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The Lewis Model: A 60-Year Retrospective

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The Lewis (1954) model of economic development is one of the rare 60 year-old papers still featured on many graduate economics reading lists. However, like many classics, the original paper, "Economic Development with Unlimited Supplies of Labor," is probably read less frequently than it is cited. There are numerous commentaries and glosses available that save readers the trouble of wrestling with the original—even though Lewis's writing was lucid and engaging. In particular, many development textbooks offer verbal or graphic summaries of the Lewis model, but the summaries often lose the richness of the original.

Lewis's (1954) paper bundles together theories of growth, structural transformation, inequality and distribution, wage determination, and population. The proliferation of ideas in the Lewis paper was not an accident. Lewis (p. 139) telegraphed his intention in the first paragraph of the paper, where he wrote: "This essay is written in the classical tradition, making the classical assumption, and asking the classical question. The classics, from Smith to Marx, all assumed, or argued, that an unlimited supply of labour was available at subsistence wages. They then inquired how production grows through time. They found the answer in capital accumulation, which they explained in terms of their analysis of the distribution of income. Classical systems thus determined simultaneously income distribution and income growth, with the relative prices of commodities as a minor by-product." This paper was not a modest undertaking, and Lewis himself clearly viewed it as a major contribution.

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For Lewis, the target of his analysis was a set of countries that were not only "underdeveloped" but also "overpopulated," a term that he seems to have taken as effectively equivalent to his notion of "unlimited supplies of labour." One very specific interpretation of overpopulation is the idea of a large population relative to fixed factors or natural resource endowments, such as land; Lewis invokes this idea a number of times in the model. But in Lewis's argument, overpopulation also seems related to ideas of underemployment and low labor force participation. This notion of overpopulation seems somewhat problematic to contemporary economists, in the sense that population, employment, and labor force participation all seem endogenous—a concern to which this paper will return. But Lewis sought to identify a distinctive process of development in overpopulated countries. He understood that this theory of development would not be applicable to other countries—including those that had already transitioned to "capitalist" production or those that had abundant natural resources and thus no real Malthusian pressures on a subsistence sector.

The Lewis model is built on the idea of a dual economy. For the "overpopulated" countries which are the focus of the essay, Lewis argued that the central process of development consists of moving a large mass of underemployed workers, with low productivity (in Lewis's terms, workers whose marginal product is "negligible, zero, or even negative," p. 141), out of a "subsistence" sector, where living standards are necessarily low, into a modern "capitalist" sector, where output per worker can be higher because it is "fructified by capital" (p. 147). In this framework, growth consists, in its simplest form, of expanding the capitalist sector. This expansion requires an increase in savings, which can only come from the capitalist sector or from external sources. As capital flows into the economy, it is used to create jobs in the modern sector, which in turn can always be filled by workers from the subsistence sector. As these workers move, the savings rate of the economy rises, and this in turn leads to a virtuous circle that steadily raises the level of income per worker in the economy.

Lewis was somewhat vague on the theoretical underpinnings of the model. Some ingredients were clear, however. Lewis envisioned a capitalist sector that was, at least in the early stages of development, sufficiently small to be a price taker on the labor market. He assumed that the supply of capital was fixed in the short run and could only be used in the capitalist sector. This assumption implicitly requires a market failure or perhaps a technological barrier, and it is the key ingredient in forcing the economy to include two distinct sectors. The labor-surplus subsistence sector determines the wage rate of the economy, at least in early stages of development. At the prevailing wage (or more precisely at a modest premium above the subsistence sector wage, discussed below), the capitalist sector hires labor up to the point where its marginal value product is equated with the wage. The remainder of the labor force remains in the subsistence sector.

At first glance, the capitalist sector appears nicely neoclassical, with a fixed supply of capital and a variable labor input hired at a given wage—behaving, in fact, like an individual firm in a standard introductory micro framework. But this

seemingly neoclassical equilibrium actually rests on a dualistic framework that is imposed by assumption. The critical point is that the subsistence sector cannot make any productive use of capital. Without this assumption, the capitalists of this economy would surely be inclined to use some small portion of their capital to "fructify" part or all of the subsistence sector. The marginal returns to capital would presumably be very high for the large numbers of workers in this sector, and market incentives should encourage capital to flow from the capitalist sector to the subsistence sector. Lewis's explanation for this assumption seems to invoke an essential lumpiness of capital. He writes (p. 145): "If unlimited labour is available, while capital is scarce, we know . . . that the capital should not be spread thinly over all the labour." Given this assumption, then Lewis's capitalist sector will indeed look like a standard neoclassical firm, at least for some model specifications and parameterizations.[1]

Many authors have sought to formalize the Lewis model and to identify a set of assumptions or rigidities that will deliver a version of the Lewis dualism. This paper does not seek to go over the same ground; interested readers can consult Wang and Piesse (2013) for a thoughtful treatment of alternative microfoundations for the Lewis model. Instead, this paper focuses on some key aspects of Lewis's vision of the development process: the dual economy, subsistence wages, patterns of unemployment and underemployment, labor market imperfections, savings, the mechanisms of development, and turning points in the growth process. In this sense, the paper is closest to Kirkpatrick and Barrientos (2004).

I will argue that many of the specific assumptions and mechanisms of the Lewis model have not been well supported by contemporary theory and evidence. This calls into question efforts to use the Lewis model in a very literal fashion for policy analysis. In spite of that, I will argue that the model remains a powerful and useful tool for thinking about growth because it correctly identifies a key feature of the growth process—namely, the importance of *within*-country gaps in income and productivity, or dualism. Lewis made the incisive observation that poor countries are not uniformly poor and that even the poorest countries have firms, sectors, and locations that operate at high levels of productivity. Lewis was perhaps less convincing in explaining why these islands remain and why the within-country gaps are not eliminated through migration and factor mobility. But his framing of the question remains deeply compelling.

This paper will not provide new interpretations of the Lewis model or seek to summarize it in authoritative fashion. Dozens of papers, chapters, and textbooks already offer reviews and interpretations of the Lewis model, and it would be

[1] Consider, for instance, a simple two-sector model economy in which there are two technologies for producing (identical) output: a subsistence technology, $Y = A(1 - n)$ and a capitalist technology, $Y = Mn^{\alpha} k^{(1-\alpha)}$, where n is the labor used in the capitalist sector such that $0 \leq n \leq 1$. For some parameter values, this model will yield an interior equilibrium in which the wage is fully determined by the linear productivity level in the subsistence technology, and the capitalist sector will take the wage as given. However, for other parameterizations, with sufficiently high levels of capital or high levels of productivity in the capitalist sector, the entire labor force can end up in the capitalist sector.

impossible to review all the literature that owes a debt to Lewis. Those looking for a textbook exposition of the model might begin with Ray (1998, Section 10.2) or for a less faithful but equally interesting version, the two-sector model of Eswaran and Kotwal (1993). Basu (1997, chap. 7) offers a critique of the internal consistency of the Lewis model. Several thoughtful papers on the Lewis model and its intellectual implications were written for a two-day conference held at the University of Manchester on the occasion of the 50th anniversary of the paper; these retrospective evaluations can be found in a special issue of *The Manchester School* (vol. 72, no. 6, 2004).

Dualism and Non-neoclassical Foundations

Perhaps the central idea of the Lewis model is the notion that a modern ("capitalist," in Lewis's classical terminology) sector and a traditional ("subsistence") sector coexist in developing countries. The traditional sector is not precisely defined, but it consists of people earning a subsistence wage—perhaps subject to some Malthusian equilibrium, as formalized later in Galor and Weil (2000) or Hansen and Prescott (2002). Lewis determinedly declines to identify the modern sector with industry or the traditional sector with agriculture, noting that commercial agriculture fits his definitions of "modern." He also recognized that the dualism did not correspond entirely to a rural–urban divide, noting that within rural areas (and within the agricultural sector) there are enterprises that seem fully capitalist, and within urban areas of the developing world, there are large numbers of workers in the nontradable service sector earning little more than subsistence wages. As Lewis (1954, p. 141) described them, these urban subsistence workers in this way included

> . . . the workers on the docks, the young men who rush forward asking to carry your bag as you appear, the jobbing gardener, and the like. These occupations usually have a multiple of the number they need, each of them earning very small sums from occasional employment; frequently their number could be halved without reducing output in this sector. Petty retail trading is also exactly of this type; it is enormously expanded in overpopulated economies; each trader makes only a few sales; markets are crowded with stalls, and if the number of stalls were greatly reduced the consumers would be no whit worse off—they might even be better off, since retail margins might fall.

For Lewis, the key feature of this traditional subsistence sector was that it existed alongside the capitalist sector and was effectively unlimited in size, thus potentially providing a perfectly elastic supply of labor to the capitalist sector at a fixed wage. The sheer size of the subsistence sector meant that the modern sector could grow without facing any labor constraints. In particular, wages in the capitalist sector would be determined by the wage in the subsistence sector, which in turn would correspond to something approximating a subsistence level of consumption.

Lewis postulated that this condition would hold until, at some unspecified future point, the growing capitalist sector would finally pull so many workers out of the subsistence sector that the supply of labor would no longer remain perfectly elastic.

How well does Lewis's dualism stand the test of time? The basic idea of dualism remains ubiquitous in the development and growth literature today. A few researchers use the term explicitly (Temple 2005; Temple and Wößmann 2006; Vollrath 2009a, 2009b). Many more use two-sector models in which the sectoral dichotomies are characterized by terminology that is less redolent of the classical literature: formal–informal; modern–traditional; industrial–agricultural. All of these dualistic models in some sense carry on Lewis's thinking, and the dualisms do seem real in the data—even if the boundaries of the dualistic sectors remain ill-defined and occasionally unsatisfying.

Moreover, Lewis's vision of dualism still seems broadly accurate today, although it is difficult to define precisely or to pin down in data. Large numbers of people in poor countries work in quasi-subsistence agriculture and in very low-productivity informal services. This does seem to comprise a "subsistence" sector that is distinct from the high-productivity formal sector. It is difficult to measure the sizes of the two sectors by objective criteria, but we know that there are important differences between agriculture and nonagriculture in developing countries, coinciding imperfectly with a rural–urban split. There are also disparities in urban areas between informal and formal sectors, in terms of average productivity and wages.

Restuccia, Yang, and Zhu (2008) and Caselli (2005) pointed out that the nonagricultural sector in low-income countries appears to be relatively close in average productivity to the nonagricultural sector in high-income countries, with countries at the 90th percentile in the cross-country income distribution having nonagricultural labor productivity about four times as high as those countries at the 10th percentile. In contrast, the 90th to 10th percentile differences in agricultural labor productivity are much larger—about a factor of 45. In a similar vein, in Gollin, Lagakos, and Waugh (2014a), my coauthors and I document differences in average labor productivity between agriculture and nonagriculture and show that these are particularly pronounced in poor countries. In many of the lowest-income countries, the average productivity of labor in agriculture is less than half that of the level in the nonagricultural sectors of the economy. This gap remains even after extensive corrections for differences in hours worked and human capital; the productivity gaps appear in micro data as well as in aggregate data. The average product of labor is not the same as the marginal product, so this is not necessarily evidence of a gap in wages across sectors, nor is it evidence of misallocation per se. The agricultural productivity gap is, however, evidence of a kind of dualism. This dualism extends from the production side of the economy to realized living standards: Young (2013) documents large disparities between urban and rural areas in a number of different measures of well-being.

Lewis's dualism is difficult to pin down, however. Much (but not all) of the agricultural sector in the poorest countries, along with some fraction of the rural and urban services sector, would seem to fall into Lewis's "subsistence" sector. His

"capitalist" sector corresponds more or less to the formal nonagricultural sector, perhaps leaving aside the government sector. But even within narrowly defined sectors, the lines can be blurred. For instance, many formal sector firms in developing countries—clearly capitalist in Lewis's definition—rely on a fringe of subsistence workers for distribution or sales. These individuals may or may not be formally employed by the firm. For instance, the large mobile phone providers in many African countries distribute air time through networks that extend ultimately to young people selling scratch-off vouchers along the roadsides. In the same way, large breweries and soft drink manufacturers typically rely on distribution chains that include informal street vendors and the owners of very small shops.

Perhaps in the end, Lewis's dualism is too stark. The dichotomy between capitalist and subsistence sectors appears on closer examination to be more of a continuum. Taking the retail food sector as an example, there are large formal retail establishments such as supermarkets in many developing countries; there are also people selling oranges and pineapples by the roadside from atop their heads. In between, there is nearly a full range of shops of different sizes, from roadside stands to market stalls to small shops. For example, Woldu, Abebe, Lamoot, and Minten (2013) offer a detailed description of food retailing in Addis Ababa and a taxonomy of sellers. Weatherspoon and Reardon (2003) discuss the evolution of food retailing in Africa and the emergence of supermarkets and chains.

The same argument about a continuum could be made for the agricultural sector in many low-income countries, which typically includes a few producers who are entirely in subsistence but many more who sell small amounts of surplus and others who are nearly fully commercial. Thus, dualism disappears under the microscope. Yet in some larger sense, Lewis's dualism was a useful abstraction—and it remains so. The basic insight seems correct and important—that there are large differences in productivity *within* countries as well as across countries. These within-country disparities are partly linked to sectors and partly to geographic space; perhaps they also reflect underlying inequality in access to capital and other resources. Development must surely involve both a movement of people (and resources) across the dualistic divide and a reduction of the barriers and obstacles that lead to dualism. This central insight of Lewis seems entirely valid today.

Subsistence Wages

A key ingredient of Lewis's model was the notion that in the subsistence sector, wages were determined not by neoclassical logic but by something approaching a biophysical notion of subsistence. Although Lewis did not formally invoke Malthus in his paper, he repeatedly emphasizes that earnings in this sector are determined by the subsistence level. In fact, he uses the word "subsistence" 92 times in the paper. He writes (p. 142) that "[t]he price of labour, in these economies, is a wage at the subsistence level." The subsistence level is slippery to define. Lewis struggles with it at length before waving his hands and dodging the issue. Influenced again by

classical thinking, he begins with the notion that "[t]he classical economists used to think of the wage as being determined by what is required for subsistence consumption, and this may be the right solution in some cases." But he recognizes that in agrarian economies, smallholders may receive land rents, so that they may ultimately earn significantly more than required for bare subsistence. After wrestling with concepts such as "the average product of the farmer," Lewis suggests in the end that the wage in the subsistence sector may be determined by a "conventional standard of living." In the end, with further a waving of hands, he writes, "It is not, however, of great importance to the argument whether earnings in the subsistence sector are determined objectively by the level of peasant productivity, or subjectively in terms of a conventional standard of living. Whatever the mechanism, the result is an unlimited supply of labour for which this is the minimum level of earnings."

In hindsight, it is not clear that the subsistence wage was a necessary ingredient of Lewis's model. Indeed, Ranis and Fei (1961), in their early formalization and extension of the Lewis model, argued simply for a non-neoclassical wage—meaning a wage higher than the marginal value product of labor—in the subsistence sector. This wage was determined by some social norm or "institutional or nonmarket forces" (p. 536). Ranis and Fei equated Lewis's "capitalist" sector with the nonagricultural sector, and their version of the "subsistence" sector was the agricultural sector. In their version of Lewis's model, the key was that the marginal product of labor must be very low in agriculture, if not literally zero, so that labor could move across sectors without reducing the availability of food (and hence reducing the real wage) in the nonagricultural sector. But if the marginal product of labor was low, then if workers received a neoclassical wage, the marginal worker would receive a near-zero wage, making dualism unsustainable. Ranis and Fei saw a way out by invoking an institutionally determined wage, greater than the subsistence wage, which would be received by agricultural workers. Specifically, they proposed a formula such that each worker in the agricultural sector would receive the average product of labor, so that the agricultural wage could be comfortably above subsistence even when the marginal product was effectively zero. Another advantage of their formulation was that it allowed for dynamics within the agricultural sector—such as population growth or agricultural productivity increases—to matter for the development process. The Fei–Ranis approach has been expanded and updated in more complete and more recent treatments, and other interpretations have been offered; for example, by Wang and Piesse (2013), who propose a more completely developed set of microfoundations for a Lewis-inspired model.

Thus, Lewis's insistence on subsistence wages was largely discarded more than a half-century ago. Over the past 60 years, evidence has grown that in most developing countries, wages and living standards are not constant at an absolute level of subsistence; on the contrary, even in those countries that have remained relatively poor, absolute living standards have on average increased substantially. This is not evidence against the more modest Lewis notion of wages being determined by a "conventional standard of living," or the Ranis and Fei (1961) notion of an "institutional force," but it does seem to diverge from a simplistic version of Lewis's

model—that is, the notion that industrialization could proceed in many countries for extended periods without increases in wages. A more nuanced reading of Lewis might allow for wages to rise in the presence of differential productivity growth across sectors, or for a labor surplus to remain even in the presence of an increasing marginal product of labor.

A more striking finding from the micro evidence is that Lewis may have abstracted too readily from heterogeneity within the "subsistence" sector. In Lewis's framing of the issue, essentially everyone in that sector earned the same effective wage, which in turn set the wage for the modern sector up until the "turning point." In an era when household survey data were rare, this generalization may have been reasonable. However, as we have greatly increased our understanding of the heterogeneity within rural areas, agricultural populations, and the urban informal sector, the data show substantial dispersion even within rural populations. For instance, within the rural population of China, the Gini coefficient for rural expenditure (often used as a proxy for income) was 41.5 in 2009, comparable with the national figures for Qatar or Nicaragua; in Indonesia, the rural Gini was 34.0, the same level as reported for national income statistics in the United Kingdom or Italy.[2] These measures of inequality show that rural households vary substantially in their living standards; they are not all living at some absolute level of subsistence, and they are not enduring "shared poverty" through some kind of pooling of income. Lewis's vision of a subsistence sector in which wages are pegged to some kind of Malthusian level seems on closer examination to be inaccurate. Similarly, the notion that everyone receives a wage that approximates the average product looks to be little more than a romanticized view of a world that in reality displays moderate levels of inequality and heterogeneity. Although Lewis's notion of a "subsistence sector" has some an appeal in a stylized sense, it is not clear whether it corresponds to any operationally meaningful category.

Unemployment and Underemployment

Lewis's notion of "unlimited supplies of labor" implicitly required a kind of "disguised unemployment" or "underemployment." Lewis himself was unafraid of using the term "unemployment" to characterize work that involved low-productivity activities. At times, he seemed to associate this concept with the importance of fixed factors in production, such as land. In this sense, Lewis equated "disguised unemployment" with "surplus population," a term he invokes in the original essay. The connection is made explicit in places; thus, he writes (p. 189) that for many sectors of

[2] The estimated rural Gini indexes for China and Indonesia are taken from the World Bank's PovcalNet data tool, along with the national figures for Nicaragua and Qatar. The PovcalNet data were downloaded from: http://iresearch.worldbank.org/PovcalNet/index.htm (last accessed on June 4, 2014). The national figures for the United Kingdom and Italy are from OECD (2013), available online at http://dx.doi.org/10.1787/factbook-2013-en.

the economy: "if the country is overpopulated relatively to its natural resources, the marginal productivity of labour is negligible, zero, or even negative." For Lewis, both natural resources and capital were effectively fixed factors in the short run, implying that some fraction of the labor force was necessarily unemployed. Lewis seems almost to have envisaged the subsistence sector as facing a fixed-coefficient technology, so that the available resource base could only absorb a certain amount of labor; the rest of the labor force was surplus to requirements and could be pulled out of the subsistence sector without giving up any production. Lewis was not arguing that the entire subsistence sector was unemployed or underemployed; rather, he argued that within that sector there was some fraction of labor that could be withdrawn without a consequential loss of output in that sector.

Lewis's view has been more widely accepted in the policy world than in the academic literature. The empirical literature has struggled to define "unemployment" in the poorest countries, where survey data consistently show that almost all able-bodied individuals work in some fashion, often in self-employment or family business. Micro development economists invariably find positive (though low) returns to labor in almost all surveys of individuals, households, and firms. The micro literature tends to find that individuals and households scrape together livings from broadly diversified portfolios of activities, any or all of which may have very low productivity. (For an example from this journal, Banerjee and Duflo, 2007, offer a vivid depiction of this reality.) Even children and the elderly normally generate positive and non-negligible marginal products, in both market-oriented activities and home production. The micro literature on labor markets in developing countries has tended to view with skepticism the notion of widespread unemployment—disguised or otherwise—other than that caused by seasonality, disability, and other unavoidable barriers.

The macro and policy literatures, however, remain open to the possibility that many individuals are in some sense effectively unemployed. To many governments in the developing world, some of the urban informal workforce appears to be effectively unemployed. For instance, recent reports on youth employment in Africa (for example, World Bank 2009) point out that formal unemployment—as defined by labor statistics—is rare, even for populations that struggle to find good jobs. The development policy literature, taking a fairly macro view, sees many people in poor countries employed in jobs that combine informality, part-time or irregular hours, and little or no return to skill or experience. The literature quibbles over semantics—whether this population should be characterized as unemployed, underemployed, or informally employed, and these terms often embed differing narratives and policy implications. Writing in 1954, Lewis did not feel a need to distinguish among the subtleties; from his point of view, people in all these categories formed the reservoir of surplus labor.

One way to reconcile the micro and macro views of unemployment is to consider the possibility that the marginal *social* value of labor may be very low—very much in the sense that Lewis described. When one additional individual joins the queue of roadside sellers of popcorn or flyswatters in Kampala or Chittagong,

the marginal product of that individual's labor may be positive for that individual and his or her family; but whether there is a positive social value is unclear. Arguably, this individual is simply taking business from other sellers, creating little or no additional social value. Policymakers often take this view when they look at the overall abundance of labor and the low social value of what is being done. Lewis also articulated this view in a spirited (and occasionally testy) defense of the surplus labor proposition (Lewis 1968, pp. 12, 14), in which he argued that it was possible simultaneously for the marginal product of labor to be positive on the intensive margin, for any given worker, but also to be approximately zero on the extensive margin, for an additional person.[3]

> I do not believe that the productivity of a manhour is zero in agriculture, domestic service, petty retailing, handicrafts, or any other part of the non-capitalist reservoir. Nevertheless, I have seen nothing in the now vast literature of under-employment to alter my belief that in India or Egypt one could mobilise a group equal to (say) ten per cent of the unskilled non-capitalist labour force without reducing significantly the output of the non-capitalist sectors from which they were withdrawn. . . . However, this is all an irrelevant digression, since the model in no way depends on the marginal product in agriculture, whether per person or per manhour. . . .

There is relatively little micro evidence on Lewis's claim about marginal labor productivity on the extensive margin. One exception is Foster and Rosenzweig (2010), who calculate that approximately 20 percent of the Indian agricultural labor force could be effectively surplus, based on calculations of the minimum efficient scale of farms. Foster and Rosenzweig calculate that if all farms were operated at an optimal scale, there would be a higher average ratio of land per worker. They calculate that some fraction of workers could thus be released from agriculture without reducing overall output; that is, the losses of output due to the release of labor would be offset by the increased efficiency from expanding farm size. In their analysis, the source of this surplus labor is that farm size in India is inefficiently small, reflecting some unspecified barriers to consolidation—perhaps legal and institutional, perhaps related to failures in other markets. Their findings rest on essentially the same logic that Lewis invokes: even though the marginal product of labor is positive on all farms, labor could be released in the aggregate without reducing output. The Foster and Rosenzweig (2010) findings suggest a misallocation of labor between sectors, but of course this is not the same as finding a surplus of labor for the economy as a whole.

To summarize, the Lewis model seems to have been wrong in assuming that wages in the capitalist sector are determined by a subsistence wage, and perhaps

[3] In the same paper, Lewis (1968) also reiterated the point that his model does not require a zero marginal product of labor; it simply needs the supply of labor to the capitalist sector to be more or less perfectly elastic.

also wrong in assuming that growth could proceed in many countries for extended periods without increases in wages or standards of living. His broader point may have been valid: that firms in the modern sector in developing countries face a very large pool of workers who are willing to work for a wage that would give them a modest increase in living standards relative to the subsistence sector. Whether the supply of labor is *literally* perfectly elastic may be somewhat beside the point.

Labor Market Imperfections

The Lewis model is sometimes portrayed as a model with barriers to movement between sectors. But in fact, Lewis posits a perhaps surprisingly free movement of workers across sectors. Labor is more or less indifferent between working in the capitalist or the subsistence sector. Wages are slightly higher in the capitalist sector, Lewis suggests (pp. 150–51), because of differences in costs of living and some nonmonetary compensation for the "psychological cost of transferring from the easy going way of life of the subsistence sector to the more regimented and urbanised environment of the capitalist sector." But this wedge is broadly consistent with a labor market equilibrium in which workers have no desire, in equilibrium, to move across sectors. Marginal productivity is also effectively equalized across sectors, in a peculiar sense: it is zero (or near-zero) in both sectors. In the subsistence sector, marginal product is near zero because of fixed factors and "overpopulation." But then marginal product is also essentially zero in the capitalist sector.

What does differ sharply across sectors is *average* productivity. In the capitalist sector, this is quite high because of the presence of capital. In the subsistence sector, average product is presumed to be lower. The real labor market imperfection lies in the determination of wages in the subsistence sector. Here, Lewis fails to spell out the reason that the wage lies above the marginal product of zero. This implies some non-neoclassical characteristics of the labor market. Indeed, the labor market imperfections of the Lewis model are not related to barriers to mobility—a subject that has received extensive recent treatment in widely differing contexts.[4] Neither are they necessarily related to labor market imperfections or disequilibrium in the capitalist sector, although that view has attracted considerable attention going back to Harris and Todaro (1970) and more recently has been revisited as a point of contention in Brown (2006) and Fields (2006).

[4] A number of recent literatures have looked at different types of barriers to labor mobility across sectors. Bryan, Chowdhury, and Mobarak (forthcoming) consider information barriers to migration; Dercon, Krishnan, and Krutikova (2013) note the importance of subjective well-being; Caselli and Coleman (2001) focus on the costs of acquiring skills needed for migration; In Gollin, Parente, and Rogerson (2004, 2007), we view subsistence factors as a barrier to migration; In Gollin and Rogerson (2014), we consider transportation costs as an additional source of differences in sectoral productivity; and Vollrath (2009b) sees differential fertility patterns as a potential source of dualism.

Lewis's view of a fixed capital stock for the capitalist sector seems difficult to accept, particularly in today's era of rapid and relatively open investment flows. Perhaps in the 1950s, it made sense to think of developing economies as operating in some kind of financial autarky, but this aspect of the Lewis model seems problematic today. Why does capital not move in to low-income countries to employ "surplus" labor? This is, of course, the central question posed by Lucas (1990), and it remains a fundamental puzzle for the development and growth literature today.

Savings and the Mechanisms of Development

A key theme in the Lewis model—perhaps the most important feature of the model, from Lewis's perspective—is the importance of capital investment as a source of growth. For Lewis, capital represents a fixed factor in the short run for most developing countries. There simply isn't enough capital to absorb all of the economy's labor in the modern sector. Lewis's thinking was heavily informed by the Harrod–Domar model and the other planning-oriented growth theories of his day. (In fact, two of Lewis's major works were books on planning: he published *The Principles of Economic Planning* in 1949 and revisited the topic specifically in the context of developing countries in *Development Planning: The Essentials of Economic Policy*, published in 1966. A major focus of these works is how to mobilize sufficient capital for an economy to grow and how to allocate it across sectors to achieve certain planning goals, assuming different values of the incremental capital output ratio for different sectors and different economies.) The "surplus labour" paper that spells out the Lewis model is also the source of the famous quotation that "[t]he 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 to 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)."

An important corollary of Lewis's view of capital as the key source of growth in labor surplus economies was that foreign assistance and other forms of foreign capital inflows could play a central role in driving development. As Easterly (1999) pointed out, the Lewis model and an associated view of capital fundamentalism, based on a Harrod–Domar view of the world, remained for many decades important ingredients in the measurement of "financing gaps" and the business of foreign aid.

Lewis's capital fundamentalism is not, I think, an essential ingredient of his theories of structural transformation, but it is related to a key set of puzzles about the model. Why doesn't the modern sector grow? Why doesn't it attract high rates of investment, given the large pool of unemployed or underemployed labor that could be productively used? Why isn't the capital spread more evenly across the labor force? Lewis repeatedly says in the paper that this does not happen, and he seems to have in mind some kind of lumpiness or indivisibility with respect

to investments. But this argument is never made explicit, and the implied model seems to require some kind of nonconvexity and/or market imperfection in the capital market.

Lewis builds his case on a set of propositions, none of which seems to be particularly well supported by the evidence available today. First, he supposes that all investment comes from the capitalist sector—and primarily from the savings of capitalists. This means that the capitalist sector can grow only from its own rents. In countries where the capitalist sector is small, this means that growth in absolute terms cannot be very rapid. As the capitalist sector grows, there is a reinforcing phenomenon, with the steady expansion of the capitalist sector leading to progressively higher savings rates. In this way, Lewis's story offers an explanation for the observed positive correlation between income per capita and investment rates. Lewis also felt that his framework offered an explanation or prediction concerning factor shares. In poor countries, the logic of his argument suggested that the capital share of income would be low. But as the capitalist sector expands through its own investment, there will initially be little or no increase in wages, leading to an increasing share of capital in national income. At the point where wages begin to rise, this trend might eventually be reversed.

Lewis's observations about the correlation between savings rates and income levels reflected a common view at that time concerning the importance of savings rates. This view has remained deeply embedded in the development policy arena in spite of well-founded concerns that the relationship is not causal (Easterly and Levine 2001). In the growth literature, the view of investment rates as an exogenous determinant of income levels was a widespread view in textbook treatments of the Solow model and in empirical papers such as Mankiw, Romer, and Weil (1992). More recently, however, views have arguably shifted; not only is the savings rate seen as potentially endogenous, but also the correlation between investment rates and income levels has been portrayed as misleading, relating more to measurement approaches than to underlying causal links (for example, Laitner 2000; Restuccia and Urrutia 2001; Hsieh and Klenow 2007). Seen through this lens, Lewis's effort to explain the investment–GDP relationship seems, with the benefit of 60 years of hindsight, to have been misguided. Reflecting back on his original work in 1968, Lewis appeared to recognize that his own capital fundamentalism was not the right story for many countries—and that the Green Revolution appeared to be associated with agriculture-led growth in some Asian countries. "This author is delighted that there are economies where the productivity of peasants increases steadily and that some portion of that increase goes into capital formation," Lewis (1968) wrote, somewhat defensively. "This does not render it useless or dangerous to study models of economies where in the initial stages the dynamism of growth is located in capitalist expansion."

In general, Lewis's emphasis on capital as a source of growth seems in retrospect to have overlooked the importance of productivity growth, and his assumption that only capitalists can invest productively seems inconsistent with current micro and macro evidence on savings behavior and investment.

Turning Points in the Growth Process

Lewis understood that in his framework, economies could not and would not indefinitely have unlimited supplies of labor—or in other words, they would not have perfectly elastic supply of labor to the capitalist sector at a wage determined by equilibrium in a subsistence sector. At some point, assuming that population growth did not outpace the accumulation of capital, sufficient labor would be pulled out of the subsistence sector to drive that part of the economy into a neoclassical mode of operation in which wages would be driven upwards by a rising marginal product of labor. For Lewis and his subsequent expositors, this moment represents a turning point. Until that moment, the capitalist sector can expand with fixed wages; beyond that moment, expansion of the capitalist sector will come in a context of rising wages.

This turning point has attracted enormous attention over the years. Much of this attention has focused on the question of whether, in the years before the turning point is reached, growth actually occurs with no increase in wages. This would arguably be an undesirable kind of growth, taken at face value; but potentially one could imagine this as a stage of growth that would allow an economy to expand and diversify. Presumably the model requires some kind of export outlet for goods produced in the growing capitalist sector, since wages are not rising and domestic consumption is then flat. Recent commentators have remarked on apparent similarities between this pre-turning-point growth and the experience of the East Asian economies, including most recently China. The argument is offered that China is reaching its Lewis turning point—presumably leading to a period of rising wages, declining comparative advantage in manufactures, and declining returns to investment (for example, Zhang, Yang, and Wang 2010; Wang and Weaver 2013; Das and N'Diaye 2013). To a large extent, this view of China reprises an earlier set of discussions of the East Asian growth experience. In that context, too, the question was whether their growth was sustainable and replicable elsewhere. Krugman (1994) argued that the East Asian miracle was in all probability unsustainable, founded on input intensification rather than productivity improvements, and cited work by Young (1995) measuring relatively low productivity growth in four East Asian economies. Although Krugman did not mention Lewis explicitly, his assessment of the East Asian experience had many of the same elements: these economies were able to grow by pulling in large supplies of low-cost labor—primarily drawing workers from rural areas and from the urban informal sector.

This paper does not seek to address the disagreement about the underlying causes of the East Asian economic growth miracle nor about China's economic prospects. One point to note, however, is that the Lewis model is neither a necessary nor a sufficient condition for growth through factor accumulation. A standard Solow-style model with growth in the labor force would allow for economic growth through accumulation of factors. The specific prediction of Lewis-style growth before the turning point is that wages in the capitalist sector will remain approximately flat

during a period—potentially quite protracted—of growth. Indeed, a specific prediction of the Lewis model—and one emphasized by Lewis both in the original 1954 paper (for example, p. 190) and in his 1968 follow-up (p. 20)—is that with flat wages and a growing capitalist sector, the economy-wide share of capital should be rising until the turning point. In modern parlance, this is a claim about factor shares. Lewis argues that poor countries with surplus labor should see the capital share rise and the labor share of income fall. But Young (2003, p. 1255) suggests that for China in the period from 1978–1997, factor shares are approximately flat; he also notes (p. 1255) that his earlier work found the same for four other East Asian countries in the period from 1960–1990. Thus, if we take the Lewis model literally, it is not clear that these economies looked like "surplus labor" economies. Perhaps they were growing through factor accumulation; but this looks more like Solow-style economic convergence in the presence of workforce growth than like Lewis growth.

An Assessment

How then to assess the Lewis model? From a long view, Lewis's contribution is not only seminal, but also profoundly useful. The iconic model has become deeply embedded in contemporary thinking about development and growth because its basic structure seems to capture a key reality of the development process. Lewis's stylized description of a dualistic economy rings true with anyone who has spent time in a poor developing country, where modern glass buildings and shiny downtown areas coexist with huge populations of farmers scratching the soil with hand tools. By focusing on this fundamental dualism, Lewis offered a useful way to think about the development process. His model offers a crude but persuasive depiction of the growth process, in which growth occurs through the reallocation of labor and other resources across sectors. The model puts structural transformation processes at the heart of economic growth—a view that has captured renewed attention over the past few years. There is abundant empirical support for the proposition that structural transformation does, in an accounting sense, explain a large fraction of growth and income levels.

What is less clear is that the underlying mechanisms of the Lewis model were correct. The labor market dynamics that he posits do not seem to apply in the real world, and the capital fundamentalism that drives growth in his model seems overly restrictive. The specific assumptions and implications of the model seem almost uniformly to conflict with micro evidence and macro data. Even for countries like those in East Asia that seem at first glance to have been characterized by surplus labor, the evidence conflicts with a key prediction of the Lewis model—namely that the capital share of income should be rising steadily until the Lewis turning point (after which they should fall steadily).

To what extent does it matter that the model is wrong in its details if it is nevertheless compelling in its outlines? The shortcomings of the Lewis model are important, both for our understanding of the growth process and for policies that

are designed to promote development. In the Lewis model, infusions of capital can play a crucial role in unlocking growth; this does not seem to be true in reality. The Lewis model might lead policymakers to imagine that labor can be moved costlessly out of the agricultural sector or the informal services sector; on the contrary, the evidence suggests that the people occupying these sectors are productively engaged and have positive marginal product. There may be settings or sectors where labor could be freed from low-productivity uses at low social costs, as suggested by the Foster and Rosenzweig (2010) evidence on farms that are operating at an inefficiently small size. But implementing such changes depends on identifying and fixing imperfections in the markets for other factors, such as capital and land.

A recent literature does provide evidence that misallocations across sectors—and even across firms within sectors—may play an important role in explaining aggregate income differences and productivity differences across countries. Both micro and macro literatures in development have explored issues of misallocation in recent decades (for example, Banerjee and Duflo 2005; Restuccia and Rogerson 2008; Hsieh and Klenow 2009; Bartelsman, Haltiwanger, and Scarpetta 2013).

Even where there is no clear evidence of misallocation per se, there is overwhelming evidence of spatial and sectoral disparities within countries. Although Lewis was careful not to associate his subsistence sector with agriculture, the data today seem clearly to point to the agricultural sector as a major source of within-country disparities in income and productivity. Large fractions of the labor force in poor countries work in agriculture, and systematically the average productivity of agricultural labor appears to be low, as do living standards in rural areas (Gollin, Lagakos, and Waugh 2014a, b; Young 2013). Understanding the growth process will require a richer understanding of the forces keeping hundreds of millions of the world's poorest people in rural areas and tying them to low-productivity work in agriculture. Lewis's explanation of these forces was perhaps inadequate, but he was surely looking at the right questions.

The Lewis model does invite a set of research questions that remain important today—and that were perhaps neglected for too long in the development and growth literatures. Both academic economics and the world of development policy were arguably hurt by the relative neglect of dual economy models for several decades, beginning in the mid-1960s. The long dominance of one-sector models in the growth literature meant that questions of importance to developing countries were not really addressed. The issues that stand out today are related to the sources of dualism. We need to learn more about the kinds of frictions and barriers that prevent the movement of labor across sectors. These barriers may reside in labor markets, or they may be related to frictions in markets for land and capital. We also need to understand better the reasons why productivity differs so markedly across sectors. But with new data sources and more ability than ever before to collect and analyze data, it seems reasonable to aim for an updated and improved understanding of dualism—one that is consistent with the data and can guide policy choices in the years ahead.

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