

Assessing Development Impact

INTRODUCTION

1. The objective of this note is to lay what areas need to be examined in determining a project's development impact. We will primarily be taking a micro or project-oriented perspective in this, building on the well-developed project analysis tradition. Economic rate of return (ERR) calculations in principle should include a proper accounting of all the project's costs and benefits accruing to the society as a whole; what we will be doing here is simply ensuring all the important ones are, indeed, taken into account. Thus the approach builds on work we already do, extending it to produce a more complete assessment of a project's development impacts on the society as a whole, and then relating this to the initial costs through standard rate of return calculations. The audience for this note is economists (and most MBA's) with a fairly good knowledge of standard cost-benefit analysis of projects. I will use technical terms appropriate to such people, and will assume familiarity with the basic concepts; these can be found in any standard text book on project analysis.
2. The "bottom-up", project-oriented, view which is the focus of this note is complementary to a "top-down", or more strategic, view of what the project's development impacts might be. The bulk of the note will be organized around the bottom-up perspective to assessing development impact, as it can lay the greatest claim to rigor. But we will also look at how a top-down or strategic view can be an important complement, which allows us to better determine the valuation of some of the project benefits (particularly with regard to demonstration effects). The two orientations provide different perspectives, and each is best in examining certain aspects of the project's development impact. But the development impact is whatever it is, and will not differ depending on which perspective is taken.
3. The body of the note will review a summary list of what to look for in assessing development impact. The organizing structure is people centered, moving sequentially through each of the different groups who may be affected, directly or indirectly, by the project. We will use this framework for the Case Studies exercise this year, to test whether the approach works well in practice. Provided it does, the logic of the approach could then be used by the regional economists to extend the ERR analysis they now do, to better reflect the full development impact of the projects. Guidelines for staff would be prepared at that point. It should be noted, however (and as will become clear below), that the approach being proposed is not one where there is a rigid set of requirements which apply equally to all projects and must be replicated exactly by all. Rather, the spirit of the work is to better refine our estimates of the economic rate of return of the project, where one starts with the FRR and then introduce adjustments to take into account those factors which lead the social returns to differ from the private returns. The adjustments to focus on first are the most important ones for that particular project. One would extend this to less important ones to the extent they may matter to the decisions to be made; when they no longer matter, further refinement is no longer worthwhile. Currently, the ERR is calculated from the FRR by adjusting generally for taxes and sometimes tariffs. This might be fine as a first step, but then many of the other impacts of the project (possibly quite important ones) are being ignored. The framework presented here shows how one can incorporate these other factors.
4. First of all, however, it will be useful to briefly review why such analysis of development impacts should be done at all for an institution like the IFC.

DEVELOPMENT IMPACT ANALYSIS AND IFC OBJECTIVES

5. Working through the analysis of development impacts, and in particular how and why the project's benefits and costs from the perspective of the society as a whole may differ from the benefits and costs when viewed from the private perspective, brings to the fore some basic issues on the role of the IFC and what IFC is trying to achieve. Arrow and Debreu and other very smart economists have received Nobel Prizes for showing that in a certain idealized world, the decentralized decision making of private agents, each seeking merely to maximize his or her own profits, will also lead to the greatest social good. That is, in such a world, maximizing private returns also means maximizing social returns (loosely speaking). Why, then, is there a need for an analysis which is based on the notion that the private returns (the financial rate of return, or FRR) may differ from the social returns (the ERR)?

6. One obvious reason why these may differ, and the traditional focus of this analysis, is that private agents may pay taxes or receive subsidies which are costs or benefits to them, but which are merely transfers from the perspective of society as a whole. As transfers, the cost to one equals the benefit to the other, and when aggregated the net is zero. Similarly, private agents may face prices for the goods they purchase or produce which are different from the costs of such goods when taken from the perspective of society as a whole, e.g. due to import tariffs, export taxes, or excise taxes. Traditional ERR analysis has focused on adjusting the project's private costs and benefits by adding to (or subtracting from) the private revenue streams the effects of such taxes, subsidies, tariffs, and other transfers.

7. But social benefits and costs may differ from private benefits and costs for other reasons as well. For example, the project may impose environmental costs on others (or benefits, if the new production is cleaner than what it replaced), or may increase (or reduce) congestion on surrounding roads, or may demonstrate the attractiveness of some new technology, or may provide better paying jobs to the employees than they would otherwise have, or may provide a benefit to a consumer which is greater than the price the consumer paid for the product, and so on. These types of impacts are the more interesting from a developmental point of view. And the IFC, as a development institution, needs to know what these are if it is to do its job well.

Theoretical Underpinnings

8. The common thread in these examples (and others, to be reviewed in more detail below), is that some relationship comes into being as a result of the project, which is not mediated exclusively through a market transaction, or whose value is not reflected fully in the price paid. The pollution or congestion is generated (or alleviated), but no one is being compensated for this cost (or benefit, if reduced); the demonstration effect is available for all to see, but they do not pay for the privilege of gaining access to this new knowledge; the workers get paid more than their opportunity cost; consumers receive a product whose value to them is greater than the price they need to pay; and so on.

9. In the economics literature, such effects are variously referred to as externalities, or as public goods, or as consumer surplus, or with other terms. What is common, however, in all these is that a product or an impact is going from the project to someone else in the society, where the price that person pays or receives for the product or impact is different from the value that person places on the product or impact. The price the person pays or receives is already reflected in the project's revenues or costs, and is therefore reflected in the project's net profits (and hence reflected in the FRR analysis). But the value (or cost, if negative) to that person may be greater or less than the price he or she pays or receives, and these excess values, when aggregated over all members of society, must be added to the net profits of the project financiers themselves to get

the value to society as a whole of the project. And it is this overall value which is the total development impact resulting from the investment.

10. What was wrong in the analysis of Arrow and Debreu and others, when they “proved” that one could ignore such impacts and rely solely on decentralized profit maximization to achieve the social optimum (maximum development impact in the terms being used here)? As Arrow and Debreu would be the first to admit, the cause stems from the specific assumptions they had to make to get to their result, where these assumptions do not fully reflect the real world. In particular, aside from the issues stemming from taxes, subsidies, and other transfers which lead to private costs differing from the social costs, the externalities (or public goods or surpluses, etc.) arise due to **transactions costs**. A project may build a new road, which is necessary for the project but which may also be used by others in the neighborhood. The project organizers could in principle charge a toll on anyone using the road, but the cost of collecting a small toll, of 10 cents say on each user, is greater than the toll itself. Therefore they do not collect it. If the cost of collecting the toll were zero, they would then find it worthwhile to collect such tolls; these revenues would be counted as part of the stream of project revenues; and the project’s financial returns would reflect the value of the newly built road. But transactions costs do indeed exist in the real world, and hence such tolls are not collected, and hence the value of the road to the neighbors does not get recorded in the project’s financial returns. That is why the development impact analysis should in principle attempt to estimate such values, and not ignore them when the impact of the project on society as a whole is being estimated. That is, this stream of benefits (valued at what the neighbors would have been willing to pay, but were not asked to pay due to the transactions costs of collecting) should be included along with the other revenue streams of the project, and then reflected in the ERR calculated.

11. Ronald Coase (who also received a Nobel Prize in Economics, for this work specifically) pointed out that transactions costs are not simply a curiozum, but are in fact pervasive in the real world. Hence these excess values (or costs) are pervasive and in general private costs and benefits will not equal social costs and benefits. The overall development impact (the return to society as a whole) will therefore in general differ from the private return (reflected in the FRR); the differences are pervasive, and are not captured in the private financial return of the project. Albert Hirschman, in his book Development Projects Observed (a classic from the 1960’s, which was based on his review of a series of World Bank investments in an approach similar to our own Case Studies), titled his concluding chapter: “Project Appraisal: The Centrality of Side Effects”. He argued that what mattered most when assessing a project from a developmental perspective were precisely the “side effects” the projects generated, that is, the effects the private project financiers themselves have no concern with.

12. This provides also a key rationale for IFC intervention, and ultimately for why IFC exists. IFC, as a development institution, has an interest in supporting certain projects precisely because social and private returns can differ. IFC has an interest because there may be demonstration effects from showing some new type of project (or new way of doing a project, e.g. a new way to do SME finance) can be successful in the environment of some country; or because of the public goods provided by the project, which the private parties cannot charge for; or because of the environmental benefits that may occur as a result of building a new, less polluting plant, to replace an old one; or because of the worker benefits from better paying jobs than they would otherwise have; and so on. It is therefore important that these development impacts be well understood, and presented clearly to the Board and the general public, if we are to expect continued support for what we are doing.

A FRAMEWORK FOR ASSESSING DEVELOPMENT IMPACT

13. A suggested framework for assessing development impact is summarized in Figure 1. The approach is to identify each of the groups who will be affected, directly or indirectly, by a project, and then examine what the impact on that group will be beyond what has already been counted in the financial analysis (the FRR). Care must be taken to ensure there is no double-counting; this is a common error. The overall development impact, that is, the impact on society as a whole, will then be the sum total of the individual impacts. The analysis does not seek to make distributional judgements, where the impact on one group is given greater or lesser weight than the impact on another. That is, we will not get into complex issues of interpersonal comparisons of utility. And to put everything in common units (the term economists would use is a common numeraire), we will examine the costs and benefits in money terms in constant prices. The net profits of the financiers are measured in this way; the other costs and benefits will be measured similarly.

14. In principle, the costs and benefits are all quantifiable, although in practice this will sometimes be difficult or almost impossible. For example, while there is in principle a quantifiable value to others from the demonstration effect of some project, in practice this may be impossible to measure. In such cases, a qualitative judgement of the value may need to be substituted for any quantitative estimate. For the particular case of demonstration effects, the strategic perspective of the project (discussed at the end of this note) may be particularly useful in arriving at a judgement on the appropriate valuations.

15. More commonly, it may be possible to come up with a reasonable quantitative estimate of some cost or benefit, but in practice it is just not worthwhile to expend the effort: the overall impact of this particular cost or benefit may be small, so the final valuation of the project (the ERR) will simply not be greatly affected by whatever value is included on this. The mark of a good economist (or engineer or scientist, for that matter) is to have a feel for where it is worthwhile to focus one's effort, and where there is no need as the overall outcome will be the same.

16. The benefits and costs to each of the groups, when quantified, would then simply be included in the spreadsheet used for calculating the project's private financial returns. An example of such a spreadsheet analysis is included as Annex II to this note, and can be referred to as the various development impacts are taken up sequentially below. The benefits to each group impacted by a project would be added as separate lines to the revenue lines of the spreadsheet, and the costs added to the cost lines of the spreadsheet. Adding these up year by year, and then calculating the internal rate of return, will yield the ERR. As a supplement to this, one would then discuss the likely impact of factors which could not be quantified but which may be important. For example, one might not be able to quantify the value to society of a demonstration effect, but one would know it is positive, and hence one would say: "The quantifiable ERR is x%, but in fact is somewhat higher as there were also positive benefits from the demonstration effects of the operation. The benefits of the latter could not be quantified, but we know they were positive."

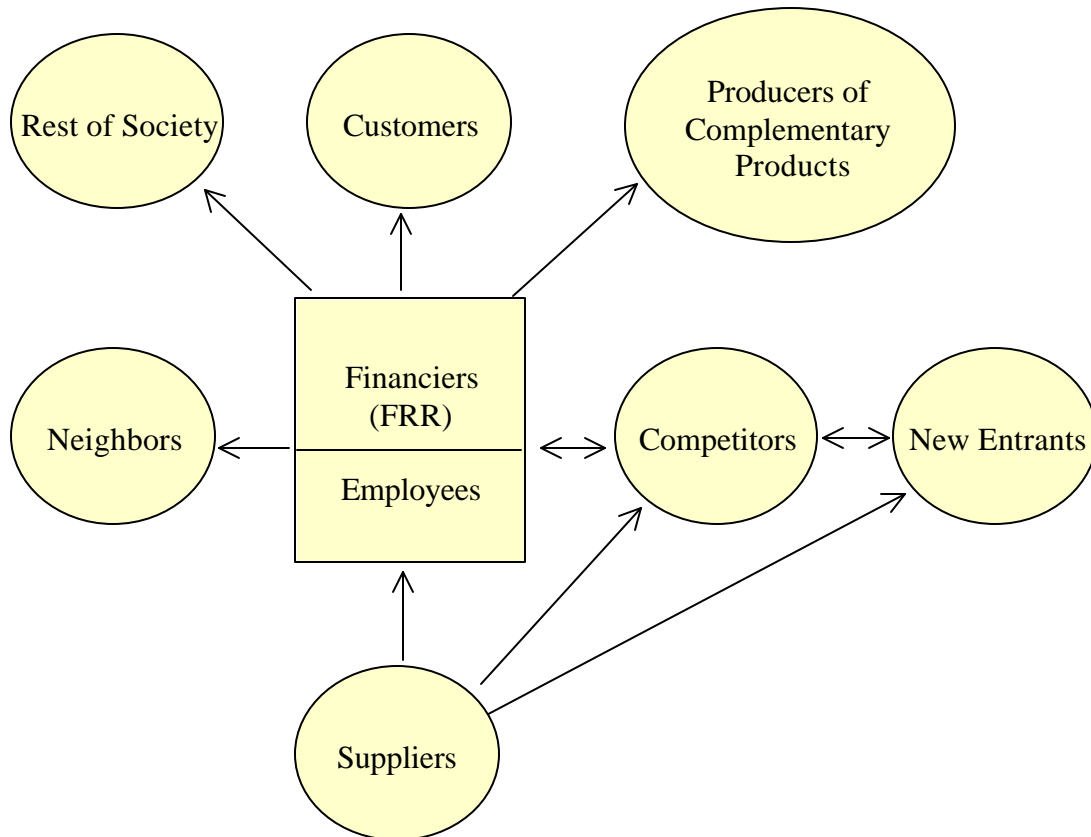
17. In what follows, we will take up each group identified in Figure 1 in turn, reviewing the possible impacts of the project (in terms of costs and benefits) on each.

The Financiers

18. The benefits and costs of the core project itself are depicted in the center of Figure 1, as the square box for the project financiers. The benefits are the private revenue streams the financiers receive from the sale of whatever the project produces, and the costs are investment and production costs. Since these are the returns to the project financiers, all the revenues and costs

are calculated at the prices the project pays or receives, i.e. including taxes paid on costs and excluding taxes paid on revenues. Profit taxes are also excluded, while subsidies received are included. (Taxes and subsidies are accounted for elsewhere in this framework, in the costs and benefits to the Rest of Society.)

Figure 1: A Framework For Assessing Development Impact



19. This is therefore the standard spreadsheet of the project's private revenue and cost streams, from which one can calculate the annual net benefits, and from this the internal rate of return to the investment (the FRR). It is what the financiers gain from the project, and provides the base on which we will add or subtract the additional benefits or costs of each of the other groups. It is important to keep in mind that the financiers are also part of the economy, and hence the development impact (which measures the return to the economy as a whole) includes the return to the financiers; they are one of the groups affected by a project going ahead.

Employees

20. The project employees are depicted in Figure 1 as part of the central square, as they are directly employed in the project and provide one key input to it (their labor services). The net benefits to the employees can be usefully broken down into two categories:

- a. The **increased wages** (including all benefits, such as health, pensions, special housing or access to special schools for their children, etc.) the employees receive, to the extent (and

only to the extent) they are greater than what the employees would have been receiving in whatever alternative employment they would have had. That is, one includes as a benefit to labor the wages they receive which are greater than the opportunity cost of that labor. In traditional analysis, this benefit would be captured by using an appropriate shadow price for the labor, but it appears that such shadow prices have only rarely been used in IFC project analysis. Note also that the benefits to the employees are not from “jobs created”; they would have been working or doing something else if they did not have these jobs. The benefits to them arise from these being better paid jobs than what they would otherwise have had, with the benefit measured by the difference in the wages (wages broadly defined, including benefits). And since they chose to take on these new jobs, the benefit here must always be positive (or at least not less than zero).¹

- b. The benefit to the worker from **training** he or she receives, as a consequence of employment in the project company. Note this is not the full benefit of the training: the company provides the training to the worker in order to raise that worker’s productivity, and the higher productivity is already captured in the financier’s private returns (the higher productivity leads to more production, or lower costs). Rather, the benefit to the worker stems from the increased skills (and increased pay as a consequence) he or she gains from the training, which can be of use in other jobs. This is quantifiable: one should be able to obtain an estimate of who was trained and the increase in the grade level (and associated salary) obtained as a result. Note also that training of managers should not be forgotten. Nor should one forget training in the use of some new technology, or some new way of organizing the business or doing things; these are often important for IFC projects. Finally, the benefit here should always be positive, or at least not less than zero.

Customers

21. Those who consume whatever good or service the project is producing will benefit from enjoying access to a product not available before, or perhaps from a better quality product, or perhaps from a lower price for a product they were already buying. We will take up each in turn:

- a. **New good or service:** Consumers will benefit if a project brings to the country or region a good or service which previously had simply not been available. This is not uncommon in IFC supported projects. The benefit to the consumer is how much they would be willing to pay for the good or service, i.e. the area under the market demand curve. What they in fact pay is the market price, but this portion of the benefits is already counted as the revenues accruing to the project financiers from the product sales. Hence this portion (the price paid times the quantity) should not be counted twice. But all consumers except the marginal one enjoy a benefit which is greater than the market price,

¹ The qualitative direction of these and the other impacts are important to keep in mind. When the effects cannot be quantified, but we know they are positive, the calculated ERR will then be a lower bound on the true one. That is, we know the economic value is at least as high as that calculated, and is in fact higher but by an undeterminable amount. And as we discuss below the impacts on the various groups, we will find that with the exception of the possible impacts on neighbors from (in some cases) higher pollution levels or greater congestion, and the possible net impact of taxes, tariffs, and subsidies (which in general should be quantifiable in any case), the impacts in all other cases are positive. That is, the employee of the firm can decide to turn down the job offer or to accept it; if he or she accepts it, then the new job must be better than the old one he or she had. Similarly (as will be discussed below), the consumer can choose to buy or not, the supplier can choose to supply or not, etc.

up to the level of the demand curve. This is the consumer surplus, and may be quite significant for certain projects. We do know it is positive. However, it may not be possible to measure quantitatively, as the demand curve is not directly observed. All we can observe for a new product is the price actually paid for the product and the quantity sold at that price, which is just one point on the curve. But with some imagination (e.g. by comparison with demands observed in other, but similar, regions for the same product) one might be able to come up with a reasonable estimate of what the demand curve might be, and then use this to quantify this benefit.

- b. **Better quality product:** If the good or service being produced by the project is fundamentally similar to an existing product, but of better quality and yet is being sold for the same price, there is clearly a benefit to the consumer. One might be suspicious how often this is in fact the case (if in fact better, one would normally expect this to be reflected in a higher price, hence in the financial returns of the project, and hence in the FRR; also what is called “new and improved” is often anything but that). But if there is a quality improvement which is not fully reflected in the price, the value of this to the consumer, to the extent it can be quantified, should be added to the benefits. And if it cannot be quantified, a qualitative judgement should be made as to its importance.
- c. **Increased supply leading to a lower price for the good or service:** The IFC supported project will in general add to the supply of the product on the market, and if it is a significant increase in supply facing a downward sloping demand curve, the market price will fall. These conditions often hold for infrastructure projects or the production of other non-tradeable goods. One would not expect it to apply in general to the production of tradeable goods, as the demand curve being faced is then normally flat (i.e. increased production and sales does not lead to a significant reduction in the price). But where the conditions do apply, consumers will benefit from the increased availability of the product and the lower price. A portion of the increased benefit to the consumer comes from reduced benefit to the producers, due to the lower price, but the producers’ benefit (in this case a partial fall from what it otherwise would have been) is already accounted for in the project’s profits and hence in the FRR calculated. This should not be double-counted. But there is still a net gain to consumers, which can be approximated by a triangle in the supply-demand diagram, whose area is equal to: $\frac{1}{2}$ times the change in the price (a fall) times the production of the project.²

Producers of Complementary Products

22. There will be a benefit generated by the project to consumers of, and producers of, complementary products. A complementary good is one whose value to the consumer increases when the supply of the good it is complementary to increases. An example would be the service provided by a gasoline station located near the exit of a toll road. The demand for this gasoline will increase, and the owner of this gasoline station will benefit from the resulting increase in demand, and hence will enjoy higher profits. Formally, the demand curve for the complementary good will shift out (see Figure 3 in Annex I), which will lead to an increase in both consumers’ surplus and producers’ surplus. The increase in consumers’ surplus may be difficult to quantify (it depends on an estimate of how much the demand curve rises, but the demand curve is not observable), but we know it will be a positive benefit. Producers of the complementary good (the services of the gasoline station in the example above) also benefit, as they will receive a higher

² Annex 1 shows how this is derived; see Figure 2 there.

price for their product or service, as well as increased sales.³ There could be further, but more indirect, benefits as well. For example, additional workers now employed in the production of the extra complementary goods will benefit to the extent they receive a wage higher than what they were receiving before. But how far it is worthwhile to go into such indirect benefits depends on the project, and on how important these indirect effects appear to be.

23. A question to address would always be why, if the producers of complementary goods benefit so much, didn't the project organizers vertically integrate to include the production of the complementary good, and hence benefit from the higher profits? For toll roads, one in fact often sees such vertical integration (i.e. the toll road builder also gets the development rights around the road exits), and such integration can be critical to the financial success of the project. And if there has been such integration, one is already counting (internalizing) these benefits in the core FRR calculation for the project, discussed above. What one would add here (in addition to the benefits to the consumers) would be the benefits to the producers of complementary products who had not been vertically integrated into the project. But if the benefits are large, why did one not see the vertical integration? There may be good reasons for this (the organizers of the core project may not have special expertise or other advantages which the producers of the complementary products might have, etc.), but these need to be understood. If there is not the vertical integration, it is possible one might simply be over-estimating the benefits to the producers of the complementary products.

Suppliers

24. Suppliers to the project will enjoy **increased demand** for the good or service they provide, and hence higher profits. An attempt should be made to estimate the size of the increased profits, and include these in the project benefits for the ERR.⁴ Similarly, the increase in wages (beyond what they would have been receiving elsewhere) of the additional workers employed by the suppliers, should also be counted. And if there is information and it appears to be important, the chain can continue to the suppliers of the suppliers, etc. In practice, however, such indirect impacts rapidly diminish in importance to the point where it is no longer worthwhile to try and estimate them.

25. In addition, and importantly for a number of IFC investments, the new project may lead to the creation of a set of **new suppliers**. For example, a major new car plant may spur the development of a network of manufactures of car parts (many of them SME's) -- firms which did not exist before. The creation of such networks can be extremely important to the development of the country. Quantifying their total value to society may well be difficult, but at a minimum the value would include the extra profits they are now earning (beyond the cost of any additional capital) plus the extra wages of additional workers employed (beyond their opportunity cost, i.e. beyond what they otherwise would have been earning).

26. But aside from the simple increase in demand generated by such backward linkages, one also observes that the project managers will often take steps explicitly to **assist their suppliers**

³ The increase in producers' surplus *other* than what constitutes a shift from consumers (due to the higher prices) will be the area of a triangle equal to: $\frac{1}{2}$ times the rise in the price times the increase in sales at the new price from what they otherwise would have been at this price. See Annex I for details.

⁴ Annex I shows how this can be done. The increased profits of the supplier (other than that portion offset by losses of other purchasers from the resulting higher prices) will again be a small triangle, equal to $\frac{1}{2}$ times the increase in the price times the amount purchased from the supplier by the project. All these are readily measurable.

in various ways. Such assistance may be especially clear when the IFC supported project is taking the initiative in developing a network of new suppliers (e.g. the suppliers of car parts to a car plant). They may assist their suppliers to produce better quality (or cheaper) products by providing assistance in managerial or organizational skills; or by providing a new technology; or by providing finance (e.g. trade credit); and so on. The actions of course assist the core project (where this benefit would already be reflected in the project's profits and hence is already in the FRR); that is why the assistance is provided. But the suppliers benefit as well, and this is a benefit to include in the ERR calculation.⁵

27. The benefits from such linkages may be difficult to quantify in practice, although not impossible. At a minimum they can be reported qualitatively. Albert Hirschman, in his 1958 book The Strategy of Economic Development, argued such backward linkages are critical to generating development, and included such linkages in his later work (discussed above) as one of the "side effects" which are in fact central to the development impact of a project.

Competitors and New Entrants

28. A common mistake that has been made in assessing IFC investments has been to record the decreased production of a good or service by a competitor, as a consequence of the increased production from the project, as a cost from the viewpoint of the economy as a whole. An example would be the reduction in demand from existing hotels when a new, IFC-financed, hotel opens in some market. The analyst has sometimes subtracted the reduction in revenues accruing to the existing hotels from the revenues of the new hotel, and used only these net revenues as the "contribution" of the project. But this is incorrect. Revenues can be broken down into variable costs of production and profits. The reduced production by the existing hotels will be accompanied by lower variable costs: they will not need so much in cleaning supplies, in food purchases for the restaurants, in labor inputs (where the labor will shift to alternative employment, quite possibly in the new hotel), and so on. These variable costs of production will be reduced, and these lower costs accompany the lower revenues and obviously should not be ignored (as a simple subtraction of revenues would do).

29. What is then left is the change in profits accruing to the competitors (e.g. the existing hotels). The profits these competitors earn will fall, all else being equal, as the demand they face will have fallen when some has shifted to the new producer. But the fall in their profits will be matched by increased benefits to the consumers (increased consumers' surplus, formally). And this is simply a transfer from the (old) producers to the consumers. The consumers, and the country as a whole, still benefit, and by an amount which is correctly measured by examining the market as a whole. This is discussed in more detail, using diagrams, in Annex I.

30. But there will also be other impacts on competitors, which in general will be positive. Such impacts include:

- a. **Demonstration effects:** The project investment may demonstrate to others the viability of some new technology or way of organizing a business; the viability of some market which previously had been of uncertain size or strength; corporate best practice; the availability of finance, perhaps in some innovative way for the country or for this type of business; etc. Such demonstration effects are in fact often argued as being the primary

⁵ In terms of Figure 2 in Annex I, the benefit to the core project would be the area E (and is already counted in the project's profits), and the additional benefit to the supplier by such measures would be the area D.

development impact of the IFC supported investment. Estimating their value is, of course, difficult, and this is where a strategic perspective on the importance of the project may be of help (discussed below). From a micro perspective, if transactions costs were zero, and if one could exclude those who did not pay a fee for this knowledge from using it (such as can be done, for example, with an enforceable patent right), then there would be a market value (e.g. from license fees or royalty payments) for these demonstration effects. Their value would then be included in the project's revenues, and hence in the FRR. But transactions costs are not zero, and excluding others from making use of this information may be impossible, so this value cannot be internalized by the private project owner. They are still, however, a benefit to the society as a whole, and this benefit should be included in the ERR (and if not quantifiable, at least described qualitatively).

- b. **Network effects:** As was discussed above, the project organizers may work with suppliers to improve the quality or reduce the costs of what they are providing. For example, a new hotel may work with local farmers to produce better quality fruit for sale in the hotel restaurants. But the better quality fruit may also then find its way to the old hotel restaurants as well. Formally, the supply curve of the suppliers has been lowered by the assistance provided by the new producer, and the competitors may benefit from this just as the new producer does. These are network effects, and explain why successful industries are often located in close physical proximity (e.g. Silicon Valley for microcomputers; a town in Northern Italy for eyeglass frames; a city in Germany for high speed printing presses, etc.). The advantages to existing competitors from the lower supply curve of the suppliers can be estimated in the same way as one would value this benefit for the new producer, as discussed above.⁶

31. **New entrants** may be drawn into the market because of the value of these demonstration effects and network effects. In contrast to old competitors, there can be no dispute that they benefit: they were not in the market at all before, but are now drawn in as they see through the demonstration effects the possibility of profitable business, or they find that with the lower costs of inputs from suppliers, what had previously not been profitable can now be profitable. Arriving at a social value for this will be difficult, in general, and the most one could normally do would be to describe such benefits qualitatively. The new entrants will earn a profit from their production, will employ workers receiving wages higher than they otherwise would have received, and so on. But they will also incur new investment costs, and these should be counted as the investments are new. Nevertheless, the long-term development effects can be significant, as Hirschman has stressed.

Neighbors

32. "Neighbors" is used here as a loose term for all those others who may be affected by a project but who do not have a direct market relationship with the project, i.e. they are not employees, customers, suppliers, or competitors. Impacts include:

- a. **Environmental externalities:** A project may lead to more pollution in some region, or perhaps (if cleaner than the previous plant) to less than what the region faced before. These are costs to society (if additional pollution) or benefits (if less), and a value can be estimated for such costs or benefits. That is, if a plant using new technology leads to a reduction of 1,000 tons of SO₂ emissions per year, and the health and other benefits in that region can be estimated at \$100 per ton, then there is a benefit of \$100,000 per year. These should be added into the project benefits, or added to the costs if pollution is

⁶ In terms of Figure 2 in the Annex, the value would be equal to area E.

increased. Coming up with reasonable estimates of the particular values for the benefits or costs may of course be difficult, but in principle it is straightforward to include them in the projects benefits or costs. And, as always, if quantification is just not possible, the effects should be described qualitatively, with some sense as to the broad magnitudes.⁷

- b. **New infrastructure, or increased infrastructure congestion:** A project will often build or expand portions of infrastructure which it needs, such as roads, water and power networks, and so on. Neighbors may benefit from the increased availability of such infrastructure, and may either pay nothing for it (e.g. a road, for which it is not worthwhile to charge a toll due to the transactions costs), or more generally a price which is below what it is worth to them (i.e. they enjoy a consumer surplus). If the project has paid for such infrastructure, then the costs have already been accounted for in the project costs, but only the benefits to the private project itself have been accounted for (and reflected in the FRR). The benefits to the neighbors should be added. In other cases, such infrastructure may have been paid for by the Government. The costs of this infrastructure should then be counted as a subsidy to the project (see below), as the benefits to the project itself have been counted (note the benefits may arise from higher productivity and/or lower costs). But one should also then add in a measure of the benefits to the surrounding community, if they exist, to get to the ERR.

Alternatively, the project may lead to increased infrastructure congestion. This imposes a cost on the surrounding community, and an estimate of this cost should be counted as part of the costs of the project when viewed from the perspective of society as a whole for the ERR calculations. And if impossible to quantify, such costs should at least be described qualitatively.

- c. **Development of social infrastructure:** The construction of a major new plant or other investment in some locale may also lead to further development of the social infrastructure of the community: theaters, restaurants, community centers, and so on. They had not been viable before, but with the new plant (and the new employment brought to the town) they now are. Their value to the community (admittedly difficult to measure), should at least be noted. Some of the social infrastructure may have in fact been constructed by the project itself for the use by the community, e.g. a community center. In such a case, the costs have already been accounted for (they would be part of the project costs, and hence reflected in the FRR), but not the benefits, as these accrue to the community and not the project owners. But they should be counted when taking the perspective of society as a whole. More broadly, firms may establish foundations or give to charities for corporate reasons; the benefits from such work should not be ignored. They may not be easy to measure, but a reasonable assumption would be that the benefits are at least equal to the costs, so one could use the cost figures as a floor to what the benefit figures would be.

Rest of Society

33. The final category is the Rest of Society. One would include here the effects of taxes and subsidies, tariffs and other causes of price distortions, where as a consequence the prices faced by the private project differ from the opportunity costs of society as a whole.

⁷ For a concrete example of how quantified estimates of environmental costs and benefits can be included in the ERR analysis of an IFC project, see Yannis Karmokolias, "Cost Benefit Analysis of Private Sector Environmental Investments: A Case Study of the Kunda Cement Factory", IFC Economics Department Discussion Paper 30, September 1996.

- a. **Profit and Value-Added Taxes:** The FRR measures the return to the private owners, and hence should be on an after-tax basis. But the project benefits are measured by the value to the consumer, which is assessed at the price the consumer paid for it, and similarly for the costs. The net project benefits are the difference between the two, and just because a portion of these net benefits were then channeled to the government as taxes does not mean the net benefits generated by the project itself were less. Thus any profit or value-added taxes paid by the project entity should be added back into the stream of benefits from the project when calculating the ERR. Note that this has nothing to do with what the government then does with the tax revenues it receives: the taxes are added back in solely in order to get to the measure of the net benefits produced by the project, where a portion went to the government and a portion to the project owners. The government could in fact then spend these extra tax revenues wisely, e.g. on education for the poor. These would then be indirect project benefits which are not normally counted in the ERR calculations, but which may well exist. They would be additional benefits, and if important, they could be noted. But one is then getting to second and third round effects, and one has to stop at some point.

- b. **Subsidies:** Any subsidies paid to the project, while a benefit to the private owner (and hence included in the FRR) should clearly be subtracted out when taking the perspective of society as a whole for the ERR calculation. If the subsidies were used to construct some associated infrastructure (or if such infrastructure was provided in kind), then the costs of that infrastructure should now be included, along with (as noted above) any benefits arising from such infrastructure which accrued to others in that locale (the benefits to the project will already be reflected in the private project accounts, in either higher productivity and/or lower costs).

- c. **Import tariffs, and export taxes or subsidies:** If the project produces a good which is traded, or makes use of traded goods as inputs, and these goods are subject to tariffs (or non-tariff barriers) if imported (even if the goods used in the project itself may have been produced domestically), then the prices faced privately by the project will differ from the costs to the society as a whole of such goods. The cost to the society is the world price at which they can be imported: tariffs paid are a transfer to the government, and even if not imported, the domestic price of similar goods will rise by this amount as well due to competition (or, more precisely, the restriction on competition from potential imports). The economic cost to the society of producing the good domestically rather than importing it is the world price of the good, i.e. the price paid minus tariffs. Thus for goods the project produces, the revenue stream should be reduced by the portion of the price which is accounted for by the tariff (or the tariff equivalent of any non-tariff barriers). For goods the project uses as inputs, the costs should similarly be reduced by the portion accounted for by tariffs (or the equivalent tariff if a non-tariff barrier). Similar adjustments (with the appropriate sign) should be made to take into account export taxes or subsidies.

- d. **Sales or excise taxes:** Prices should similarly be adjusted for any sales or excise taxes paid. On a good or service produced by the project which is subject to a sales or excise tax, the value to the consumer is at least equal to the price that consumer pays (and is in fact more, as consumers' surplus). The price received by the project is, however, the price after tax, and hence these taxes should be added back in to the revenue stream when calculating the ERR rather than the FRR. On inputs, the project has paid the price inclusive of any sales or excise taxes, but the opportunity cost to society of producing the good is the price before taxes. Hence the taxes paid on such inputs should be taken out

of the costs when calculating the ERR. Note that prices paid as “user fees”, such as for water or to use a toll road, are still prices and reflect costs to society of providing such services, even if the entity producing the water or the toll road is a government agency. These should not be viewed as taxes, even if they go to a governmental entity, as they reflect a fee for a service rendered, where the fee is normally proportionate with the cost of producing that service.

TREATMENT OF FINANCIAL INTERMEDIARIES

34. The framework outlined above for assessing development impact applies equally well to projects producing a good as for projects producing a service, including a financial service. In particular, banks and other financial institutions produce and sell the service of financial intermediation. They borrow funds to do this, lend them out at a margin above their cost of funds, have administrative costs to cover, and also need to cover the costs of some percentage of the loans going bad and not being repaid. If the margin is sufficient and their costs low enough, they earn a profit. This can be worked out in economic terms for the society as a whole for an ERR, as it can be in private terms to produce an FRR. There is nothing fundamentally different here from the production of any other good or service. In particular, the basic analysis to determine the development impact will be the same, and there is no need for separate treatment of financial sector and non-financial sector projects. While it is recognized there are differences in detail, this is true for any two sectors: there are similar differences in detail that need to be taken account when assessing a steel project as opposed to a power project, or water distribution versus insurance.

35. There is in particular no requirement that the economic value (development impact) of a financial sector project can only be ascertained by examining the economic values of each of the sub-projects financed as a consequence of the investment the IFC made in the bank. This is perhaps easiest seen by way of analogy to a cement project. The IFC may invest in the construction of a new or expanded cement plant, and in our ERR (and FRR) analysis we would value the product produced according to the price paid for the cement. If the revenues earned exceed the costs of producing the cement, one will earn a profit, and one can calculate the ERR and FRR. We do not try to find out where the bags of cement sold went or what they were used for. They could have been used to help build a bridge, or a school for poor children, or a swimming pool for some rich criminal. We do not worry whether the cement went to the bridge or school, or the swimming pool, in determining the ERR. We focus on the profitability of the cement plant, not on the “sub-projects” the cement plant made possible.

36. Similarly, the focus of the ERR analysis of an IFC investment in a bank should be the bank itself. Is the bank profitable or not, is it well-run taking prudent (and not imprudent) risks, with sound management systems in place, etc.? For the loans it makes (the “sub-projects”), does the bank have the capability and incentive to do a proper evaluation of the risks involved, is it able to assess the collateral backing up the loan, and so on? There may of course be additional benefits generated by the sub-projects themselves, beyond the price paid by these borrowers for the loans. But this is simply the consumers’ surplus earned by the customers of the project, as discussed in the framework above. It applies to financial intermediary projects, but to other projects as well. One could try and calculate it for banks, just as one could similarly try and do so for cement projects. But it is not correct to assume banking projects have no benefits beyond the consumers’ surplus generated by its sub-loans, just as it would be incorrect to assume cement projects have no benefits beyond the consumers’ surplus generated by the users of the cement.

THE STRATEGIC PERSPECTIVE

37. The framework outlined above takes a micro or project-oriented perspective. This allowed us to build on the project analysis literature, and construct a rigorous approach to assessing development impact. But it was recognized that valuing some of the benefits to society of the project could be difficult to do in practice. An example would be the value of the demonstration effects of some IFC supported project. Similarly, values arising from network effects, or from the provision of complementary goods, may be difficult to value when taking a project-oriented perspective. An example would be the value to the country as a whole from the establishment of a credit rating agency, which may be critical in allowing an efficient financial sector to operate (a complementary good), and which is in turn critical for the rest of the economy.

38. For such purposes, a strategic, or top-down, perspective may be a useful complement to the bottom-up perspective of the project. The value of the demonstration effects, or the network effects or provision of complementary goods, may become clearer when viewed strategically. This does require a prior strategic view. That is, based on prior analysis of the country situation and the constraints to development that it is facing, one would need to know what is in fact strategically important and what is not (not everything can be strategically important). And what is strategically important is not limited to sectors (such as the financial sector), but could include examples of good corporate governance, or the demonstrated usefulness of transparent accounting practices, etc.

39. More broadly, the IFC support for a project may be accompanied by support for critical policy change, which affects not only the project but also much else. An example might be support for a private power generation plant, during which the IFC (and/or the Bank) also worked with the authorities on the appropriate legal framework for such investments. The improvement in the legal framework will be of benefit more broadly, and should be noted as part of the development impact.

40. The strategic view can assist in assessing the value of the project's effects, but it is likely they would remain qualitative. That is, one might argue that a particular demonstration effect of policy change is strategically important and present the case for that, but the assessment will in the end still be a qualitative one. And there is the real danger that poetry will sometimes be substituted for rigorous analysis, with an outcome which justifies anything. It can be easy to assert something is strategically important; it is much more difficult to present a substantive case for why.

SUMMARY AND CONCLUSION

41. The framework presented above will permit an assessment to be made of the development impacts of a project, which is more complete than the analysis which has traditionally been done. While an ERR analysis is required for all IFC investments, this has normally been a superficial analysis which simply adjusted the FRR analysis for taxes paid. The effects of tariffs are fairly often added, and taking account of the opportunity cost of labor (the shadow price of labor) has occasionally been done. But development impacts are much broader, and development impact is the objective of IFC's support. It is thus important that these impacts be understood, assessed correctly and as rigorously as possible, and presented clearly to the Board and to the broader public if one is to expect support for what IFC is doing.

42. To summarize, in the discussion we have noted the following development impacts of a project should be assessed:

- a. The **project financiers** receive a private return, as measured in the traditional FRR (and should be measured after taxes).
- b. **Employees** receive higher wages than they might have received elsewhere (that is, higher than their opportunity cost), and may receive a value to them of training (improved human capital, resulting in a greater value in the labor market).
- c. **Customers** may receive a new good or service, not previously available, with a value to them greater than the price they pay; or may receive a better quality product at the same price as before; or may pay a lower price than they had before due to the increased supply on the market (resulting in an increase in their consumer surplus).
- d. **Producers of complementary goods or services** may see an increased demand for their own product, and hence higher sales and profits.
- e. **Suppliers** will see an increased demand for what they sell, and hence increased sales and profits. A network of new suppliers may come into being, and the project company may extend assistance to the suppliers (both new and old) through help on management or technology perhaps, or in the availability of finance, etc.
- f. **Competitors** may see a reduction in the demand for their product, but this is not a loss from the viewpoint of society as a whole but rather a shift in surplus to consumers. And competitors may gain from the demonstration effects of the project, as well as from network gains resulting from the bigger market or improved suppliers.
- g. **New entrants** may develop, as a consequence of the demonstration by the project that producing some new product, or new way of producing a product, is viable, or as a consequence of the network effects.
- h. **Neighbors** may be impacted in several ways. There may be environmental gains (or losses), new infrastructure may become available (or become more congested), and new social infrastructure may develop.
- i. The **rest of society** will benefit from the value of profit or value-added taxes generated by the project (part of the project benefits, but which do not accrue to the private project owners). Subsidies paid by the Government to the project will need to be subtracted. For products used as inputs to the project, benefits are generated to the rest of society from the amount paid in sales or excise taxes, and for any import tariffs paid (or the equivalent tariff for a domestically produced competitor to the import, as its price will be higher by an equivalent amount due to competition). For products produced and sold by the project, benefits to society accrue by the amount paid in sales or excise taxes on these products (the consumer values it at the price he pays, but the producer gets the price after tax). And also for products produced and sold by the project, benefits to society should be reduced by the amount of tariffs (or tariff equivalent) charged on imports which can compete with the product.

43. It should still be noted that while a proper ERR analysis presents the project's benefits and costs for society as a whole, the impacts assessed are still just the first round effects of the project. The project financiers earn a profit, and this profit is reflected in the FRR, but their increased income may then permit further rounds of effects which may have social benefits. Or, as noted above, the government may receive increased tax revenues as a result of the project, but what the government does with those increased revenues is not normally included as one of the

impacts of the project. But as a consequence of the increased tax revenues, the government may spend more on basic education or health (or missiles and bombs), or reduce the tax rate. These indirect effects are not counted, but do exist. While it is impossible in practice to include them fully (ultimately, the entire economy ends up in a new equilibrium), they should not be forgotten.

ANNEX I: Impact of a Project on Consumers' and Producers' Surplus

1. This annex will derive the impacts of a project on several of the key groups, by using simple demand and supply diagrams to find the impact on consumers' and producers' surpluses.

a. Impact on Consumers

2. Figure 2 shows the impact of an increase in supply, as a consequence of the project, on consumers' (as well as producers') surplus. Areas are marked as capital letters. Thus the initial supply curve is S_1 , the initial demand curve D , and the initial consumers' surplus the area A . The initial producers' surplus is the area $B + C$: it is the area above the supply curve (the short run marginal cost curve) up to the sale price of the product, and accrues as profits.

3. When the supply curve shifts out as a consequence of the project, to S_2 , the consumers' surplus now becomes the area $A + B + E$; and the producers' surplus area $C + D$. Thus the change in consumers' surplus (the new area minus the old area) is the area $B + E$, the change in producers' surplus is $D - B$, and the total change in surplus for the economy as a whole is $E + D$, which is definitely positive.

4. The area D corresponds to the additional profits now being generated as a consequence of the project, and these have already been accounted for in the financial analysis of the project, i.e. in the FRR. They should not be double-counted. But the area E is new, and additional. It corresponds to additional consumers' surplus which is not partially offset by a decline in a portion of the producers' surplus. It can be estimated relatively easily (and adequately) as a triangle whose area is equal to $\frac{1}{2}$ times the fall in the price times the total extra production of the project. Note that in some earlier formulations of the extra consumers' surplus that have appeared in IFC papers, the mistake was made of calculating only the area corresponding to the growth in production of the market as a whole (i.e. from the old equilibrium output level to the new one, not the extra output of the project where some of it displaces high cost existing production) times the change in price. This is incorrect, as seen in the diagram.

b. Impact on Producers of Complementary Goods

5. Figure 3 shows the impact of the new project on the producers of complementary goods, where the figure is for the market for the complementary goods. Due to the increased availability of the project's output, the demand for complementary goods will increase (e.g. a new toll road increases the demand for the services of gasoline stations around the exits). That is, the demand curve for the complementary good shifts out.

6. The initial consumers' surplus is area $B + C$, and the initial producers' surplus is area D . The final consumers' surplus is $A + B$, and the change in consumers' surplus is $A - C$. The final producers' surplus is $C + D + E$, and the change in producers' surplus is $C + E$. The total change in the surpluses for the economy as a whole is hence $A + E$, which is definitely positive. Furthermore, the additional consumers' surplus here (that is, that part of the change in consumers' surplus which not offset by a shift to producers' surplus) is new, and should be counted if one can come up with a measure. However, this would require some knowledge of the position of the demand curve for the complementary good, both before the project and where it shifted to as a consequence of the project, and this may be difficult to ascertain in practice.

7. For the producers of the complementary goods, the additional surplus (excluding area C , which simply is a shift of a portion of the surplus from the consumers) is area E . With an estimate of the elasticity (or slope) of the demand curve, it can be estimated as the triangle whose area is

equal to $\frac{1}{2}$ times the change (rise) in the price of the complementary good times the increase in sales from what they would have been at the new price and what they become.

c. Impact on Competitors

8. The diagrams are slightly more complicated in tracing though the impact on competitors, i.e. those who produce goods which are substitutable for the good being produced by the project. See Figure 4. It is best to start with the extreme case of the goods being perfect substitutes (i.e. consumers are indifferent between the two suppliers).

9. The left panel in Figure 4 shows supply and demand in the market as a whole, covering both the original competitors as well as the new production from the project. The right panel shows the supply of the original competitors only, and the demand curve they face. Prior to the project, the right panel is the same as the market as a whole (only the original competitors exist), and the S_1 and D_1 curves in the left panel are identical to these curves in the right panel. When the new production of the project comes on stream, the supply curve in the left hand panel shifts to S_2 . Some of the demand shifts to the new supplier (the project), and one can draw a notional demand curve D_2 as the demand curve being faced by the original competitors.

10. In the final equilibrium, the price has fallen from P_1 to P_2 (due to the new supply), and the production by the original competitors has fallen from Q_1 to Q_2^C . The total quantity produced has risen to Q_2^F . One can then go through the simple geometry of the areas to arrive at the effects on producers' surplus (both of the original competitors and the new supplier) and consumers' surplus. The equations are as shown in the diagram. Consumers' surplus rises by the area $C + E + F$ (which is also equal to the area $C' + E' + F$), while producers' surplus (for both old and new suppliers) will change by the area $G - (C + E)$. The total change in consumers' and producers' surplus would then be $F + G$, which is definitely positive. For the original competitors only, producers' surplus will fall by the area $C + E$, but this is part of the transfer to the increased consumer surplus (area $C + E + F$); that is, it is a transfer from the old producers to the consumers.

11. When goods are not perfect substitutes, the left and right panels of Figure 4 will now be of two different (but related) markets. The demand curve of the substitute will shift in, but not by as much as before when the goods were perfect substitutes. The total change in producers' plus consumers' surplus in the market of the product being produced by the project will still be the area $F + G$, and will still definitely be positive. The producers' surplus of the producers of the substitutable good will fall by the area $C' + E'$, but this will no longer be equal to the area $C + E$. Rather, it will be less (in value terms).

d. Impact on Suppliers from the Increased Demand of the Project

12. One can use the same Figure 3 to examine the impact on suppliers as a consequence of the increased demand from the new project for their input. One merely needs to reinterpret whose supply and demand curves these now are: the demand curve will now be that resulting from the demand of the project and others who purchase goods from these suppliers, and the supply curve will be that of the suppliers of the input.

13. The geometry is then the same, and the total change in consumers' and producers' surplus will be the area $A + E$. Area A is the benefit to the project from having access to this input from the supplier, and is already accounted for in the project's private accounts (the FRR); it should not be counted again. But area E is new, and corresponds to the increased profits of the suppliers resulting from the increased demand of the project. Its value will be equal to $\frac{1}{2}$ times the

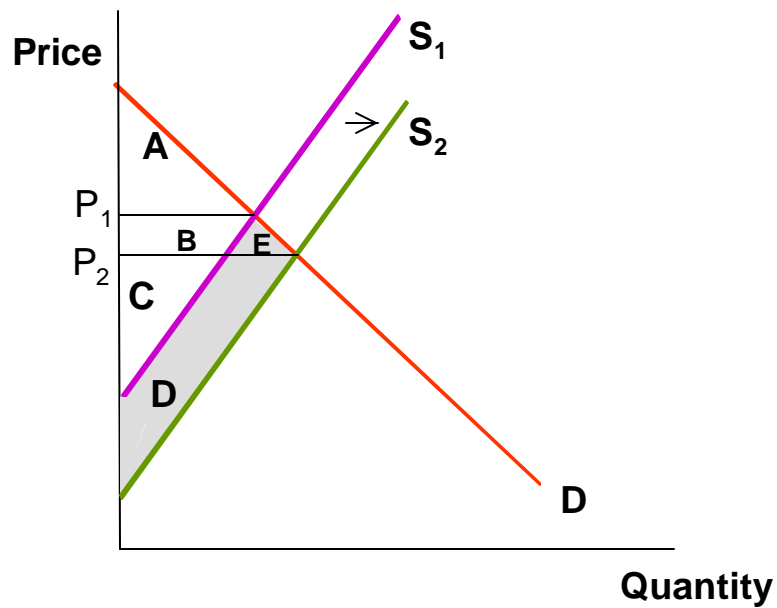
rise in the price of what is being supplied times the increased amount being purchased at the new price (which is equal to the amount the project purchases from the suppliers).

e. Impact on Suppliers from Assistance in Reducing Costs

14. One can use Figure 2 again to depict the situation when the project provides assistance to its suppliers (e.g. by help on technology or on the way to organize production, or help on accessing cheaper finance, etc.). The supply curve will now be that of the input suppliers to the project, while the demand curve will be that of the project and others who purchase goods from these suppliers.

15. As a consequence of this help, the supply curve of these input providers shifts out: it costs less than before to produce any given quantity. The geometry is the same as before, and the area D will measure the increased profits of these suppliers, while area E will measure the increased profits of the firm as well as others who purchase inputs from these suppliers (e.g. competitors, new entrants, and others), other than that which corresponds to lower producers' surplus among the suppliers (due to the now lower price). The increased profit to the firm will already be accounted for in the FRR. The increased profit to the others will then be the remaining amount in area E, which can be estimated by knowing how much the price has fallen, what is the increase in sales in the industry as a whole, and how much of the increased production was used by the project.

Figure 2: Consumers' and Producers' Surplus Resulting from an increase in Supply



Initial Consumers' Surplus (CS) = A

Initial Producers' Surplus (PS) = B + C

Final CS = A + B + E

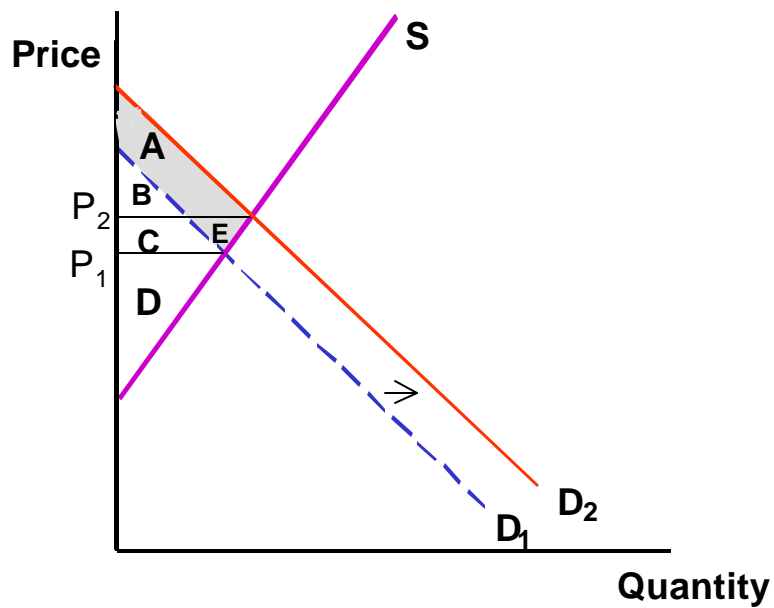
Final PS = C + D

Change in CS = (A + B + E) - A = B + E

Change in PS = (C + D) - (B + C) = D - B

Total change in CS + PS = (B + E) + (D - B) = E + D

Figure 3: Consumers' and Producers' Surplus Resulting from Increased Production of a Complementary Good



Initial Consumers' Surplus (CS) = B + C

Initial Producers' Surplus (PS) = D

Final CS = A + B

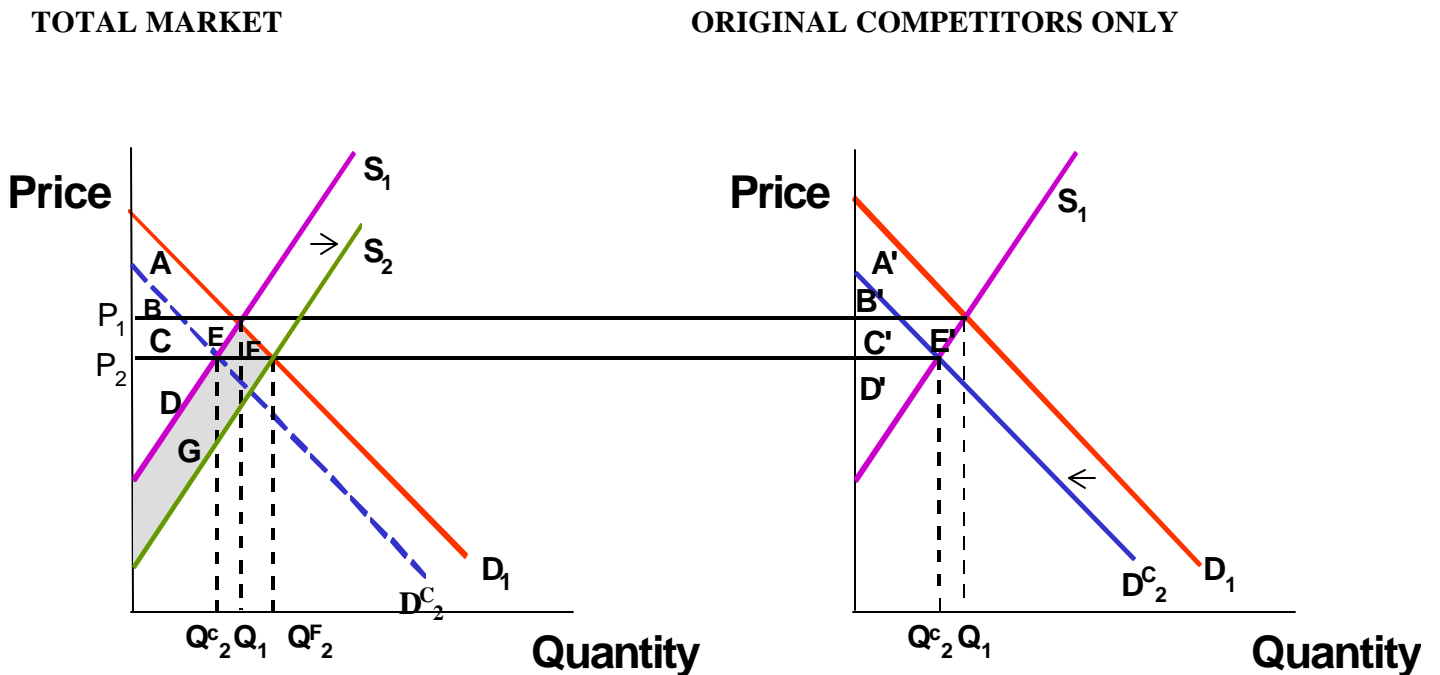
Final PS = C + D + E

Change in CS = (A + B) - (B + C) = A - C

Change in PS = (C + D + E) - (D) = C + E

Total change in CS + PS = (A - C) + (C + E) = A + E

Figure 4: Consumers' and Producers' Surplus Resulting from Increased Production of a Perfectly Substitutable Good



D_1 = Initial demand curve, as well as final demand curve of market as a whole

D_2^C = Final (notional) demand curve faced by original competitors

S_1 = Initial supply curve

S_2 = Final supply curve, after additional production of project becomes available

P_1 = Initial price

P_2 = Final equilibrium price, determined in market as a whole

Q_1 = Initial quantity produced (all by original competitors)

Q_2^C = Final quantity produced by original competitors

Q_2^F = Final quantity produced, by original competitors plus new suppliers

Figure 4: Consumers' and Producers' Surplus Resulting from Increased Production of a Perfectly Substitutable Good (continued)

$$\text{Initial Consumers' Surplus (CS)} = A + B = A' + B'$$

$$\text{Initial Producers' Surplus (PS)} = C + D + E = C' + D' + E'$$

$$\text{Final CS} = A + B + C + E + F = A' + B' + C' + E' + F$$

$$\text{Final PS} = D + G$$

$$\text{Final PS of original competitors only} = D' = D$$

$$\text{Final PS of new supplier only} = G$$

$$\text{Change in CS} = (A + B + C + E + F) - (A + B) = C + E + F = C' + E' + F$$

$$\text{Change in PS} = (D + G) - (C + D + E) = G - (C + E)$$

$$\text{Total change in CS + PS} = (C + E + F) + (G - [C + E]) = F + G$$

$$\text{Change in PS of original competitors only} = D' - (C' + D' + E') = - (C' + E') = - (C + E)$$

$$\text{Change in PS of new suppliers only} = G$$

Note: The area of PS lost by original competitors ($=C' + E'$) becomes part of the increase in final CS ($=C' + E' + F'$)

ANNEX II: A Numerical Example

1. A numerical example was developed to illustrate how development impact may be assessed in practice. The calculations are shown in Table 1, as a simplified spreadsheet. The specific numbers used are fictional, but are internally consistent and not implausible. While assumptions will always need to be made, for a good analyst the difficulty in arriving at figures for the economic analysis should in general be no greater than they are for the financial analysis.
2. The example is for the construction of a new plant by the AAA Widget Co. (with a credit rating not necessarily reflective of their name). The project consists of a capital investment of \$700,000, all in year 1, and a lifetime of 7 years, at the end of which the capital will have a scrap value of \$100,000. Annual sales of \$1,000,000 are expected, with labor costs (including all fringe benefits) amounting to 50% of this, material inputs amounting to 30%, and a gross margin of 20%. The plant's production of widgets will be equal to 5% of the current market.
3. Panel A of the spreadsheet is the standard financial analysis, and takes the perspective of the project financiers. The FRR of the investment is 11.9%. The remaining panels calculate estimates of the impact of the project on others who might be affected, following the sequence used in the paper.
4. Panel B shows the impact on employees. It is assumed the opportunity cost of the workers employed is 5% less than the wage they receive in the new plant. Hence their new wage of \$1,000 per year is \$50 per year more than they would have been receiving in alternative employment, and the aggregate benefit for all the workers is \$25,000 per year of plant operation. In addition, the workers benefit from training they receive. The benefit to the *workers* is hard to assess (the benefit to the *firm*, in contrast, is already captured in the FRR, through the resulting higher productivity of the worker), but workers will in general benefit by becoming more skilled and hence able to command a higher wage after the training than before. We will assume the benefit to each worker is half of the amount spent on their training. In the example, \$50 is spent on the training of each worker per year, or 5% of a worker's wages, so the benefit to the worker works out to \$25 per worker per year.
5. Panel C provides a calculation of consumers' surplus, using the approach explained in Annex I to this paper. A price elasticity of 1.0 is assumed; with a market supply increase of 5%, this will lead to a reduction in the price of $1/1.05 = 4.8\%$. As derived in Annex I, the consumers' surplus is $\frac{1}{2}$ times the change in price times the new production of the project. With these numbers, the consumers' surplus then works out to \$25,000 per year.
6. Panel D shows how one could calculate the increased profits of producers of complementary goods, i.e. goods whose value increases as a consequence of the increased availability of the good or service produced by the project (for example, gasoline stations near the exits of a new toll road). In this example, we will assume the demand for these goods will rise by 5% when there are extra (and cheaper) widgets on the market. Sales are assumed to rise from 50,000 units to 60,000, and at the new higher price the sales would have only been 47,500 (assuming a price elasticity of 1.0) had the new widgets not become available. The area of the triangle is then \$1,563 per year, which compared to the other figures being calculated is relatively small. This also illustrates the approach that should be used in practice by the analyst. A rough, "back of the envelope" calculation should first be done, using rough but reasonable guesses at the parameters. If the figure works out to be small, then there is no need to do more in depth work in that particular case. Rather, just note that the effect is positive but probably small.

7. Panel E shows calculations for the increased profits of suppliers resulting from the new demand generated by the project. It is assumed the result is a 5% higher price, where it should be noted that the purchases recorded in the financial analysis of Panel A (of \$300,000 for the material inputs) are at the new, higher, price. In terms of the prices existing prior to the project, the \$300,000 in inputs is equivalent to 285,714 units (= $1/1.05$ times 300,000). The estimated area of the triangle is \$7,143 per year.

8. Panel F would show the value of the demonstration effects for competitors and new entrants. These will always be positive (there is some value to any information generated as to the viability of some production process), but difficult to measure. In the fictional example here, the new plant by the AAA Widget Co. is simply one more plant which only adds 5% to an existing market, implying there is nothing terribly new here. Therefore the demonstration effect is likely not to be too large, and we have assumed simply a value of zero.

9. Panel G shows the impacts on neighbors from two distinct effects: higher pollution, and a new road being made available. Pollution will increase relative to what it would have been, as this is a greenfield plant.⁸ And even if the new plant meets all the IFC and country environmental guidelines (and it better, or it would not be approved), it will still have some impact on the environment. Assessing the value of this impact may be difficult, as it depends on parameters which are generally not known by economists or financial experts.⁹ For the fictional example here, we assume the increased pollution of 10 tons of particulate emissions per year will increase sickness of all 100,000 people in the air basin by 0.01%. The resulting lost work-days are then valued at the same average wage as the workers of this plant.

10. The second part of Panel G shows how one might arrive at an estimate of the value of a new road which is built by the sponsors as part of the project. It is assumed that in addition to the use by the project (already reflected in the FRR) 1,000 other people will use it daily, and that they would be willing to pay a toll of 4 cents per trip if asked. Such a toll is too low to be worthwhile to collect. However, it still produces a value at least equal to this for those who would use the road, or \$10,000 per year when added up.

11. The impact on the Rest of Society is shown in Panel H. These are the impacts on prices and taxes, which have traditionally been the adjustments made in going from the FRR to the ERR. One will add in, as a positive contribution to the benefits generated by the project, the profit taxes paid. These are excluded from the FRR (which takes the private perspective), but are part of the gross returns generated by the project -- it is simply a portion which then accrues to the government rather than the project owners. Similarly, the sales and excise taxes paid on the products sold by the project are portions of project benefits which are generated but then accrue to the government.¹⁰ On the material inputs purchased, the project also pays a sales tax -- the FRR shows the amount paid inclusive of tax (the \$300,000), but the opportunity cost to the economy of producing these inputs excludes the portion going to the government in taxes.¹¹

⁸ If the plant were substituting for an existing, more polluting, plant which would then be shut down, then one would see a net reduction in pollution. This would have a positive value. But in our fictional example, we are assuming a new plant which simply adds to the market.

⁹ But for an example of what can be done for a specific IFC project, see Yannis Karmokolias, "Cost-Benefit Analysis of Private Sector Environmental Investments: A Case Study of the Kunda Cement Factory", IFC Discussion Paper #30, September 1996.

¹⁰ The consumer pays the price inclusive of the tax, and values the output at the price he or she in fact pays.

¹¹ The \$300,000 is the after-tax figure. Hence the 5% tax is on \$285,714 ($=\$300,000 / 1.05$).

12. Import tariffs will in general apply on both the product produced by the project and on the inputs purchased by the project. A tariff on a product which is a close equivalent to that which the project is producing will mean the project will be able to sell its product for a higher price than otherwise: i.e. higher than the opportunity cost of the economy from importing the good instead. The \$1,000,000 in sales revenue is therefore an over-estimate of the value of what is being produced, by an amount equal to the tariff paid (or the tariff equivalent of a non-tariff barrier, such as a trade quota).¹² On material inputs purchased by the project, a tariff will increase the price of this cost factor, above what the opportunity cost to the nation is of the input which is imported (or which could be imported). To arrive at the impact on the economy as a whole, this cost factor should be reduced by the amount of the tariff. That is, the value of the tariffs paid (or which would be paid) on such inputs should be added back as a benefit to the project.

13. The net impact of all these factors can then be added up and used to calculate the ERR. In the fictional example here, the resulting ERR is 25.6%, compared to the FRR of 11.9%. There is a significant difference, using numbers which are not necessarily unrealistic (and which in several cases are probably estimated conservatively). Furthermore, some of the individual effects can be quite large, such as (in this example) the value to the employees of the increased wages and of the training, the consumers' surplus, the value of the new infrastructure, and (with a negative sign) the social costs from the additional pollution. Ignoring these factors could lead to a highly misleading assessment of the project's true value to society.

¹² Since the \$1,000,000 is the revenues received post-tariff, the 10% tariff rate must be applied on the pre-tariff revenue figure of $\$1,000,000 / 1.10 = \$909,091$.

Table 1: ERR Calculation for AAA Widget Co. New Plant

Parameter	Rate or other	Positive or Negative Impact on ERR	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
A. Financial Rate of Return									
1. Annual revenues, incl. subsidies		Positive	\$0	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000
a. Units sold				100,000	100,000	100,000	100,000	100,000	100,000
b. Price per unit (after tax)				\$10	\$10	\$10	\$10	\$10	\$10
2. Annual wage costs (all inclusive)		Negative	\$0	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000
a. Number of employees				500	500	500	500	500	500
b. Wages (all inclusive) per employee				\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
3. Material inputs (after tax)		Negative	\$0	\$300,000	\$300,000	\$300,000	\$300,000	\$300,000	\$300,000
4. Capital investment / terminal value		Negative	\$700,000	\$0	\$0	\$0	\$0	\$0	-\$100,000
5. Gross Profits = A1-A2-A3-A4			-\$700,000	\$200,000	\$200,000	\$200,000	\$200,000	\$200,000	\$300,000
6. Profit taxes	20%		\$0	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$60,000
7. Profit after taxes = A5-A6		Positive	-\$700,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$240,000
FRR =			11.9%						
B. Impact on Employees									
1. Wages above Opportunity Cost									
a. Opportunity Cost (annual wage elsewhere)				\$950	\$950	\$950	\$950	\$950	\$950
b. Difference with wage paid				\$50	\$50	\$50	\$50	\$50	\$50
c. Benefit to workers of higher wage		Positive		\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
2. Value to Worker of Training Received									
a. Annual expenditure on training per worker				\$50	\$50	\$50	\$50	\$50	\$50
b. Value to worker of the training	50%			\$25	\$25	\$25	\$25	\$25	\$25
c. Value to all the workers				\$12,500	\$12,500	\$12,500	\$12,500	\$12,500	\$12,500
C. Consumers' Surplus									
		Positive		\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000

Assumptions: Price elasticity = 1.0; Market supply rises 5%; so price falls by $1/1.05 = 4.8\%$;

Price without project supply was \$10.50 per unit, so new price will be \$10 per unit.

Consumers' surplus = $1/2 * \text{change in price} * \text{project output} = 1/2 * \$0.50/\text{unit} * 100,000 \text{ units} = \$25,000$

D. Profits of Producers of Complementary Goods	Positive	\$1,563	\$1,563	\$1,563	\$1,563	\$1,563	\$1,563
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Assumptions: Price of complementary good rises 5%, from \$5 to \$5.25 per unit;

Units sold before project = 50,000; Rise to 60,000; but would have been 47,500 due to price rise alone (price elasticity of 1.0)

Increased profits on complementary goods = $1/2 * \text{change in price} * \text{change in output} = 1/2 * \$0.25/\text{unit} * 12,500 \text{ units} = \$1,562.5$

E. Profits of Suppliers	Positive	\$7,143	\$7,143	\$7,143	\$7,143	\$7,143	\$7,143
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Assumptions: Increased demand leads to 5% price rise, from \$1.00 to \$1.05;

Demand by the project is \$300,000 at the new price, which is $300,000/1.05 = 285,714$ units in terms of the pre-project prices

Increased profits = $1/2 * \text{change in price} * \text{change in output at the new price} = 1/2 * \$0.05/\text{unit} * 285,714 \text{ units} = \$7,142.9$

F. Competitors and New Entrants	Positive	\$0	\$0	\$0	\$0	\$0	\$0
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Assumptions: There were positive demonstration effects, but impossible to quantify and probably small. They were therefore set to zero.

G. Neighbors

1. Additional pollution	Negative	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
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Assumptions: The process used in this greenfield plant yields 10 tons of particulate emissions per year (after cleaning to the environmental standards of the IFC and the country). There are 100,000 people in the air basin, and such additional pollution will increase sickness of 0.01% in terms of work-days lost. Valuing this loss at the average wage of the plant, the loss will be $0.0001 * 100,000 = 10 \text{ work-years} = \$10,000$

2. New Infrastructure	Positive	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
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Assumptions: The project builds a new road used by 1,000 people daily. It cuts their journey time and they would be willing to pay \$0.04 (four cents) per trip.

Value to these users = $250 \text{ week-days per year} * 1,000 \text{ users per day} * \$0.04 = \$10,000$

H. Rest of Society

1. Profit taxes paid out of earnings	20% Positive	\$0	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$60,000
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2. Sales and excise taxes paid								
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a. On products sold	5% Positive		\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000
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b. On inputs purchased	5% Positive		\$14,286	\$14,286	\$14,286	\$14,286	\$14,286	\$14,286
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3. Effects of import tariffs								
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a. Higher price on products sold	10% Negative		\$90,909	\$90,909	\$90,909	\$90,909	\$90,909	\$90,909
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b. Higher price on inputs purchased	10% Positive		\$27,273	\$27,273	\$27,273	\$27,273	\$27,273	\$27,273
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4. Subsidies received (assume \$40,000 per year)	Negative		\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000
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Aggregate Economic Return to Society as a Whole

=A7+B1c+B2c+C+D+E+F-G1+G2+H1+H2a+H2b -H3a+H3b-H4		-\$700,000	\$231,855	\$231,855	\$231,855	\$231,855	\$231,855	\$331,855
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ERR = 25.6%