THE BROOKINGS INSTITUTION

HOW IMPORTANT IS INFRASTRUCTURE?

A LOOK AT ITS ECONOMIC IMPACT IN A GLOBALIZED WORLD

Washington, D.C.

Thursday, June 10, 2010

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Welcome:

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Introduction:

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PRESENTATION: KEY ISSUES IN THE ECONOMICS OF INFRASTRUCTURE:

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PRESENTATION: THE SLOWLY GROWING CASE FOR INFRASTRUCTURE PRIVATIZATION:

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PRESENTATION: EVALUATION AND DELIVERY OF INFRASTRUCTURE - THEORY AND PRACTICE:

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PRESENTATION: THE RETURNS TO INFRASTRUCTURE: IS INFRASTRUCTURE CAPITAL PRODUCTIVE?:

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the Development Research Group
The World Bank

PRESENTATION: DYNAMICS OF INFRASTRUCTURE AND DEVELOPMENT:

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Panel Discussion

Moderator:

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P R O C E E D I N G S

MS. DYNAN: Good morning, everyone. I'm Karen Dynan, Vice President and Co-Director for Economic Studies here at Brookings, and it's my pleasure to welcome you today to our infrastructure conference. I want to start by thanking my colleague, Warwick McKibbin, for his leadership in this important area, and also for giving Brookings the opportunity to play a role by hosting this event.

And I have to tell you, I've been excited about this conference ever since Warwick walked into my office several months ago to propose it. If you haven't read Warwick and Timo's excellent summary of the issues surrounding infrastructure, which Timo will actually be talking about in a few minutes, I recommend you do so.

About a year and a half ago, people came to the realization that infrastructure was interesting, there was this ground swell of interest in infrastructure because people recognized the fact that it was a way to mitigate the cyclical downturn, the great recession, while at the same time

laying groundwork for higher, longer term growth. So that all sounded great, and yet from the perspective of making the most use of our scarce fiscal resources -- and this is a point that Warwick and Timo stress, and I think they get it just right -- it wasn't a great time to do that spending because of important gaps in our knowledge about how to evaluate potential infrastructure projects and how to, once you've deemed which projects are worthy, how to deliver them.

Hence, there was skepticism at the time. So I remember a piece I was reading in *The Economist*, I thought they put it well -- this paraphrases them, but -- they said the infrastructure of spending spurred by the very large U.S. stimulus package could easily run amuck.

And, hence, the need for work that addresses key questions about infrastructure, so work that that thinks about how we should measure the cost and benefits of different projects, and also just work that looks at the evidences out there and draws broad conclusions, a need for work about the appropriate roles of the public sector and the private sector in infrastructure.

There are arguments to be made for important roles for both sectors, but there's a need to sort through and think about how you balance the two different sectors. And also in the recognition that the question surrounding infrastructures, they're not just about the U.S. and about other developed countries, there are very important questions and

issues in the developing world, so how the answers to these questions depend on a country's stage of economic development.

And I really think that the work that was done for the conference, the earlier conference in Australia, and then this event, makes important strides towards answering these questions and filling our infrastructure knowledge gap more broadly.

So let me thank Warwick and Timo. I'd also like to thank the other sponsors of this event, the Asian Development Bank, the Australian National University, the Lowy Institute and Worley Parsons for their sponsorship. And I'd also like to thank the participants of the earlier conference in Australia, as well as the participants in this event. And finally I'd like to thank you for showing up to listen and also discuss these issues.

So having said that, I'm going to turn things over to Warwick, who is going to commence with the substance of the day.

MR. McKIBBIN: Thank you very much, Karen. And I'd like to add my welcome to you all this morning for attending this conference. The conference itself is – today's session is the extension of a conference that was held in Sydney, and the theme in Sydney was the economics of infrastructure in a globalized world, issues, lessons and future challenges. And this conference was unique because the idea was to bring together both policy-makers, academics and practitioners to discuss the key issues surrounding infrastructure investment.

It's very timely, as Karen said, because of the role of infrastructure projects in the stimulus programs in many economies in the world. That conference consisted of many more presenters than we have here today, and there's a whole series of presentations and papers which will be on the Brookings web site linked to that original conference.

There's also a conference summary or a survey of the issues paper which is available as you entered this morning and is also downloadable from the Brookings web site. That's a paper co-authored by myself and Timo Henckel.

Now again, this conference and this summary document is not meant to be a definitive solution to the many questions, it actually sets out a long term research agenda and raises the issues that we think policy-makers and practitioners need to be concerned about over the coming decades. As Karen said, this conference and this workshop is sponsored by the Asian Development Bank, the Australian National University, the Brookings Institution, particularly the Global Economy and Development Program and the Economic Studies Program, the Lowy Institute for International Policy, and Worley Parsons, who's a major international resource and infrastructure company.

Now, at the conference, there are many issues, as you can imagine, because this is a very large area. And we tried to restrain the sort of questions we're addressing at the conference and which will be summarized today, but there were six broad vanes.

One question was, what are the returns to infrastructure. There's a lot of theory that suggests they should be very large, but the critical question is, what actually are they in practice, once you go to the implementation phase, do we actually get returns that we think should be from a theoretical perspective.

The second question is, what is the role of the private sector in the formulation and delivery of infrastructure projects, how to evaluate, and what are the problems around delivery of infrastructure and practice, what is the nature of network industries pricing and regulation, political economy considerations of infrastructure provision, and what's the difference between infrastructure and advanced economies versus the problems facing infrastructure in developing economies.

So in order to provide a better understanding of these key issues today, we will first have a series of presentations from our distinguished participants. We'll then have a break at around 11:00 for people to have a cup of coffee and some nutrition, and then we'll come back for several more presentations, and then a panel discussion.

So I'll ask you to please hold your questions until after we've completed the presentations, and during the panel session we'll be asking people both in this room and in an overflow room to submit questions for the participants to answer.

Now, I should also mention that if you're having trouble understanding my accent, you better be ready, because 50 percent of the presenters are Australian, so you better start tuning now.

Our first presenter is going to provide a summary of the conference and a summary of the overview paper which was available on your way in. This is Doctor Timo Henckel. Timo is a Research Fellow in the Center for Applied Macroeconomic Analysis at the Australian National University, and he's the main organizer of the Sydney conference. Timo.

MR. HENCKEL: Thank you, Warwick. Ladies and gentlemen, fellow colleagues, distinguished guests, you and I come by road or rail, economists travel on infrastructure, so said former Prime Minister Margaret Thatcher. So it's a great pleasure to be here today and to talk as an economist, who came here by road and rail and plane, about an exceptionally important topic.

Infrastructure, whether energy, water, transport, or telecommunications, touches our lives every day. Well designed infrastructure facilitates economies of scale, reduces costs of trade, and is thus central to specialization and the efficient production and consumption of goods and services. It is a vital ingredient to economic growth and development, which is the key to raising living standards.

Unfortunately, many issues surrounding infrastructure spending are not well understood. At the Sydney conference, we asked a range of important questions, which Warwick outlined earlier. I will try to

provide a very curt summary of our state of knowledge, leaving my fellow panelists to fill in some of the details. Most economists agree that infrastructure investment is necessary for a country to industrialize. From a development perspective, infrastructure offers two benefits, it raises productivity and reduces the cost of private production, and it has a disproportionate effect on the incomes and welfare of the poor by reducing costs to access markets, raising returns on existing assets, facilitating human capital accumulation, and facilitating agglomeration economies and the dissemination of knowledge.

Measuring the returns of infrastructure investment is a challenging exercise that has dogged economists for centuries, however, considerable progress has been made. New, robust evidence suggests that a ten percent rise in infrastructure assets, not spending, assets, directly increases GDP per capita by about .7 to one percent. This estimate is sizeable, but considerably smaller than some of the older estimates.

There is little evidence that the percentage change of output with respect to the inputs of the aggregate production function differs across countries. Hence, the marginal productivity of infrastructure is higher in countries with relatively lower infrastructure endowments. We will hear more about this from Luis later.

For policy-makers, it is tempting to jump on these numbers and announce the construction of a new bridge. But before any decision

is taken, the benefits to infrastructure investment must be compared to the opportunity costs of infrastructure spending.

Moreover, there exists only a weak link between infrastructure spending, on the one hand, and the stock of assets and equality of services on the other. This reflects big cross country differences in efficiency and quality of governance.

A key benefit of infrastructure, in particular transport infrastructure, is the reduction of transport costs which helps to create new markets and realize the returns to agglomeration. This, in turn, fosters competition, spurs innovation, lowers prices, and raises productivity.

For example, within three years of the completion of the Lanzhou Chengkun railroad in China, eastbound trade volume increased by over 40 percent and eastbound trade costs decreased by about 30 percent, implying a social return to the investment of approximately 30 percent per year. In China and India, declining trade costs account for a large and increasing portion of trade growth, explaining approximately 75 percent of trade expansion since the early 1990's. One economist, Holmos argues that for the period, 1950 to 1998, faster transport, mainly air shipping and faster ocean vessels, was equivalent to reducing tariffs on manufactured goods from 32 to nine percent.

So whether in China or the U.S., infrastructure investment also leads to dramatic reduction in inventories. Thus, infrastructure is the

key ingredient in a country's ability to capture the gains from trade possible through the process of globalization.

But the benefits are likely to be non-linear. Once an efficient transport network is in place, direct benefits to building yet another highway are limited. Infrastructure investment influences a country's absolute and comparative advantage by mitigating the constraints of factor endowments and promoting intra and interregional integration.

And this leads to a complex interdependent process in which infrastructure determines the patterns of trade, and the patterns of trade, in turn, determine the level and type of infrastructure. As an economy moves up the value chain, its infrastructure needs to adapt to reflect the changes and production structures and the ever changing patterns of movement in goods and people. The challenge for governments is to listen to the demands of the market while acknowledging the spillovers inherent in much of infrastructure investment and acknowledging the potential inefficiencies caused by interest groups that seek to realize rents from public expenditures. Doug will enlighten us further on some of what I just said.

Historically, most infrastructure investment was undertaken by the private sector. Heavy government involvement is a more recent 20th century phenomenon. However, the performance of public infrastructure, airports, highways, waterways, public railways, has been far from exemplary, with cost blow-outs, planning and construction delays, as

well as safety problems commonplace and a lack of innovation and technological advance.

Since the 1980's, there has been a renewed push to involve the private sector in infrastructure either exclusively or in partnership with the public sector. Infrastructure projects typically exhibit economies of scale, possibly leading to natural monopolies. They may be socially desirable, but not privately profitable. Now, for those of us who have taken Econ 101, will recognize that this constitutes a market failure, which can be corrected by the government by regulating private service providers or by providing the services themselves, that's the theory.

In the real world, government policies tend to be inefficient and subject to rent seeking pressures, so much so that these government failures may actually exceed the market failures.

I will not dwell further on the benefits of outright privatization lest I preempt my fellow panelist, Cliff. A more recent organizational form to capture both the benefits of private and public infrastructure provision are public private partnerships, or PPP's.

They have increased seven fold in developing countries from 1990 to 2008, and six fold in Europe during the same period. The advantages of PPP's include bundling of building maintenance and operations, easier implementation of efficient user fees, relief of public budgets, and fewer politically motivated white elephants. They may also be a necessary first step toward complete privatization.

However, there are also potential drawbacks including high contracting costs, inefficient competitive arrangements leading to bilateral monopolies, exploitation of soft budget constraints, and problems resulting from asymmetric information between the two contract partners. Moreover, the motives of PPP's may not be aligned with social welfare maximization. For example, governments want cash to reduce their deficits and private companies want to earn a high rate of return.

Once again, the theory behind PPP's is neat, the reality less so. There are several problems with this organizational form. For example, PPP's allow off budget spending, which is naturally attractive to politicians. In the United Kingdom, for example, only 14 percent of 599 PPP projects up to April, 2009 were on balance sheet.

This accounting trickery provides an incentive for governments to pursue excessive and inefficient infrastructure projects.

Most importantly, the complexity of infrastructure operations often requires renegotiation, which itself is a significant source of inefficiencies. It opens doors to further pork barreling, and the lack of competition and informational asymmetries at such a stage of a project can lead to considerable increases in cost and reductions in service quality. Renegotiation may enable a firm to earn monopoly rents that were denied to it in the bidding process. Success of PPP's, therefore, depends on good governance of the renegotiation process and on the initial contract design.

And in practice, this requires, for example, referral to an independent specialized agency that reviews and approves projects so as to minimize the terms of the renegotiation, use of service, not input standards in the contract, public tendering of additional works to break the monopoly power of the private partner, guarantees that contract values will not change after renegotiation, and better and more sophisticated accounting standards with respect to future capital costs and demand guarantees.

So the upshot is one that many policy-makers do not want to hear. There is no turnkey solution. Individual circumstances will have to determine the optimal contract specifications.

Infrastructure is expensive. Small inefficiencies can put to waste billions of dollars. Given the sums of money involved, the nonchalance and arbitrariness of some infrastructure investment decisions is simply baffling. If countries demand value for money and strive for productive efficiency, first rate evaluation of infrastructure projects is necessary to separate the good projects from the bad ones. Unfortunately, the quality of evaluation is typically poor everywhere as governments tend to overstate the benefits and understate the costs of infrastructure projects.

Furthermore, project evaluation must not only feed into the decision about whether or not to approve the project, but also into the

choice about the most efficient form of delivery. Sonia will have more to say about this in a moment.

No matter which evaluation tool is used, and this is a topic that could fill volumes, its truthfulness, and hence, usefulness, hinges on the government's commitment to sound evidence based policy. Otherwise, these tools act as fig leaves for politically motivated investment decisions.

Fostering a culture of analytical rigor and disinterested infrastructure policy should be high on the agenda for every government seeking to maximize social welfare. Large fixed costs and increasing returns to scale are common to many infrastructure industries, as are public good qualities and the presence of network externalities. These features tend to endow incumbent firms with market power due to large fixed capital costs, but tend to act as a barrier to entry. Clearly from society's viewpoint, this is inefficient. So there are a number of solutions to these inefficiencies. Governments may own and operate the monopoly firm, private monopolies can be subjected to rate of return regulation, or governments can adopt incentive regulation with the objective to emulate the incentives found in a competitive market.

The third solution, incentive regulation, is desirable in theory, but difficult to implement. Moreover, it exposes infrastructure operators to risks they have limited ability to influence, including demand side uncertainty, supply side uncertainty, and regularity uncertainty.

And as the pace of technological innovation increases, so do all these uncertainties. And as the pace of the change increases, so does the risk of getting regulation wrong.

As a consequence, in certain instances, regulators ought to learn the lessons from the theory of investment under uncertainty and refrain from regulating until more information is collected. But do note that unregulated does not mean that we tolerate uncompetitive behavior. Antitrust laws remain as important as ever. The full ramifications of regulation are not well understood, for not only does regulation respond to inefficiencies associated with infrastructure provision, but regulation, in turn, effects investment. There is no time for me to discuss the relative merits of say different types of price regulation. Suffice to say that when studying the relationship between price regulation and the cost of capital, information and uncertainty are the salient factors.

The optimal choice of regulation relies on the comparison between the extent of informational asymmetries and the cost of capital resulting from say a price count. For governments, this is challenging because of the amount of information required. Firms are likely to have better information about cost and demand conditions, suggesting that heavy handed price controls are likely to be grossly inefficient.

Furthermore, regulatory stability is vital to reduce uncertainty in firm's investment decisions and extend their planning horizons.

U.S. House Transportation Committee Chair, Bud Shuster, once said, angels in Heaven don't decide where highways will be built, this is a political process. While there is an opportunity for governments to correct some of the market failures associated with big investment projects, they often generate their own failures, as I mentioned before. The lack of hard profit objectives means government tend to run projects inefficiently, and rent seeking and lobbying pressure often proves too strong to resist, leading to inefficient political log rolling, pork barreling and corruption.

The theoretical links between the market environment and infrastructure provision are poorly understood. We know that the political economy matters and interacts with private markets in subtle ways, because consumers, in their roles as voters, are given the chance to choose the rules of the game.

Recent theoretical research shows that even in environments where there exists a positive level of welfare improving infrastructure capital, the political process may prevent this level from being achieved if costs and benefits are unequally distributed. This may lead to infrastructure traps in which no infrastructure is provided, even though it would be beneficial, and infrastructure thresholds, which imply that only sufficiently large projects are politically feasible. And interestingly, stronger competition and product markets makes such traps less likely. I mentioned earlier that high quality project evaluation is the

basis for good policy decisions, but project evaluation is only as good as the governments for which it is done. It is only sustained if governments see value in it.

Improving the quality of the decision-making process at the political level is difficult as long as governments view infrastructure spending as a benefit as opposed to a cost and as an end as opposed to a means. Improvements will require a cultural shift, as well as institutional change.

The time is scarce, so let me conclude with one final message. There is a tendency in political discourse to assume that all spending labeled infrastructure is necessarily good. In many countries, the government is best place to deliver these projects. It is clear from the debate among the experts at the Sydney conference that this is far from the consensus view.

Ideology on all sides of the political spectrum has poisoned the debate. There is no turnkey solution. In some instances, government intervention may be warranted, in others not. Let the economics determine the correct approach, not political ideology. Thank you.

MR. McKIBBIN: Thanks very much, Timo. The next presenter is Doctor Cliff Winston, a Senior Fellow in the Economic Studies Program here at Brookings and one of the world's leading thinkers in the economics of infrastructure, particularly transportation. Cliff.

MR. WINSTON: Thank you, Warwick, happy to be here and round out the conference we had in Australia for the conference here in the home turf. The title of the talk is actually the title of a book that I have coming out in a few months, so I figured I might as well talk about that, preview a bit of it, and I'll focus just on the infrastructure component of it.

The notion of privatization is a very long term idea. This is going to be quite challenging, both analytically and politically, so I'm not sort of presenting this without any qualification or an unconditional endorsement of it, I think it's something that we need to sort of carefully work through, but the motivation I think will be quite clear.

And I think to sort of move things along to ultimately deal with the political and analytical issues, I call for experiments to guide our thinking about this that I think will provide the kinds of evidence that we need to be confident going forward. We'll also learn things about what privatization is going to do, and I think hopefully in the end, it will be clear that this is really a sound policy.

Accordingly, I title the introductory chapter, I begin it with a quote saying, "the philosophy of one century is the common sense of the next", and hopefully that's how this is going to work out. That quote is not from Carl Marx, by the way.

All right. I have a short time, I'll have to go quickly. It's like an episode of 24, I hear tick, tick, tick, tick. All right, let's go. So motivation of this, I think this is, you know, can be done observationally in

terms of the problems that we have with deficits. The biggest story of the U.S. is now officially the Highway Trust Fund is running a deficit after a long time, observed delays that everybody experiences with the highways or airports and the like, and also safety concerns.

So in terms of performance, there's certainly concerns about, you know, how our infrastructure is performing. It's also increasingly clear that we aren't going to spend our way out of these problems. I know we're writing checks left and right, but I don't think we can even write a big enough one to spend out way out of this one.

The heart of the problem really is economics, and that is in line with what Timo was saying, to try to get the economics right, inefficiencies and pricing investment. And the thing that I think is most important really, the thing that we don't see, innovation, or lack of innovation and technical change I think ultimately could be the real big improvements in infrastructure.

And interestingly, and this came across well in Australia and hopefully today, the U.S. is actually behind the thinking in terms of privatization. A lot more experiments and thoughts and explorations about that are really going on in the rest of the world, so we have a chance to learn from it, but I think also we could push things forward.

And ultimately I think where we wanted to go with this, as I said, take it slowly, get some experiments, learn about the policy, but I think it will be clear about the benefits of it. All right. So let me run

through then the economic problems to at least get the motivation clear. When I talk about inefficient pricing, what I'm talking about is basically prices that are unrelated to cost, that are more specifically generally prices that are set for people that are below the costs of serving them. Particularly in airports, we have what we call weight base landing fees, where an aircraft's use of the runway is based on the weight. It has very little to do with congestion.

So you can imagine a little plane can delay big planes by quite a bit, but they don't pay very much because they don't weigh that much. In fact, the little planes can delay the big planes bigger than the big planes can delay the little planes, because they've got to stay away from each other, little ones, you've got to stay really far away from them, so that's obviously inefficient pricing.

Roads, we have the gasoline tax, again, that's not really – it's a pretty blunt instrument for congestion, for cars and trucks, and also a blunt instrument for the damage that the trucks do to roads, so people effectively are underpaying costs.

Ports, even their fees are unrelated to congestion for the most part. There are a few exceptions where you have a congestion based fee, but even then it's not covering the cost. So right off the top, you know, we're seeing these things are heavily subsidized, and they're big deficits, and these things have to be financed by taxpayers. At the same time, not only then is the pricing distorted, and that's the key,

because that signals then where you want to put your money on cost benefit grounds, we have problems with investment and production. The result is that for any infrastructure you do, the costs of actually producing it are highly inflated, all right, so it's a Woody Allen joke, under priced and costs too much.

Airports putting in runways just takes forever, a long, long time in putting these things in, there are lots of delays, environmental things, a lot of political things. By the time they're put in, you know, it's really a long, drawn out process.

Roads, problems with suboptimal capacity in terms of design of these things and the actual durability, lifetimes of the roads worn out with insufficient thickness. Ports, on the other hand, often times these things are overbuilt, you see huge excess capacity and no one is using them. From my own experience, the best example is Kawaihae Harbor in Hawaii, I suggest you visit that port and use it as a tax deduction for research, and you can see what excess capacity is about. And generally what you have is – efficiency, because regulations inflate the costs of labor and capital, so both wages and various regulations are weighing capital costs, so costs are high. And then the allocation of funding, there's a lot of waste in terms of allocating funds, they're not really based obviously on cost benefit analysis.

Airports, you have a misallocation of funds. To the airport improvement program, stuff really generally has to be spread out. So you

have a very heavy distributional component to all of this, you're not looking at where all the traffic is. That gets actually disproportionately a small amount of the money in terms of funds for airports.

Highways also are spread out. Again, it's not really directed in terms of cost benefit. Everybody has got to get in on it, and so you get pretty low returns that way. And then recently we've had earmark funds or demonstration projects, which again, are not based on cost benefit analysis and can generate low returns, okay. So even just allocating the money also is another source of inefficiency and waste, okay.

And then finally, the thing, as I said, it's hardest to actually document analytically, because it's not what we don't observe, the lack of innovation and technical advance. We're really not on the frontier. So when Timo was talking, he was mentioning a production function, we usually like to think we're on the frontier, the best combinations of inputs are being used to produce to produce a given level of output, that's hardly the case in the case of infrastructure.

A lot of things that we're aware of that could lead to improvements, improvements in navigational aids and signals, a lot of people know about this, could use this in highways and transit, we're not using that. Methods of construction could be vastly improved, much more sophisticated, advanced ways of doing it that reduce cost are not really done.

We even have ideas of automated highways, you probably read a bit about that, you know, that's a real possibility in terms of reducing delay and improving safety, and obviously we're light years away from that.

And airports will increasingly get attention about the delays in getting the satellite based air traffic control system, that's the kind of ideas about the advances in technology that we like in our systems. All right. Now, these things are no accident. You know, why exactly do we have all these inefficiencies? Well, agency limitations, very slow bureaucratic, trying to make – trying to have changes is very difficult, as we know, in all agencies of government. The mentality for a long time is really what I call an engineering or spending mentality, which was okay when we had a new system and didn't have these problems, but the thought is still, you know, thinking now, even today about highways, you know, where are we getting the money, that's usually the – how are we going to build more capacity as opposed to using tools of more inefficient pricing and investment?

Regulations obviously creep in. There's a long history in terms of where these have come from, and obviously, political forces run through all this, they're very powerful interest groups, and there's a status – bias with interest groups, they like how things are going, things are redistributed their way, they don't like to have change.

And what we really learned in terms of all these policies, and there's really nothing different about infrastructure than all the other ones, is that government, if it wants to make reform, it does it by getting out. You know, it's very rare that you just see fundamental changes in how we do things, and the government overcoming all these things and wakes up the next day and says, look, we're going to be rid of interest groups and we're really going to focus on efficient policy that has yet to happen, at least from my experience.

All right. So all these things come together to motivate alternative institutional approach to the problem. And obviously all this is paralleling what we get in inner city transportation in the U.S., and that changes throughout the world in terms of deregulation.

You know, we had problems with regulation, the politics were intractable, and the attitude was, okay, we're going to solve this, have the government get out, the same idea with privatization.

The theory here will be that you have strong incentives for cost reduction, private firms are doing this, they're going to want to minimize cost, won't be constrained by regulations, have incentives for innovation, so on and so forth, and more importantly, then start dealing with customers, learning about their preferences, the kinds of things they're looking for, offering a variety of price and service packages.

All these are on the good side; obviously, the concern is market power, are we going to really just be creating government

regulation for monopolies, is there any way then that we're going to be able to introduce competition to deal with that concern, okay. Now, what we have, as I said, is somewhat limited. We have evidence from deregulation which gives you some idea of the kind of benefits that we have and the problems that we're dealing with, and we have some work also from evidence abroad and then some preliminary work we've been doing on sort of simulating effects of privatization.

All these things are positive, but they are limited. And I think in the U.S., what we would really like to see is, you know, hard core experiments. The thing that we learned in deregulation is, what you're really dealing with, and we didn't really appreciate how important this was, is the – inefficiencies, that is, the inefficiencies that build up from government regulation and owner –

(Microphone problem.)

MR. WINSTON: The idea in privatization is going to even be more of a challenge. So here you have private sector firms in the U.S. that were providing inner city service, and so they're at least used to doing things that firms do, but subject to regulation. Now we're going to go to public operations, and we have to completely privatize those, so these are people now that are going to have to compete that's never even done this before, or if they've done it, they've done it in other countries, okay, and overcome things that are there. So this is really, you know, a lot of

excavation to get out what's been done in the past, it's going to take a while.

And then the notion also starting to contract, which it starts to give you a preview of how we start dealing with market power. A key part of what we learned in deregulation and dealing with railroads, for example, shippers organizing as a bargaining unit and negotiating rates, same kind of idea, you know, we can import in terms of privatization.

I've done some work on simulating the effects of privatization for highways, and it incorporates these kinds of ideas. We can get a monopoly provider in this case, but we also then would have, in a sense, a bilateral monopoly situation where motorists are bargaining with the monopolist for price and service packages. The key part of what works in getting to get well for gains is, the monopolist starts offering differentiated prices and service. There are people who use highways that have a very high value of time, they're willing to pay tolls to get better service, and the highway is divided in such a way that you can get price service packages along that way. People who don't want to pay that much and obviously face more congestion don't, okay. Dividing these things up can help improve welfare at the same time as enabled the highway firm to make profits.

Airports, you have a better chance of competition. We do have airport competition already, it's just not formal. Obviously in this

area, Dulles, National, BWI compete. Again, simulations, okay, letting these firms go at it could lead to these kinds of things, okay.

Obviously, predictions are going to be difficult. A lot of predictions in deregulation were – generally things were under predicted, otherwise, we could have had regulation to get all this.

All right. So in practice, you know, what I'm basically saying is that this is really a very long term of adjustment. You know, if anything we're going to move to, it's going to take many years, decades for firms to overcome the problems and then start innovating and competing to do this. Mistakes will be made. Anybody who thinks that this is going to be smooth is crazy. I mean there's going to be mistakes, big ones, and the public is going to be inconvenienced. But I think the longer term gains at stake is hundreds of billions of dollars, and even more in terms, as I said, advances that we're not even aware of that could be implemented could really have a big payoff.

But what I'm saying here is something that we need to focus then on the innovations and look for ways that we're going to move forward with experiments. So the idea here is really have carefully planned experiments in selected cities.

You know, we can think of highway privatization in a few places where this is possible and where there are problems with congestion in – highways. Again, these things can be worked out in terms of how we want to either have competition directly with duopoly or a monopoly provider,

but allow the kind of negotiations I'm talking about, and then monitor this very carefully. These things have to be really designed.

California, an electricity regulation experiment that blows up is obviously not what I have in mind. So this is something that all stakeholders really need to be involved with. And then drill out the evidence and learn, you know, is this something that we can let loose, are there conditions that we need to attach to this. You know, my instinct is to hope not, I really don't want price cap regulation, I really would like to let these things loose, but we have to have an open mind about all of this.

Ultimately, as I said, you know, this is something that could have a long payoff, it won't be happening while we're around, but I think we've got to get the idea started.

MR. MCKIBBIN: Thank you very much, Cliff. Now we'll turn to the perspective from a practitioner. Sonja Lyneham is Director of Strategy and Approvals at WorleyParsons. Sonja has over 30 years' experience in urban development including master planning, project management, development staging and economic appraisal. She's a member of the Australian Housing and Urban Research Institute as well as the Royal Australian Planning Institute.

MS. LYNEHAM: Good morning and thank you very much. This forum today as a continuation of our earlier discussions raises some very important policy and practical issues that will continue to challenge us.

Infrastructure assets are generically categorized into two groups, one of economic infrastructure and the other social infrastructure. What differentiates economy infrastructure as we generally define it from social infrastructure? In essence, economic infrastructure involves basic utilities, transport and telecommunications that are required to bring land into productive use by firms and households. The distribution of goods and services through those networks is fundamental to the profitability and competitiveness of firms, essential to households and their economic and social well-being.

An important component therefore of infrastructure, economic infrastructure in particular, is its spatial dimension and the fact that it involves land. That also is fundamental to establishing a role for government particularly in rapidly developing and emerging nations and in megacities where the role of government in terms of reservation of land for future infrastructure purposes, compulsory acquisition of land, et cetera, are fundamental to the practical provision of infrastructure whether or not it is subsequently privatized.

There are very significant consequences as we've heard associated with infrastructure investment. It is lumpy, it is large. There are interdependencies importantly between transport and property. This is a fundamental paradigm we need to address carefully and it is the one that poses challenges in particular for government in how they address

interagency coordination in terms of sequencing and allocation of resources for infrastructure in cities and in regions.

We understand as well that there are monopolistic profiles and attributes of infrastructure particularly in geographies and so when we limit infrastructure to a part of the city, it is very easy to create a geographic monopoly even though we might argue it is a competitive circumstance. There are a multiplicity of objectives that need to be satisfied in the provision of infrastructure. There are also significant differences in terms of the challenges that will be facing us in developed nations compared with emerging nations and the period in time that we are now operating over the next 10 to 20 years is where there is going to be a major shift. Globalization and its consequences are evident in terms of rising standards of living and gross domestic productivity. The developed world is flattening and our demand in terms of infrastructure will be increasingly on the asset management of that infrastructure rather than in developing countries which is to provide new infrastructure particularly since there is such a low standard of existing provision of all utilities, transport and telecommunications.

The infrastructure deficit that has been calculated, debated and however the methodology that is being used, poses a major question, namely, how are we going to fund these expectations in terms of the standard of infrastructure we expect in the future? The OECD has estimated that 2.5 percent of gross domestic product is allocated to

economic infrastructure that is excluding ports and airports. Again I find it interesting that one can differentiate transport in terms of road and rail from ports and airports whereas in fact the supply chains are we're dealing with freight movements and we're dealing with passenger movements. Nonetheless, even OECD have an interesting way of categorizing infrastructure.

In Australia we have spent about 6.8 percent of GDP on economic and social infrastructure. That of itself has raised another public policy issue of whether there is crowding out of economic infrastructure with social infrastructure because social infrastructure is easier to provide. It's more incremental, whereas economic infrastructure because of the real physical distribution networks is lumpier, more difficult and the readiness of those projects is as well planned. Tax is the largest single source of capital and that is clearly insufficient to fund the infrastructure gap that's been estimated. As such, is there really a choice other than to let the private sector in on the game?

In Australia the significance of infrastructure has been recognized by the national government and it has stepped in with the creation of Infrastructure Australia and the Building Australia Infrastructure Fund. While the Infrastructure Australia Act is very broad in terms of it providing an advisory role not limited to government but also investors and owners, its principal focus has been to try and align and harmonize the actions of all the state government agencies so it is this federal/state

coordination problem that exists within Australia and Infrastructure Australia has sought submissions from the states and requested that there be some benefit cost analyses undertaken of those projects that are put up by the state so there can be a more rational allocation in terms of merit amongst those spend projects. However, the problem has been the readiness of those submissions from the state government to the commonwealth for infrastructure spent. It is the problem of the lack of readiness that in itself creates potentially inefficiencies because just because one state isn't ready because it hasn't documented the benefits or the costs does not mean that the allocation therefore for that amongst states is most efficient.

The challenge in the future will be particularly in cities and in our cities the challenge will be in the emerging nations where the government's arrangements in terms of delivery of infrastructure are particularly problematic. So while in the developed countries we're dealing with how to better manage our assets, in emerging nations our challenge will be how do we provide infrastructure, basic essential infrastructure, in cities, in urban areas, and as well at the same time the globalization and economic growth will also create another set of challenges for regions particularly areas such as Africa and South America and also we've seen the challenges in Australia in terms of the resources in the mining sector where the challenge will be how do we provide efficient infrastructure allocation to be globally competitive in terms of supplying energy and

minerals resources. So the challenges are twofold, one in our cities and the other in our resource regions.

While we have had considerable guidance from agencies that are present here today from the World Bank, the Asian Development Bank and our governments in terms of how to plan for cities, a lot of the planning that I have observed over in fact 40 years of experience in these areas has been really more about dots and circles and maps designed by architects and urban designers rather than those understanding the fundamentals of infrastructure and the economics of infrastructure. What is absent in so many of our own cities, our own regions as well as those in emerging regions is benchmarking of the analysis in terms of both forecasting and modeling the transport land use interfaces, those networks and how to increase efficiency and productivity of firms and households and their competitiveness and access to basic jobs and other goods and services. Particularly problematic I believe has been or very limited is the work that's being done on forecasting in terms of labor markets and distribution. The work on land and supply elasticity and pricing and distribution of economic activity is very limited. While in the 1970s we saw in Chicago and in Australia in models such as the Sydney Area Transport Studies where there were major transport network models being developed. All that does not occur today. It is far more limited. Instead of doing real network analysis of transport and land use transport or economics and transport interactions and doing a macroeconomic

evaluation of those consequences, instead we run speedily into developing projects, a stream of projects which we bundle together we all a program and from that program we say we have a strategy. So it's been a very bottom-up approach rather than really understanding the network and how projects contribute to the efficiency of a network.

One of the major challenges when we're dealing with complex networks and complex interfaces particularly between land and property infrastructure markets is the jurisdictional one that poses for government, central government, how does central government align its policies with those of Treasury, with those of independent bodies on competition, third-party access pricing, with the competitive goals of single-line delivery agencies? What you find in practice is that the allocation of spend for infrastructure is very much a bottom-up approach where it is the individual line agency, whether it is a road agency, a rail agency, a port, an airport authority, the utilities authority within government puts up its budget, it's last year plus or minus, and then it's deemed to be the central government budget. So the efficiency in terms of allocation of spend across agencies and the alignment of that to achieve a more productive allocation distribution of funds for infrastructure is a task yet to be done.

Again as this little diagram oversimplisitically puts forward, that each of the agencies at the present time whether it's transport, water power, the urban development or whatever agency comes up with its own

budget and that's just fed back in to form a vision. We need both a bottoms-up plus a top-down way of aligning central government allocation of resources as well as the bottom-up approach and unless we have analysis in terms of evaluation and planning being coupled, we live in blind ignorance. Evaluation needs to occur using a series of different tools, not just one tool. It's not solely cost-benefit analysis or general equilibrium modeling. There are different types of analysis that are appropriate at various levels. At the metropolitan level in particular we do need to look at the complex interfaces between the distribution of economic activity and how we design and allocate funding for infrastructure particularly transport. We do need to look at supply chains and not separate ports from airports, from road from rail, but to look at the freight supply chain or the passenger supply chain. We do need to interrogate in far greater detail our patronage modeling. We only need to look at some of the examples in Australia as to the poor forecasting that's been done as the basis for privatization of certain toll-ways where they underachieved by 50 percent what was predicted. So there are fundamental problems in our analysis that we need to fix if we are to properly plan. This is just a small outline of those interfaces. The outputs of planning are most important because we need to develop long-term strategies rather than just limiting ourselves to short-term budget cycles. We need network solutions rather than just a stream of independent projects where you do a cost-benefit ratio on each little project that doesn't contribute as much as it might to the

network solution. We need a role for government to better understand where to reserve corridors or sites for a range of distribution networks which it might to the private sector, et cetera. We need to be ready with a pipeline of well-considered projects to act as countercyclical measures, and importantly, to unwind regulatory restrictions not only on infrastructure pricing because also land because it's the interface between land, property and infrastructure that is most important. We need to reconsider the role of government in the private sector. If the fundamentals are correct, namely, that taxation is insufficient to fund the deficit in infrastructure spent and there is no choice ultimately but to allow more constructive arrangement and relationship between government and the private sector, the question is how can we have the private sector better involved earlier in the planning phases rather than just at the delivery? So not just at delivery but also at planning because the asymmetry of knowledge and information is at the planning stage and not only at the delivery stage where there is a lot of private-sector knowledge in terms of what will work, what will pay, what are the benefits that is not available to government when they're undertaking their planning and allocation is resources.

The delivery as I said from the outset will need to be a different delivery model depending on the particular circumstances whether we're looking at asset management in developed nations and more so at new infrastructure in emerging nations. Asset management

has been well developed as a way of going forward and achieving efficiencies in the hydrocarbon sector and they are equally relevant to government projects today. How can we get more out of our assets and deliver them more efficiently? PPPs and the value for money they offer, again, there are questions and it's only as good as the analysis that underpins it and the delivery models that are used. Again, there are both inefficient governments as well as inefficient firms.

As a result of PPPs, various investigations have been done looking for initiatives to enhance private-sector participation, reducing the cost and complexity of bids, developing longer project pipelines with clear outcomes, increasing certainty in relation to project execution and timetables. Why not call for more openness in government project pipelines? If the private sector can equal or better what government puts up in project pipelines, why can't then the private sector provide it, keep that IP and compete with government in terms of what it proposes at the early planning stages? Why not put on public record government asset registers and accounts so that the private sector can put forward innovation and ideas for more efficient delivery? To build capacity in markets and contestability we need to do this throughout the planning process, planning, evaluation and delivery, contestability in terms of how government proposes to allocate resources for infrastructure projects, contestability about land use controls and pricing, contestability about how they manage their assets, partnering to build capacity, again, fast-tracking

institutional strengthening. We know that over a period of time as government has downsized that capacity in knowledge base has also become challenged and therefore there are new models including project management and other models available whereby the private sector continues with government throughout the delivery process. We need to tap into diversified sources of capital and revenue because as we've said it's obvious that taxation will not provide a sufficient source to meet the community and government expectations, and private capital will not go into infrastructure unless we unwind the distortions in terms of pricing and rigidities in land supply that presently exist.

Therefore we need greater flexibility and new entrants into the market, new entrants not only at the delivery stage but also at the earlier stage. Why not put forward to the market different contract forms for particular projects? So rather than selecting a particular contract form, it is also open to government to consider for a project to nominate, design/construct, lump-sum price if they're concerned about a blowout in the cost of construction or that there's a construction risk? Why not put out in addition to PFIs different types of arrangements such as strategic infrastructure partnerships where there is an open accounting model used? Why not use embedded project management consulting teams within government working to procure procurement preparation as well as the actual procurement construction, operation and delivery as well as alliancing? There are many opportunities and engagement in a

constructive way in terms of risk sharing and opening it to the private sector is fundamental. Thank you.

MR. MCKIBBIN: Thank you very much, Sonja, and I'd like to ask everyone to join me in thanking the first three presenters. Now that we've got everybody excited and ready to ask questions we'll have a break for coffee. Coffee and sustenance is available at the end of the room and we'll return in approximately 15 minutes. Thank you.

(Recess)

MR. MCKIBBIN: Several people have asked whether or not their presentations are available on the website. In fact, the 2-day conference from Sydney, the background papers and presentations are already available. If you go through the Brookings website to the Infrastructure Workshop page, there is a link to the original material. The material that's being presented today will also be available on that website probably later on this afternoon so that there will be a full set of presentations from both conferences available.

The next presentation is by Dr. Luis Serven who is the Research Manager in Macroeconomics and Growth in the Development Research Group at the World Bank. Luis has published very widely in the areas of savings, investment and the determinants of economic growth and it's a great pleasure to have Luis today.

MR. SERVEN: Thank you very much, and thanks for the kind invitation to be here with you today.

I would like to talk about the fundamental question is which is the contribution of infrastructure development to economic performance and I'll do it from a development perspective given the institution I work with. As Timo already said at the beginning, there are two reasons from a development perspective while we're interested in infrastructure. One has to do with growth or aggregate economic performance through the productivity increasing effect of infrastructure and its contribution to reducing the cost of production, the other has to do with the poverty and inequality angle because all other things being equal, there is good evidence as infrastructure expands the effect on the incomes of the poor is disproportionately larger than on average incomes for a number of reasons. There is another reason nowadays why we are interested in infrastructure, of course, which is in connection with the fiscal packages in response to the crisis and that's of much more short-term interest although predicated on the basis that infrastructure precisely in the long run will increase growth and therefore to some extent that kind of fiscal expansion is self-financing, and I'll get back to that if I have time later on.

The question of how important infrastructure is for growth which is the one I'm going to address here is an old one that goes all the way back to Adam Smith in "Wealth of Nations." For those familiar with this literature, this question was revived in the 1990s after a famous paper by Ashower who found very large rates of return on infrastructure and on public capital in the U.S. and that was followed by a mass of increasing

literature taking into particular a macro perspective in using a variety of approaches and techniques to try and pin down the growth or productivity impact of infrastructure development. It's also a growing thread of micro studies based on firm level data that focused as well on growth, efficiency, investment and so forth at the level of the firm across many countries. Some of that work has been done at the World Bank but also by others and usually with interesting results in terms of finding effects of infrastructure development.

On the macro front there are two common approaches. One is in this period of traditional growth regression to build an empirical growth regression and put some infrastructure indicator there. The other is to think in terms of an aggregate production function where aggregate output or GDP is generated with capital, human capital and infrastructure and then can identify the respective contributions of the different factors.

There are a lot of contrasting results, if you will, in this literature. There is perhaps a growing majority of studies that tend to find positive effects of infrastructure development and growth particularly those that have to do with developing countries particularly in more recent studies. There are a number of problems with this literature unsurprisingly and they in some cases have to do with measurement issues, in other cases have to do with biases that are built in to the approaches that we use to test for the contribution of infrastructure. I've listed five here. One for example is the fact that infrastructure as a multidimensional concept

has to do with telecommunications, it has to do with transport, it has to do with power. In general in this empirical work one takes some shortcuts and the classic shortcut is to look at telephones as an indicator of everything and that may be misleading in countries where telephony has developed more or less rapidly than other areas of infrastructure. Often measures of infrastructure capital or infrastructure spending are used in this kind of work. We know that the relation between monetary measures of infrastructure constructed from spending flows whether accumulated or not can be very misleading because as I will insist later, there is a very weak link between spending and assets or services that have to do with among other things the efficiency of government procurement, corruption and related things.

There are some technical reasons why also one tends to find large effects of infrastructure that have to do with the so-called spurious regression problem. Over time countries grow, their infrastructure growing too and things are growing together so one tends to attribute causality when in reality there might be none or much less than one likes to think. A related problem is that of reverse causality. Richer countries, other things equal, tend to demand better and more abundant infrastructure services and thus if one is now careful, that positive association between income and infrastructure services is going to be seen as a causal effect from infrastructure to income when in fact it is the other way around, and that also tends to lead to an exaggerated assessment of the contribution on

infrastructure. Lastly, when comparing results across countries and the role of infrastructure, one has to keep in mind that there are many reasons why that such a contribution of infrastructure could be different in different countries because of institutional reasons or because of different kinds of frictions in the economic environment and so forth.

So those are problems and I'm going to refer now very quickly to a recent paper that we have completed that tries to address many of these issues. We tried to take this multidimensional approach to infrastructure using a synthetic index of telecommunications, transport and power infrastructure. We focus on physical measures rather than monetary measures of infrastructure for the reasons of measurement I just described. We tried to employ techniques that will free us from the spurious regression problem, we tried to verify that all the causality runs in the right direction from infrastructure to growth or output rather than the other way around, and finally we allow for a lot of differences across countries for a lot of heterogeneity in the response of aggregate performance to infrastructure.

I don't plan to get technical here. Let me just very briefly comment that in doing this work we take the approach of the aggregate production function I described where aggregate GDP is related to physical capital, human capital and importantly that Z there which is the infrastructure capital measure as I said in terms of that synthetic infrastructure index. This we do for a very large sample of countries in

years from rich to poor, from the 1960s to the 2000s and that means that heterogeneity is a big issue that we need to be aware of.

In particular we use the conventional setting and what we are interested in here when we write this linear equation is the parameter gamma that is the primary indicator of the contribution of infrastructure to in our case aggregate labor productivity which is the little Y in that equation. We tried to be careful and do this in steps. First we see what the properties of the variables are. Then we see that for each one of the very many countries we work with that properties are roughly the same so there is essentially one relation only which is the one that we're interested in that is the production function. Then we try to estimate the parameters of that relation and try to check if those parameters show any significant variation across countries. Happily for us it turns out that one relation among the different variables is all we have in all countries and then we can use relatively simply techniques to estimate the parameters of that relation and appraise the contribution of infrastructure and other things.

That importantly we can do in a context in which we allow things to be very different across countries. We can allow the constants and the variances, the dynamics of the production function to defer freely across countries. That is not a problem and that is something that is probably realistic because as I said, frictions, adjustment costs, institutional features and so forth may be very different across countries that will be the magnitude of exogenous shocks. And we do a lot of

experimentation with different specifications to try to make sure that what we're getting is robust.

The one thing we do restrict in this approach is that the long-run parameters of that production function I showed to you and particularly the gamma in question will be the same for all countries. We imposed those restrictions but we importantly can test them and we can test each one of those restrictions or all of them at once to make sure or to asses to what extent there are significant differences across countries.

After that long introduction, this is what we get. The line that will be of interest here is the one in red that shows the elasticity of aggregate output to infrastructure as defined by the synthetic index I briefly mentioned. Here there are a bunch of different experiments in terms of empirical specification. The numbers are not very different. They are about .10 or slightly below .10, so that's our best estimate of the elasticity of infrastructure in this context. Except for the last one, we see in the last column that there is negative number in that it's something that reminds us that we need to be careful in how we specify the properties of the disturbances here. We're working with macroeconomic data for many countries and there are good reasons to think that there is good movement in the aggregate data across countries in terms of prices, the world's business cycle and so forth. If we ignore that then we get a very strange estimate and that is in fact reassuring. So those are the basic results from this work. Those estimates are very robust across

specifications. As I said, they only crease to be reasonable when we ignore this cross-country correlation. They change very little when we define our measure of infrastructure or our measure of physical capital or our measure of human capital in a different way. The changes in those numbers are marginal and there are lots of experiments that we do that can confirm that.

The numbers for the conventional variables for physical capital and for human capital are well in line with what's in the literature, about elasticity of one-third for physical capital, about 10 percent for human capital. The estimates for infrastructure ranging from .07 to .10 are perhaps at the low end of what's now the consensus number but not unreasonably so. And more importantly, there is very little evidence that these elasticities are different across countries. Mind you that equal elasticities with respect to infrastructure means that the marginal product of infrastructure is going to be systematically higher where infrastructure endowment is lower and vice versa. The finding that there is now a lot of variation in these parameters across countries is consistent with other work on (inaudible) across countries that finds essentially the same conclusion, yet there is a lot of dispersion in the country-specific estimates. So when we are looking for heterogeneity across countries maybe there is so much noise in the data from our combining so many different countries that we're losing power in our statistical tests. One way to address that is to look for particular forms of heterogeneity. For

example, we can think that other things being equal, there are (inaudible) in the elasticity of infrastructure so maybe it's higher at low levels of infrastructure development and lower when infrastructure is well developed. Or we can think that it's really something that has to do with the level of income of countries. In poor countries maybe the elasticity of infrastructure is bigger than in rich countries and so forth. And we can think of many such options and we in this paper go over a number of them and in essence find very little evidence for any of them.

Here for example you have a plot of what be the country-specific estimates of the elasticity of infrastructure, of output with respect to infrastructure, mapped against what would be GDP per capita in the horizontal axis. There is a lot of dispersion but essentially the numbers of the countries align along a horizontal line and there is no slope one way or the other, or to put it differently, there is no obvious indication that richer countries on the right half of the graph have any different numbers than poor countries in the left half of the graph and this can be formally tested and that is the conclusion.

Equipped with these numbers what can we say? Is This is an interesting number. Is this a meaningful effect? We can perform some back-of-the envelope calculations and think what the increase in output per worker would be in different countries if their infrastructure development were to catch up with the median of rich countries of the OECD. Here you have on the right the numbers that come up for different

reasons of the world. For East Asia there is a gain of 11 percent of an increase in output per worker. It's a number but it's not very big. At the bottom of the column we have Sub-Saharan Africa where the increase would be 36 percent and that's a respectable number and that makes us think that there is a lot of room for prosperity through infrastructure development in Sub-Saharan Africa and in other poor areas. But before we jump to the conclusion that we need to go and start spending left and right on infrastructure, we need to keep in mind that all that we've seen so far here has to do with the benefit side of infrastructure, the contribution to output, to growth and so forth and we need the other side. We need the cost of infrastructure. We need a cost-benefit comparison to be able to establish where and how much infrastructure is underprovided and how big is the gap and what would be the optimal amount of provision that needs to be added to what's there. Moreover, we need to know even if infrastructure is underprovided, is that the most critical thing for each country. In other words, we can think of many countries in which there really, really is the serious constraint that underprovision is more extreme in the case of human capital because of health of education deficiencies and even if infrastructure is underprovided that doesn't mean that it is the top thing to tackle.

Unfortunately on this we have much less evidence. There are fewer studies and this is a more difficult question you could say too. For example, a paper by Kenner and Petrony recently concludes that

there is really no evidence of a generalized shortage of infrastructure across countries or even across sectors, and not even in poor countries it is necessarily the case that infrastructure is systematically underprovided so that makes you think that more information is needed before rushing to policy decisions. In a related paper we find that infrastructure catch-up in Sub-Saharan Africa has a big payoff in terms of income but also has a huge cost associated and let me just briefly show you here how big it is. In percent of GDP here for different Sub-Saharan African countries I show how much investment they would need just to half the gap with countries of comparable levels of per capita income. This is just investment mind you. In addition there would be need for expenditures and operations and maintenance that would be substantial, and this is just to half the gap, it's not to close it. So we can see for example that in East Africa that would require about 16 percent of today's GDP just to reduce in half the gap with countries of comparable income. In other countries the amounts are smaller. So there's a big opportunity cost and if you need to devote 16 percent of GDP to that, what other things are you not going to do and this is what needs to be evaluated by the policymaker. In related work recently (inaudible) finds that infrastructure has a big potential for growth in Egypt but it only works out if the expansion in public infrastructure is funded to a large extent by spending cuts elsewhere. Otherwise the government grows too big and crowds out everything else and you don't get the benefit.

Lastly I would also like to stress that it's not only the quantity of spending but also the quality of spending that makes a big difference. As I said earlier, the association between spending and assets and services is not very strong and that has to do with the technical capacity of the government to choose the right projects, the government or whoever chooses infrastructure projects, to choose the right ones that have maximum efficiency, the capacity of physical institutions and the governance, in particular fiscal governance but also more broadly corruption at large.

Just to conclude, there is I think an increasingly clear agreement of robust evidence of further contribution of infrastructure to GDP productivity. Our best estimate here is that a 10-percent rise in infrastructure assets has a direct effect on GDP per worker of about 1 percent. Mind you, that's only the direct effect. There may be second-run effects through the profitability of other private inputs whose accumulation would then be encouraged by higher infrastructure. We don't get into that here. This effect is significant, robust and seems to survive a lot of experimentation around statistical specification and so forth. There is not a lot of evidence that it varies across countries so that means that the returns on infrastructure with all other things equal are going to be higher where the endowment is lower. The effects are also economically significant and not only statistically. We can see that there is the potential for large, big gains in terms of income particularly for poorer countries

from the numbers I showed to you. But still care needs to be exercised before calling for big infrastructure spending rises. First of all, the extent of underprovision is not clear and the question whether infrastructure is the top priority needs to be established, and you need reforms also to enhance the link between spending and assets. Thank you.

MR. MCKIBBIN: Thank you very much, Luis. The final presenter before the panel is Douglas Brooks. Douglas is Principal Economist of Macroeconomics and Finance in the Economics and Research Department at the Asian Development Bank.

MR. BROOKS: Thank you for inviting me today. My colleagues have covered a lot of material. I'd like to try to emphasize a few of the key points that I felt were key points from their presentations, and fill in a little gaps here and there in-between them from the viewpoint of the dynamics. My work in a development institution like Lewis, so I'd like to look at how infrastructure and development interact over time.

So, I'll talk first about a few key characteristics of infrastructure. Then a bit about growth -- or stages of growth in infrastructure in terms of stylized facts. And the emphasis here is heavy on the stylized, light on the facts. Then a little bit about some of the major issues and challenges, and the way that we may see going forward.

Okay. Some public good characteristics of infrastructure. These depend a lot on technologies, as was mentioned earlier. Up until last century, infrastructure was primarily something that the private sector took

care of. As technologies changed, the public sector became more involved. It has to do with externalities, the spillover effects that go along with infrastructure, non-excludability -- many of the infrastructure services, if some people can have benefits it's difficult to exclude others. And so you have the free rider problem, that it's hard to get everyone to pay for it makes cost recovery difficult. And the poverty impacts. For developing countries in particular this is very important, but it also adds to difficulties with cost recovery.

Long-term horizon means that there's a need for a long-term financing. Many of these projects will take decades to come online, many more decades before the service provision recovers the full costs. And during that time there can be quite a bit of changes in the political environment. The political risk, the risk sharing when you have both public and private sectors involved needs a long-term horizon as well. And a lot of the risk sharing is a key element of what makes the public-private partnership modus work and not work, in many different situations: the bulkiness of investments; the lump sums; the sunken cost aspects; that these are large investments, but they're also by powerful agents, powerful in the economy, powerful in the political context in which they're operating. And the political economy aspects can become extremely important if the possibility of market dominance, natural monopoly characteristics, and also regulatory capture where the large players can have more influence on the regulatory environment than we might like them to.

Those two points -- the long horizon, the bulkiness of investment -- have been covered quite a bit by the previous presenters so I will not spend a lot of time on those. The infrastructure industry nexus -- infrastructure has a lot more -- certain types of infrastructure have a lot more influence on certain types of industry, certain sectors of industry than others. So the way the infrastructure is developed influences the industrial development of an economy. It will influence the dynamics of comparative advantage, which sectors does an economy specialize in in terms of trade. They will -- the infrastructure services will serve as substitutes or complements, or both, for different factors of production and feed into the production functions in that way. And there's also a lot of special effects related to infrastructure. These are generally things with very localized impacts. So, we'll talk some more about these aspects, especially the first and the last of those, the public goods character.

The externalities and particularly where infrastructure is developed in largely poor countries, implementation of user fees can be quite difficult. And these are arguments why the public sector may need to be substantially involved in most sectors of infrastructure.

Poor countries generally face weak revenue-raising capacity. Sonja made the point that it's generally tax revenues that pay for infrastructure. But in the poorer countries you don't have much tax revenues, so you need to find alternative financing sources.

Limited access to financial -- international financial markets

can lead to a domestic dilemma for developing countries. Now, where do they find the financing from? They can't find it domestically, they can't access it internationally. That's a major problem.

Also, the public goods character through the network or coverage effects. Networks effects -- if you think of the Internet, when there were only, say, 200 websites your incentive to get access to the web was not too great. When there are 200 million websites you have a lot more incentive to get access. And the costs of doing so with 200 million other people helping to pay for the basic infrastructure comes down quite a bit.

And skipping the middle two points and characteristics slide, moving to the infrastructure industry nexus, dynamics of comparative advantage. I mentioned trade and infrastructure has a lot to do with the ability to trade, particularly trade in goods, but also trade in services. The dynamics also influence foreign direct investment and its interaction with infrastructure. Can foreign investors invest in a country's infrastructure? Do they have incentives to? If they're investing for export services, can they benefit from infrastructure investments? These type of issues. And specialization, again, that may change over time, calling for different types of infrastructure investment, different infrastructure sectors. We'll come back to these points in a bit more detail.

Nowadays, there's a lot of talk about going green in infrastructure, particularly in the power and transport sectors. Asian Development Bank, where I work, has a big program on green transport.

And this largely fits into the urban infrastructure sector. How can we reduce the negative externalities of transportation in urban sectors and the infrastructure that supports that?

Infrastructure for service sectors, networks, agglomeration and dispersion effects -- again, the special aspects can be quite important. Infrastructure investments are usually special in nature. You have rival location choices: if you build the infrastructure in one, you're probably not building it in another location, at least not at the same time. And they serve limited areas. This becomes important for infrastructure connections as well.

You know, I have -- a well-developed port doesn't do much good if it's not connected to the hinterland. That also means that the sea port infrastructure probably needs to be connected to the road infrastructure or the railway infrastructure. And you need to have these intermodal connections -- the development of dry ports inland, particularly for landlocked countries. All of these different sectors have different requirements for infrastructure, for different types of infrastructure as well.

So, before I move to my stylized facts I'd like to emphasize one point that Sonja mentioned very briefly in her presentation, but I think it deserves more attention. And she very briefly mentioned three dimensions of infrastructure: the assets, the services, and the markets for infrastructure. The infrastructure assets gets a lot of discussion, particularly from the investment side. How do we make these big investments? What are the lumpiness characteristics? Who will pay for it? Those type of issues. But

why do we have infrastructure? Really, for the services that it generates.

Luis was talking about infrastructure's contribution to growth. Well, a giant dam or a new highway doesn't do any good if no one's using it. It's the services that come from the assets that contribute to the growth.

And one thing we find is that something that also hasn't received much discussion today, but is very important in infrastructure is maintenance. If you don't keep maintenance, if you don't maintain the assets, the service provision will decline over time and the contributions of the infrastructure also decline over time. So, from the dynamic aspect the maintenance is very important.

I know in the U.S. occasionally a bridge collapses, infrastructure maintenance gets a lot of attention for a brief period of time, but the attention span is short, particularly in the media and then the focus moves on fairly quickly.

Looking at infrastructure in different stages of growth. Again, these are stylized facts or stylized characteristics, would be a better way to put it, I guess. In low-income countries they need basically everything. But relative emphasis for infrastructure tends to be on transportation, water provision, and power. Transportation to connect to markets. Water provision, much of that is not the urban, the consumer use, but agriculture needs it for irrigation to get the rural areas going so that you can get the rural surplus to feed into the urban areas and get the industrialization process going. Industrialization also needs power, so you have a big emphasis on

developing the power sector at the beginning.

Major constraints in the low-income countries? Finance. I mentioned where do they get the money from? They can't get it from taxes, they can't get it from the international markets. Aid agencies are very small. The place I work, the Asian Development Bank, we lend roughly $15 billion a year nowadays. China, one of our member countries alone, invests over $50 billion in fixed capital each year. Our investment is a drop in the bucket in the Asian region as a whole. India invests quite a bit as well, Indonesia, many of the other countries. So, there's limits to what the multilateral, what the aid agencies can do. It really depends a lot on the domestic financing and access to the international markets.

In low-income countries there tends to be a shortage of administrative capacity and governance. If you don't have the institutions developed to keep the infrastructure, to get the financing going to keep the -- to balance the power between the investors and the users, between the government and the private sector, you run into quite a few difficulties. And the earlier presentation mentioned the infrastructure traps. What happens if you don't get up to the threshold level to make the infrastructure? Or if some of the investors have too much power and can control the infrastructure investments in ways that are not to the general benefit of the country.

A few observations on the low-income countries. Issues of equity -- the classic picture is the power lines going over the heads of the rural peasants to the urban areas. Electricity being generated by dams built

in the rural areas, but they're serving the urban areas and not reaching the poorer farmers. Inclusion -- who gets the benefits of the infrastructure development? Who gets the benefits of the contributions to growth? Population growth -- most of the low-income countries have higher rates of population growth, which means the demand for infrastructure services is growing faster than in more developed countries and probably much faster than the supply of infrastructure services.

Little competition leads to issues of monopoly. Development of competition policy. And a little information or asymmetric information between the providers of infrastructure, the investors, and the users -- or, in many cases, the government as well.

In middle-income countries the emphasis still heavily on transportation, but there tends to be more emphasis on transport for trade: gaining access to the international markets, development of port facilities, connecting natural resource deposits to the ports, connecting urban areas to ports, and so on.

Power is still -- in the middle-income countries you start to see more emphasis on communications. The connections between the rural areas and the markets is not just for transportation, but also for information. And I think by now we've all heard about people in the rural areas using cell phones to find out the prices for their agricultural goods or for the fish among the fishermen in various markets, and directing their production to where they can get the best returns. So, communications becomes increasingly

important both for connecting domestically and connecting to work markets and world information.

Constraints -- finance is still a big constraint. Regulatory capacity is still a big constraint.

Some observations for the middle-income countries. The foreigners tend to have not too much interest in the low-income countries, but they start to get interested in investing in the middle-income countries. Often this takes the form of foreign investment through public-private partnerships.

Also, you see the growing importance of soft infrastructure in the middle-income countries: the institutions to support not just the investment, but the maintenance, the distribution of the infrastructure services, the competition policy to promote competition -- not just in provision of infrastructure services, but competition in the markets for final products, which boosts competition in the infrastructure services and efficiency in their provision. Also in the middle-income countries you start to see an acceleration in urbanization. So, there's increasing demand for urban infrastructure.

Hopefully, the chart will come up with the next click. There we go.

The World Bank has created a logistic performance index which has various subcomponents, one of which is infrastructure performance index. Looking at a variety of developing Asian countries here

with a few countries at the bottom for comparison purposes. The bottom five countries -- two Asian, three non-Asia -- are OECD member countries. You can see in general the developing countries have a much lower level of infrastructure performance within them. East Asian countries are generally above the average for Asia. South Asia is generally below the Asian average. Both of those are generally below the OECD countries. But you notice Singapore stands out. Of all of the countries surveyed, developed and developing, Singapore had the highest score for infrastructure performance. Hong Kong also did quite well.

Of course, if you're only building infrastructure for a city, then you don't need to worry too much about connecting to the rural hinterlands, it's a little easier. But still, they do have quite a bit of innovations going on in their infrastructure sector, and quite a bit of lessons for both developed and developing countries.

So moving on to higher income countries. As I mentioned, I work more on the developing countries so I welcome suggestions for -- or corrections for improving the presentation. The emphasis -- there's a lot going on in the telecommunications sector. But you see that this is -- thanks to technological developments. In the communications sector nowadays, it's largely driven by the private sector. You don't need so much government intervention, except beyond regulation. And quite often the public sector can profit from the development of the private sector.

If you look when the 3G telecoms were being rolled out,

particularly in Europe, they auctioned off the bandwidths and there was a huge amount of money raised by the governments shortly before they realized that the private sector probably should not have been bidding so much for what they got. The power sector also a big area for the private sector. The public sector doesn't need to be involved so much there.

Urban infrastructure. You have -- much more of the population lives in urban areas. Much more of the urban activity takes place in urban areas. So, urban infrastructure is much more important. And the soft infrastructure. Again, as you get higher levels of development of the physical infrastructure the institutions to support that, to regulate that, to finance it, to maintain it become relatively more important.

Constraints. You see a lot more concern about environmental impacts of infrastructure development in the developed countries. I lived for a while in Seattle. Seattle is well-known for having a large number of highway on ramps, off ramps that lead to nowhere because they started to build them, and then the environmental movement shut them down, and the infrastructure was partly developed and never completed.

Technology. It depends a lot more on, how do you upgrade your infrastructure? You quite often need advances in technology. You know, the shifts from fixed-line telecommunications to mobile telecommunications was a huge shift in technology with lots of implications for developing countries that may not need to build as much of the fixed line infrastructure. But how do you upgrade to the next generation of

technology, say, in telecoms? Again, it depends largely on the private sector. You had -- the government might have been the starting point for development of the infrastructure -- for the Internet infrastructure, but nowadays the Internet is almost entirely run by the private sector.

Regulation under uncertainty becomes more important for higher income countries. Where you get this technological change, you get shocks to the system which were unanticipated. You have the basic knowledge and the capacity for regulation, but how do you deal with uncertainty? You know, right now we see this a lot in the financial sector, but it's true for physical infrastructure as well.

So, observations for high-income countries. Maintenance becomes more of an issue. The more of the physical infrastructure you have, the more important maintaining it becomes and the financing it. Connectivity between the different types of infrastructure, connecting your roads to the ports, connecting your communications to the transportation, those types of issues. Standardization across borders becomes more important and the environmental impacts that I mentioned.

Okay, so major issues and challenges. Still, how do you crowd in the private sector? Through public-private partnerships, cost recovery, a big issue is property rights. How can you get the land to develop infrastructure? If it's primarily special in nature, you need to have land access to do it, perhaps guarantees to control for political risks.

How do you manage the networks and technical change?

There's a growing role for international cooperation as we get more and more regional and global infrastructure, regional integration. The conference in Sydney raised the issue of growth spillovers. The faster one country grows thanks to infrastructure, the more the benefits spill over to its neighboring countries, or at least its trading partners. And financing, of course, remains a huge issue, long-term financing, local currency bond markets, and new development of financial instruments, hopefully with better regulatory oversight than some of the recent ones.

A call for partnership. This is something the Asian Development Bank is working on to connect governments, donor agencies, research institutes, private sector, civil society, and coordinating institutions. And, of course, the private sector is just one of these, but it should probably have a much huger share of this diagram than it currently has. I'd be happy to talk about that more later, but we're about out of time.

So, I will stop there. Thank you. (Applause)

MR. McKIBBIN: Okay. Thank you very much to Douglas and to Luis. Could I ask the panel to please come and take a seat at the front.

What we'll do now is I'll field any comments from the participants on the panel about each other's presentations, and then we'll turn it over to the floor for general questions.

Could you please when asking a question, will you please raise your hand, wait for a microphone to be handed to you? If you'd state your name and affiliation, and then address your question either to an

individual on the panel or to the panel as a whole. And we'll take questions and answers one at a time.

So, what I'll first do is just going from left to right, if any of the panel wish to make a statement regarding any of the other presentations or anything they'd like to qualify from their own presentations. Timo first?

MR. HENCKEL: Just a clarification. Maybe on the two -- Luis on the estimate of infrastructure assets and its effect on productivity or output per unit of labor.

What is the temporal aspect of that? You tend to think of infrastructure investments as long run. So, the first year, you know, you get your .1 less assessment. But then the thing is still presumably producing effects. You expect the second year, third year ad infinitum. And you'd have depreciation and discounting it. So, just looking at sort of an elasticity estimate -- and it seems like a static sense. Does not seem to sort of characterize what infrastructure investment is about.

And then Douglas' presentation that the infrastructure performance index, if you're going to present that you should say exactly how that was calculated, what it means, how anybody could possibly believe such a thing. I have no idea what 4.71 or what it was for the U.S. or Singapore is. And I think probably what you'd really want to know is how the thing is changing over time.

MR. McKIBBIN: Luis, do you want to say?

MR. SERVÉN: Sure, thank you.

Yes, those calculations have to do with a long run effect of an increase in the physical assets on labor productivity or whatever other variable of interest. So they don't -- they won't tell you anything about the effect of investment precisely for the reasons that you mention. Investment will, first of all, take time to build up the asset. And secondly, the asset will depreciate. So in order to maintain the asset -- to keep the original increase in the asset availability you will need extra spending down the road.

But having said that, however, those are the long run effects. The short run dynamics, as I mentioned, in that particular approach that we use in that paper allow short run effects to be all over the place for different countries. And we, in fact, didn't look very closely at them.

The related question is -- concerns the effects of investment. And on the variables, that has to do with the other issues that I raised in my presentation briefly about the link between spending assets and services that I -- Douglas also mentioned. In fact, we are doing some research now trying to identify the effects of institutional weakness, in particular as measured by corruption or the technical capacity of the government bureaucracy and so forth on the unit cost on infrastructure assets.

Other things equal and other things involve a number of things such as the geographic statistics of the country and so forth when thinking of the cost of transport networks, for example. Other things equal, what one finds is that there were the institutional framework is weaker, corruption is more rampant, or the government is more incompetent -- other things equal,

than the unit cost of given increase in infrastructure assets is bigger.

MR. McKIBBIN: Douglas, did you want to?

MR. BROOKS: Yeah. Thanks for reminding me I didn't say much about the infrastructure performance index.

As it's name says, it's an index. It runs from 1 to 5. Five would be fantastic infrastructure, the best among the countries we've looked at. As I mentioned, was Singapore with a little over 4 or the OECD countries also around 4 out of 5, and down for the countries I've covered. Afghanistan at 1.1, so there's quite a bit of range. But it's looking at a variety of characteristics of the infrastructure, assets and services provided by these countries.

As far as how it changes over time, the series has only been going for three or four years, so it's -- because infrastructure is long-term assets the quality of its performance tends to not change too much in a short period of time. And there's not a lot of change from one year to the next. But we hope that as that series becomes available with a longer time horizon we can see more of the dynamics coming through that.

Did you want to add anything on?

MR. McKIBBIN: Sonja, did you want to make any comments generally?

MS. LYNEHAM: I'd be interested in hearing from the other panelists that having had regard to the ex-post merits of infrastructure investment, what are then the lessons learned ex ante, for future policy and

where would they as a result of their work direct attention?

MR. McKIBBIN: That's a small question. (Laughter) Would anyone like to comment on that?

SPEAKER: No. (Laughter)

MR. McKIBBIN: Douglas?

MR. BROOKS: I'll take advantage of being first to stake out one tiny bit of the answer for myself. I think one area that needs a lot more attention is maintenance of infrastructure. And it has a lot to do with the soft infrastructure role, the institutions -- how do you design the program of delivery of services and recovery of cost to build in some support for maintenance over a longer term horizon? I think that's something that we still don't know too much about, but it's an area for a lot more research.

MR. McKIBBIN: Luis?

MR. SERVÉN: Yeah. And I fully agree with that. And I think one particular item that is very pressing has to do with the building capacity for project selection and evaluation, particularly in poor countries. Because benefit analysis and related tools -- whatever their imperfections -- are essentially gone in most countries. There is very little of that being done. The vast majority of countries don't have any project evaluation abilities, and I think there -- the vast majority of international organizations have very limited project evaluation abilities, if any anymore. That, I think, is completely essential if useful investment is to be carried out.

There is one other thing that I would like to add. That perhaps

some -- from a different perspective. Recently we evaluated 20 years of private participation in Latin America. We evaluated means we took stock in a recent paper. Prior participation in infrastructure in Latin America, and things are perhaps turned around a little bit in the sense that 20 years ago with awareness of the limitations, incentive problems, and governance difficulties of public provision of infrastructure made many people think that private participation was to solve all these problems.

20 years later, the experience with PPPs, their renegotiation of virtually 80 percent of PPPs with dramatic results in terms of fiscal costs and risks that ended up being borne by the taxpayer make many people think that private participation brings its own problems, which are not necessarily simpler than those of private provision.

MR. McKIBBIN: Timo, did -- Cliff crowded you out. Did you like to -- did you have a comment?

MR. HENCKEL: I gave him a push in the side, that was all right.

No, I would like to say one thing. I agree with what Doug and Luis said just now.

In reference to Cliff's suggestion that we run experiments, I'll be perhaps a little more specific even and say that we should try to run controlled experiments. And we can learn a little bit from recent revolution that's taken place in the area of development economics in the last 10 to 15 years where there was considerable dissatisfaction with coming to grips with

the big questions of whether aid, for example, works.

It seems like such a monumental question that is hard to answer, so a number of academics and also members of policy institutions have decided to break it down into more manageable bits, and they would then ask questions. For example, is it useful if we want to lower the incidence of malaria infections to distribute mosquito nets in East African villages? And the approach that was taken was one of controlled experiments where you had 100 villages that you could look at that were similar in many dimensions. And you introduced mosquito nets in 50 and you didn't introduce mosquito nets in the remaining 50. And it provided us with a really useful database to properly evaluate what the effect of these mosquito nets are.

I think we can do something similar for infrastructure projects. It's a little more difficult because the horizon is much longer and, you know, the expenditure is typically greater than a mosquito net. But that idea of building up a database and, therefore, also a knowledge base from which we can draw on in the long run to decide which kind of approach for planning, developing, and also delivering infrastructure is something that we should really consider.

Thank you.

MR. McKIBBIN: Did anyone wish to respond to that?

I'd just make one comment, if I can. There is a danger, though, of that sort of experimentation if you don't understand the difference

between partial equilibrium and general equilibrium. If you look at the outcomes and you say, yes, the incidence of malarial disease propagation fell, that's a good idea. But it could well be that by giving away the nets rather than encouraging local producers to produce the nets and therefore transfer payments to the people to buy nets from the local producers, you could actually destroy the capacity for existing producers to survive. And that's one of the dangers of that sort of experimentation is, you have to take into effect -- into account the general equilibrium or the system-wide effects rather than just the localized question, which is directed at getting an answer that you wish. So it's got to be done very carefully.

MR. HENCKEL: These experiments, specifically in the mosquito nets, actually allowed for a while range of different provision mechanisms, including selling mosquito nets and allowing for local production of the mosquito nets as well.

MR. McKIBBIN: Okay.

MR. HENCKEL: But --

MR. McKIBBIN: Okay. Now, if there are no further questions from the panel, I'd like to turn it over to the audience. And I'd like you to raise your hand, which we have a hand at the back which I can barely see. I need my binoculars.

And if you could just state your name and affiliation and to whom the question is addressed.

MR. TRINKL: Thank you very much. I'm Garth Trinkl with the

U.S. Department of Commerce. I found it a very stimulating morning, so I thank you all. And with no prejudice to the last two, the question to the first three follows up on the Esther Duflo controlled experimentation idea, and the rebuttal that perhaps there's a big difference between Bill Gates doing anti-malarial controlled experimental funding in sub-Saharan Africa and infrastructure around the world.

But this morning, I think that Dr. Winston mentioned that the experiments with privatization are taking place outside of the U.S. And I was wondering if you could -- if some of you could put the -- in perspective where you think that the -- we know that there's been privatization efforts going on. But where would you look for future privatization experiments? And what's the institutional setting that you see developing? Do you see it developing within the OECD countries and with a collaborative approach? Or do you see this within the G-20 countries, or do you see this within the resource rich countries of Saudi Arabia and perhaps Russia?

Thank you.

MR. McKIBBIN: Who would like to -- Cliff?

MR. WINSTON: Well, I think the experiments are going to occur in different places depending on the motivation for them. Again, my focus was just on the U.S. and my interest in thinking about this, certainly in terms of the experiment was really following how we sold. And that's the operative word, "sold" intercity deregulation. That is, going into this, you know somebody -- high level officials in consultation with others -- is really

going to have to perceive the reality of the existing infrastructure and problems that we have in the U.S. and realize that these are not going to be solved in the public sector.

And that I would not treat the experiments as a randomization, as Timo was saying. I think that at least the initial ones are really going to have to be carefully selected to demonstrate a particular outcome -- I'm not saying rig the outcome. But see if indeed this could be possible that we can improve upon the efficiencies or the vast inefficiencies that we see with the existing systems, both in pricing, investment, and particularly technology, as I've said. And we want to give it the best forum to see what it can produce.

Now, no policy -- at least that I'm aware of in this country -- is going to be sold by some official saying we've got problems with the microeconomic efficiencies of our infrastructure. It's going to have to be sold very differently. There are two ways to do it. One, which certainly needs to be the budgetary part of it, right? Where we're having extreme budgetary pressures and selling this as a way to relieve the public budget and have the private sector involved -- extensively, not just in partnership -- is certainly one way to start motivating private sector involvement. And second is innovation and technical change. If we're going to come out of this recession, we need growth. Growth requires innovation. Where are we going to get it? Private sector, small firms generally is the way these things happen.

So, you know, with that in mind then you're going to have to

think very specifically. Okay, we're going to motivate it for budgetary reasons and for growth. You know, what part of this country is going to be a good way to demonstrate that and see what could be produced?

You know, elsewhere I think there might be a very different story.

MR. McKIBBIN: Anybody else want to comment on that question? Okay, we have a question here at the front.

MR. RUEDA-SABATER: Hi, thank you very much. Very interesting series of presentations. I'm Enrique Rueda-Sabater from Cisco Systems, so you can guess what my question is going to be about. And two panelists, at least I would like to gather reaction from.

Douglas, I was really surprised that for low-income countries some indications was there because the cost benefit is tremendous. And I could argue that that's one of the things that can be done. And the reason why is, I think, one issue that Timo raised and you all have referred to, which is PPPs.

Now, I think the history of PPPs in other types of infrastructure is very different. And it seems to me that there is a huge opportunity for imaginative PPPs, and I wonder if you have had any experience with that? And specifically, I could think about sharing infrastructure as a huge way of increasing the cost-benefit -- or improving the cost-benefit ratios.

Simple examples, for instance. You could make the sewers of a city available to anybody who wants to put fiber. Now, the part of the

imagination is that you're using an asset that is already there, and you open it up for competition. What's one of the best things that private sector can do is respond to competition. And, I mean, there are many examples like that. You could use the roofs of schools to put wireless transmitters, all kinds of things. Is there anything that you have looked at that exploits that potential and looks at the barriers? Lack of imagination or possibly political economy barriers.

MR. HENCKEL: What you addressed often requires a considerable degree of coordination among various government departments which, unfortunately, is not always forthcoming. I'm always baffled -- at least in Germany where I come from -- you look at a street and they dig up a hole and they close it again. And two weeks later, they dig another hole in the same place and they close it again. And three weeks later, there's another hole and they close it again. And this is all for different reasons. There was a broken pipe and then they laid a cable and they did something else.

So, it requires a big coordination effort. And I think that in turn presupposed a certain top-down culture which goes back to what Sonja was talking about, thinking of the network characteristics of infrastructure that is often not there because line agencies tend to think in a quite compartmentalized way.

MR. McKIBBIN: Does somebody else wish to comment as well?

MS. LYNEHAM: Yes. There are a number of examples now where government is looking precisely at that that they see. What was previously seen as a sunk investment has a real opportunity and where below-ground infrastructure such as pipes give them a real access, which would be very difficult to obtain today in markets. And even in projects such as telecommunications and MBN, there may be real opportunity to use the water sewage drainage networks for other purposes.

Also, as industry or as government seeks new sources of revenue, diversified sources of revenue, whether at simple things such as railway corridors, one looks at what are the revenue streams are there? Even advertising ports. How more efficiently could you use land for generating income and getting assets out of that? So, I think there is a move in each of those areas, as you suggest.

MR. McKIBBIN: Doug?

MR. BROOKS: Yeah, with the communications in low-income countries, I did not mean to imply that they're not important. I'm -- as I said, low-income countries need everything. It's a question of emphasis.

And I think partly in the low-income countries the governments feel that -- nowadays, at least, that something the private sector will come in and will work on even if the government doesn't do much, just doesn't block them too much, while the emphasis from the governments tends to be more on the things where it's more difficult to recover the costs from investment.

As far as sharing infrastructure, there's a long history of that. If

you think about in this country 150 years ago when the railways were crossing the country going out west, right along with them went the telegraph wires, that they used the same right of way. And it's largely a process of looking at the land rights and looking at the incentives for who can access them and how can they gain that access. But sure, it's an area where a lot more could be done.

MR. McKIBBIN: Okay, thanks.

I have some questions at the back. There's the lady with her hand -- there's two there together. Yes, that one, correct. And then the lady behind next, and then the gentleman at the back.

MS. HOWARD: Thank you. I'm Julie Howard from the Partnership to Cut Hunger and Poverty in Africa. And thank you very much for a very nice set of presentations.

In Africa -- sub-Saharan Africa, there's a lot of talk these days about regional economic integration and the development of transport in development quarters. And then I think all of you have mentioned the issues of governance and project development. All those are sort of multiplied when you get into a regional framework.

So, I'm wondering if you can come up with any examples -- perhaps from Asian Development Bank or our Asian experience -- kind of best practices for both governance and also modeling of effect of regional transport plus development networking. I'm very interested in the discussion of networks.

MS. YOON: Well, excuse me. I'm going to talk about -- ask about the Africa. So could I?

MR. McKIBBIN: Well, let's ask the two questions together, then. That's a good idea.

MS. YOON: Yeah. Yang Ro Yoon, Foundation for Empowerment, formerly the World Bank.

I'm very glad to hear Dr. Douglas Brooks talking a lot about the maintenance. When I was working for the World Bank on the Africa for 10 years as a labor economics, the maintenance in Africa -- infrastructure, absolutely critical. And the -- why the -- a lot of money has been invested in road and other things. It has not been maintained. You see it over again and again. So, I just try to ask -- I'd like to ask Dr. Brooks and Servén about what kind of things should be done to change the -- this kind of maintenance culture in Africa, especially in towns with incentives, what kind of incentives can be provided for them to change that kind of -- the culture.

And I have one more question to Ms. Sonja Lyneham. She -- you talked about this sort of changing the framework and the infrastructure. In the past there was so much more integrated approach and sort of like this network analysis. But these days it sort of much more program and project-oriented things. In Africa, in particular, because there is -- they're very limited resources, this kind of integrated analysis is very important to privatize what is important and what should be completed.

So I'd like to ask you advice on what kind of advice you can

give, really, to the Africa region. Thanks.

MR. McKIBBIN: Okay, let's turn to those two questions. I guess Douglas first and then maybe Sonja.

MR. BROOKS: As far as examples from Asia on regional integration, I think our prime example is the Greater Mekong sub-region. And there are a number of studies looking at the infrastructure development, the completion of the first East-West Corridor, the transport corridor which is now being developed to be an economic corridor. I'd be happy to talk with you more about that later, but that would be good place to start.

There's a number of regional initiatives. There's SASEC, South Asia Subregional for Economic Cooperation. There's CAREC, the Central Asian Republic for Economic Cooperation. CAREC has also done quite a bit on transportation, looking particularly at trade facilitation and crossing borders. And there are a number of studies on these things available on our website.

As far as incentives for maintenance in Africa, I don't have the solution. But one lesson that seems to have become clear is, you need to get the users of the infrastructure involved in planning and building, implementing the infrastructure so that they feel they have a stake in maintaining it. And then -- that doesn't guarantee anything, but it increases the chances.

MR. McKIBBIN: Sonja, did you want to respond?

MS. LYNEHAM: Transparency in terms of information is

always a good start. And I would suggest that if we're looking at how do you encourage improved maintenance of infrastructure, the first thing you do is put on public record the infrastructure you have in terms of an asset register and some clarification as to how much it is costing so that there is a political pressure on government to improve the efficiency with which they deliver and maintain their assets. And it also provides a mechanism where private sector can come in and say, well, we'll equal or better the way it's being done at the moment. But unless you have it on public record and it's contestable, you won't have the incentives.

MR. McKIBBIN: Luis?

MR. SERVÉN: Yeah, just to add to that. This is a big concern when -- particularly at a time of new investments. A mechanism is needed to ensure that when a new road is built, there will be the necessary appropriations to maintain it down the road, breaking the tradition of rebuilding the road every 5 or 10 years, which is the norm in Africa.

And there you need some changes in budgetary procedures and fiscal institutions in order to ensure that. In fact, many experts nowadays think that if there is one advantage of PPPs in the transport sector, it's precisely that. That they can bundle the maintenance into the entire exercise.

But what has been tried in Africa with assorted success is road funds or other independent agencies that are in charge of the overall road and design and maintenance and then can enforce the priority of

maintenance over new constructions. But of course, those agencies need to be funded and that's where the budgetary part comes.

MR. McKIBBIN: Okay, there's a question at the back. The gentleman at the back with his pen raised. And then one more question down here and then we'll have to call it quits.

MR. VANDERHILLS: Hi, this is Alan Vanderhills at the Congressional Budget Office.

We've been looking at public-private partnerships and you've all mentioned it very positively. And one problem, especially in the United States, we've seen that a lot of these -- the private component just is not very profitable. Most of the public-private partnerships have gone through fairly significant losses over an extended period of time. And I'd like to get the panel's idea or concepts as to why -- how to get around this problem to see new firms coming in if there is an extended experience with these projects not particularly being attractive to the private sector -- at least not over the, you know, three-, five-year time period.

MR. McKIBBIN: Yeah?

MR. WINSTON: Let's historically forget about the modern public-private partnerships. When we had privatization or private provision of infrastructure and services in this country -- and that's how all these things began. They never started in the public sector, all of them started in the private sector. They ran into very serious problems in profitability, and a lot of it was because of imposed regulations from the government limiting

various things they could do. Public-private partnerships still have that potential problem. I don't know which specific ones you're talking about, but oftentimes there's limits on rates and whatnot on these things.

And so I would say that, you know, one would first try to see exactly what the nature of these contracts are and what limitations that are on the private sector for them to be profitable, then -- of course, then looking at the incentives for them for cost efficiency and so on, so forth.

MR. McKIBBIN: Just time for one more question here at the front. Nikki? Just here?

MR. CHEN: Yeah. Chia Chen, freelance correspondent (inaudible).

First is the infrastructure privatization is the policy for the developing country. And then, how's the effect so far? And I heard this mosquito net. Is mosquito net the policy for dealing with mosquito control over the DDT?

And then, what's the infrastructure effect -- infrastructure on poverty or inequality? Thank you.

MR. McKIBBIN: Okay, I wouldn't worry about the mosquito net question because that's a separate conference. But the poverty question, I think if someone would like to address the question about poverty?

MR. SERVÉN: Sure. There are many studies about the effect of infrastructure on incomes of the poor. Studies range from micro studies of

localized roads or communication facilities or water provision to macro studies at the country level in which the researchers try to see how improvements in the quality or quantity of both infrastructures services -- other things equal -- on poverty or inequality, for that matter.

In general, the finding is that there can be very large effects that comes from the micro studies. And from the macro studies what you see is that as infrastructure moves on, the inequality tends to decline, to decline rather significantly, in fact. And that is because the services reach out to poorer segments of the population that were not covered yet. What matters for the poverty inequality effect is essentially to increase access, to expand access of the population to the services, number one.

And number two, the affordability of the services. So, if services reach out to everybody, but they are so expensive that half the population can't afford them, then obviously you're not going to get a big bang for the buck. And that has been perhaps the one sticky point in some cases of privatization. How about the affordability part, the universal access which is important for the welfare of the poorer segments of the population?

Having said that, related to your other question -- with privatization there have been all kinds of stories. I don't think we can say the right policy is to privatize or not to privatize. The right policy will vary across countries, sectors, and so forth. Institutional conditions are going to be a very major determinant of what to do, and the private sector interest certainly be another major determinant of how much the private sector wants to do.

So there are successes, there are failures. And I think, importantly, there are lessons learned for next rounds of privatization, if they do happen. For example, the capacity for the regulatory bodies in infrastructure sectors is very important to obtain all the benefits from privatization that you could get. Otherwise, experientials you may not get very much.

MR. McKIBBIN: Okay, Cliff and then Douglas.

MR. WINSTON: One point I wanted to make, though, it's important in thinking about both poverty and inequality and all these things, the way you really want to design these systems is still to make them as efficient as possible. You don't want to distort the systems in the nature of income redistribution or what have you. If you want to accomplish those goals, that's fine. But you can treat those separately. So the focus should still be, if we're going to consider privatization, is it going to be a more efficient system?

If so -- and if prices are higher and you're worried about income distribution effects and you can supplement the policy with vouchers. But I think a common mistake that's made is to distort these systems in the name of inequality. And what you'll wind up doing is just really lowering the overall welfare for the whole country.

MR. McKIBBIN: Douglas?

MR. BROOKS: Yeah. That was partly the point I was going to make.

I agree with Luis. You can find examples that will support any conclusion you want to draw about infrastructure and poverty. It depends a lot on the particular project and characteristics of the project and the population.

I think the word that sticks in my mind with what Cliff was talking about is subsidies. If you look at the developing countries, often provision of infrastructure services is subsidized by the government. Often the subsidies are not done well, they wind up going to groups that don't need to get them, they add to budget deficits that are unsustainable. So, it's partly the planning aspect and thinking about what is the efficient way to accomplish the goal. If the goal is equality, or is it growth through infrastructure, you may have different policy prescriptions.

MR. McKIBBIN: Okay. Well, I think we have to draw the proceedings to a close. I know there are more questions, and there's certainly more questions that will be emerging over coming years.

I'd like to take this opportunity to thank the organizations that funded this event: the Asian Development Bank, the Australian National University, Brookings, the Lowy Institute, and WorleyParsons.

I'd like to thank the panelists for giving us their time and their insights. I'd like to state -- thank the staff in the global economy and development and economic studies programs at Brookings, particularly D.J., Nicki, and Mao-Lin; and Dr. Renee Frye (phonetic), director of the ANU Center for Applied Macroeconomic Analysis; and Dr. Timo Henckel, who

has been the core of the development of the program and the delivery of this infrastructure project.

Thank you very much. (Applause)

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Expires: November 30, 2012