

*How use doth breed a habit in a man!*

Shakespeare, *Two Gentleman of Verona*

On March 6, 1957, the Gold Coast, a small British colony, became the first nation of sub-Saharan Africa to gain its independence. It renamed itself Ghana. Delegations from both sides of the iron curtain, including from Moscow and Washington, vied to be the first to extend loans and technical assistance to the new nation. Vice President Richard Nixon led the American delegation. (According to one source, Nixon asked a group of black journalists, "What does it feel like to be free?" "We don't know," they replied, "we're from Alabama.")<sup>1</sup>

A later writer commented about Ghana's independence day, "Few former colonies can have had a more auspicious start."<sup>2</sup> Ghana supplied two-thirds of the world's cocoa. It had the best schools in Africa, and economists thought education was one of the keys to growth. It had a good amount of investment, and economists thought investment was another of the keys to growth. Under limited self-government in the 1950s, the Nkrumah government and the British had built new roads, health clinics, and schools. American, British, and German companies expressed interest in investing in the new nation.<sup>3</sup> The whole nation seemed to share an excitement about economic development. As one Ghanaian wrote at the time, "Let us now seek the economic kingdom."<sup>4</sup>

Nkrumah had the services of many of the world's economists—Arthur Lewis, Nicholas Kaldor, Dudley Seers, Albert Hirschman, and Tony Killick—who shared the optimism that Dudley Seers had already expressed in a report in 1952: that assistance to Ghana would

yield very high returns. As Seers put it in 1952, "Surfacing the road from Tarkwa to Takoradi would increase total output" by much more "than applying the same materials to almost any road in the United Kingdom."<sup>5</sup>

### Miracle on the Volta

Nkrumah had bigger goals than paving a few roads. He had already begun plans to build a large hydroelectric dam on the Volta River, which would provide enough electricity to build an aluminum smelter.<sup>6</sup> Nkrumah anticipated that once the smelter was operational, an integrated aluminum industry would develop. The new smelter would process alumina, which would come from a new alumina refinery, which would process bauxite from new bauxite mines. Railways and a caustic soda plant would complete this dynamic industrial complex. A report prepared by expatriate advisers was enthusiastic that the lake created by damming the Volta would also provide a water transportation link between north and south in Ghana. The project would lead to "a major new fishing industry in the lake." Large-scale irrigated agriculture using lake water would make the loss due to flooding of 3,500 square miles of agricultural land "small in comparison."<sup>7</sup>

The Ghanaians indeed built Akosombo Dam within a few years, with support from the American and British governments and the World Bank. The dam created the world's largest man-made lake, Lake Volta. They built an aluminum smelter quickly as well, owned 90 percent by the multinational giant Kaiser Aluminum. Nkrumah ceremonially lowered the dam gates to start filling the great Volta Lake on May 19, 1964.<sup>8</sup>

I remember visiting Akosombo Dam when I lived in Ghana for a year in 1969–1970. The big pile blocking the Volta River was indeed a stunning achievement.

I was optimistic in 1969 about the prospects of Ghana, but my projections did not receive a great deal of public notice, perhaps because I had just finished elementary school.

Other more mature observers shared my precocious optimism. The head of the World Bank's Economics Department in 1967, Andrew Kamarck, thought that Ghana's Volta project gave it the potential to reach growth of 7 percent per annum.<sup>9</sup>

### Back to the Volta

In April 1982, a Ghanaian student at the University of Pittsburgh named Agyei Frempong handed in his Ph.D. dissertation, which compared the performance of the Volta River project to the high hopes held by Nkrumah and his foreign and domestic advisers for industrialization, transport, agriculture, and overall economic development. Lake Volta was there, an electricity generator was there, and an aluminum smelter was there. Production of aluminum in the smelter had fluctuated up and down, but did grow on average about 1.5 percent a year from 1969 to 1992.

But that was it for the project's benefits. Frempong noted in 1982, "There is no bauxite mine nor alumina refinery nor caustic soda plant nor railways." The efforts to create a lake fishery were "plagued by poor administration and mechanical equipment failures." People living next to the lake, including the 80,000 whose old homes had been submerged, suffered from waterborne illnesses like river blindness, hookworm, malaria, and schistosomiasis. The large-scale irrigation projects that the planners had envisioned never worked. The lake transport from north to south that was going to solve "the nation's transport difficulties" had "ended up in complete failure."<sup>10</sup>

The saddest part was that the Volta River project was the most successful investment project in Ghanaian history. Frempong agreed with other analysts like Tony Killick that the core part of the project had been a success. The electricity generator and aluminum smelter continue to operate today, the latter with subsidized electricity and imported alumina.

The real disaster is that the Ghanaians are still about as poor as they were in the early 1950s. Ghana had a half-century of stagnation in growth. How did this happen? Just about everything went wrong. The military overthrew Nkrumah in a coup in 1966, the first of five successful military coups over the next decade and a half. His overthrow set off street celebrations in Accra, because Nkrumah's development ambitions had brought little but food shortages and high inflation.

Ghanaians would have celebrated less if they had known how much worse their situation would get over the next two decades. The military briefly restored democracy between 1969 and 1971 under the presidency of Kofi Busia. After the army overthrew Busia in 1971,

economics and politics alike fell apart. Ghana even had a famine in the 1970s.<sup>11</sup>

The nadir came in 1983 during the new military government of Flight Lieutenant Jerry Rawlings. In 1983, the income of the average Ghanaian was two-thirds of what it had been in 1971. A drought lowered Lake Volta so much that the hydro plant had to cut off electricity to the Volta Aluminum Company for a year. Ghanaians in 1983 were getting only two-thirds of their recommended daily calorie supply.<sup>12</sup> In 1983, even relatively well-off Ghanaian civil servants made macabre jokes about their “Rawlings necklaces”—the collarbones protruding from their underfed bodies.<sup>13</sup> Malnutrition caused nearly half of all child deaths in 1983.<sup>14</sup> Per capita income in 1983 was below that at independence in 1957.

The crisis in 1983 provoked the Rawlings government to new efforts to bring Ghana back, and economic growth did recover, but it was a long and slow road after a quarter-century of decline.

### The Harrod-Domar Model, 1946–2000

The idea that aid-financed investment in dams, roads, and machines would yield growth goes back a long way. In April 1946, economics professor Evsey Domar published an article on economic growth, “Capital Expansion, Rate of Growth, and Employment,” which discussed the relationship between short-term recessions and investment in the United States. Although Domar assumed that production capacity was proportional to the stock of machinery, he admitted the assumption was unrealistic and eleven years later, in 1957, complaining of an “ever-guilty conscience,” he disavowed the theory.<sup>15</sup> He said his earlier purpose was to comment on an esoteric debate on business cycles, not to derive “an empirically meaningful rate of growth.” He said his theory made no sense for long-run growth, and instead he endorsed the new growth theory of Robert Solow (which I discuss in the next chapter).

To sum up, Domar’s model was not intended as a growth model, made no sense as a growth model, and was repudiated as a growth model over forty years ago by its creator. So it was ironic that Domar’s growth model became, and continues to be today, the most widely applied growth model in economic history.

How did Domar’s model survive its supposed demise in the 1950s? We economists applied it (and still do) to poor countries from

Albania to Zimbabwe to determine a “required” investment rate for a target growth rate. The difference between the required investment and the country’s own savings is called the *financing gap*. Private financing is assumed to be unavailable to fill the gap, so donors fill the financing gap with foreign aid to attain target growth. This is a model that promised poor countries growth right away through aid-financed investment. It was aid to investment to growth.

With the benefit of hindsight, the use of Domar’s model for determining aid requirements and growth projections was (and still is) a big mistake. But let’s not be too unkind to the proponents of the model (I was one, earlier in my career), who did not have the benefit of hindsight. The experiences we observed at the time of the model’s heyday seemed to support a rigid link from aid to investment to growth. It was only as more data became available that the model’s failings became ghastly apparent.

Domar’s approach to growth became popular because it had a wonderfully simple prediction: *GDP growth will be proportional to the share of investment spending in GDP.* Domar assumed that output (GDP) is proportional to machines, so the change in output will be proportional to the change in machines, that is, last year’s investment. Divide both sides by last year’s output. So GDP growth this year is just proportional to last year’s investment/GDP ratio.<sup>16</sup>

How did Domar get the idea that production was proportional to machines? Did not labor play some role in production? Domar was writing in the aftermath of the Great Depression, in which many people running the machines lost jobs. Domar and many other economists expected a repeat of the depression after World War II unless the government did something to avoid it. Domar took high unemployment as a given, so there were always people available to run any additional machines that were built. Domar’s theory became known as the Harrod-Domar model. (A British economist named Roy Harrod had published in 1939 a similar but more convoluted article.)

Clearly Domar’s interest was the short-run business cycle in rich countries. So how did Domar’s fixed ratio of production to machines make it into the analysis of poor countries’ growth?

### The Invention of Development

The quest for a theory of growth and development has tormented us economists as long as there have been economists. In 1776, eco-

nomics' founding father, Adam Smith, asked what determined the wealth of nations. In 1890, the great English economist Alfred Marshall said the quest for growth "gives to economic studies their chief and their highest interest."<sup>17</sup> Nobel Prize winner Robert Lucas confessed in a 1988 article that once one starts to think about economic growth, "It is hard to think about anything else." But this constant interest in a theory of growth was focused on the rich countries only. No economists paid much attention to the problems of poor countries. The League of Nations's 1938 *World Economic Survey*, prepared by the future Nobel Prize winner James Meade, included one paragraph on South America. Poor areas in Asia and Africa received no coverage at all.<sup>18</sup>

Suddenly after World War II, we policy experts, having ignored poor countries for centuries, now called for attention to their "urgent problems."<sup>19</sup> Economists had many theories as to how the newly independent poor countries could grow and catch up to the rich.

It was the bad luck of poor countries that the first generation of the development experts was influenced by two simultaneous historical events: the Great Depression and the industrialization of the Soviet Union through forced saving and investment. The depression and the large number of underemployed rural people in poor countries motivated development economist Sir Arthur Lewis to suggest a "surplus labor" model, in which only machinery was a constraint. Lewis suggested that building factories would soak up this labor without causing a decline in rural production.

Lewis and other development economists in the 1950s assumed a fixed ratio between people and machines, like one person per each machine. Because of surplus labor, machines (not labor) were the binding constraint on production. Production was proportional to machines, just as in Domar's theory. Lewis suggested that the supply of available workers was "unlimited" and cited a particular example of an economy that had grown through pulling in excess labor from the countryside: the Soviet Union.

Lewis said that "the central fact of economic development is rapid capital accumulation."<sup>20</sup> Since growth was proportional to investment, you could estimate that proportion and get a required amount of investment for a given growth target. For example, suppose that you got one percentage point of growth for every four percentage points of investment. A country that wanted to triple growth from 1 percent to 4 percent had to raise its investment rate from 4 percent

of GDP to 16 percent of GDP. The 4 percent GDP growth would give a per capita growth rate of 2 percent if population growth was 2 percent. At a 2 percent per year rate of growth, income per capita would double every thirty-six years. Investment had to keep ahead of population growth. Development was a race between machines and motherhood.

How do you get investment high enough? Say that current national saving is 4 percent of GDP. The early development economists thought that poor countries were so poor they had little hope of increasing their saving. There was thus a "financing gap" of 12 percent of GDP between the "required investment" (16 percent of GDP) and the current 4 percent of GDP level of national savings. So Western donors should fill the "financing gap" with foreign aid, which will make the required investment happen, which in turn will make the target output growth happen. (I will henceforth use *financing gap approach* as equivalent nomenclature to *Harrod-Domar model*.)

The early development economists were hazy about how long it took for aid to increase investment and in turn increase growth, but in practice they expected quick payoff: this year's aid will go into this year's investment, which will go into next year's GDP growth.

The idea that growth was proportional to investment was not new. Domar ruefully mentioned in his 1957 book that an earlier set of economists very concerned about growth, Soviet economists of the 1920s, had already used the same idea. N. A. Kovalevskii, the editor of *Planned Economy*, in March 1930 used the growth-proportional-to-investment idea to project Soviet growth, exactly the way that economists were going to use it from the 1950s through the 1990s.<sup>21</sup> Not only had the Soviet experience inspired the Harrod-Domar model, but the Soviets themselves should get some of the credit (or debit, as it turned out) for the invention of the model.

### The Stages of Rostow

The next step in the evolution of the financing gap was to persuade rich nations to fill the gap with aid. In 1960, W. W. Rostow published his best-selling book, *The Stages of Economic Growth*. Of the five stages he projected, the stage that stuck in peoples' minds was the "takeoff into self-sustained growth." Yet the only determinant of output take-off that Rostow cited was investment increasing from 5 to 10 percent

of income. Since this was almost exactly what Sir Arthur Lewis had said six years earlier, "takeoff" just reasserted Domar and Lewis with vivid images of planes swooping off runways.

Rostow tried to show that the investment-led takeoff fit the stylized facts. Stalin's Russia influenced Rostow a great deal, as it had everyone else; it fit the takeoff story. Then Rostow considered a number of historical and Third World cases. His own evidence was weak, however: only three of fifteen cases he cited fit the story of an investment-led takeoff. Nobel laureate Simon Kuznets in 1963 found his own independent historical evidence even less supportive of Rostow's story: "In no case do we find during the takeoff periods the acceleration in the rate of growth of total national product implied in Professor Rostow's assumptions of a doubling (or more) in the net capital formation proportion."<sup>22</sup> (But stylized facts never die. Three decades later, a leading economist would write: "One of the important stylized facts of world history is that massive increases in saving precede significant takeoffs in economic growth.")<sup>23</sup>

### The Soviet Scare and Foreign Aid

Regardless of the evidence, Rostow's *Stages* drew a lot of attention to the poor nations. Rostow was not the only or even the most important advocate for foreign aid, but his arguments are illustrative.

Rostow played on cold war fears in *Stages*. (The subtitle was *A Non-Communist Manifesto*). Rostow saw in Russia "a nation surging, under Communism, into a long-delayed status as an industrial power of the first order," a common view of that time. Hard as it is to imagine today, many American opinion makers thought that the Soviet system was superior for sheer output production, even if inferior in individual freedoms. In issues of *Foreign Affairs* in the 1950s, writers noted the Soviet willingness to "extract large forced savings," the advantage of which "it is difficult to overemphasize." In "economic power," they will "grow faster than we do." Observers warned that the competitor derived "certain advantages" from the "centralized character of the operation." There was danger that the Third World, attracted by "certain advantages," would go communist.<sup>24</sup>

It is too easy today in hindsight to mock these fears. When I first visited the Soviet Union in August 1990, almost everyone by then had belatedly realized that the Soviet Union was still a poor country.

not "an industrial power of the first order." As I sat sweating in a tiny Intourist hotel room with sealed windows, with air-conditioning that had broken down under Khrushchev and hadn't been fixed yet, with less than irresistible prostitutes trying to break down my door ("Hello I Natasha, I lonely"), I wondered how the Soviets managed to fool us for so long. Today Russian per capita income is estimated to be less than one-sixth of American per capita income. (With an economist's gift for prophecy, I said to my companions in 1990, "This place will be booming in no time!" Actually growth has been negative every year since 1990.)

Nevertheless, at the time Rostow felt the need to demonstrate to the Third World that communism was not "the only form of effective state organization that can . . . launch a take-off" and offered in its place a noncommunist way: Western nations could provide Third World nations with aid to fill the "financing gap" between the necessary investment for takeoff and actual national saving. Rostow used the financing gap approach to figure out the necessary investment for "takeoff."<sup>25</sup> The role of private financing was ignored, since international capital flows to the poor countries were minuscule.

The Soviet scare worked. U.S. foreign aid had already increased a lot under Eisenhower in the late 1950s, to whom Rostow was an adviser. Rostow had also caught the eye of an ambitious senator named John F. Kennedy, who, with advice from Rostow, successfully got the Senate to pass a foreign aid resolution in 1959. After Kennedy became president, he sent a message to Congress in 1961 calling for increased foreign aid: "In our time these new nations need help . . . to reach the stage of self-sustaining growth . . . for a special reason. Without exception, they are all under Communist pressure."

Rostow was in government throughout the administrations of Kennedy and Johnson. Under Kennedy, foreign aid increased by 25 percent in constant dollars. Under Johnson, American foreign aid reached its historical maximum of \$14 billion in 1985 dollars, equivalent to 0.6 percent of American GDP. Rostow and other like-minded economists had triumphed on aid.

The United States decreased its foreign aid after that peak under Johnson, but other rich countries more than compensated. Between 1950 and 1995, Western countries gave \$1 trillion (measured in 1985 dollars) in aid.<sup>26</sup> Since virtually all of the aid advocates used the financing gap approach, this was one of the largest policy experiments ever based on a single economic theory.

### Don't Forget to Save

There was a remarkable degree of consensus that the aid to investment to growth dogma "was substantially valid," as a popular text by Jagdish Bhagwati in 1966 put it. But there were warnings about excessive indebtedness to donors on the low-interest loans that made up part of the aid. Turkey had already developed debt servicing problems on its past aid loans, this early text noted. One early aid critic, P. T. Bauer, sarcastically (but presciently) noted in 1972 that "foreign aid is necessary to enable underdeveloped countries to service the subsidized loans ... under earlier foreign aid agreements."<sup>27</sup>

The obvious way to avoid a debt problem with official donors was to increase national saving. Bhagwati said this was a job for the state: the state had to raise taxes to generate public savings.<sup>28</sup> Rostow predicted the recipient country would naturally increase its savings as it took off, so that after "ten or fifteen years" the donors could anticipate that aid would be "discontinued." (We are still waiting for that apotheosis forty years later.)

Hollis Chenery stressed the need for national saving even more heavily in his application of the financing gap approach. Chenery and Alan Strout in 1966 started off in the usual way with a model in which aid will "fill the temporary gap between investment ability and saving ability."<sup>29</sup> Investment then goes into growth. But they also assumed a high rate of saving out of the increase in income. This saving rate had to be high enough for the country eventually to move into "self-sustained" growth, in which it financed its investment needs out of its own savings. They suggested that donors relate "the amount of aid supplied to the recipient's effectiveness in increasing the rate of domestic saving." (Donors have yet to follow this suggestion thirty-four years later.)

### The Financing Gap Meets the Computer

Economists computerized Chenery's version of the financing gap at the World Bank in 1971, where Chenery was now the chief economic adviser to Bank president Robert McNamara, who was delighted to get a tool that gave precise aid requirements for each country.

A Bank economist, John Holsen, developed over a long weekend what he called the minimum standard model (MSM). Holsen expected the "minimum" model to have a useful life of about six weeks.<sup>30</sup>

He expected country economists to build more elaborate country-specific models to supplant it. (As it turned out, it is still being used today, twenty-nine years later. I was part of a unsuccessful attempt to revise it fundamentally eleven years ago, so it's partly my fault.) World Bank economists revised the MSM a couple of years later and renamed it the revised minimum standard model (RMSM).<sup>31</sup> The growth part of the RMSM was Harrod-Domar: the growth rate of GDP was proportional to last year's investment/GDP. Foreign aid and private finance were to fill the financing gap between saving and the necessary investment to get high growth.

The financing gap informed discussions with other donors over how much aid or other financing that country needed. Following Chenery—and equally unheeded—the RMSM creators cautioned that saving out of the additional income had to be high to avoid unsustainable debt. (Much Latin American and African debt indeed turned out to be unsustainable in the 1980s and 1990s.)

The failure of growth to respond to aid-financed investment did give economists pause, but there was a logical fallback for defenders of the financing gap approach. One leading development textbook (both recently and in earlier versions) gave what quickly became a new dogma: "Although physical capital accumulation may be considered a necessary condition of development, it has not proved sufficient."<sup>32</sup> Another leading development textbook echoed, "The basic reason why [the investment-led takeoff] didn't work was not because more saving and investment isn't a *necessary* condition—it is—but rather because it is not a *sufficient* condition."<sup>33</sup> We will see how the idea that investment is necessary but not sufficient works out in the data.

### The Financing Gap Forever

The financing gap approach had a curious fate after its heyday in the 1960s and 1970s. It died out of the academic literature altogether, yet the ghost of it lives on. We economists in the international financial institutions (IFIs) today still use it to make aid, investment, and growth projections.

We IFI economists used the financing gap approach even when it clearly wasn't working. Total GDP in Guyana fell sharply from 1980 to 1990, as investment was increasing from 30 percent to 42 percent of GDP,<sup>34</sup> and while foreign aid every year was 8 percent

of Guyana's GDP.<sup>35</sup> This was no triumph for the financing gap approach. Yet another World Bank report in 1993 argued that Guyana "will continue to need substantial levels of foreign capital inflows ... to provide sufficient resources to sustain economic growth."<sup>36</sup> The idea seems to be, "That didn't work, so let's try it again."

We IFI economists used the financing gap approach amid recovery from civil war. We World Bank economists programmed the Ugandan economy in 1996 to grow rapidly (at the ubiquitous growth target of 7 percent). With little savings and substantial investment requirements, this implied high foreign aid inflows. The report argued for the high aid because anything less "could be harmful for medium-term growth in Uganda, which requires external inflows."<sup>37</sup>

We IFI economists used the financing gap approach in the aftermath of macroeconomic crises. A World Bank report in 1995 told Latin Americans that "enhancing savings and investment by 8 percentage points of GDP would raise the annual growth figure by around 2 percentage points."<sup>38</sup> An Inter-American Bank report in 1995 worried about the Latin American "challenge of sustaining the level of investment necessary for continued output growth."<sup>39</sup> A World Bank report on Thailand in 2000 told the country that was the epicenter of the East Asian crisis that "private investment is the key to the resumption of growth."<sup>40</sup>

We IFI economists used the financing gap approach to train developing country officials. Courses still given today at the International Monetary Fund (IMF) and World Bank train developing-country officials to project investment requirements as proportional to the "target growth rate."<sup>41</sup>

We IFI economists used the financing gap approach amid the chaotic transition from communism to capitalism. A 1993 World Bank report on Lithuania said that "large amounts of external assistance will be required" in order to "provide the resources for critical investments" to stem the output decline.<sup>42</sup> A 1998 World Bank on Lithuania was still using the assumption that growth was proportional to investment. A 1997 report on war-ravaged Croatia said that "to achieve sustainable growth of 5–6 percent ... within the next three years ... [it] must achieve investment levels of 21–22 percent of GDP."<sup>43</sup>

How much aid and investment is needed to reach a growth target? A report by the European Bank for Reconstruction and Development (EBRD) in 1995 adroitly notes that these are central

planners' questions—and then goes on to answer them anyway. The EBRD announced it was using the "Harrod-Domar growth equation" to project investment requirements. This equation warned the ex-communist countries that "investment finance of the order of 20 percent or more of GDP will be required" to reach "growth rates of 5 percent" The report noted that "conditional official assistance ... contributes to cover the gap between domestic savings and investment."<sup>44</sup>

So the circle of irony closes. The communist economies had inspired the financing gap approach, the cold war inspired the filling of the gap with aid, and now the capitalist economies strove to fill the financing gap for the ex-communist economies.<sup>45</sup>

### Aid to Investment in the Light of Experience

As far as I know, nobody has checked the financing gap approach against actual experience. By the time that sufficient cross-country data became available, the model had already fallen out of favor in the academic literature. Yet as we have seen, the ghost of the model lives on in the determination of aid requirements and growth prospects of poor countries. Let's now test this model. } not

When we financing gap users calculated aid requirements as the excess of "required" investment over actual saving, our presumption was that aid would go one for one into investment. Moreover, aid givers talked about conditions that would require countries to increase their rate of national saving at the same time, which some like Rostow thought would even happen naturally. So aid combined with savings conditions should increase investment by even more than one to one. Let's see what actually happened.

We have eighty-eight countries on which data are available spanning the period 1965 to 1995.<sup>46</sup> The aid to investment link has to pass two tests for us to take it seriously. First, there should be a positive statistical association between aid and investment. Second, aid should pass into investment at least one for one: an additional 1 percent of GDP in aid should cause an increase of 1 percent of GDP in investment. (Rostow predicted investment would rise by even more than one for one because of increased saving by the aid recipient.) How did the aid to investment do on these tests? On the first test, only seventeen of eighty-eight countries show a positive statistical association between aid and investment.

Just six of these seventeen countries also pass the test of investment increasing at least one for one with aid. The magic six include two economies with trivial amounts of aid: Hong Kong (which got an average of 0.07 percent of GDP in aid, 1965–1995) and China (average of 0.2 percent of GDP). The other four—Tunisia, Morocco, Malta, and Sri Lanka—did have nontrivial amounts of aid. The other eighty-two countries fail the two tests.

These country-by-country results are reminiscent of the results of a 1994 study that found no relationship between aid and investment across countries. Unlike this study, I do not intend here to make a general statement about whether foreign aid is effective. There are many problems in doing such an evaluation, most of all the possibility that both aid and investment could be responding to some third factor. It could be that in any given country there was bad luck like a drought that caused investment to fall and aid to increase. I am only asking whether investment and aid jointly evolved the way that the users of the financing gap model expected. We financing gap advocates anticipated that aid would go into investment, not into tiding countries over droughts. According to my results, investment and aid did not evolve the way we expected.

The financing gap approach failed badly as a panacea because it violated this book's official motto: People respond to incentives. Think of the incentives facing the recipients of foreign aid. They invest in the future when they get a high return to their investments. They do not invest in the future when they do not get a high return to their investments. There is no reason to think that aid given just because the recipient is poor changes the incentives to invest in the future. Aid will not cause its recipients to increase their investment; they will use aid to buy more consumption goods. This is exactly what we found when we checked the aid-investment relationship: on balance there is no relationship.

Aid could have promoted investment instead of all going into consumption. As many aid advocates suggested, aid should have been made conditional on matching increases in a country's savings rate. That would have given the governments in poor countries incentives to increase their own savings (for example, cutting government consumption so as to increase government saving) and to promote private savings. The latter can be done by a combination of tax breaks for income that is devoted to saving and taxes on consumption. The increase in saving would have kept the aid recipients out of debt

troubles and would have promoted as increase in investment. Having aid increase with country saving is the opposite of the current system, where a country with lower saving has a higher financing gap and so gets more aid.

### Investment to Growth

The second link in the financing gap approach is the link from investment to growth. Does investment have a quick growth payoff, as the financing gap model assumed?

I start assuming the same short-run investment-growth relationship across all countries. I tried using four-year averages to assess the growth-investment relationship. (Five years is a common forecast horizon on country desks in the IFIs. Country economists usually project the first year from current business conditions, so four years is de facto the common horizon for projections.) The results with four-year averages do not bode well for the financing gap approach: there is no statistical association between growth in one four-year period and investment in the previous four-year period.<sup>47</sup>

Let's now allow the investment-growth relationship to vary across countries by examining the link from investment to growth individually for each country. We have 138 countries with at least ten observations on growth and investment. Again there are two tests of the investment-to-growth link. First, countries should display a positive statistical association between growth and last year's investment. Second, the investment-growth relationships should be in the "usual" range to give reasonable "financing gaps." The four economies that pass both tests are an unusual assortment: Israel, Liberia, Réunion (a tiny French colony), and Tunisia.<sup>48</sup>

Remembering the few countries where the aid-to-investment link worked as expected, I can now say that the financing gap approach fits one country: Tunisia. Before Tunisians throw a national celebration, I should point out that 1 success out of 138 countries is likely to have occurred by chance even if the model made no sense, which so far the evidence says it doesn't.

### Is Investment Necessary in the Short Run?

For the other 137 countries, the ritual incantation of us practitioners at this point is that investment is necessary but not sufficient. I can

test this idea by checking how many four-year-long high-growth episodes (7 percent and above) were accompanied by the necessary investment rates in the previous four years. Nine-tenths of the countries violate the "necessary" condition. At the short-run horizons at which we IFI economists work, there is no evidence that investment is either a necessary or a sufficient condition for high growth. In the longer run, accumulation of machines does go along with growth, but I will discuss in the next chapter how investment is not the causal force; instead it is technology.

Using the four-year averages for both growth and investment, let's also look at episodes where growth increased and see how often investment increased by the "required amount." During episodes of increased growth with four-year periods, investment increased by the "required amount" only 6 percent of the time. The other 94 percent of the episodes violated the "necessary condition." Empirically, increases in investment are neither necessary nor sufficient for increases in growth over the short to medium run.

To understand why the idea that growth is proportional to last period's investment doesn't work out in practice, remember that such a relationship assumed that machines were the constraint on production, because it assumed that laborers were perpetually in excess supply. Nobel laureate Robert Solow, whose model of growth I discuss in the next chapter, pointed out the problem with this assumption as long ago as 1956 (although his insight went unheeded by those of us in the IFIs for the succeeding four decades). If there is an abundant supply of laborers and a limited supply of machines, then companies will have a strong incentive to use technology that uses a lot of workers and few machines. For example, road construction projects in the labor-scarce United States use many jackhammers and relatively few workers. By contrast, road construction projects in labor-abundant India use many workers with picks breaking up rocks. The idea that investment is a rigid constraint on growth is incompatible with "people respond to incentives."

The surplus labor idea led to another cause for urgency to fill the gap for the "necessary" investment—if the investment is not forthcoming to generate enough output growth to absorb more of this excess labor, unemployment will increase. For example, a 1998 World Bank report on Egypt used the usual growth-proportional-to-investment idea, and then noted the alarming possibility that unemployment would shoot up to 20 percent of the labor force in 2002 (as

opposed to 9.5 percent in 1998) if growth was only 2 percent. If on the other hand, growth were 6.5 percent (with the accompanying higher investment), unemployment in 2002 would be only 6.4 percent of the labor force.<sup>49</sup> The idea of low investment mechanically increasing unemployment is silly—it ignores again the possibility of substituting labor for machinery. If machines increase slowly because of low investment, then the presumably abundant workers will be substituted for the scarce machines. The surplus labor idea suggests that additional people have no effect on production at a given rate of investment, an idea strongly rejected by the evidence.

How could we have gotten more of a growth response from investment? It is true that as an economy grows, it will need more machines. But the reason that the rigid investment-and-growth relationship has not worked is that machinery investment is just one of many forms of increasing future production, and all the forms are responsive to incentives. If incentives to invest in the future are strong, then there will be more investment in machines, but also more adaptation of new technology (an important component of growth, as we will see in the next chapter). There will be more investment in machines, but also more investment in education and training. There will be more investment in machines, but also more investment in organizational capital (designing efficient institutions).

The multiple factors that affect growth cause the relationship between growth and investment to be loose and unstable. Growth fluctuates around an average for each country, while investment rates drift all over the place. Nevertheless, it is common in the IFIs to use the ratio of investment to growth (called the jaw-breaking name of Incremental Capital to Output Ratio, or ICOR) as an inverse measure of the "productivity" of investment. For example, the World Bank in a 2000 report on Thailand saw that one of the harbingers of the 1997–98 financial crisis was that the ICOR "was almost at its historical high in 1996."<sup>50</sup> Likewise a World Bank 2000 report on Africa attributed Africa's low and declining growth over 1970 to 1997 to low and declining investment productivity "as measured by the incremental capital-output ratio."<sup>51</sup> The ICOR is reified to the extent that it is seen as an independent causal factor, when it really is just the ratio of two things only loosely related. Even if growth declined for reasons totally unrelated to investment (like mismanaged banking systems in Thailand or kleptocratic governments in Africa), we could still tautologically say growth fell for an unchanged

investment rate because the ICOR rose—that is, the ratio of growth to investment fell. We could equally say the price of apples fell because the price of oranges was unchanged and the price ratio of apples to oranges fell!

Rather than worrying about how much investment is “needed” to sustain a given growth rate, we should concentrate on strengthening incentives to invest in the future and let the various forms of investment play out how they may. (I talk more about how to do this at the end of this chapter and in future chapters.)

### Jointly Checking the Aid-to-Investment and Investment-to-Growth Links

I can construct a scenario of what income a country would have achieved if the predictions of the financing gap approach had been correct and then compare the prediction to the actual outcome. The financing gap model predicts that aid goes into investment one to one, or more. I stick to the one-to-one prediction to be conservative. So investment to GDP will increase over the initial year by the amount that aid to GDP increases over the initial year. Then this investment will increase growth in the next period. This predicts total GDP growth. To get per capita growth, I subtract actual population growth.

I start with a comparison of what Zambians’ actual average income to what would have been, \$2 billion of aid later, if filling the financing gap had worked as predicted (figure 2.1). Zambia today would be an industrialized country with a per capita income of \$20,000, instead of its actual condition as one of the poorest countries in the world with a per capita income of \$600 (which is one-third lower than at independence). Zambia is one of the worst cases for the financing gap approach, because it already had a high investment rate before aid and it got a lot of aid. But Zambia’s investment rate went down, not up, as the aid increased, and the investment in any case did not yield growth.<sup>52</sup>

What about the financing gap approach’s predicted growth for all of the aid recipients? First, the countries’ actual growth was more often than not lower than predicted growth. Second, the financing gap model did not successfully pick out the growth superstars. The most notable examples are the predicted superstars like Guinea-Bissau, Jamaica, Zambia, Guyana, Comoros, Chad, Mauritania,

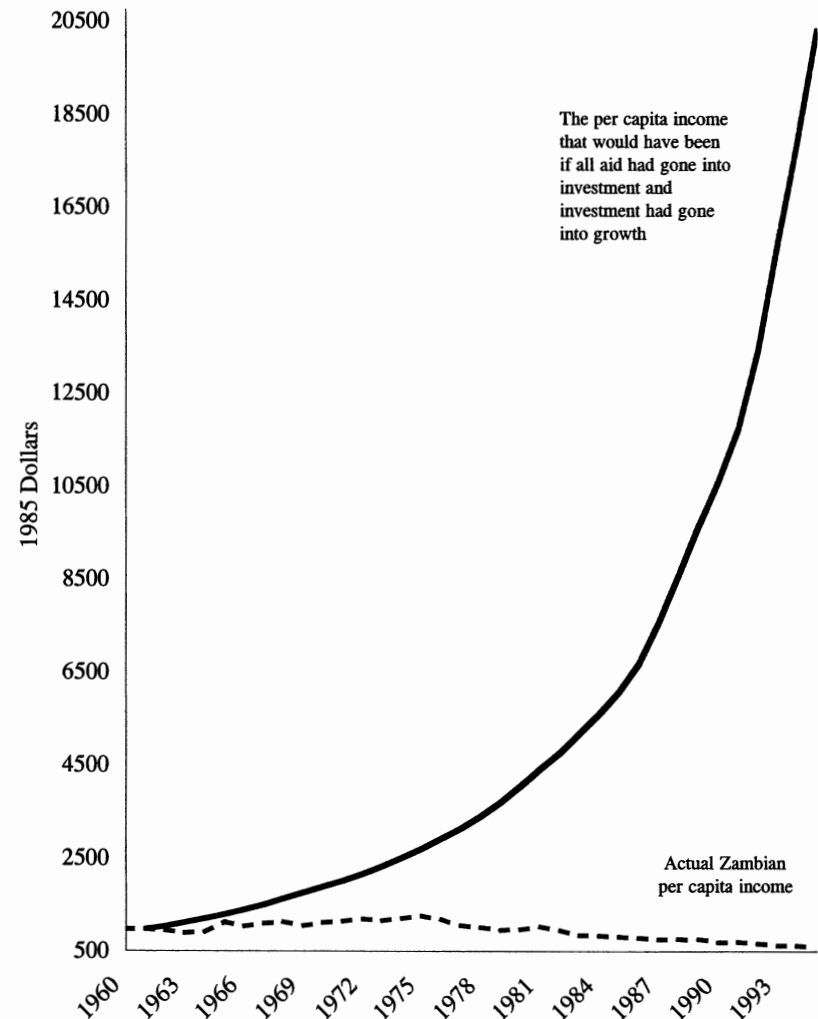


Figure 2.1

The gap between the financing gap model and the actual outcome in Zambia

Mozambique, and Zimbabwe, countries that instead turned out to be growth disasters despite high initial investment and high subsequent aid. We have real superstars like Singapore, Hong Kong, Thailand, Malaysia, and Indonesia (superstars until very recently, at least) that the financing gap predictions did not pick up. These were countries that had low initial investment or low subsequent aid (or both) yet grew rapidly. There is virtually no association between predicted and actual growth.

### Fifty Years Is Enough

The aid-financed investment fetish has led us astray on our quest for growth for fifty years. The model should finally be laid to rest. We should eliminate the notion of the financing gap altogether, with its spurious precision on how much aid a country needs. We should not attempt to estimate how much investment a country "needs" for a given target growth rate, because there is no stable short-run link between investment and growth. We should not attempt to estimate how much aid a country "needs" for a given growth rate, because there is no economic model that addresses that question.

Moreover, giving aid on the basis of the financing gap creates perverse incentives for the recipient, as was recognized long ago. The financing gap is larger, and aid larger, the lower the saving of the recipient. This creates incentives against the recipient's marshaling its own resources for development.

To return to the Ghana story, the sad reality is that Ghana is about as poor today as it was forty-three years ago at independence. If aid is given to countries that create good incentives for saving and growth, as we will detail more in part III, then aid will be more effective at helping countries on the quest for growth. The more hopeful reality is that Ghana has had a healthy 2 percent per capita growth rate since reforms (and fresh aid inflows) began after the low point in 1983.

Still, the fetish for achieving growth by building factories and machines proved amazingly resistant to blasted hopes. In the next chapter, we will see how a more flexible version of the machine fetish would be held out as a panacea for growth.

### Intermezzo: Parmila

*Parmila is an Indian widow in her early thirties. Her husband passed away last year after a prolonged illness, leaving her to fend for her seven-year-old son and three-year-old daughter. The land that her husband once owned had to be sold off to raise money for his expensive treatment. Today Parmila is left with no land and finds it extremely difficult to make ends meet.*

*Parmila comes from a well-off family in Khairplan village of Singhbhum district, but destitution has forced her to take up menial work despite her lineage. She earns her living by selling firewood, dehusking rice grains, and working as a daily laborer for local contractors. She collects wood from the nearby forests and dries it, then twice a week walks 8 kilometers to sell the wood at Jamshedpur market. She finds employment on farms in the months of Agrahayan and Poush (from mid-November to mid-January) dehusking rice. She dehusks 36 kilograms of rice a day working for nine hours; one-twelfth of her daily output is paid to her as wage. Thus, two weeks of work in each of the two months fetches her about 90 kilograms of rice in wages. Her daily household consumption of rice amounts to about 1 kilo, so the rice she earns as wages lasts for nearly three months. In addition, Parmila works for a local contractor and gets about ten days of work a month at a construction site. For this work, she is paid 25 rupees daily, which is less than half of the minimum wages set by the Minimum Wages Act. This work, however, is not available during the four months of the rainy season.*

*Parmila does not receive any support from her relatives or in-laws. Nevertheless, in spite of her destitution, she has high hopes for her two children, whom she regularly sends to the local village school. She even has plans to send them to Dimna Higher Middle School when they grow up. She plans to take up making puffed rice to save enough money to be able to send her two children to school.*

*Parmila has great self-respect and despite her woes refuses to be looked at with sympathy. "Even in times of acute crisis, I held my nerves and did not give in to circumstances. My God has always stood with me," says Parmila in a confident tone.<sup>1</sup>*