

# The Ghost of Financing Gap

## *Testing the Growth Model Used in the International Financial Institutions*

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**Abstract:** The Harrod-Domar growth model supposedly died long ago. But still today, economists in the International Financial Institutions apply the Harrod-Domar model to calculate short-run investment requirements for a target growth rate. They then calculate a “Financing Gap” between the required investment and available resources and often fill the “Financing Gap” with foreign aid. The Financing Gap Model has two simple predictions: (1) aid will go into investment one for one, and (2) there will be a fixed linear relationship between growth and investment in the short run. The data soundly reject these two predictions of the Financing Gap model.

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International financial institutions (IFIs) like the World Bank and IMF today use a growth model that long ago died out of the academic literature. This paper performs the unusual task of examining this “ghost” model in the light of theory and evidence.

It’s not common to test models that have been out of favor for decades in the literature. However, I put forward that testing models widely used in practice is as important an enterprise as testing models that are at the frontier of economics. While the latter advances the state of knowledge, the former tests the application of that knowledge in making economic policies.

The growth model used in the IFIs today, despite frequently expressed misgivings and caveats, is the Harrod 1939-Domar 1946 model as further developed by Chenery and Strout 1966 as the Two Gap Model. The model has two important features: (A) investment requirements to achieve a given growth rate are proportional to the growth rate by a constant known as the Incremental Capital Output Ratio (ICOR). (B) Aid requirements are given by the “Financing Gap” between the investment requirements and the financing available from the sum of private financing and domestic saving. I will call the Harrod-Domar-Chenery Two Gap Model the “Financing Gap Model” for short, because its most important use is to determine financing shortfalls. (A) and (B) imply the following testable propositions: (1) aid will go into investment one for one, and (2) there will be a fixed linear relationship between growth and investment in the short run. The constant of proportionality is one over the ICOR. Both predictions are about the *short-run* evolution of aid, investment, and growth; nothing in this paper addresses the *long-run* relationship between growth and investment or the *long-run* effectiveness of aid.

I will first document the widespread use of the Financing Gap model in international organizations. Then I will review the literature on the Financing Gap model. Next I will examine the consistency of the Financing Gap model with different growth theories. Then I will test the model against the data. Finally, I will appeal to theory to speculate why the model has lasted so long despite all the evidence against it.

## I. The Financing Gap Model in the 90s

Although it died in the academic literature some time ago, the ghost of the Financing Gap Model lives on today in the international financial institutions. Over 90 percent of country desk economists at the World Bank, for example, use some variant of the Financing Gap model today to make growth and financing gap projections.<sup>1</sup> According to the Spring 1995 reference guide to the standard World Bank model, “the ICOR and prior investment determine GDP.”<sup>2</sup> Country economists make assumptions about ICORs and national saving and calculate the Financing Gap corresponding to a target growth rate. World Bank staff present the result of this calculation at meetings where aid donors agree upon aid amounts for a specific country. The donors and multilaterals also apply analytical and political judgment to determine the aid given, of course, but the number produced by the Financing Gap Model influences the outcome.

To start off with some country examples, World Bank economists programmed the Ugandan economy in 1996 to grow rapidly (at the common growth target 7 percent). With little savings and an ICOR of 3 implying high investment requirements, the World Bank’s public report presented to the donor community argued for high aid because anything less “could be harmful for medium-term growth in Uganda, which requires external inflows...”<sup>3</sup> The “medium term” in this argument was two to six years as indicated in the projection tables. A 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>4</sup> 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>5</sup> A 1998 report on Lithuania stated explicitly that it was using the Financing Gap model to perform a “consistency and feasibility check” of the growth target with “the country’s access to external financing.”<sup>6</sup> A 1989 World Bank report noted that “India’s low per capita income means its domestic resources are limited relative to its investment needs. Increasing levels of concessional assistance will

ensure India's rising purchases of capital goods." The World Bank (1995b) echoed that "investment in the economy is still well below the levels needed for India to grow at rates comparable to high performing Asian economies"; support for investment "should guide the deployment of available assistance." On Zambia, "a useful (if simplistic) tool for comparing growth and investment scenarios across countries is an ICOR."<sup>7</sup> On Yemen, "the medium term growth targets will require a steady increase in the Investment/GDP ratio from about 13.7% in 1996 to about 20% by the year 2000 on the basis of an incremental Capital Output Ratio of about 4.2 over the five year period 1996-2000."<sup>8</sup> On Argentina, "a key prerequisite for reaching a sustainable growth rate of 7 percent is a fairly quick acceleration in investment rates."<sup>9</sup> On Nicaragua, The World Bank (1994a) said the growth "scenario continues to depend on a large influx of aid to finance a resource gap." In Laos, the World Bank (1994b) noted that "To achieve this growth path...Domestic investment is projected to increase... These projections indicate that external financing requirements will increase."

This methodology is so widespread across country desks that those who do not use it feel the need to apologize. The Bank's 1996 report on Russia warns the reader that their projections are "not an estimate of investment requirements based either upon detailed analysis of needs or knowledge of the appropriate capital-output coefficients."<sup>10</sup>

The World Bank is not alone; virtually all international institutions addressing the needs of poor countries stress the *short-run* necessity of both investment and aid for growth. The *International Monetary Fund* (IMF) today trains developing country officials to project investment requirements as the "target growth rate times the ICOR."<sup>11</sup> The IMF also expresses confidence in a short-run investment-growth link. "Africa's economic performance is expected to improve in 1992-93", but the improvement in these two years hinges on -- among other things -- "the increase in investment that is needed to promote economic growth." [IMF (1992, p. 18)] In a

different region, the IMF in 1996 told the ex-Communist countries in Europe that “raising investment rates to 30 percent of GDP” would “double projected growth rates.”<sup>12</sup>

The *Inter-American Development Bank* (IDB) 1995 worried about “the challenge of sustaining the level of investment necessary for continued output growth.”<sup>13</sup> The following year’s IDB report suggests they had a short run link in mind. Things looked better, the IDB 1996 noted, because an investment recovery in the 1990s led in the short-run to “the improved growth performance during the 1990s.”<sup>14</sup>

The *European Bank for Reconstruction and Development* in 1995 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” (an ICOR of 4).<sup>15</sup> They noted that “conditional official assistance ... contributes to cover the gap between domestic savings and investment”).<sup>16</sup>

The *International Labor Organization* 1996 reviewed the poor growth performance of LDCs over 1986-93. It related this to “the failure of investment rates to rise, since this is an essential condition for raising growth rates.”

For a bilateral example, the *Swedish International Development Cooperation Agency* commissioned a study of Vietnam (Andersen 1996) that used the Financing Gap methodology. Andersen 1996 said that to “support the targeted growth of 9-10% a year for the remaining years of this century, investments would need to increase from the current level of approximately 20% to around 30%.” This is “using a standard estimate of 3 for the ICOR.” The “capital requirement” for this investment is to be filled in part by “foreign development assistance.”<sup>17</sup>

## **II. Literature review on the Financing Gap model**

Ironically, Evsey Domar’s April 1946 article did not discuss long run economic growth, much less poor countries; it discussed the relationship between short-term recessions and

investment in the United States. Nevertheless, his prediction that GDP growth will be proportional to the share of investment spending in GDP (which he made assuming high unemployment in the US) proved convenient for economists studying poor countries' growth. Sir Arthur Lewis (1954) justified the use of a constant relationship between growth and investment assuming "surplus labor" in the countryside. Chenery and Strout 1966 gave the definitive statement of the Financing Gap model in their Two-Gap model. Aid will "fill the temporary gap between investment ability and saving ability." The usual ICOR formulation determines investment requirements for a given growth target.<sup>18</sup>

As the World Bank (1991) noted, "This so-called two gap model of the domestic saving and foreign exchange constraint to growth guided external aid and lending agencies in judging the extra resources that developing countries would need to finance imports and investment." Since most aid advocates used the Financing Gap model, we can think of the \$1 trillion in aid from 1960-94 as one of the largest policy experiments ever tried of an economic model.

Economists computerized Chenery's version of the Financing Gap model at the World Bank in 1971, where Chenery was now the chief economic adviser to Bank President Robert McNamara. Although Chenery and Strout were vague over what time horizon to use their model, the computerized version of the model had a lag of one year from investment to growth.

The run of the Financing Gap Model in the academic literature was closing even as its use spread throughout the World Bank and other IFIs. Although a "gap" segment of the literature still exists today in the three-gap model of Taylor 1994 and Bacha 1990, the spirit of the three-gap model is far from the Financing Gap model. In the three gap models, output is an adjustment mechanism in Keynesian fashion and so does not have a stable relationship to investment. As Taylor 1994 (p.19) puts it, the three gap model drops "the older gap models' maintained hypothesis that output is predetermined by capital accumulation."

What became the majority view in the literature, however, was not “gap” related at all. The heyday of the neoclassical critics of development policy came beginning in the 1980s.<sup>19</sup> The neoclassical critics thought resource *allocation* more important than resource *quantity*. They emphasized “getting prices right.” They pointed out growth failures who had high investment but “wrong” prices. The Financing Gap model had no role for prices in resource allocation and so the neoclassical approach seemed to rule out reliance on the Financing Gap model.

The defenders of the use of the Financing Gap model in the IFIs responded that aid and investment were *necessary* but not *sufficient* conditions for growth. The idea seemed to be that the Financing Gap model gave you the financing requirements for the “necessary” investment in the short-run, while IFI-imposed conditions on getting prices right and other policies would give you the “sufficient” conditions for short-run growth.

The IFIs echo this language with phrases like “{there is an} urgent need for investment” (EBRD 1996, p.6), “physical capital formation remains a necessary condition for rapid economic growth” (ILO 1995, p. 89), and “official financing on concessional terms will be necessary, but not sufficient, to improve growth prospects” (IMF 1993, p. 79). Regardless of the validity of these statements in the long-run, I have shown in section I that the IFIs apply this “necessary condition” to estimate short-run investment and aid requirements.

Another popular way to put this idea is to say that investment must be of sufficient *quality* as well as of sufficient *quantity*. IFI economists routinely interpreted the ICOR as a measure of investment quality. Thus, movements in the growth rate were often decomposed into movements in “investment quantity” and movements in “investment quality”.

### **III. The Financing Gap Model in Light of Growth Theory**

How does The Financing Gap model look in light of alternative growth theories? If aid is viewed as permanent income -- and there is considerable justification for viewing it as such given its persistence -- then the optimal response of the recipient is to consume aid rather than to invest

aid. In an endogenous growth model (like the one below), a lump sum transfer like aid would have no effect on the rate of investment. There is also a moral hazard problem with giving aid on the basis of a “financing gap.” Recipient countries will have an incentive to maintain or increase the “financing gap” by low saving (i.e. high consumption) so as to get more aid. Even if the donor puts savings conditions on the aid, the conditions may not be credible if the recipient perceives the donor as soft-hearted. (Donor conditionality has indeed turned out to be ineffective in changing recipient behavior.)<sup>20</sup> All of these theoretical perspectives are inconsistent with the one-to-one aid to investment link postulated in the Financing Gap Model.

As far as the investment to growth link, I will discuss three questions about the investment-growth link in alternative growth models: (1) is the ICOR a measure of investment quality? (2) is there a causal, proportional relationship between investment and growth? (3) Is the ICOR constant during steady state growth and in the transition to steady-state growth? I will give the qualitative conclusions here and leave the algebraic details for an Appendix available on request.

In the neoclassical growth model of Solow with labor-augmenting technical change, the ratio of capital to output will be constant in steady state. Both output per worker and capital per worker will increase at the rate of technical progress. The *level* of output, not the *growth rate* of output, will be a function of the investment rate in steady state. One can derive a constant ICOR in steady state-- it will be given by the ratio of the investment rate to the sum of population growth and the rate of labor-augmenting technical progress. A high ICOR here could reflect a high investment rate and a low population growth rate -- both thought to be desirable -- *not* necessarily low efficiency of investment.

The constant ICOR in the Solow steady state does not signify a causal, proportional relationship between investment and growth. An exogenous increase in investment will raise growth temporarily during the transition from one steady state to another. One can show that the

measured ICOR during the transition is higher, the higher is the initial level of the investment rate and the lower is the change in the investment rate. A high ICOR during the transition then may simply reflect a small change in the investment rate, not low investment efficiency. The ICOR also will not be constant during the transition, since it is a nonlinear function of the change in investment and the initial investment in each period. In the Solow model, the answer to questions (1) to (3) will be “no.”

In the endogenous growth models of recent years, the ICOR also does not fare well. A decrease in the ICOR also does not necessarily imply improved *quality* of investment. It may mean simply a lesser *quantity* of capital invested relative to other factors. The endogenous growth models stress a multitude of inputs besides physical capital, such as human capital, intermediate “new goods”, organizational capital, etc.

For example, suppose that there is a tax imposed on investment in physical capital, like an import tariff on imported capital goods or a sales tax on domestic capital goods. The tax increase will lower the ICOR because physical investment will now play less of a role in growth compared to human capital investment. This represents not a salutary increase in investment quality but just the opposite -- a loss in efficiency due to a tax-induced suboptimal combination of physical and human capital investment. (The same story would hold in the Solow model if we had both human and physical capital in the Solow production function.)

The ICOR is constant in the steady state of the endogenous growth model, as in the Solow model. However, the constant ICOR reflects the endogenous steady state response of both growth and investment to the model parameters and to policies like the tax rate. It does not represent a linear causal relationship between physical capital and output, because any increase in physical capital with human capital held constant will run into diminishing returns. The ICOR also would not remain constant during the transition to a new steady state after such an increase

in physical investment. In a variety of endogenous growth models, the answer to questions (1) to (3) is “no.”

In conclusion, in the short run there is no theoretical reason in standard neoclassical and endogenous growth models to expect the ICOR to be a measure of investment quality, to be the derivative of growth with respect to investment, or to be constant during transitions.

#### **IV. Testing the Financing Gap model**

As far as I know, nobody has done a full-scale test of the Financing Gap model with cross-country data. It’s easy to understand why. By the time that large-scale cross-country datasets became available, the model had largely fallen out of favor in the academic literature. Testing dead models is not an enterprise that is generally rewarded by the academic profession. Yet, as we have seen, the ghost of this dead model lives on in the determination of aid requirements and growth prospects of poor countries. The models that are applied in practice should be tested against the data just as much as the models that are at the frontier of knowledge in the literature.

##### *IV.1 Aid to investment*

When Financing Gap Model users calculated aid requirements as the excess of required investment over actual saving, their presumption was that aid will go one for one into investment. Moreover, aid givers talked about conditionality that would require countries to increase their rate of national saving at the same time. So aid combined with conditionality should increase investment by even more than one to one. Let’s see what actually happened.

We have 88 aid recipient countries on which we have data spanning the period 1965-95 (Table 1). How many of these countries show a significant and positive effect of foreign aid on investment, with a coefficient greater than or equal to one? The dependent variable here is Investment/GDP and the independent variable is Overseas Development Assistance (ODA)/GDP. Just 6 of the 88 countries pass the test of a positive and significant coefficient greater than or

equal to one. The magic six include two economies with trivial amounts of aid: Hong Kong (which got an average of .07 percent of GDP in aid 1965-95) 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 82 countries fail the test.

**Table 1: Results of regressing Gross Domestic Investment/GDP on ODA/GDP country by country, 1965-95**

<b>Coefficient of Investment on ODA</b>	<b>Number of countries</b>	<b>Percent of Sample</b>
<b>Total</b>	<b>88</b>	<b>100%</b>
<b>Positive, significant, and <math>\geq 1</math></b>	<b>6</b>	<b>7%</b>
<b>Positive and significant</b>	<b>17</b>	<b>19%</b>
<b>Positive</b>	<b>35</b>	<b>40%</b>
<b>Negative</b>	<b>53</b>	<b>60%</b>
<b>Negative and significant</b>	<b>36</b>	<b>41%</b>

This result is reminiscent of the results of Boone (1994), who found a zero coefficient on aid in a cross-section investment regression. Unlike Boone (1994), 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 endogeneity of aid. It could be that in any given country that there was an adverse shock like a drought that caused investment to fall and aid to increase. I am only testing the first link in a particular model -- the Financing Gap model. I am asking whether investment and aid jointly evolved the way that the users of this model expected. The Financing Gap Model aid advocates anticipated that aid would go into investment, not into tiding countries over droughts. According to Table 1, investment and aid did not evolve the way they expected.

#### *IV.2 Investment to growth*

The second link in the Financing Gap model is the linear growth-investment relationship. Does the linear investment - growth relationship work well in the data? Of course if we recalculate ICOR every period to be (Lagged Investment/GDP) over Growth, then the

relationship holds tautologically. What we really want to know is if the relationship has some predictive power, i.e. if we can predict growth with a constant ICOR.

Let me reiterate here that I am testing the *short-run* link between investment and growth that the Financing Gap model postulates. The growth literature has generally found a robust *long-run* relationship between investment and growth (Levine and Renelt 1992).

Let's regress growth on lagged investment to GDP individually for each country. We have 138 countries with at least 10 observations on growth and lagged investment (the median number of observations is 36). I include a constant (remember the ICOR model does not have one) and then do a test of its significance. Table 2 shows the results of these country by country regressions. By a "zero" constant, I mean a constant that is insignificantly different than zero.

**Table 2: Results of regressing GDP Growth on Gross Domestic Investment/GDP with a constant, country by country, 1950-92**

<i>Coefficient of Growth on Investment/GDP</i>	<i>Number of countries</i>	<i>Percent of Sample</i>
<b>Total sample</b>	<b>138</b>	<b>100%</b>
<b>Positive, significant, "zero" constant, and <math>2 &lt; ICOR &lt; 5</math></b>	<b>4</b>	<b>3%</b>
<b>Positive, significant, and "zero" constant</b>	<b>7</b>	<b>5%</b>
<b>Positive and significant</b>	<b>11</b>	<b>8%</b>
<b>Positive</b>	<b>77</b>	<b>56%</b>
<b>Negative</b>	<b>61</b>	<b>44%</b>
<b>Negative and significant</b>	<b>10</b>	<b>7%</b>

There are four countries that pass all the tests of a positive and significant relationship between growth and investment, a "zero" constant, and an ICOR between 2 and 5.<sup>21</sup> The four economies that pass the tests are an unusual assortment: Israel, Liberia, Reunion (a French colony), and Tunisia.

Remembering the few countries where the aid-to-investment link worked as expected, I can now say that the Financing Gap model fits one country: Tunisia. Unfortunately, 1 success out of 138 countries is likely to have occurred by chance even if the model had no empirical validity -- which so far the evidence says it does not.

#### IV.3 Is investment necessary in the short-run?

As we have seen, a common defense for the use of the Financing Gap model is that “investment is *necessary* but not *sufficient*.” Table 3 shows how often the necessary investment rates (lagged one period) accompany one-year high growth episodes over 1950-92 (defining high growth as 7 percent or above, a desideratum often mentioned).<sup>22</sup> At the optimistic ICOR of 2 we have less than half of the sample complying with the necessary conditions. At the “normal” ICOR of 3.5, nine-tenths or more of the sample violate the “necessary” condition. At an ICOR of 5, the “necessary” investment accompanied just 1 percent of the high growth episodes. (Recall that the regressions estimated ICOR to be above 5 in both the annual and four-year-average datasets).

The second column of Table 3 shows how many four-year-long high growth episodes were accompanied by the necessary investment rates (lagged one period). There were *no* four-year high growth episodes that had the “required” investment implied by an ICOR of 5; even at the highly optimistic ICOR of 2 just half of the episodes had the “required” investment. At short-run horizons -- which is where the Financing Gap model is applied -- there is no evidence that investment is a necessary condition for high growth.

**Table 3: How "necessary" is investment in the short run?**

*High growth episodes (7 percent or above) that have "required" investment/GDP (%):*

<i>Assuming ICOR of:</i>	<i>Period lengths</i>	
	<i>Annual averages</i>	<i>Four-year averages</i>
<b>5</b>	<b>1%</b>	<b>0%</b>
<b>3.5</b>	<b>9%</b>	<b>11%</b>
<b>2</b>	<b>37%</b>	<b>49%</b>

*Note: investment is lagged one period, for both 1-year and 4-year averages.*

Using the 1-year and 4-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.” Table 4 gives us the answer: during episodes of increased growth with four-year periods, investment increased by the “required amount” between 6 and 12 percent of the time, depending on the ICOR. The other 88 to 94 percent of the episodes violated the “necessary

condition". Of course, the data are even more unkind to the "necessary condition" with annual averages. Empirically speaking, increases in investment are neither necessary nor sufficient for increases in growth over the short-run that IFIs use the Financing Gap model. This calls into question the urgency of filling the Financing Gap to support that investment, as pronounced in many IFI documents.

**Table 4: How "necessary" is increased investment in the short run?**  
*Increased growth episodes that have "required" increase in investment/GDP (%):*  
*Period lengths*

<i>Assuming ICOR of:</i>	<i>Annual averages</i>	<i>Four-year averages</i>
<b>5</b>	<b>3%</b>	<b>6%</b>
<b>3.5</b>	<b>4%</b>	<b>6%</b>
<b>2</b>	<b>7%</b>	<b>12%</b>

*Note: investment is lagged one period, for both 1-year and 4-year averages.*

*Jointly evaluating the aid-to-investment and investment-to-growth links*

We can construct a counterfactual of what income a country would have achieved if the predictions of the Financing Gap model had been correct, and then compare the counterfactual to the actual outcome. The 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/GDP will increase over the initial year by the amount that aid/GDP increases over the initial year. Then this investment will increase growth, with a one year lag. (I will use an ICOR of 3.5 since it's the mid-point of the commonly cited 2 to 5 range.) This predicts total GDP growth. To get per capita growth, we subtract population growth (remember in The Financing Gap Model, more labor does not increase total GDP). So we have the prediction:

**GDP Growth per capita = (Initial Investment/GDP + Increase in Aid/GDP over initial year))/ICOR - Population growth**

Figure 1 shows the comparison of Zambia's actual per capita income to the predicted income if filling the Financing Gap had worked. Zambia would today be an industrialized country, instead of being one of the poorest countries in the world. Zambia is one of the worst-predicted cases because it initially had a high investment rate and it got a lot of aid. Zambia's

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investment rate went down, not up, as the aid increased and the investment in any case did not yield short-run growth.

Figure 2 shows the predicted Financing Gap model growth for all of the aid recipients. I show predicted per capita growth on the horizontal axis and actual per capita growth on the vertical axis. If the equation had predicted growth well, we would expect to see points clustering along the 45% line through the diagram. We do not see such a clustering. We have predicted superstars like Chad, Comoros, Guinea-Bissau, Guyana, Jamaica, Mauritania, Mozambique, Zambia, and Zimbabwe, countries who instead turned out to be growth disasters. We have real superstars like Hong Kong, Indonesia, Malaysia, Singapore, and Thailand that the equation did not pick up. Instead of a positive one-to-one correlation, the correlation of actual and predicted growth is slightly negative.

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#### **V. Why is the model still used?**

Why is the Financing Gap model still used in the applied development community? I speculate that it's a combination of four things. First, the model provides a handy back-of-the-envelope calculation of aid requirements, and justifies the aid requirements as "necessary" for growth. This helps aid agencies rationalize aid flows to each country. No other model delivers such a rationalization and calculation so cheaply.

Second, there is the multiple equilibrium model of "crime." If almost everyone is committing a "crime," the chances of a "criminal" being caught and punished are low. We have seen that the use of the Financing Gap model is so widespread that even if a user was accused of using an out-of-date model, the user could argue that "everyone else is doing it."

Third, there is the public good nature of a model. A model, like many forms of knowledge, is a nonrival, nonexcludable public good. An individual country analyst does not internalize the benefits to the entire development community of building a new model to replace

the Financing Gap model; she only compares the benefits for her report against the substantial fixed costs of building a model.

Fourth, there is the pattern of incentives in the academic literature. The academic literature tends to reward creation of new models at the frontier of knowledge, not the critical evaluation of practitioners' use of a decades-old model.

## **VI. Conclusions**

The Financing Gap Model lies behind calculations that influence economic policy and the allocation of aid resources in the International Financial Institutions. Yet, the Financing Gap growth model fails all theoretical checks and empirical tests this paper performs upon it. There is no theoretical or empirical justification for assuming a short-run proportional relationship between growth and "investment requirements." There is no theoretical or empirical justification for the assumption that filling a "financing gap" determined by "investment requirements" will raise investment or growth in the short run.

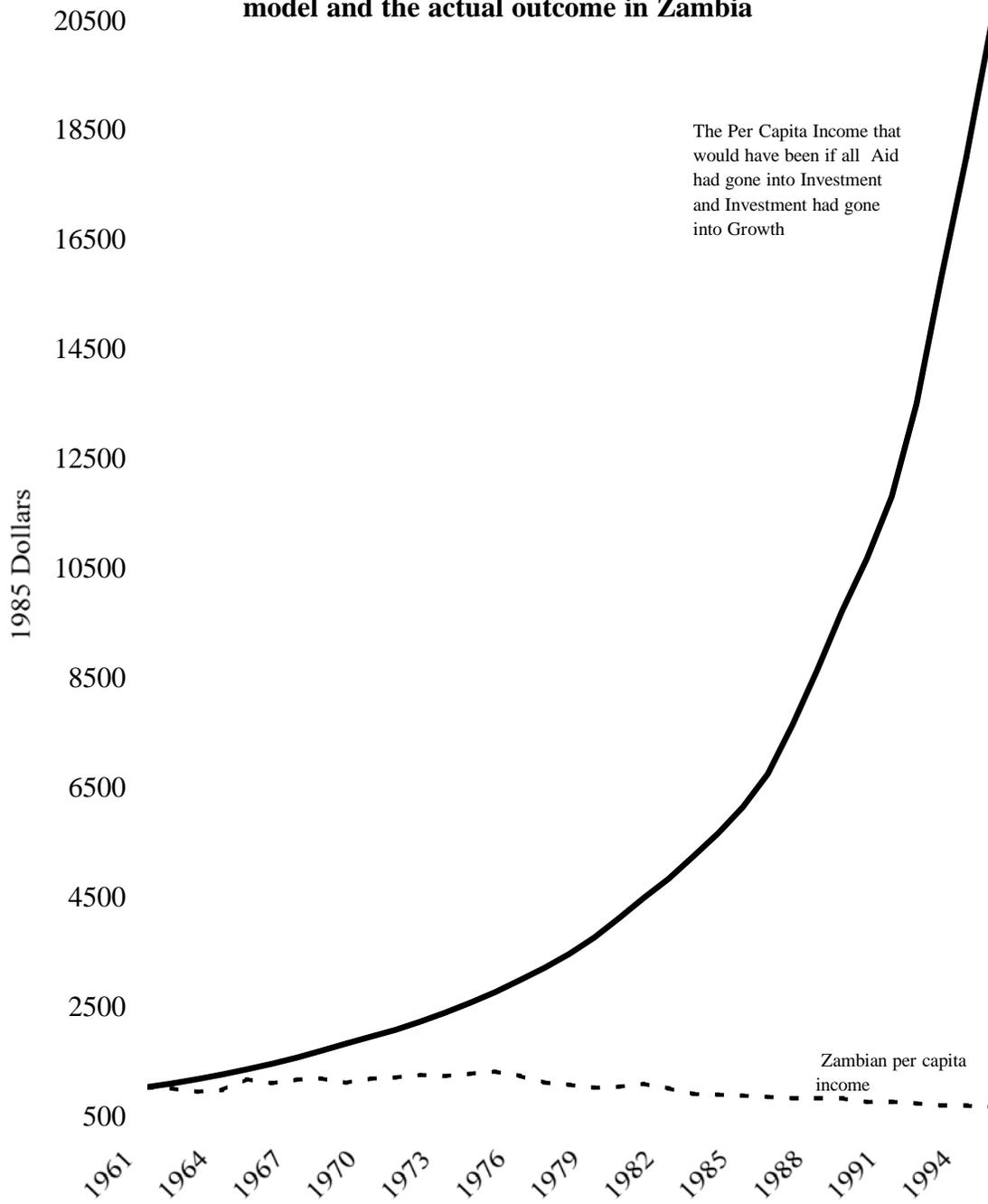
Nevertheless, the current structure of incentives in the academic world and the aid community suggest that use of the Financing Gap Model will continue. To change this (and analogous mismatches between academic knowledge and applied practice), academic researchers should devote more research effort to critiquing models used in practice. Within the IFIs and other policy-making organizations, there should be a process of subjecting applied models to outside academic review.

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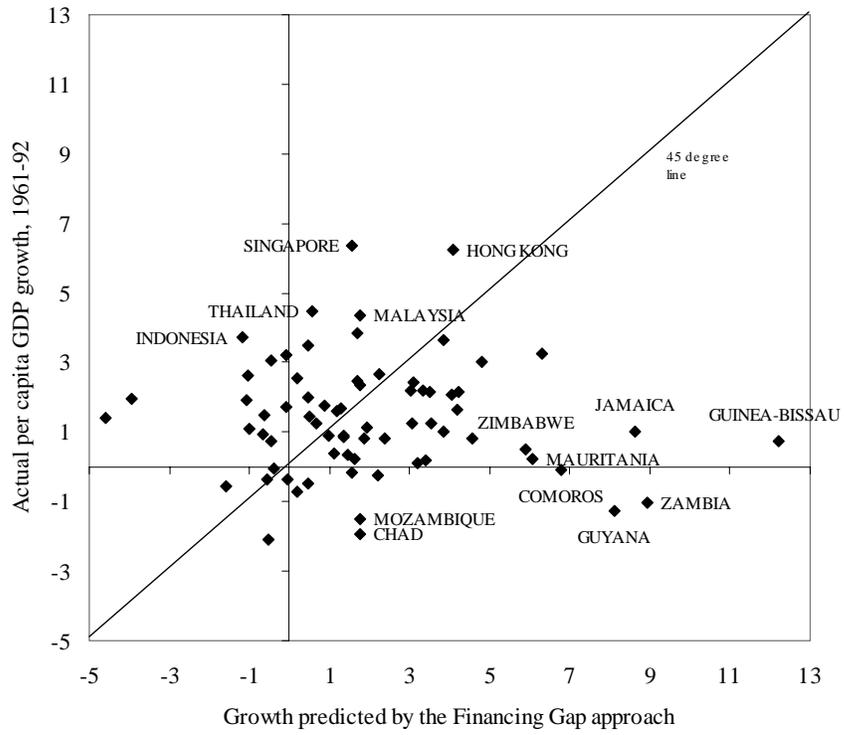
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**Figure 1: The Gap between the linear aid-investment-growth model and the actual outcome in Zambia**



**Figure 2: Actual growth versus that predicted by the Financing Gap approach**



## Endnotes

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<sup>1</sup> The model is called the Revised Minimum Standard Model (RMSM). The estimate is by Jos Verbeek, the World Bank's RMSM coordinator, from a survey. Also see Ventura 1995 documenting widespread usage. The RMSM has evolved over time. Khan, Montiel, and ul Haque 1990 suggested reconciling the models of the International Monetary Fund and World Bank by including monetary accounts. This suggestion was followed in the early 90s when a team of economists (of which I was one, I must confess) added fiscal and monetary accounts to the RMSM, which was then renamed RMSM-X.

<sup>2</sup> p. 7, World Bank 1995.

<sup>3</sup> p. 23, World Bank 1996a.

<sup>4</sup> World Bank, 1993a, p. 32.

<sup>5</sup> p. 20 World Bank, 1993b.

<sup>6</sup> p. 18 World Bank 1998, Volume I.

<sup>7</sup> World Bank 1996b

<sup>8</sup> World Bank 1996c

<sup>9</sup> World Bank 1996d

<sup>10</sup> World Bank 1996d, p. 79

<sup>11</sup> p. 228 and p. 239, IMF 1996a.

<sup>12</sup> IMF 1996b. (P. 88)

<sup>13</sup> Interamerican Development Bank 1995, p. 19

<sup>14</sup> Interamerican Development Bank 1996, p. 35

<sup>15</sup> European Bank for Reconstruction and Development 1995, p. 66, p. 5, p. 71.

<sup>16</sup> p. 75, EBRD 1995. The chief economist of the EBRD, Nicholas Stern, read an earlier version of this paper. He clarified in correspondence to me that the EBRD does not lend on the basis of the Financing Gap model.

<sup>17</sup> Andersen 1995, p. 6 and p. 18

<sup>18</sup> Chenery and Strout 1966 called their model the Two Gap model. The investment-savings gap was one of the Two Gaps. The other was the trade gap which ex post is equal to the investment gap, but ex ante might be a constraint in an import-constrained economy with fixed prices. IFI staff still occasionally use the trade gap instead of the investment-saving gap, but this is of little consequence since the two are equal. In any case, the trade gap no longer made sense once the neoclassical resurgence brought with it the assumption of market-clearing prices. I also found no evidence for the trade gap model (results available on request).

<sup>19</sup> See the overview in Myint 1987.

<sup>20</sup> see Svensson 1997 and Burnside and Dollar 1996.

<sup>21</sup> The other three countries had ICORs of 1.1, 1.7, and 6.8.

<sup>22</sup> For example, the developing nations in September 1980 in the UN set a target of 7 percent growth for themselves as part of the ill-fated North-South negotiations; also note earlier text examples.