
Imports	27.5	95.1	125.1	41.0	62.6	98.4	698.1	166.2	61.0	160.0	991.8	256.0
Canada												
Exports	14.5	17.7	30.3	7.4	33.9	33.9	133.5	30.0	20.1	44.3	167.0	42.9
Imports	5.2	9.8	41.5	10.7	13.7	13.7	161.9	36.4	15.0	15.0	201.4	50.7
Australia												
Exports	9.6	6.0	4.7	3.9	18.0	18.6	16.3	18.8	13.8	15.0	21.6	21.1
Imports	1.6	3.2	14.9	6.5	3.7	4.3	52.7	18.8	4.6	7.1	74.5	21.5
New Zealand												
Exports	3.9	0.3	1.1	1.0	8.9	0.8	4.1	4.0	8.2	0.2	4.8	6.4
Imports	0.4	1.4	3.6	1.8	1.3	1.2	12.1	5.0	1.5	1.7	14.7	5.6
Korea												
Exports	1.4	0.2	15.7	2.6	4.1	5.4	125.1	26.3	2.7	6.9	180.0	32.7
Imports	4.7	8.0	9.6	3.3	15.9	31.8	96.9	29.5	10.0	39.0	114.8	40.3
Malaysia												
Exports	6.0	4.5	2.5	1.1	10.9	7.0	59.2	15.0	8.6	10.0	76.4	13.6
Imports	1.5	2.0	7.2	3.0	4.8	4.8	67.7	17.5	4.2	4.5	68.1	17.5
Philippines												
Exports	2.4	1.3	1.3	1.4	2.2	0.7	11.2	15.1	2.2	0.6	32.9	3.0
Imports	0.8	2.8	4.0	1.4	3.9	3.9	23.5	14.1	2.8	4.0	31.4	4.2
Thailand												
Exports	3.7	0.9	1.6	1.5	13.2	1.7	40.9	15.8	11.4	2.0	60.7	15.8
Imports	0.8	3.2	4.8	1.6	5.0	7.4	48.4	17.3	3.7	9.1	57.6	18.2
Brazil												
Exports	10.1	2.2	7.4	1.7	18.4	5.2	28.3	7.3	21.0	3.8	37.8	10.5
Imports	2.7	12.0	10.2	4.9	7.8	9.8	48.2	18.5	3.6	8.0	36.5	15.6
Costa Rica												
Exports	0.67	0.01	0.29	0.19	3.12	0.09	1.07	1.52	1.8	0.0	4.0	2.0
Imports	0.18	0.27	1.09	0.29	0.60	0.47	3.10	1.15	0.6	0.6	6.3	1.2
Mexico												
Exports	2.2	11.3	1.9	4.6	7.7	13.2	89.0	11.4	9.1	18.5	135.0	12.7
Imports	1.5	1.2	14.7	6.5	8.9	5.6	92.8	12.6	12.0	6.0	153.1	18.2
Peru												
Exports	0.65	2.09	0.56	0.72	2.32	2.81	1.04	1.54	2.4	0.9	2.0	1.7
Imports	0.59	0.10	1.88	0.88	1.37	0.94	6.25	2.29	1.1	1.5	5.7	2.6

Table 1, continued

PATTERNS OF MERCHANDISE AND SERVICE TRADE, 1980, 1997, AND 2003

(in current US $ billion)

Country	1980				1997				2003			
	Food & Agriculture	Fuels & Minerals	Manufactures	Services	Food & Agriculture	Fuels & Minerals	Manufactures	Services	Food & Agriculture	Fuels	Manufactures	Services
India												
Exports	2.48	0.53	4.43	2.95	7.08	1.61	23.18	9.25	6.3	3.2	42.8	27.6
Imports	1.52	7.05	5.39	1.52	2.90	13.43	18.15	8.11	4.1	2.2	38.4	16.9
Pakistan												
Exports	1.14	0.18	1.24	0.62	1.12	0.09	7.42	1.76	1.2	0.3	10.2	3.0
Imports	0.86	1.60	2.89	0.85	2.57	2.46	6.04	3.26	4.3	2.9	7.6	3.3
Tunisia												
Exports	0.18	1.25	0.80	1.07	0.67	0.56	4.34	2.52	0.6	0.7	6.5	2.9
Imports	0.63	0.88	2.04	0.60	1.11	0.87	5.95	1.13	1.0	0.8	8.6	1.6
Turkey												
Exports	1.89	0.23	0.79	0.71	5.51	1.05	19.68	19.37	4.7	1.0	39.0	19.1
Imports	0.45	3.86	3.26	0.57	4.86	7.29	34.98	8.51	2.9	9.0	47.4	8.6
SACU												
Exports	2.81	2.81	4.60	3.03	4.68	7.18	17.17	5.23				
Imports	1.11	0.37	11.50	4.02	2.48	3.41	22.33	6.59				
Cameroon												
Exports	0.85	0.44	0.06	0.37	0.89	0.76	0.15	0.48	0.5	1.2	0.2	
Imports	0.14	0.20	1.20	0.38	0.21	0.22	0.87	0.69	0.4	0.3	1.4	
Kenya												
Exports	0.68	0.46	0.16	0.58	1.23	0.23	0.49	0.94	1.0	0.5	0.6	1.2
Imports	0.23	0.91	1.45	0.50	0.62	0.59	2.07	0.84	0.4	0.9	2.3	0.7
Senegal												
Exports	0.22	0.19	0.07	0.34	0.10	0.10	0.20	0.56	0.5	0.3	0.4	
Imports	0.27	0.26	0.50	0.34	0.39	0.14	0.62	0.58	0.7	0.4	1.5	

Source: World Bank (1999, 2003)

Table 2.
Manufactured Exports/GDP Equations for Less Developed Countries from 1960-2003

	OLS 1960-2003 (1)	Fixed Effects 1960-2003 (2)	First Differences 1960-2003 (3)	Fixed Effects 1960-1970 (4)	First Differences 1960-1965 (5)
Log (GDP-Exports) [PPP adjusted]	0.0122 (0.0026) ***	0.0132 (0.0016) ***	14.832 (1.6776) ***	2.29e+07 (3.60e+06)***	1.93e+07 (4.00e+06)***
(Log (GDP-Exports)) ^{2} [PPP adjusted]	-0.0000 (0.0000) ***	-0.0000 (0.0000) ***	-0.1544 (0.0174) ***	-845679.8 (132747.7)***	0676381.0 (128515.4)***
Openness Index (Constant Prices)	3.5378 (0.6563) ***	3.7978 (0.4105) ***	3.520 (0.1316) ***	-3.2323 (0.0001)***	-3.2320 (0.0001)***
Urban Population (% of total)	-1.719 (1.2851)	-2.2344 (0.8058) ***	0.1344 (0.2399)	0.45014 (0.00001)***	0.45010 (0.00001)***
Gross Domestic Savings (% of GDP)	0.1163 (0.0978)	0.1551 (0.0618) **	0.1219 (0.0186) ***	0.58389 (0.00003)	0.583292 (0.00002)***
Adult Literacy Rate [% 15 and above]	1.031 (0.9327)	1.4049 (0.5848) **	-0.4637 (0.1721) ***		
Lagged Manufactured Exports	-0.1640 (0.0399) ***	-0.1764 (0.0225) ***	-0.0746 (0.006) ***		
N	1101	1101	998	104	71
R^2 (overall)	0.999	0.999	0.934	0.985	0.999

Manufactured Exports/GDP (means):

1970					
Actual	0.0239	0.0239	0.0239	0.0239	0.0239
Fitted Values	***-0.0354***	***-0.0524***	**-**	***-1.25e+07***	***-1668165***
1980					
Actual	0.0361	0.0361	0.0361	0.0361	0.0361
Fitted Values	***-0.0277***	***-0.0359***	***-0.0915***	***-1.45e+07***	***-112408.2***
1990					
Actual	0.0764	0.0764	0.0764	0.0764	0.0764
Fitted Values	***0.0000***	***0.0029***	***-0.0000***	***-1.46e+07***	***2150.246***
2000					
Actual	0.0898	0.0898	0.0898	0.0898	0.0898
Fitted Values	***-0.0000***	***0.0012***	***0.0000***	***-1.46e+07***	***-337.4665***

*This table presents OLS, fixed effects and first difference estimation results explaining manufactured exports in less developed countries. Fully robust standard errors are in parentheses beneath estimates. ** indicates statistical significance at the 5% level, and *** indicates statistical significance at the 1% level. In addition, actual and fitted mean values for manufactured exports as a share of GDP are also shown. All variables are weighted by the official exchange rate (LCU per US $, period average) and the US GDP deflator. Column 4 and 5 GDP-Export values are in current rather than PPP dollars. Data Source: World Development Indicators (2005)*

FIGURE 1

ECONOMIC DEVELOPMENT WITH UNLIMITED SUPPLY OF LABOR

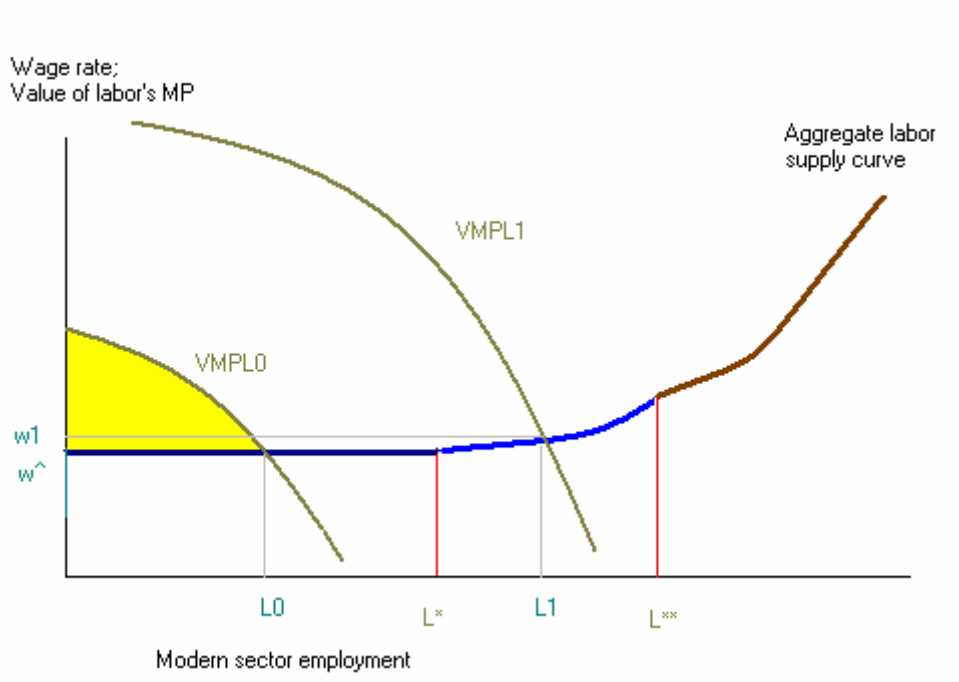
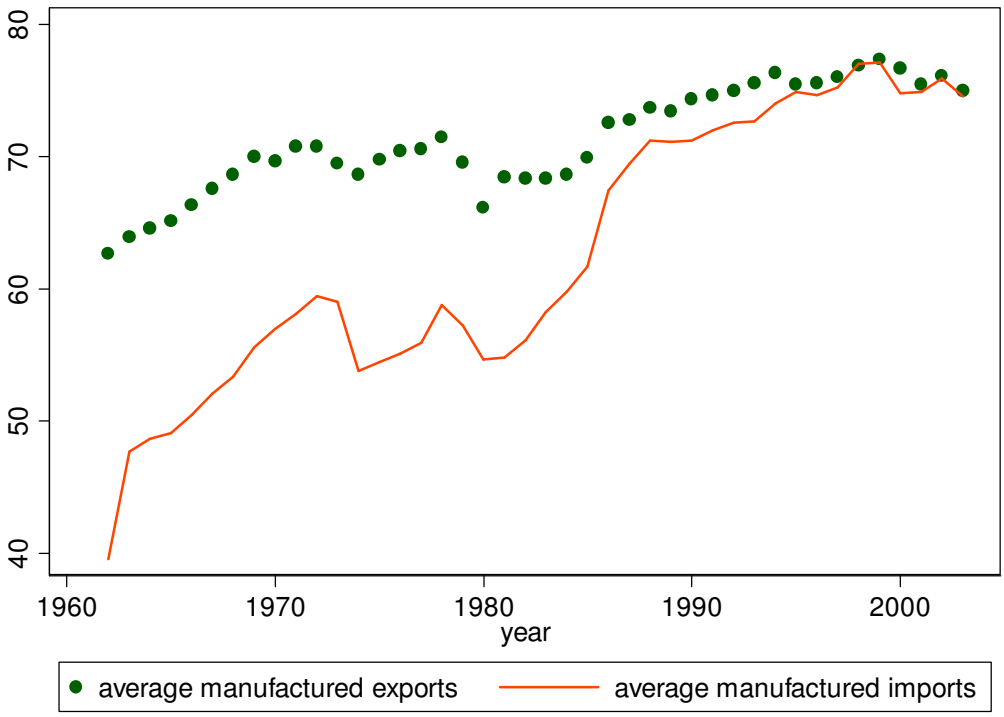
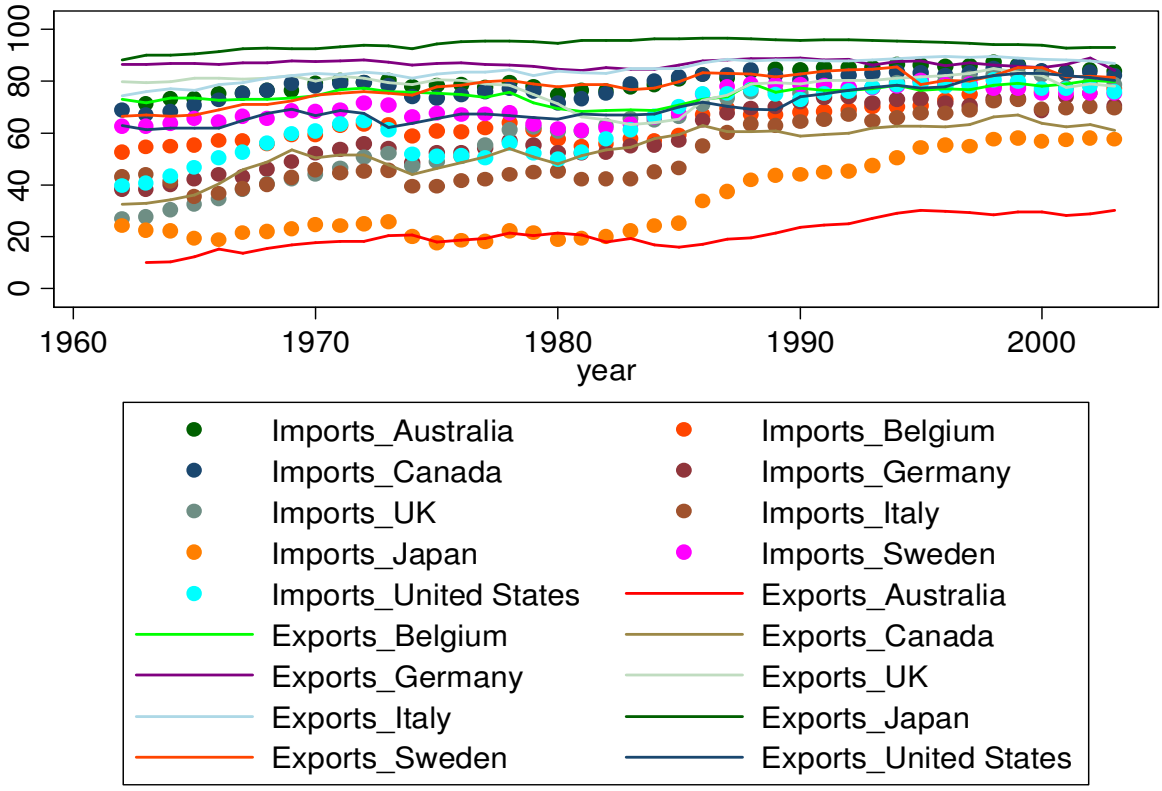


FIGURE 2

MANUFACTURES' EXPORTS AND IMPORTS AS A SHARE OF GDP, DEVELOPED COUNTRIES, 1960-2000

(USA, CANADA, UK, GERMANY, ITALY, JAPAN, AUSTRALIA, BELGIUM, SWEDEN)

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Imports_Australia
Imports_Belgium
Imports_Canada
Imports_Germany
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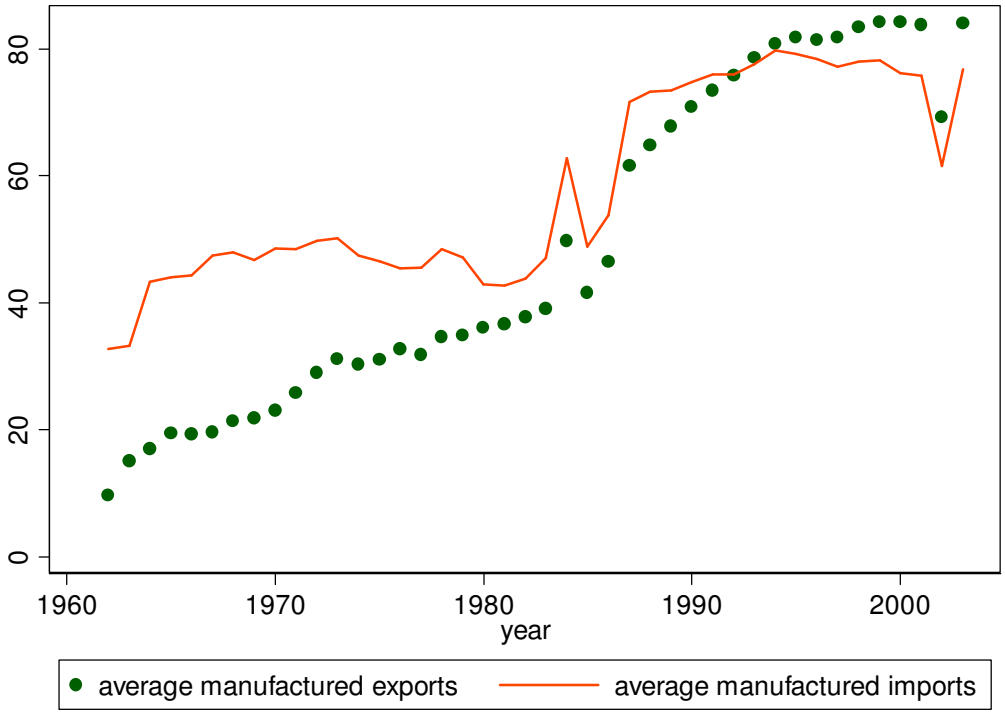
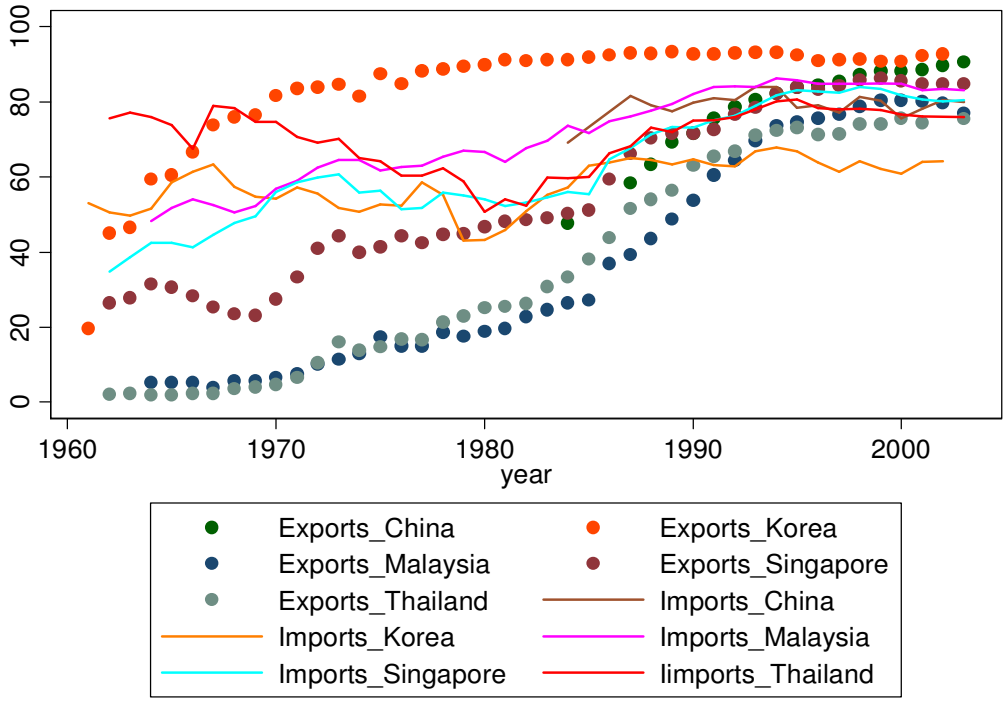
Imports_Italy
Imports_Japan
Imports_Sweden
Imports_United States
Exports_Australia
Exports_Belgium
Exports_Canada
Exports_Germany
Exports_UK
Exports_Italy
Exports_Japan
Exports_Sweden
Exports_United States

FIGURE 3

MANUFACTURES' EXPORTS AND IMPORTS AS A SHARE OF GDP, ASIAN TIGERS AND CHINA, 1960-2000
(KOREA, SINGAPORE, MALAYSIA, THAILAND, CHINA)

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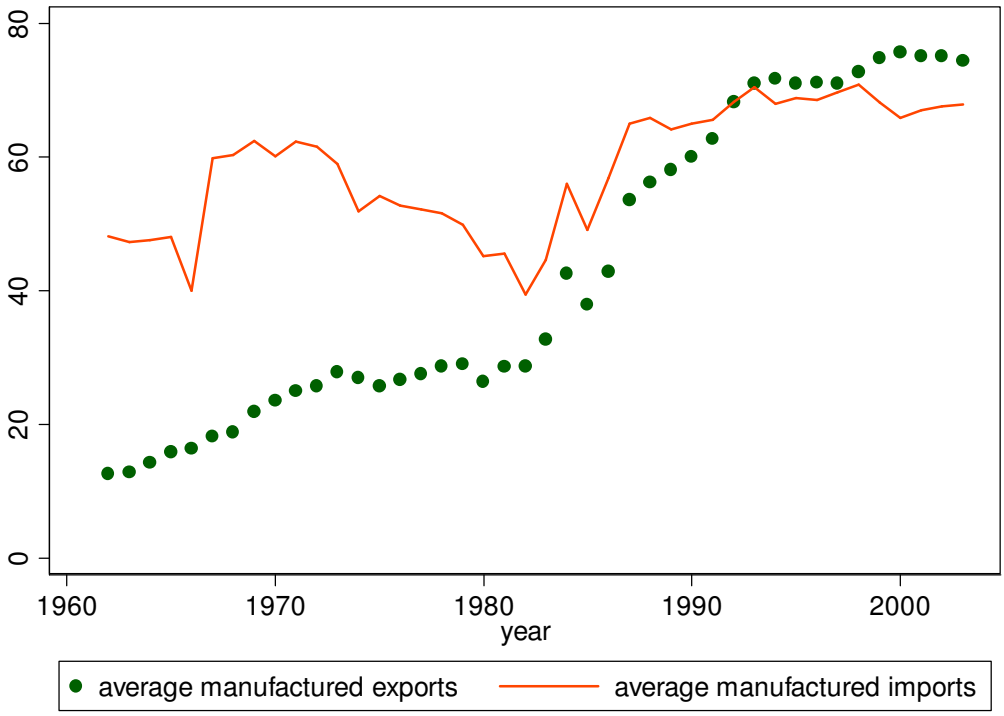
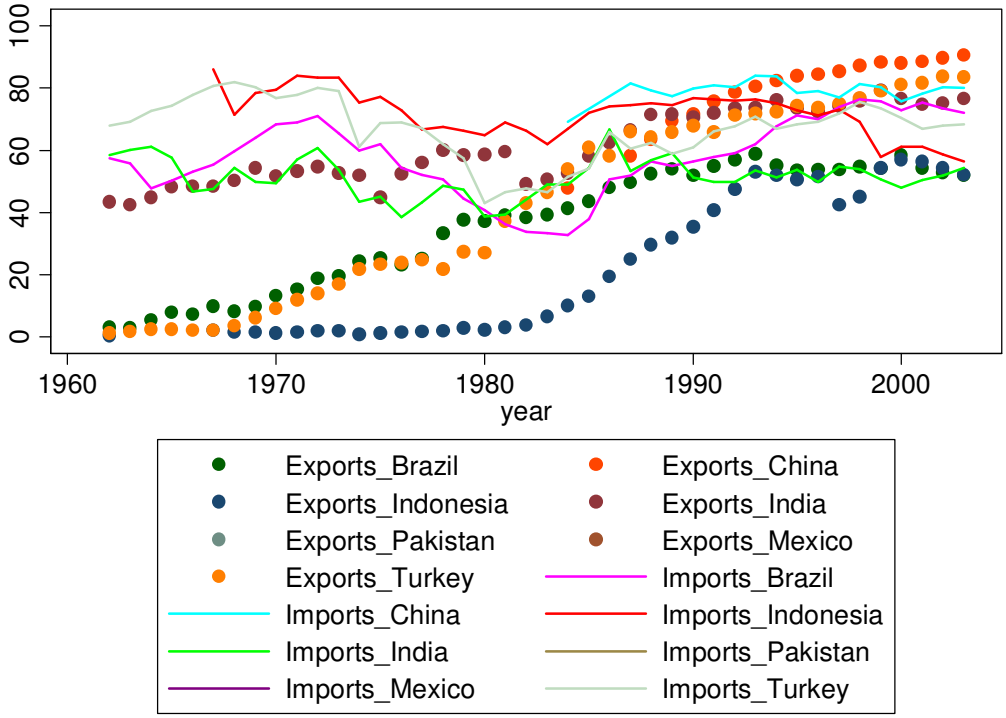
Exports_Korea
Exports_Malaysia
Exports_Singapore
Exports_Thailand
Imports_China
Imports_Korea
Imports_Malaysia
Imports_Singapore
Iimports_Thailand

FIGURE 4

MANUFACTURES' EXPORTS AND IMPORTS AS A SHARE OF GDP, LARGE DEVELOPING COUNTRIES, 1960-2000
(INDIA, CHINA, BRAZIL, MEXICO, TURKEY, PAKISTAN, INDONESIA)

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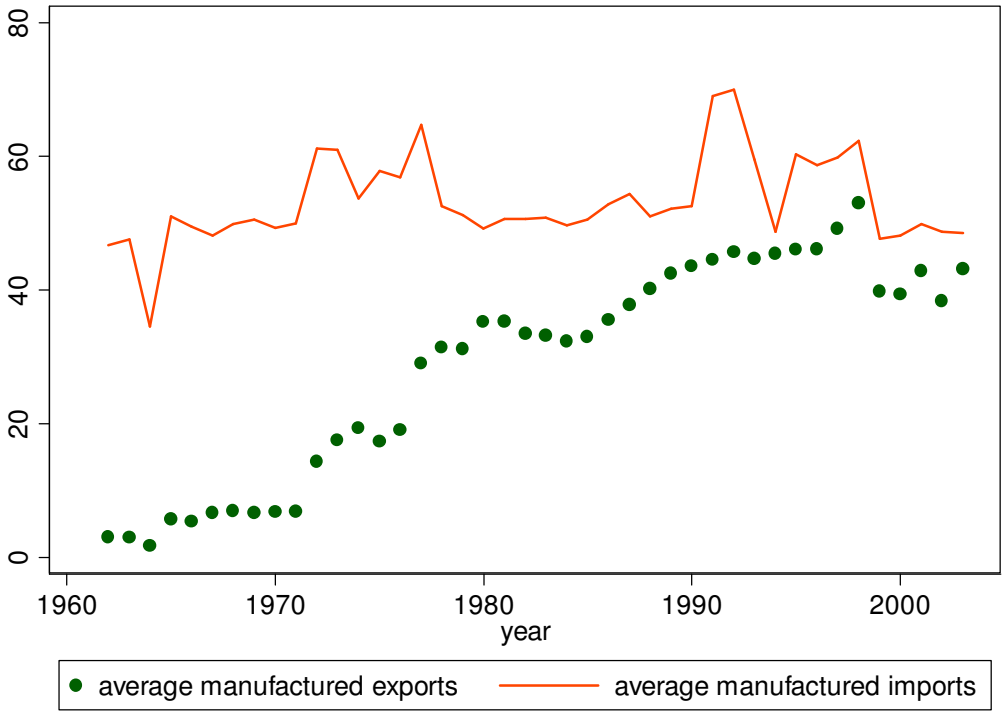
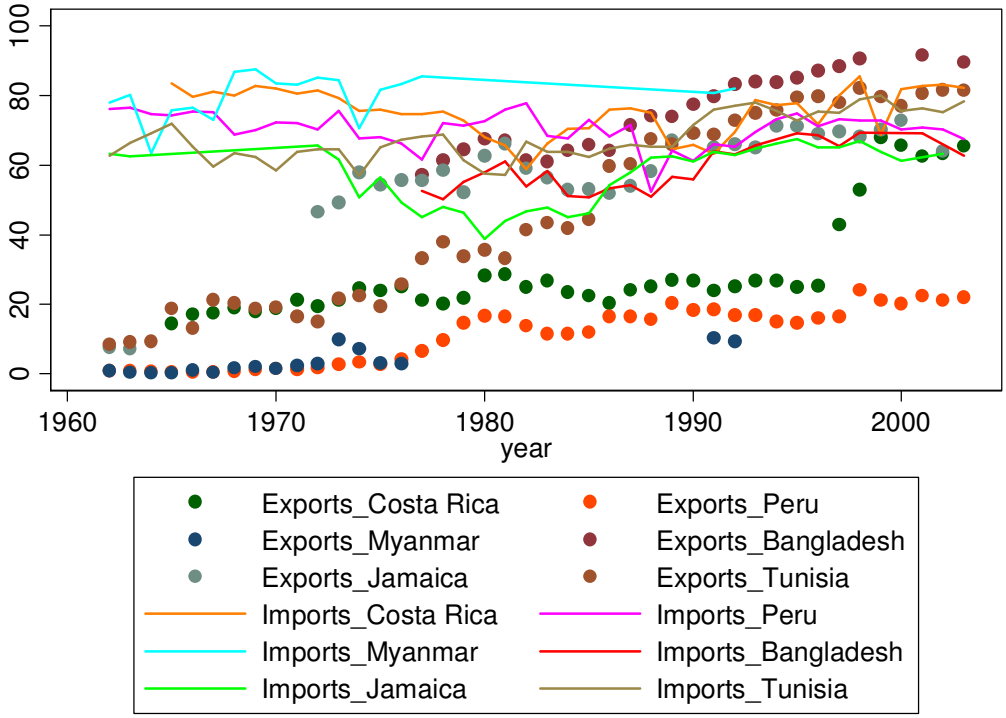
Exports_Indonesia
Exports_India
Exports_Pakistan
Exports_Mexico
Exports_Turkey
Imports_Brazil
Imports_China
Imports_Indonesia
Imports_India
Imports_Pakistan
Imports_Mexico
Imports_Turkey

FIGURE 5

MANUFACTURES' EXPORTS AND IMPORTS AS A SHARE OF GDP, SMALL DEVELOPING COUNTRIES, 1960-2000
(COSTA RICA, PERU, TUNISIA, BURMA/MYANMAR, BANGLADESH, JAMAICA)

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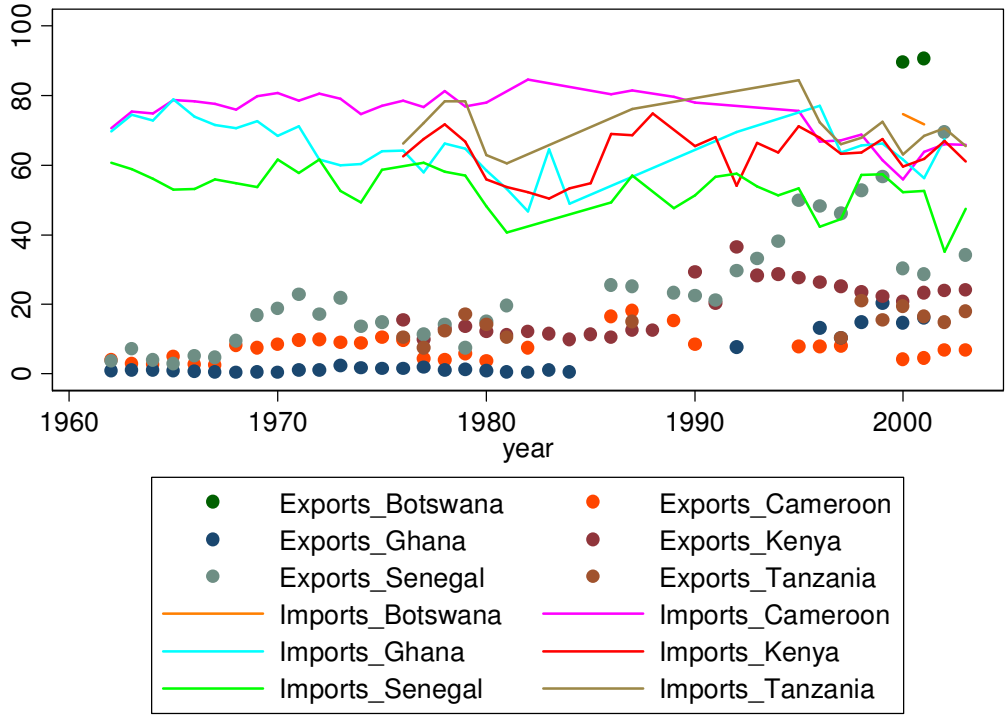
Exports_Costa Rica
Exports_Peru
Exports_Myanmar
Exports_Bangladesh
Exports_Jamaica
Exports_Tunisia
Imports_Costa Rica
Imports_Peru
Imports_Myanmar
Imports_Bangladesh
Imports_Jamaica
Imports_Tunisia

FIGURE 6

MANUFACTURES' EXPORTS AND IMPORTS AS A SHARE OF GDP, SUB-SAHARAN AFRICAN COUNTRIES, 1960-2000
(KENYA, CAMEROON, GHANA, SENEGAL, BOTSWANA, TANZANIA)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Exports_Kenya
Exports_Senegal
Exports_Tanzania
Imports_Botswana
Imports_Cameroon
Imports_Ghana
Imports_Kenya
Imports_Senegal
Imports_Tanzania