



Impacts of private investment on sustainable development in developing countries:

Session note on Frontier Methodologies

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1. Beyond jobs

Most development finance institutions (DFIs) would regard job creation as the main measure of their development impact. It is easy to understand why. Between now and 2030, Africa's working-age population is expected to grow forty percent to 1 billion, which implies that the rate of job creation must increase by around 12 million jobs per year to prevent unemployment from rising.¹

But DFIs also know that unproductive low-income economies must transform themselves into high-productivity economies that are capable of sustainably supporting a good standard of living for all their citizens. That will not happen by adding "more of the same" jobs.

Economists use the term structural transformation to refer to the movement of workers and capital out of unproductive activities, and into more productive ones.² Historically that has meant moving the workforce out of agriculture and into manufacturing and then services.

DFIs can contribute to economic transformation by making investments and creating jobs in higher productivity activities, such as manufacturing. In that way DFIs contribute to the process of "creative destruction", which means that new higher productivity firms put older lower productivity firms out of business, so over time the average productivity of firms in the economy will increase.

Replacing unproductive units with more productive ones is certainly a contribution to economic transformation. But it is not transformational. Rather than transform economies one investment at a time, DFIs also aspire to make investments whose impact ripples out across the economy.

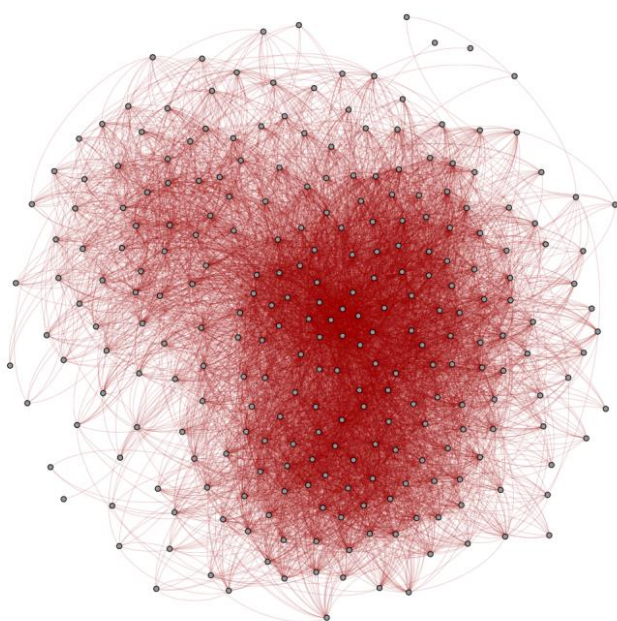
Thanks to greater data availability in some countries, economists are now able to create almost complete maps of the trading relationships between firms in an economy, which can help us think about what economic transformation means. Here is a picture of the Indonesian economy:³

¹ African Economic Outlook, 2019.

² See Duarte, M., & Restuccia, D. (2010) for example.

³ Taken from Bazzi et al. (2017)

Figure 1. The Indonesian production network



Source: Bazzi et al. (2017)

We could think of a non-transformative investment as affecting a single node in the network, and a few others it is connected to. For example, opening a new restaurant might create some new demand for its suppliers, but it might also put another restaurant out of business (and reduce demand at its suppliers). Presumably that would be a net positive, if people prefer the restaurant that opened to the one that has closed, but it is by no means transformative.⁴

At the other extreme, an investment that meaningfully reduces transportation costs across the economy could cause the entire network to rearrange itself, many firms to enter and others exit, and new connections to be made. The example of transportation hints at how investments can be transformative: if they produce intermediate goods that are used by many other firms in the economy.⁵ Graphically, that could show up as a node with connections to many others. The World Bank has defined a transformative investment as one that reduces the costs of subsequent investments (World Bank, 2018), but that could be interpreted more broadly as an investment that increases the returns of other investments, whether by reducing costs or increasing demand. In an influential paper Jones (2017) has argued that the huge productivity gap between rich and poor economies can be explained by linkages and complementarities in production networks (and their absence in poor countries). He shows how investments that increase the productivity of producers of intermediate goods will stimulate further rounds of investment by other firms, creating a multiplier effect. These effects are more powerful when investments are complements – the productivity of one is increasing in the productivity of the other. Jones shows this structure implies that economies can be held back by the ‘weakest

⁴ Aghion et al. (2017) argue that standard economic statistics understate growth because they miss quality improvements when new firms replace old ones, largely in the services sector.

⁵ Exports can be seen as an intermediate good, if you view trade as an external sector that takes exports and converts them into imports.

link in the chain'. If DFIs' investments can fix these crucial weak links, we can contribute to economic transformation.⁶

Transformative investments will entail indirect job creation, and destruction. There is overlap here with the methods that DFIs use to think about indirect job creation. But existing methods to estimate job creation usually rely on Input-Output tables which hold fixed the relationships between sectors and calculate the effect of increased output in one sector as it works its way through the system (and then uses average output per worker statistics or estimated marginal output to employment elasticities to end up with a jobs number). In contrast the mechanisms described above draw attention to the general equilibrium effects of changing productivity, quality and prices. In Jones' model, it is access to cheaper and better intermediate goods that causes other firms to grow.

But reducing the price of intermediate goods and services is only one mechanism by which DFIs can hope to be transformational. Another important channel is the creation of knowledge and capacity building (which can extend to regulatory reform and other policy interventions).⁷ DFIs place great value on pioneering investments that will have a 'demonstration effect' so others will follow in their footsteps. Much of the work DFIs do trying to incubate local capital markets, for example, could be seen as trying to fix a weak link in an economy.

Our only hope of getting 'from billions to trillions' rests on investments whose effects are multiplied by the investments of others—DFIs were never going to be able to leverage trillions of dollars of additional private capital through co-investment in their own projects.⁸ Such numbers are only plausible if DFI can act as the impetus that gets the ball rolling in an economy.

These ambitions are behind the IFC's most recent strategy, IFC 3.0, which emphasizes the importance of 'creating markets' and DEG has introduced market and sector development into its investment scoring system. CDC puts great weight on the potential to be transformational, when forming a view on our return expectations and risk tolerance for both direct and intermediated investments.

2. How can we know which investments are transformative?

DFIs want to know what impact investments will have on economic transformation before they make them (ex-ante) and what impact their investment had, afterwards (ex-post). A few DFIs have developed ex-ante investment assessment systems to guide their capital allocation decisions, which will be described shortly.

Ex-post monitoring and evaluation serves two purposes: accountability and learning. The public wants to know what impact money allocated to DFIs is having, and DFIs, and other investors who are motivated by impact, want to know when actual results differ from intended results, so that they can make better investments.

In general, trying to measure impact gets harder the further the outcome that you seek to have gets from the point of intervention. Trying to identify the impact of an

⁶ Another promising approach is Liu (2018) which shows how various distortions in product networks become concentrated at certain central nodes, so investments in those places can be transformative.

⁷ Economists have long claimed that the income gap between rich and poor countries cannot be explained by differences in the quantity of investment. What matters is how much output an economy can produce for a given quantity of inputs. The economist Paul Romer won the Nobel prize in economics for his theories that showed how economic growth is only possible because, unlike other economic inputs, knowledge is not a scarce resource, so new methods and techniques can be replicated across economies.

⁸ Despite being mentioned often at conferences and in other forums, this fact may still not be widely appreciated in the wider development community.

investment on economic transformation is extremely challenging, in many cases practically impossible, because of the enormous quantity of data required to really build up a picture of impacts distributed across the economy. And because there is so much going on at the same time across an economy (data are ‘noisy’) an evaluator may need a large investment to have much hope of picking up its effect (extracting a signal from the noise).⁹

There has been some interesting thinking on how to evaluate the market-level effects of interventions.¹⁰ The availability of satellite generated luminosity data paired with other geospatial data has made it easier to trace out the economic impact of interventions.¹¹ There is no space to do justice this topic here. Rather I will make a sweeping claim: DFIs generally will not be able to directly measure the transformative impact of their investments. So, what should DFIs do, and what should external audiences look for?

A feasible alternative strategy is to infer the transformative impact of investments by drawing on the universe of economics research, both theoretical empirical. That means figuring out what sorts of investment have proven to be transformational in the past, and then demonstrating to shareholders and the public that DFIs are making them. DFIs can then identify which outcomes are on the causal path (results chain) from investment to economic transformation (electricity produced, transit times reduced or prices decreased) and monitor these. Such an approach would bring ex-post and ex-ante assessments together: both must be grounded in a rigorous and well-evidenced understanding of where transformative impacts come from, understanding what outputs can be expected to drive transformation when making investments and tracking their delivery afterwards.

The IFC is at the forefront of ex-ante investment assessment. Its Anticipated Impact Measurement and Monitoring system (AIMM) sets out to capture catalysed changes in the market beyond those directly linked those linked to the project. AIMM assesses five aspects of market creation: competitiveness; integration; inclusiveness; resilience and sustainability. Within each of these, the IFC has identified four channels via which investments can develop those five aspects of markets: enabling frameworks; actions that promote competition; demonstration and replication; and capacity building. The details of what the four channels to market creation look like, and how they are scored, is tailored to each sector. For example, the concept of resilience in the power sector includes the diversity of power generation and a fail-safe transmission network, and the robustness of business models (extent of cost-recovery), whereas in the financing sector it takes in prudential regulation, asset quality and the diversity of lending across the economy. In each case there may be quantitative metrics available, or the score may be based on informed subjective judgements of IFC economists.

The IFC approach is rich but resource intensive—it involves developing detailed impact frameworks for 29 sectors – but the largest effort involves collecting the evidence to understand the current stage of market development and the conditions

⁹ One of the best-known economics papers (Donaldson, 2018) that shows the effect of transportation on economic transformation used railway construction in India, under British colonial rule. The results are based on a district-level dataset that includes prices, output, daily rainfall, interregional and international trade in India, as well as a digital map of India’s railroad network in which each 20 km segment is coded with its year of opening. Another, (Filipski et al., 2017) uses the Ethiopian Productive Safety Net Programme, that makes payments to around 8m people.

¹⁰ See section 3.4 of the DCED “2018 Reader on Results Measurement”

¹¹ The Brookings Institute blog from October 2018, “[A quiet revolution in impact evaluation](#)” is a good introduction.

for the different channels to operate, and the expertise to make economic judgements.¹²

Since 2017, DEG has managed its investments' development impact with its Development Effectiveness Rating (DERa).¹³ Economic transformation, as conceived here, fits best under DERa category 3: 'market and sector development'. In addition to rewarding investments in countries, the lower income per capita and the more doing business is difficult, this category includes three aspects of an investment that are likely to make it more transformational and which can be assigned with measurable indicators. The first of these are forward effects – sectors that provide inputs to others in the economy score higher (e.g. communications and technology, finance, and infrastructure). The scores depend on how well developed that sector in the country already is, the less developed the higher the score. DEG then also uses the HIPS0 definitions for innovation and competition. The competition score is based on market share. Innovation requires subjective judgement, so the deal teams must provide a short, written justification which is checked by the impact team.

At CDC we took the decision for 2017-21 not to create an investment scoring system to supplement the DI Grid.¹⁴ Instead the development professionals that are embedded in our deal teams conduct bespoke impact analysis for each deal, drawing on the relevant evidence, or commissioning impact due diligence where the evidence is patchy, and working within a conceptual impact framework that has been developed to ensure all relevant aspects of an investment receive attention: what our contribution is; how impact is achieved; how are people affected? Our philosophy is to create an honest and wide-ranging conversation about the development impact we expect from investment, focussing on CDC's contribution. This approach has the benefit of flexibility, and perhaps avoids some pitfalls of trying to formalise ex-ante assessment in a scoring system but comes at the cost of making it harder to compare investments or quantify the magnitude of expected impact.

3. Who benefits?

Returning to the idea of seeing the economy as a production network, we need to add another layer of information to this map – who are the workers and the customers of each node? If we want economic transformation to create inclusive growth, we need it to ultimately affect nodes that employ or serve the poorest sections of society, even if those nodes are quite distant from the point of intervention.

This is the hardest question of all, and existing economics research is, at least based on my reading of it, of limited use. Historical studies of inclusive growth tend to focus on government policy or broad swathes of investment patterns across sectors, that do not much help DFIs contemplating individual investments. It is likely that the ultimate impact of an investment will depend greatly on context and on the response of other investors. There are hints and suggestions to be found in empirical research, but these are questions where DFIs may have to rely on guidance from theory.

The same methods that are currently used to estimate indirect job creation numbers can also be used to estimate who benefits from those jobs. Input-output tables can be

¹² There are also substantial resources required on the post-investment tracking side.

¹³ The DERa scores five categories of impact: core development effects of private sector, decent jobs (1) and local income (2), the development of markets and sectors (3) and behavioural change benefiting the environment (4) and local communities (5).

¹⁴ The [CDC DI Grid](#) is a high-level portfolio management tool. It is not how we assess the full spectrum of development impacts expected from individual investments.

augmented with information about the households that tend to be employed in different sectors, to create what's called a 'social accounting matrix'. Such models are a useful first step, but they work by holding a lot of economic relations constant, and do not capture channels that are likely to be more transformative, such as reducing the effective price of intermediate goods.

Models that can incorporate price changes are called Computable General Equilibrium models. Even these do not capture everything we might wish for, such as how investments may cause technological change. The IFC is again at the forefront of modelling the transformative effects of investments, with its Economy-wide Private Impact Quantification model (EPIQ) that was first developed for the Philippines and more recently Ethiopia. This is not an ex-ante investment evaluation tool—it's a simulation model designed to help the IFC understand how investments contribute to the World Bank Group's Twin Goals.

The model has an astonishing level of detail. For example, to capture the distributional impact of investments in Ethiopia (who benefits) the model features twelve productive private sectors, a government that taxes and makes productive investments, and 9,600 different household types that vary by the number of family members and their age, the number of workers, education level whether located in an urban or rural area.¹⁵ The model is calibrated in a 'top down and bottom up' fashion, by fitting the model to macro data and also using information from household surveys. Detailed modelling of the household sector makes it easy to compute poverty and inequality statistics.

The model suggests that investments in manufacturing would have the most powerful effect on poverty reduction, although do less to reduce inequality. The manufacturing sector is more interlinked with other sectors of the economy, with spillovers in both urban and rural areas. Urban poverty in Ethiopia is high, so urban job creation is high impact. Manufacturing also accelerates urbanization, and former subsistence farmers become wage earners for the first time, enabling them to escape extreme poverty.

4. How far can we trust models?

Economic models are complicated, but they can be comprehended. In principle, anyone who understands the model well enough should be able to tell you what output will follow from a given input. If the model says that investments in manufacturing can sometimes increase inequality, and sometimes decrease it, it will be possible to say why. Standard mainstream models are the sum of their parts.

There is another possibility, which is that economies are complex systems. In this paradigm, how inputs will translate into outputs cannot be figured out by examining the system's component parts—outcomes are 'emergent' (one must switch it on and see what happens, so to speak). This idea appeals intuitively to many people, although not so much to mainstream economists. It would be going too far to say that if the economy is a complex system, we can say nothing about what the ultimate effect of an investment will be, but it does mean that the economy is in a sense, incomprehensible.

Even if we think the economy will submit to being modelled, which model should we choose? The editors of a recent special edition on structural change, in the journal

¹⁵ See IFC (2018) for full details. The model also includes some deviations from standard neoclassical assumptions: in the model markets do not always clear, and firms cannot adjust their production decisions instantaneously but make plans and choose target levels of production, it has segmented labour markets and endogenous unemployment.

World Development, wrote: “drawing on the more recent history and applying a range of methods, the papers in this special issue confirm the view that growth in agriculture is on average more poverty reducing than an equivalent amount of growth outside agriculture.”¹⁶ Does that mean the EPIQ model of Ethiopia is wrong? Not necessarily: EPIQ may have captured how Ethiopia differs from the countries behind the journal editors’ conclusion. Be what would we conclude if another team of researchers created a CGE model for Ethiopia that reached different conclusion. When we are groping in the dark, thoughtful theoretical work that is carefully calibrated, is probably the best available guide. EPIQ enriches our understanding of how private investments interact with the Ethiopian economy. But it is hard to know how much faith to put in theoretical models. And there is another dimension to that questions, which is: how much faith are external audiences going to have in them?

5. Communicating to external audiences

Trickledown economics has a very bad name. That’s a problem for DFIs who want to argue that our impact on development is indirect. DFIs are in danger of being interpreted as proponents of trickledown economics, whenever it looks like we are claiming to be indirectly helping the poor by directly helping the better-off (and making project sponsors rich in the process). Trickledown economics is an idea with no good definition, but for most people probably means the idea that making the rich richer is the best way of eventually reducing poverty, because the rich are ‘wealth creators’. Trickledown economics is widely discredited.¹⁷

And yet in parallel to (justified) suspicion about trickledown economics, many people (perhaps some of the same people) believe that activist industrial policy is the key to development, and that the ‘Washington consensus’ is responsible for keeping countries poor. Under this view, development policy would involve subsidies for investment in certain sectors, perhaps protection by trade barriers and capital controls. In her book “How China escaped the poverty trap” Yuen Yuen Ang recounts how the government encouraged bureaucrats to improvise, with the single-minded aim of attracting investment, even tolerating local officials enriching themselves in the process. Some critics look at investments made by DFIs and complain it’s unclear how they will help those living in extreme poverty. But would the connection between poverty reduction and private investments in China have been any clearer?

In a recent lecture, renowned left-wing economist Joseph Stiglitz gave a speech in which he said: “trickle-down economics, which holds that if GDP goes up, so too will the incomes of all (or most) will too, simply doesn’t work.” But he also called for governments to adopt industrial policies that “promote those forms of industrialization which most enhance the country’s long run development strategy, e.g. promoting learning, with broad societal spillovers, and generating foreign exchange and jobs.” Such policies would be coordinated with other government interventions, in education for example, to ensure their benefits eventually reach the poor. For Stiglitz, positive spillovers are evidently something quite different from trickle-down economics, but for outside observers the distinction may be less clear.

This leaves DFIs with twin challenges. We need to find ways of tracing the connections between our investments, economic transformation and inclusive growth, so that we can make the right capital allocation decisions. And we also need to find ways of communicating those linkages to external audiences, who might not be convinced by a CGE model.

¹⁶ World Development 109 (2018) 511–522

¹⁷ See for example “[Trickle-down economics is wrong, says IMF](#)”

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