

THE LEWIS MODEL IN PRACTICE: ECONOMIC DEVELOPMENT IN LATIN AMERICA DURING THE TWENTIETH CENTURY

[first discussion draft]

Abstract. ‘Economic Development with Unlimited Supplies of Labour’ contains a growth model in the classical tradition designed as a representation of early industrialisation in developing countries over the long run. Central properties of this model include: high and rising labour productivity in industry, while in agriculture it is low and stagnant; labour reallocation from agriculture to industry as the basis for ‘extensive’ growth; and a rising investment rate as growing incomes permit increased saving. This paper tests Lewis’ propositions for Latin America both during the fifty years before his model – covering the transition from primary export led growth to import-substituting industrialisation – and during the subsequent fifty years of transition from closed to open economic strategy. The results do not seem to confirm the central role in economic growth of unskilled labour supply at a low real wage, but do support Lewis’ classical emphasis on factor accumulation, and thus both human and physical investment, which Lewis further developed in ‘The Theory of Economic Growth’.

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1. Introduction¹

‘Economic Development with Unlimited Supplies of Labour’² contains a growth model in the classical tradition, designed as a representation of early industrialisation in developing countries over the long run, which is now regarded as canonical to development economics. Lewis based his model on ‘stylised facts’ drawn from economic history rather than systematic quantitative evidence, which was not available for developing countries at that time.³ Although he presented his model as generally true of developing countries and Asia is specifically mentioned,⁴ it is reasonable to suppose that Latin America – with its large labour reserves, incipient industrialisation and reliance on primary exports – was also in his mind. However, the recently completed OxLAD database⁵ now provides comparable economic and social series for the major Latin American economies for the whole of the twentieth century. This paper is thus able to test Lewis’ propositions for both the fifty years before his model – covering the transition from primary export led growth to import-substituting industrialisation – and the subsequent fifty years of transition from closed to open economic strategy.⁶

Lewis (1954: 138-9) summarises his argument in fifteen propositions, the first of which is that the classical model of surplus labour freely available to the ‘modern’ sector at the subsistence wage is appropriate for developing countries: “The neo-classical model (including the Keynesian) when applied to such economies gives erroneous results” [1]. The remaining 14 propositions may be grouped into three categories:

Labour supply. The main sources of surplus labour are “subsistence agriculture, casual labour, petty trade, domestic service, wives and daughters” where “the marginal productivity of labour is negligible, zero or even negative” [2]. The subsistence wage “may be determined by the conventional view” or by “the average product in subsistence agriculture” [3]. In

¹ As will become rapidly evident to the reader, this paper relies heavily upon results of empirical research with two Oxford colleagues, Ame Bergés and Pablo Astorga; however they are not responsible for the interpretation I have placed on our findings.

² Lewis (1954).

³ According to Singer (1979), Arthur Lewis based this model on the earlier work of his Manchester colleague Mandelbaum on industrialisation in Central and Southern Europe, on which see FitzGerald (1991).

⁴ Op. cit. p. 139

⁵ The *Oxford Latin American Economic History Database (OxLAD)* is available on <http://oxlad.qeh.ox.ac.uk>

⁶ More details of the methodology, sources and data used in this paper may be found in Astorga, Berges & FitzGerald (2003).

consequence, “in such an economy employment expands in the capitalist sector as capital formation occurs” [4] but “capital formation and technical progress result not in rising wages but in a raising share of profits in the national income.” [5]

Capital accumulation

The dynamics of the model are such that “as the capitalist sector expands, profits grow relatively, and an increasing proportion of national income is reinvested” [6] Although “capital is formed not only out of profits but also out of credit creation” [7], “inflation for the purpose of creating productive capital is self-destructive” [8]. Finally, the capitalist sector cannot continue with ‘extensive model’ because accumulation is faster than population growth: “when the surplus is exhausted, wages begin to rise above the subsistence level” [9].

Integration to the world economy. Logically, if neighbouring countries also have surplus labour, then labour import and capital export will take place, checking the wage rise [10]. Mass immigration might raise per capita output but would “keep wages in all countries near the subsistence level of the poorest countries” [11]. Similarly, “the export of capital reduces capital formation at home and so keeps wages down” (12) and capital imports do not improve real wages unless they raise productivity in the wage-goods sector [14]. Finally, because “the main reason why tropical *commercial* produce is so cheap is the inefficiency of tropical *food* production per man.” [14], so that “the Law of Comparative Costs is just as valid in countries with surplus labour as it is in others. But whereas in the latter it is a valid foundation of arguments for free trade, in the former it is an equally valid foundation of argument for protection.” [15].

Central and measurable properties of the Lewis model that I propose to examine in relation to the experience of Latin America over the whole twentieth century are: (i) real wages (and by extension living standards) grow slowly with industrialisation while employment rises rapidly; (ii) there is high and rising labour productivity in industry, while in agriculture it is low and stagnant; (iii) labour reallocation from agriculture to industry forms the basis for ‘extensive’ growth; and (iv) a rising investment rate as productivity rises due to increased savings out of profits. This paper focuses on Argentina, Brazil, Chile, Colombia, Mexico, and Venezuela (the ‘LA6’) because these countries account for three-quarters of population and output in Latin America. In Section 2 of this paper, I examine labour supply and living standards – as a rough approximation of the real wage over the long term. Capital accumulation is examined in Section 3, with reference to both physical investment and human capital, with technological change being captured by total factor productivity growth. I then turn to sectoral change and the form of industrialisation in

Section 4. Section 5 concludes with some observations on the integration of Latin America to the world economy.

2. Labour and living standards⁷

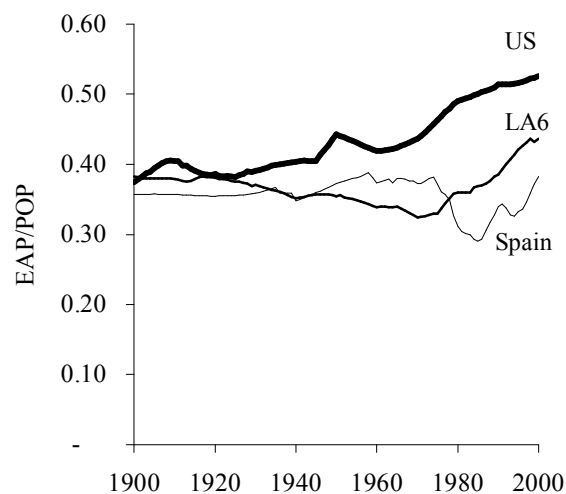
Latin America in the twentieth century was certainly characterised by rapid expansion of the labour force although, as I show below, this was combined with a relatively low rate of capital accumulation, which may help explain decelerating aggregate productivity (and TFP) growth rates through the century as a whole. Population growth reflects a familiar demographic transition, rising mid-century with the fall in mortality rates, and declining towards the end with the fall in birth rates.⁸ The work force in Latin America itself grew in response to population expansion and changes in participation rates, with improvement in its skill level as a result of the spread of schooling. However, the increase in participation rates was sudden and only occurred in the mid-1970s as is evident in Figure 1, that is after the main phase of ‘extensive industrialisation’ (see Section 4 below). This is particularly striking when compared with the more ‘regular’ patterns for the US and Spain.

This increase in participation was partly due to sociological changes, such as the increase in female work force participation, but was also due to the lagged effect of declining infant mortality during the 1940s and 1950s. Data on the economically active population (EAP) for the post-1950 period from the ILO show a complementary increase in workforce and population rates until the 1960s. The EAP subsequently grew by 73 percent between 1963 and 1980, compared to 59 percent growth in population in the same period; and then accelerated further as the EAP increased by 61 percent between 1980 and 1998 compared to 36 percent for population. However, this pattern of increasing activity rates starts at different dates in each country: as early as 1960 in Brazil; around 1970 in Chile, Colombia, Venezuela, and Mexico; and as late as 1990 in Argentina.

⁸. On demographic transition in Latin America, see del Palloni (1990).

This increase appears to be due largely in part to the demographic transition, as the better health and urbanisation of the 1940s onwards worked through birth rates into greater workforce participation. But the entry of women into the workforce as social structures and labour requirements changed was clearly important, with the greatest increases in the female participation rate occurring in Mexico, Venezuela, Brazil, and Colombia – rather than the more ‘socially advanced’ Chile and Argentina.⁹ However, whereas the increase in population and workforce may have exerted a positive demand effect on the creation and expansion of domestic markets in the first half of the century, in the second half the problem was one of productively adsorbing the growing labour force - the failure to do so exacerbating social inequality.

Figure 1: Workforce (EAP) and Population (POP) in Latin America



Sources: Astorga, Berges & FitzGerald (2003)

As Table 1 below indicates, Latin America made dramatic improvement in per capita income and social welfare during the twentieth century. Between 1900 and 2000, average per capita incomes in 1970 PPP dollars in the LA6 rose almost five-fold, growing at an average compound rate of growth of 1.8 per cent per annum.¹⁰ Literacy rates and life expectancy—broad indicators of ‘human capital’—saw the per cent of LA6 population over 15 years of age considered to be literate nearly double from 33 per cent in 1900 to 60 per cent by 1950 and 89 per cent by 2000; life expectancy at

⁹. See Appendix Table A.6 of Astorga, Berges & FitzGerald (2003). This increase in female participation may be due in part to improved recording, particularly as women’s participation in agriculture and in family firms has traditionally been high but under-reported in censuses.

¹⁰ The LA6 and LA13 sub-regional averages are population-weighted means of country values.

birth rose from 29 years in 1900 to 70 years by 2000. These improvements are also evident in the smaller less industrialised Latin American countries, although to a lesser degree.

Table 1. *Income per capita, literacy and life expectancy in Latin America*

	<i>GDP per capita</i> <i>(1970 PPP dollars)</i>			<i>Literacy</i> <i>(percent)</i>			<i>Life Expectancy</i> <i>(years)</i>		
	1900	1950	2000	1900	1950	2000	1900	1950	2000
Argentina	497	811	1,459	51	88	97	39	61	73
Brazil	114	245	874	35	49	85	29	43	68
Chile	284	592	1,602	44	79	96	29	49	75
Colombia	290	389	921	34	62	92	29	49	71
Mexico	240	519	1,284	24	61	91	25	48	73
Venezuela	94	719	1,014	28	51	93	28	51	73
LA6	216	440	1,077	33	60	89	29	48	70
LA13	...	319	538	25	46	82	31	43	67

Notes: Figures from Appendix Tables A.1, A.3 and A.4 in Astorga, Berges & FitzGerald (2004).

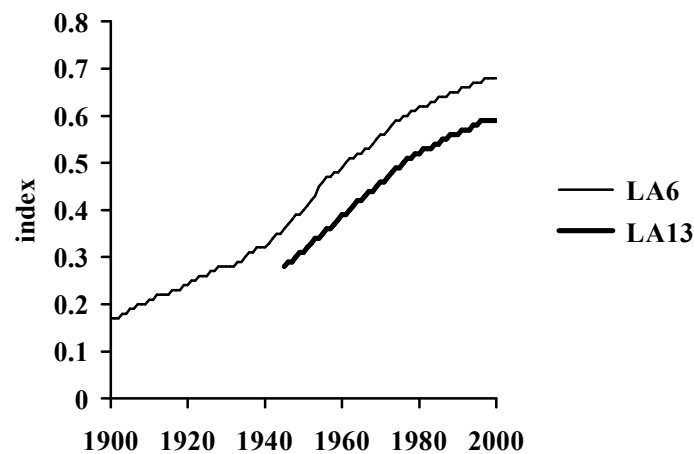
In fact, both literacy and life expectancy experienced the greatest improvement between 1940 and 1980. Literacy grew by 2.2 per cent per annum compared to 1.2 per cent in 1900-39 and to 0.5 per cent in 1981-2000. Life expectancy—perhaps the most fundamental indicators of welfare—increased by an average of three years per decade from 1900 to 1940, rising to seven years per decade between 1940 and 1960, before returning to its previous rate of increase as it approaches the natural asymptote. The LA13 followed a similar pattern but with a considerable lag, rising from 32 per cent literacy in 1920 to 46 in 1950 and 82 per cent by 2000; the ‘big push’ period having occurring after 1945. Health improvements in the LA13 also lagged slightly behind, with life expectancy rising from 46 years in 1950 to 67 by 2000. There are several explanations for the rate of improvement in both literacy and life expectancy during the middle period. In the case of literacy, these figures reflect the lagged returns on the alphabetisation and mass vaccination campaigns in the LA6 in the first third of the century. Increasing urbanisation and the expansion of publicly funded education programmes in the middle decades also saw dramatic advancement in literacy rates.

The prioritisation of public investment in potable water, sanitation, more widely available medical treatment (including cheap antibiotics), along with rising incomes and the urbanisation process has also led to dramatic improvements in life expectancy the middle decades. The improvements in life expectancy, however, appear to be due more to declining rates of infant mortality than to the increase in longevity of the elderly: infant mortality rates in the LA6 have fallen by 24 per cent per annum since 1960, compared to a 5 per cent per annum decline in death rates. Although we have

no similar indicator for the first half of the century, it is reasonable to suggest that in 1900 the mortality distribution was bipolar, and thus life expectancy was really a ‘death measure’—in effect, an expression of the chances of dying in infancy—whereas by 2000 it had become essentially a measure of adult life expectancy.¹¹ Furthermore, these increasing levels of literacy and life expectancy clearly improved the quality of the labour force and contributed to productivity growth: indeed, the accumulation of physical and human capital stock accounts for nearly all the productivity growth experienced during the twentieth century.¹²

Figure 4 illustrates the overall movement of the estimate for living standards (based on a similar methodology to the UNDP’s ‘Human Development Index’ constructed by Astorga, Berges & FitzGerald (2004) for 1900 to 2000. Such an index contains three elements with equal weights – the log of income per capita, literacy level and life expectancy at birth. This index shows that the standard of living in the LA6 – and thus for the majority of the Latin American population – increased four-fold over the century as a whole. However, although standards almost doubled from 0.17 in 1900 to 0.30 in 1935 and more than doubled to 0.62 by 1980, they had risen to only 0.68 by the end of the century. The pace of increase of living standards for the LA13 stagnated after 1980 as well.

Figure 2. *Historical living standard index (HLSI)*



Source: Table A.5.

In terms of explanatory power of the ‘Lewis model’ that motivates this paper, the results are thus clearly mixed. Participation of the population in the workforce has

¹¹ We are indebted to Avner Offer for this point.

¹² See Astorga, Bergés and FitzGerald (2003).

changed, but largely due to demographic reasons – which themselves are driven by public intervention and rapid urbanisation – while the increase of female participation is subsequent to the extensive industrialisation period (1940-70) rather than a driver of it. We do not have data on real wages over the long term, but the Lewis model would imply that aggregate (or median) living standards should not rise as rapidly as productivity until surplus labour is eliminated. However, the evidence on living standards in Latin America during the twentieth century indicates that these have risen in line with productivity, and that the ‘indirect’ components of the real wage (health and education) have actually risen more rapidly than average incomes.

3. Capital Accumulation

Recent studies of the long-run economic growth of Latin America and of the world as a whole do include some aggregate output and population series for the region.¹³ However, the quantitative literature on productivity in Latin America has concentrated on the post-WWII period and addressed aggregate rather than sectoral productivity.¹⁴ In contrast, Figure 3 provides an overview of productivity trends for our six countries in 1970 PPP dollars and weighted by population: by this measure, Latin American productivity grew at 1.6 percent per annum between 1900 and 2000.¹⁵

It is evident that three distinct periods can be distinguished within the century: 1900-36 with 1.5 percent per annum growth; 1937-77 with 2.6 percent; and 1978-2000 with *minus* 0.2 percent.¹⁶ The first and third periods also experienced much higher volatility in annual productivity growth than the second. Thus productivity growth in the middle period can be unambiguously regarded as superior in terms of both level and stability in comparison to the opening and closing periods. These trends reflect a common pattern across the leading economies in the region. The first and third

¹³. See Bulmer-Thomas (1994), Maddison (1995), and Hofman (2000).

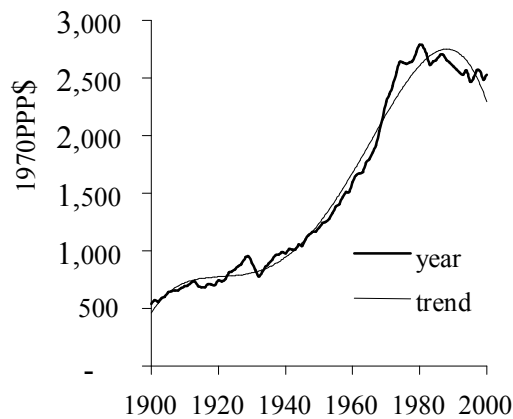
¹⁴. Most recently, Fajnzylber and Lederman (2000). A notable exception is of course Syrquin (1988) and associated studies of structural change, but these are limited to the immediate post-WWII decades.

¹⁵. In the rest of Latin America (the ‘LA13’) productivity growth was only 1.0 percent between 1950 and 2000, compared to 1.5 in the LA6, see OxLAD.

¹⁶ See Astorga, Berges & FitzGerald (2003, 2004) for an explanation of how these periods are determined statistically.

periods, as is well known, correspond to open economies led by primary exports, and the second to state-led industrialisation associated with ‘import substitution’.

Figure 3 Productivity (output per worker) in the LA6



Notes: ‘trend’ is the value of the fitted polynomial for that ‘year’.
Source: Astorga, Berges & FitzGerald (2003) Appendix Table A.1.

Investment rates - essential for the generation of new capital stock and embodiment of new technologies - have been relatively low throughout the century in Latin America, as Figure 4 indicates. In fact gross fixed capital formation averaged only 17 percent of GDP, about half the ratio experienced by the East Asian ‘tigers’ in recent decades.¹⁷ However the investment rate did rise considerably between the first and second halves of the century, while its volatility decreased. The explanation may relate to the reduced reliance on fluctuating export revenue (uncertainty depresses investment) on the one hand, and the development of domestic financial institutions on the other.¹⁸ However, although industrialisation and rapid productivity growth get under way from 1937, the investment rate only rises substantially after 1950. This may be due to excess domestic industrial capacity being absorbed during the Great Depression and WWII as Latin America shifted into import substitutes, with new capacity only needed later.¹⁹ Moreover, the investment rate seems to have been maintained after 1978 - albeit with a trough after the 1982 debt crisis - but without significant impact

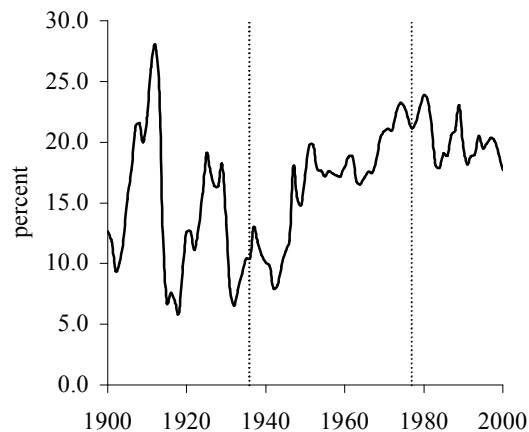
¹⁷. Gross fixed capital formation in South Korea, Hong Kong, Singapore, and Japan averaged 30 percent of GDP between 1960 and 2000, compared to 20 percent in Latin America (World Bank, 2001).

¹⁸ Although the under-estimation of investment in the historical national accounts before 1950 is also a possibility.

¹⁹. On the impact of the Great Depression on capital formation in Latin America, see FitzGerald (1984).

on increases in capital stock per worker due to accelerated EAP growth, as I show below.

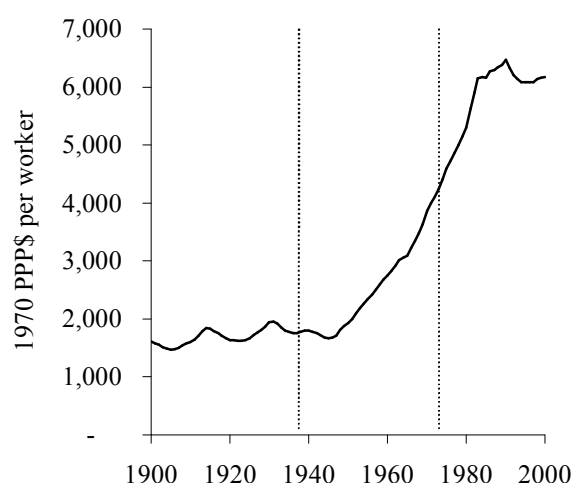
Figure 4 Investment share of GDP in Latin America



Note: Ratio of gross fixed capital formation to GDP for the LA6. *Source:* Astorga, Berges & FitzGerald (2003) Appendix Table A.8.

Despite a 3.8 percent per annum increase in the capital stock in the LA6 between 1900 and 2000; a workforce growth of 2.4 percent implies a long-run growth rate of capital stock per worker of only 1.4 percent. This statistic lies at the core of the problem of economic development in Latin America during the twentieth century. As Figure 5 indicates, capital stock per worker stagnated between 1900 and 1950, but then rose rapidly – tripling between 1950 and 1980 – only to revert to stagnation after the debt crisis of 1982. Chile shows a decline of capital stock per worker between 1970-85, as might be expected, but rapid growth thereafter. Mexico sustained a rising trend from 1940 until the crisis of the mid-1990s. However, Colombia, Argentina, and Brazil, show no increase between 1980-2000 at all, while Venezuela shows a marked decline.

Figure 5 Capital stock per worker in Latin America



Sources: Population-weighted mean for LA6. See Section 3 for an explanation of the sources and methods for capital stock and labour force estimates.

Table 2 below presents our results for TFP growth for the three productivity growth periods identified above. TFP growth averaged less than one tenth of one percent per annum between 1900 and 2000, and thus accounted for just 2 percent of the overall increase in productivity during the century.²⁰ Further, the TFP growth rate clearly declined throughout the century. On the one hand, the more rapid process of capital accumulation during 1937-77 was not accompanied by a rise in TFP growth as would be suggested by the ‘embodiment’ hypothesis.²¹ On the other hand, the economic reforms saw a decline in TFP from 1978 onwards in every country except Chile. The relatively rapid apparent TFP growth in the first third of the century is almost certainly related to the reliance on natural resource exports for growth, endowments of which are not part of our production function. Unfortunately, we have no means of measuring the resource stock in a comparable manner to capital and labour over time and between countries.²²

²⁰. The ‘unaugmented’ form of our model (when quality changes in labour are excluded) shows TFP growth of 1.1 percent per annum. Moreover, our estimates may underestimate TFP to the extent that endogenous innovation is embodied in new types of capital, since its effects would be felt through an ‘excessive’ capital contribution (α).

²¹. See Scott (1991).

²². Maddison (1995), for instance, proxies for natural resource endowments with land area. This does not seem plausible, given that this measure is time-invariant, does not reflect mining resources, and does not even distinguish between arable and otherwise unproductive land.

Table 2 Period averages of TFP growth (percent)

	<i>TFP growth</i>			
	<i>1900-2000</i>	<i>1900-1936</i>	<i>1937-1977</i>	<i>1978-2000</i>
Argentina	0.15	0.13	0.39	-0.23
Brazil	0.06	0.68	0.59	-1.87
Chile	0.33	0.24	0.26	0.58
Colombia	-0.16	0.60	0.06	-1.76
Mexico	0.10	0.50	0.29	-0.86
Venezuela	0.31	1.41	-0.17	-0.54
LA6	0.08	0.56	0.39	-1.26

Source: see Table A.4 in the Appendix to Astorga, Berges & FitzGerald (2003).

Whether a country is able to achieve rapid productivity growth through the diffusion of technology will depend in great measure upon its stage of economic development. We would expect those countries with higher incomes and more advanced institutions at the outset of the century, such as Chile and Argentina, to experience higher TFP growth due to their ability to seize the convergence ('catch up') benefits of technology transfer from industrialised countries, and 'late starters', such as Mexico and Brazil, to be more dependent on higher rates of factor accumulation. Surprisingly, this does not seem to be the case for Latin America during the twentieth century. At the turn of the century, Brazil, Argentina, and Mexico enjoyed the highest absolute productivity, with Colombia, Venezuela, and Chile still lagging behind; by 2000, Chile and Argentina, and Mexico and Brazil, had traded places but the otherwise the ranking remained constant. Moreover, for all countries TFP growth is higher during the stage of state-led industrialisation between 1937-77 than in the subsequent 'reform' period except in the case of Chile.

In terms of the 'Lewis model' that motivates this paper, there are some relevant characteristics in of the process of capital accumulation in the Latin American experience. On the one hand, it is clearly factor accumulation (physical capital and human capital – i.e. skilled labour) that drives growth, rather than total factor productivity, that drives growth in this case at least. This is clearly in the classical tradition that Lewis espouses. This process is clearly associated with protected industrialisation (Lewis' interpretation of trade theory) when labour productivity rises most rapidly, although whether this reflects the shift of labour from agriculture to

industry will be addressed in the next section of this paper. On the other hand, savings and investment rates, which are expected to rise under the Lewis model, clearly do not exhibit the upward trend expected as the modern capitalist sector expands. Moreover, while capital stock per worker rises in the middle period of protected industrialisation, it ceases to do so thereafter: but not because profit shares decline (indeed one of the major achievements of structural adjustment has been to create greater income inequality) but rather because the investment rate failed to recover in response to increased incentives and the labour force expanded faster than investment.

4. Structural Change and Industrialisation Phases

An important aspect of all economic development models in the classical and structuralist traditions is the shift of labour from low- to high-productivity sectors—typically from agriculture to industry.²³ We do not attempt to measure productivity in the tertiary sector even though services have accounted for at least half of GDP from 1945 onwards.²⁴ The reason for this is that ‘output’ in government has little economic meaning, while petty commerce and services act as ‘labour sponges’ with a large part of their workforce effectively underemployed.²⁵ Mining presents a similar problem, in that changes in measured output per worker reflect the changing discovery and exploitation of resource endowments (and also shifting international demand patterns) rather than labour productivity itself.

Table 3 below shows that output, employment, and productivity in manufacturing grew faster than in agriculture for all countries save Brazil and Venezuela.

Surprisingly, the inter-sectoral productivity gap is not large: on average, productivity growth in agriculture reached more than three-quarters of that in manufacturing, while

²³ Our measure of sectoral productivity (P_{jt}) in sector j in year t is aggregate labour productivity (P_{Tt}) as defined in Section 3 above, multiplied by the share of that sector in GDP (X_{jt}) at current prices and divided by its share in the EAP (Z_{jt}), yielding a figure in 1970 PPP dollars in year (t).

²⁴ ECLAC (1978).

²⁵ For further discussion, see FitzGerald (1993, Chapter 5), which models productivity (and thus income) in the informal sector through the impact of internal migration on labour supply.

the variance in industrial productivity is slightly greater than in agriculture. This gap is widest in Mexico and narrowest in Chile and Colombia, but the pattern seems contrary to expectations. There are two possible explanations: first, much of the apparent increase in agricultural productivity is in fact the result of rural-to-urban migration of surplus rural labour; and second, technological transfer into ‘modern’ agriculture (from the US in particular) has been less difficult than the more complex technological learning in manufacturing, which has required new forms of corporate organisation as well as imported equipment and labour skilling.

Table 3 Sectoral productivity growth rates 1900-2000

	<i>Agriculture</i>			<i>Manufacturing</i>		
	Output	Employment	Productivity	Output	Employment	Productivity
LA6	2.9	1.4	1.7	4.9	3.0	1.8
Argentina	2.3	0.8	1.5	3.5	1.6	1.9
Brazil	3.4	1.4	2.0	5.1	3.9	1.1
Chile	2.5	0.8	1.7	3.7	1.7	2.0
Colombia	2.6	0.7	1.9	4.4	2.3	2.0
Mexico	2.3	1.2	1.0	5.4	2.4	2.9
Venezuela	3.6	1.2	2.3	5.3	3.2	2.0

Notes: ‘LA6’ is population-weighted mean. *Sources:* Astorga, Berges & FitzGerald (2003), Appendix Table A.7.

These patterns of sectoral productivity change were underpinned by changes in the composition of national output and employment. Agricultural employment in the LA6 declined from 69 percent of the labour force in 1900 to 24 percent by 2000, experiencing its steepest fall during 1936-77. Venezuela and Colombia saw the greatest decrease in share, followed by Argentina. However, significant rural-to-urban migration only began in the 1950s: the absolute size of the labour force in agriculture in the LA6 did not start to decline until the 1980s.²⁶ The labour shedding in agriculture has clearly had a positive effect on sectoral productivity by simply draining off underemployed labour held on family farms. In contrast, the absolute size of the economically active population in manufacturing grew by an average of 3 percent per annum from 1900-2000, and by as much as 5 percent in the 1940s, declining only from the early 1980s onwards. The share of manufacturing in total EAP for the LA6 peaked in the mid-1970s, with Argentina and Chile experiencing the

²⁶ This rural exodus occurred much later in Mexico, probably because it embarked upon large-scale land reform relatively early in the twentieth century following the 1910-20 Revolution.

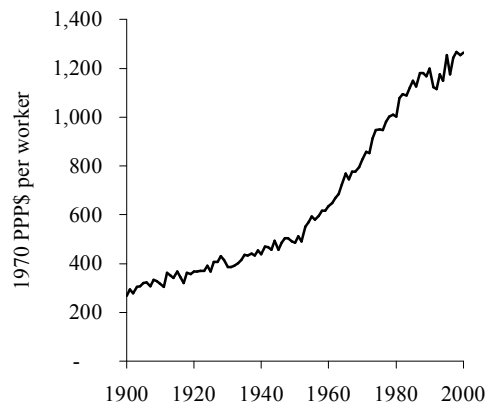
greatest increases. Despite increasing absolute levels of manufacturing employment, however, its share of EAP declined steadily in the last quarter of the twentieth century to levels last seen in the late 1940s. This decline appears to be mainly due to the impact of trade liberalisation on labour-intensive small and medium manufacturing firms.

There was also a sharp fall in the agriculture share of output from 27 percent in 1900 to less than 9 percent in 2000, with the middle decades seeing the greatest decline. In contrast, the manufacturing share of output followed a similar pattern to that of the employment share, rising from 9 percent in 1900 to 27 percent by 1977 before dropping to 27 percent in 2000. The share of manufacturing in total output declined after the 1970s for all countries save Mexico and Venezuela, Argentina and Brazil experiencing the greatest decline.

The greatest improvement in agricultural and manufacturing productivity in the LA6 occurred during 1937-77, with growth rates of 1.7 percent and 3.2 percent, respectively. Agricultural productivity continued to grow after 1977 in Brazil and Chile, but declined in Argentina and Colombia, and more dramatically in Mexico and Venezuela. Overall, however, agricultural productivity seems to have increased relatively rapidly and steadily between the mid-1950s and the mid-1980s, albeit due to labour shedding.²⁷

²⁷. Agricultural productivity growth is generally overlooked in the literature. However, Martin and Mitra (1999) find that productivity growth rates in agricultural are relatively high, and that in many countries higher than those in manufacturing. They attribute this finding to faster international dissemination of innovations in agriculture than in manufacturing.

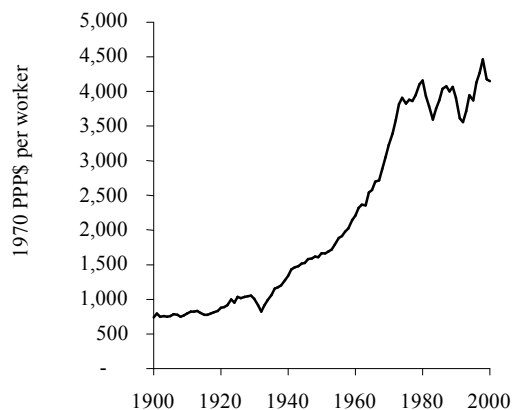
Figure 6 Agricultural Productivity in Latin America



Source: Table A.7

The pattern of manufacturing productivity growth is similar, with more rapid growth during 1937-77 followed by deceleration in all countries, and even decreases in Colombia and Venezuela. As might be expected, manufacturing shows a stronger tendency towards sectoral convergence in the region than agriculture.

Figure 7 Manufacturing productivity in Latin America



Source: Astorga, Berges & FitzGerald (2003), Appendix Table A.7.

In order to synthesise these complex shifts in output and employment we construct a simple expositional framework derived from standard economic development theory, which is summarised in Table 4 below. Growth at an early stage of industrialisation is generally understood to be ‘extensive’ in the sense that both output and employment expand rapidly while productivity grows slowly. This is followed by an ‘intensive’

stage where output increases more than employment, with a rapid rise in productivity. This crucial transformation is usually associated with deeper technological change and with emerging labour scarcities. When this desirable second stage is *not* achieved, undesirable states of ‘stagnation’ (low employment and output growth with little productivity change) or even ‘regression’ (output growth less than that of employment, so productivity falls) can result.

Table 4 Characterisation of Sectoral Growth

	<i>Growth relative to long run</i>	
	<i>Output</i>	<i>Employment</i>
Extensive (EXT)	Higher	Higher
Intensive (INT)	Higher	Lower
Stagnation (STA)	Lower	Lower
Regression (REG)	Lower	Higher

The model is applied in Table 5 below. The evidence for agriculture is mixed: growth was extensive in most of the LA6 in the first and second periods, with four countries (Brazil, Chile, Colombia, and Mexico²⁸) showing an improvement in the second period. In the third period, however, growth was either stagnant or regressive in all countries save Chile—the only country to see sustained progress over the course of the twentieth century as its agricultural sector shifted from regressive, to extensive, and finally intensive, growth. Stagnation in Brazil and Argentina in this period was due to continued urban migration.

In contrast, growth trends in manufacturing present a more consistent picture, with the anticipated extensive growth phases occurring in all countries from 1937-77 after a generally stagnationary first period. As discussed below, this was accompanied by the highest rates of growth in both fixed and human capital. However, there is clearly a failure to attain intensive growth in the 1978-2000 period. Half of our countries experienced stagnation and the other half experienced regression. Possible explanations include the adverse effects of external shocks, financial crisis, and fiscal retrenchment on demand, as well as the negative impact of trade liberalisation and economic reform on industrial employment, particularly in the less competitive small and medium firms.

²⁸. In Mexico, extensive growth in agriculture was delayed until after the Revolution.

Table 5 Characterisation of sectoral growth periods in Latin America

	<i>Agriculture</i>			<i>Manufacturing</i>		
	<i>1900-36</i>	<i>1937-77</i>	<i>1978-2000</i>	<i>1900-36</i>	<i>1937-77</i>	<i>1978-2000</i>
LA6	REG	INT	STA	STA	EXT	STA
Argentina	EXT	STA	STA	EXT	EXT	STA
Brazil	EXT	EXT	STA	REG	EXT	STA
Chile	REG	EXT	INT	STA	EXT	REG
Colombia	REG	INT	REG	STA	EXT	REG
Mexico	STA	EXT	REG	STA	EXT	REG
Venezuela	EXT	STA	REG	STA	EXT	STA

Source: See text.

As before, the implications for the Lewis model as a representation of economic history are mixed. On the one hand, perhaps the most surprising finding is the steady growth of labour productivity in agriculture over the century, a rate that is of a similar order of magnitude to that for industry. This is due to both technological change and labour withdrawal, but is clearly not anticipated in the Lewis model. On the other hand, the ‘extensive’ process of industrialisation in the middle period does broadly correspond to the Lewis model, as does the lack of industrial progress during the opening and closing decades of the century when economies were more open is similarly consistent with his views.

6. CONCLUSIONS

The broad trends that stand out from the above analysis are quite surprising, in the light of widespread beliefs about the Latin American economy formed on the basis of data for the second half of the century only²⁹ as well as those expectations generated by the Lewis model itself. In particular: (i) while industrial productivity growth was rapid during the middle years of the century, it was not sustained thereafter; (ii) agricultural productivity has grown relatively rapidly and steadily over the entire century, at rates comparable to those of industry; (iii) while labour did leave agriculture and industrial growth was ‘extensive’ during the import-substitution phase, most of the labour released ended up in urban services; and (iv) although the

²⁹ See Dornbusch and Edwards (1991), or Solimano (1996) for instance .

investment rate did rise initially with industrialisation, it remained volatile throughout the century, and capital accumulation was subsequently insufficient to sustain growth.

On labour markets, Lewis' expectation that unskilled labour would be available at a low real wage determined by low agricultural productivity, and that this will drive investment through the large profits generated thereby, does not seem to be supported by the historical evidence. Real wages and popular living standards (the 'subsistence wage') seem to have risen, particularly during the period of rapid industrialisation, without the reserve army (in the sense of labour in informal sector) having been reduced, let alone used up. The major contributors to growth have been skilled labour (even under our limited empirical definition of human capital) and physical capital, but neither can be said to have been driven by low real wages.

It might be argued that rising agricultural productivity breaks one of the assumptions in the Lewis model (he is explicit about this), but his assumption as to the absorptive capacity of industry (or at least, the modern sector) seems also to have been wrong – or at least, over-optimistic. The well-known attempt to explain massive internal migration in the face of limited modern employment constructed by Todaro (based on the expectation of a job) is clearly implausible, and it would seem necessary to allow explicitly for the provision of wage goods and services by the urban informal sector in any realistic model of labour markets – equilibrium then being reached when average incomes in the informal (not formal sector) approach those in the countryside.³⁰

Lewis was probably right to suggest that “capital formation and technical progress result in a rising share of profits in national income” to the extent that income distribution in Latin America is among the worst in the world and largely based on factor income and asset asymmetries.³¹ However, his classical belief that “as the capitalist sector expands, profits grow relatively, and an increasing proportion of national income is reinvested” is clearly not born out by the Latin American experience. In this sense, he was perhaps too hasty in discarding the Keynesian model as irrelevant to developing countries. He was undoubtedly right to argue that that “capital is formed not only out of profits but also out of credit creation” as financial

³⁰ I set out a model of this kind some time ago in FitzGerald (1976).

³¹ Thorp (1998).

development is now seen to be central to the growth process, but Latin America is a tragic illustration of the misguided optimism of suggesting that “inflation for the purpose of creating productive capital is self-destructive”. In the event, although extensive industrialisation of the classical type did take place in Latin America between the 1930s and the 1970s, and capital accumulation was faster than population growth, it was not enough to adsorb the surplus labour pool. Thereafter, labour shedding in the modern sector seems to have increased rather than reduced this pool.

This paper has not been concerned with the integration of Latin America to the world economy, but some closing remarks on these aspects of the Lewis model are probably necessary. He suggests that if neighbouring countries have surplus labour, then labour import and capital export will take place, checking the wage rise; mass immigration might raise per capita output but would keep wages in all countries near the subsistence level of the poorest countries; the export of capital would reduce capital formation at home and so keep wages down; while capital imports do not improve real wages unless they raise productivity in the wage-goods sector. These intuitions are clearly born out in specific cases such as the integration of Northern Mexico with the United States, or the relationship between Chile and Bolivia, or between Costa Rica and Nicaragua. But such effects are hardly exclusive to the Lewis model, and can easily be handled in a neo-classical framework, except perhaps the point about foreign investment in the wagegoods sector.³² Moreover, the overwhelming influence of uncertainty about future profits (rather than funds from past profits) in determining private investment and thus employment is missing in the Lewis model at both the national and international level.

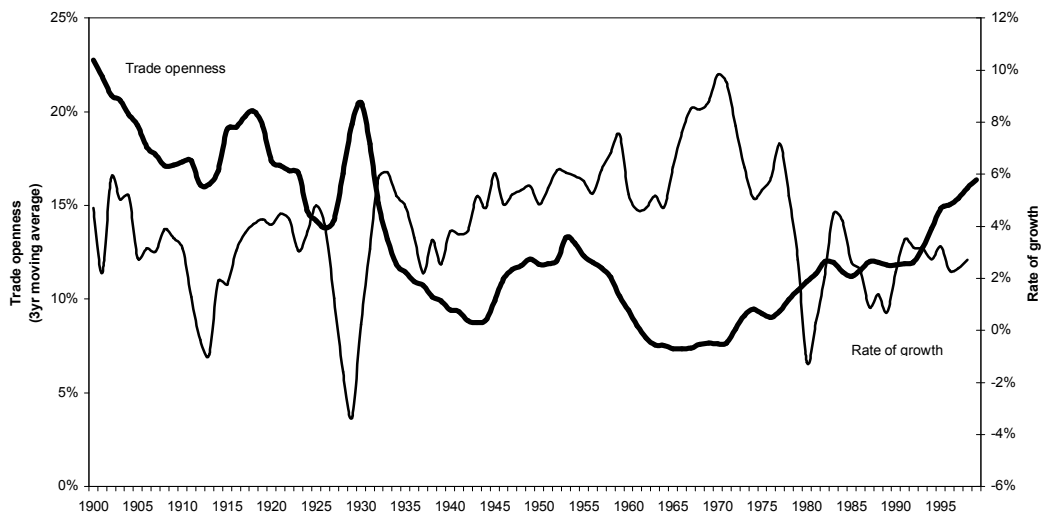
Finally, the proposition that “the main reason why tropical commercial produce is so cheap is the inefficiency of tropical food production per man” does not seem to be borne out by the evidence or rising agricultural productivity in this paper. It may well be that Prebisch’ model of the over-supply of primary exports – derived from the macroeconomics of foreign exchange constraints rather than the microeconomics of labour costs - has more explanatory power in this context.³³ None the less, Lewis was probably right to argue that “the Law of Comparative Costs is just as valid in

³² However, this was more rigorously analysed by Kalecki – see FitzGerald (1993).

³³ See FitzGerald (2001).

countries with surplus labour as it is in others. But whereas in the latter it is a valid foundation of arguments for free trade, in the former it is an equally valid foundation of argument for protection”, even though nowadays this argument would be expressed in terms of the dynamics of investment rates and labour skilling rather than by comparative statics. Certainly growth was less rapid in Latin America during periods of greater integration to the world economy.

Figure 8: Trade Openness and Growth in Latin America 1900-2000



In sum, to the extent that the experience of the Latin America economies during the twentieth century can be considered as a test of the robustness of the Lewis model as an explanation of the long run growth dynamics of ‘tropical labour surplus’ developing countries – for it was not intended as a policy framework or as a model of the short run – then that model cannot be said to provide a good explanation of the trends that we can measure. It may well be that the model is a better explanation of the Asian experience, for its applicability to the Caribbean or Africa is probably even less than to Latin America. None the less, even though our results do not confirm the central role in economic growth of unskilled labour supply at a low real wage, they do support Lewis’ classical emphasis on factor accumulation, and thus both human and physical investment, a theme that he developed to greater effect in *The Theory of Economic Growth*.

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