Unedited Event Transcript

Upgrading the Tax System to Boost Productivity

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Adam Posen: Good afternoon, ladies and gentleman. And welcome back to the Peterson Institute for International Economics. I'm Adam Posen, the Institute's president. And we are in the midst of one of our busy seasons. Yesterday we had the Semi-Annual Global Economic Prospects with David Stockton, Karen Dynan, our great new senior fellow, and Joe Gagnon. And today we are moving on to a discussion of some non-trivial influential outside work. But on topics closely near and dear to the heart of many here at the Institute. The relationship between fiscal efficiency, particularly tax efficiency, and productivity.

As came up in our ample discussions of the border adjustment tax in the U.S. in recent weeks including here at the Institute, there is – there are a lot of claims made back and forth about the importance of tax reform to long term growth and to long term productivity. The availability of good cross sectional work that is reliable and not ideological on this topic is quite limited. And therefore, it is as no surprise and very welcome that the fiscal department, Fiscal Affairs Department of the IMF has chosen to make this a focus of their latest fiscal monitor. And we're delighted to have Vitor Gaspar and Laura Jaramillo of the Fiscal Department here with us today to present the work of them and their colleagues.

Just a brief note that, that we have had a series, it is ad-hock but recurring with department heads and distinguished authors behind them from the IMF coming in to present some of their newest work. We, in addition to Vitor, we've had Chang Yung Reef in the Asian Department, David Lipton, the Deputy MD, Alejandra Verna from the Latin American Department and so on. And we view this as a valuable relationship in the sense that the IMF gets out of its building, and out of a high class hotel in some God forsaken place, and instead comes here and confronts the intellectual liveliness of the Peterson Institute crowd and our fellows.

At the same time, we get to encourage the Fund to put forward some of the more thematic and interesting, and I hope draw more attention to this, some of their more thematic work. So this is, what we're discussing today is part of the semi-annual, or is it tri-annual, I can never remember, fiscal monitor. But it is in a sense, the box, or the thematic chapter. And Vitor Gaspar was kind of enough to do something similar a year ago, and we're glad to have him back.

We're also joined today by two distinguished discussants. So let me just quickly talk about the bios of our speakers today and then turn it over for substance. Vitor Gaspar of course, is currently the fiscal affairs department of the IMF. I've known him and considered him a friend for a very long time. Back to when he was director general of research at the ECB. He of course, has gone on to many other positions since then including as minister of state and finance for Portugal during the cleanup from the crisis in 2011 to 2013. He's a true European, working at the European Commission's Bureau of European Policy Advisors during 2007 to 2010. And of course, now has been at the Fund since I believe 2013. He also of course, has a distinguished academic record, which we tend to take for granted in this business but is still worth noting.

He is joined for today's presentation by Laura Jaramillo Miar, who is the deputy division chief in the fiscal affairs department. Her reputation precedes her; she's been doing great work since joining the Fund in 2002. She also worked at the Ministry of Finance of Colombia as assistant to the vice minister prior to joining the Fund. Has graduate studies from Princeton, and was clearly one of the lead authors on this set of research and so we're delighted to have her here to present the research in her own voice in this thing.

As usual, one of the great things I'm proud of PIE is what we call convening power, both internal and external. And so given the topic and the authors, it was easier than usual. But we're delighted to have Jason Furman, who has been with us as a senior fellow since, somehow running out of employment sometime in January. Jason of course, was chairman of President Obama's council of economic advisors until then. After serving a variety of senior economic posts in both the Obama and Clinton administrations, working across the street at Brookings on tax issues in between administrations, and teaching, another person who's distinguished academic contribution should not be taken for granted. And in particular he of course, is an expert on tax issues. And we look forward to him thinking from his practical perspective as well as the U.S. perspective about the lessons that Vitor and Laura are giving us.

And then finally our discussant, our external discussant as it were, I'm delighted to have Mihir Desai, who is a professor jointly at the Harvard Business School and the Harvard Law School. As a Harvard graduate I'm aware of what a big deal that is. Mihir of course, is not only Mizuho Financial Group Professor of Finance at the business school, he is at the NBR, he has run the NBR's India program, he has worked in the real world at CS First Boston, and at McKinzey, and of course this understates his influence and his writing. He remains one of the world's leading experts on matters of corporate taxation, international tax competition, advises a number of both research efforts and companies, and has had an effect on tax policy in countries ranging from India to the United States and many in between. So we're grateful that Mihir took the time to come down from Cambridge to join us today, thank you very much.

It's a very packed program. I now shut up and I turn it over to Vitor Gaspar. Thank you very much.

Vitor Gaspar: Thanks Adam, for your kind words of introduction. Many thanks to the Peterson Institute for hosting us in this presentation of the analytical chapter of the fiscal monitor. We're looking at tax, and productivity, we had a similar topic a year ago where we looked at how public policies could influence innovation and productivity growth. So there's a continuity between these two seminars at the Peterson. Let's see if this works. Now normally pressing the button, something which is within what I can do, but I was being challenged.

So the way we are going to do this is I will cover the first two parts of the outline, the motivation and I will present some estimates of the gains from resource misallocation. And then Laura will cover the use of tax instruments to effect resource misallocation. And she will conclude.

So all this discussion about productivity and policy instruments, so productivity and policy is related to the fact that around the world there is the perception that the behavior of productivity has been disappointing. We would like to have productivity evolving stronger because productivity is the most important factor driving living standards in the long run.

I will not elaborate on the trends that we have on this slide for advanced economies, emerging markets and low income developing countries because I believe that these trends are familiar to all of you. In all these country groups, in all countries we would like productivity growth to be stronger.

Now to repeat the point that I've already made concerning our presentation one year ago, one can effect productivity in a number of different ways. One year ago we were looking at how one can push outward the technological frontier. So it was about innovation, it was about research and development, it was about externalities associated with knowledge, all very important topics.

This time we'll look at a much more precise question. We'll look at misallocation of resources within very narrowly defined industries. And we want to quantify this misallocation, and then we want to go about thinking about how can tax policy reform revenue administration, reform effect misallocation.

Okay, I think it's worthwhile to think for a little while, spend a little time thinking about what is this notion of resource misallocation, and where does resource misallocation across firms within a narrowly defined industry come from. And in this chart we can see there are very simple illustrations in which we have two firms, firm A and firm B. We can see they're only one factor of production, labor. And we think about the allocation of labor between these two firms.

Okay. So the allocation that maximizes efficiency across these two firms is one that equalizes the marginal product of labor in the two firms. And that's what you would expect to see in competitive equilibrium in an economy. Okay. So nothing at all fancy here. Now it turns out that you may have a number of distortions in the world, you could think of many. In this particular case we just consider that there is a labor tax, there is some tax that effects the gross wage rate.

And we can imagine a negative tax on firm A, and a positive tax on firm B. And what's going to happen is that this distortion, the fact that the two firms are not being treated the same, leads to a situation where firm A in this case, the least efficient firm is going to expend, and firm B, the most efficient firm is going to contract relative to the equilibrium.

Now it turns out that this is costly. The output, the value of the output in this sector is the sum of the area below these lines in the chart. And so you can see the loss associated with misallocation as this triangle. That was the focus of this research. In practice, of course, we have more factors than labor, and we have more distortions than tax. So this is more complicated than what I've just explained. But this is the general idea.

Now empirically what you get is something like what you have on this slide. And this slide is definitely worth looking at with some attention. I'm a great fan of this slide. I didn't make it, so I can be a fan of it. So on the left hand side you have two countries. One more efficient in blue and another less efficient in red. And you do see that the different levels of efficiency affect the whole distribution. On the right hand side, you have a normalization that it's the same distribution, but you normalize by taking the mean and then taking the log.

And what you see on the right hand side more clearly than on the left hand side is that the difference between the more efficient country and the less efficient country comes from the fact that in the less efficient country you have many more firms that are less efficient. They're firms that should be out of business for efficiency reasons but they're not. For whatever reason, perhaps because implicitly they're being subsidized, they don't go out of business.

Now how important are these types of effects? They're huge. We're talking about very, very large effects. This effects our level effects, they're not growth effects, but we estimate the level effect and then we convert it and that is what is shown in this picture, into growth effects over a period of twenty years. We present it that way because we thought it would be more intuitive.

And so if you go across the three country groups, advanced economies, emerging market economies, and low income developing countries, you have this enormous effect on average of about one percentage point for growth lasting for twenty years. It's a very, very large effect associated with misallocation at the industry level.

The effect is actually larger, as you can see, for emerging markets and for low income countries than for advanced economies. And then the question is, okay, so we have this very large effect, how much can we get from the use of tax policy instruments, revenue administration instruments. And there in the chapter we'll look at a number of distortions, across capital asset types across sources of financing between formal and informal firms, between large and small firms.

And what we find is that for emerging markets and low income developing countries measures of tax reform, measures pertaining to revenue administration can allow one fourth of this effect to be reaped. It's still a very large effect. So tax policy and revenue administration matter a lot and for you to know where these results are coming from, you will have to listen to Laura.

Laura Jaramillo: Well thank you, Vitor. So as Vitor said, I will be looking at what is the contribution of tax policies and tax administration to resource misallocation. And as Vitor was saying earlier, there are many important sources of misallocation. They arise because of ill designed government policies, or from poorly functioning markets that effect certain firms over others.

There are a number of examples. Tax incentives that are based on size or on location. Weak tax administrations and enforcement. Product market regulations that limit market access. Preferential loans to specific firms. Financial markets that are not well developed. And I could name many others.

But here in our fiscal monitor, we make the case that tax policy and tax administration are important factors that policy makers need to take into account when they're thinking about the productivity challenge. Vitor already mentioned the four tax distortions that we looked at.

We are only looking at a selection of policies. This is not an exhaustive list, but what we wanted to do with these four examples is to give concrete examples of how the design of tax systems can effect, can result in differentiated tax treatment across firms.

And I will, in the next slides, I will go into each one of these in turn. So let me start with the first one. We explored disparities in tax, in effective marginal tax rates across capital asset types. The effect of marginal tax rate is an indicator of the various factors effecting investors decisions when they are deciding on whether to move ahead with a new investment. Disparities in the effective marginal tax rate across capital asset types can result in resource misallocation when they steer investors towards lower return investments because they are tax favored.

To illustrate, this slide shows four developing countries that are higher tax disparity is associated with lower share of investments in the asset that is tax disadvantaged. We measure tax disparity as the effective marginal tax rate on machinery, minus the effective marginal tax rate on buildings. In our sample of countries, about half of the countries have a positive tax disparity. And many countries have a tax disparity close to ten percentage points.

For each industry, the blue bars in the chart show the machinery as a share of total assets for countries with a low tax disparity. The red bars show the share of machinery in total assets for countries with a high tax disparity. And as you can see for most industries, the blue bar is longer than the red bar.

And it's especially the case for the industries that are at the bottom of the chart, which are those industries that actually have a higher share of machinery overall. In our analysis, we find that eliminating this tax disparity would raise productivity in machinery intensive industries. And also that this would have a positive impact on aggregate productivity.

The second tax distortion that we look at is corporate debt bias. Corporate debt bias occurs when there is a higher cost on equity financed investment compared to debt financed investment. Corporate debt bias can create resource misallocation when it effects investment decisions that are more dependent on equity.

Research and development is a clear case. Innovating firms, especially startups tend to rely on equity to finance their R&D investment because there are no collateral requirements and also investors will be able to share in upside returns. This chart illustrates the positive correlation between research and development intensity of industries and their dependence on equity. And you can see that there's that positive relationship.

So by imposing a higher cost on equity compared to debt, debt bias ends up imposing a higher cost on research and development compared to other capital spending. Our empirical results for advanced economies indicate that by removing or reducing corporate debt bias, you will have a positive effect on industries that are more intensive in R&D. And the effect on the aggregate economy is likely to go beyond our estimates because R&D will also expand the technology frontier for the country.

Let me turn to the third tax distortion that we study. We find that differentiated tax treatment across formal and informal firms is a problem not only for revenue collection but also for productivity. Our analysis focuses narrowly on cheats. What are we referring to when we say cheats? These are firms that are registered with a tax authority but that under report their sales for tax purposes.

Through tax evasion, cheats enjoy potentially large implicit subsidies that allows them to stay in business despite having lower productivity. Because of this implicit subsidy, cheats have a larger share of the market than they should at the expense of the more productive tax compliant firms.

This chart for emerging markets and low income developing countries shows that there is indeed a productivity difference between tax compliant firms, which are in blue, and cheats, which are the bars in red. Our empirical results show that stronger tax administration reduces a prevalence of cheats in the economy.

This is found to raise productivity because it makes room for productive tax compliant firms to have a higher share, market share in the economy. As these tax compliant firms grow, they absorb larger amounts of labor and capital, and they will have a higher weight in the economy increases aggregate productivity.

Now I turn to the last tax distortion that we look at. Preferential tax treatment for small firms can result in resource misallocation. If more productive firms decide to stay small in order to remain below the eligibility threshold. This creates a small business trap. The small business trap effects aggregate productivity because a larger share of the output of the economy is produced by smaller, less efficient firms that fail to take advantage of economies of scale and of scope.

This figure illustrates that preferential tax regimes can create a disincentive for small firms to grow. It shows that older firms tend to grow less in countries that offer low tax rates for small firms, that's the red line. Compared to countries that do not have this type of incentive. Our regression analysis for advanced, emerging market and low income countries shows that getting rid of this preferential tax for small firms has a positive effect on productivity.

So what specific tax policies can help reduce misallocation? In our fiscal monitor we call for minimizing the tax treatments that discriminate across types of assets and across sources of financing. This can help tilt firms' investment decisions towards assets that are more productive rather than tax favored. That allows for corporate equity system and a cash flow tax both can address these two types of distortions.

We also call for leveling the playing field across firms to encourage productive firms to grow. Lower tax compliance costs and stronger tax enforcement can help reduce the unfair cost advantage that informal firms enjoy. Lower tax compliance costs will also help encourage growth and productivity among small and young firms. So the less resources that these firms spent on filing their taxes, the more resources they can use on productive activities.

Lastly, to avoid the small business trap, tax relief could be more effective if it were targeted to new rather than to small firms. So now let me conclude. At the IMF we see raising productivity as a major challenge. Our recent work has focused on shedding light on this issue with the aim of identifying policies that can help increase growth over the medium term.

In our most recent fiscal monitor we are able to show that there are substantial gains to be made from narrowing the productivity gap across firms. In particular, reducing the distortions that weigh on productive firms can lift annual real DDP growth by one percent per year for twenty years. We also find that developing countries can achieve a quarter of these gains by improving the design of their tax policies and tax administration.

These findings complement our work, as mentioned by Vitor, where we looked at fiscal policies to increase R&D and innovation. We recognize that this is the start of a conversation. I'm sure that the discussion today will be very enlightening and I look forward to a very lively discussion. Thank you.

Jason Furman: So there's an expression, fool me once shame on you, fool me twice shame on me. And the shame is on me for discussing this paper. Last year I was invited to discuss a paper that Vitor did, and I agreed without reading the paper. I got the paper and I just agreed with every word in it from beginning to end, which is just an embarrassing and terrible position to put a discussant in to.

This year Adam asked me if I wanted to discuss something by Vitor, I once again failed to read the paper, once again finally got around to reading it, and was thinking it left me with very little of negative, terrible things to say about it. Apologies in advance.

I spent a lot of time on business tax reform in the Obama Administration, a lot of time looking at different models about the impact of tax reform. And what was really frustrating was that those models for the most part, didn't capture what I thought was most important in reform, and most of what I thought we could accomplish in reform.

And you look, one of the important contributions of this paper is to remedy that problem. So you look at a typical dynamic scoring, or dynamic analysis model of a tax plan, and it has capital, you know, just capital K one sector.

And you look at how the tax plan changes the cost of capital. And if it does you get more capital, and if you have more capital you get more productivity. Some of the fancier models might have a few different types of capital and a few different sectors. And you could get some shift in the allocation of capital between sectors. But all of this misses a lot of what you're really trying to do in business tax reform, which is first of all not about capital, but about total factor productivity.

And second of all, about the allocation of capital across sectors, but also within sectors across different types of firms, which are enormously heterogeneous, something that has implications not just for productivity but for inequality, as I've talked about elsewhere. So one of the important contributions of this paper is to shift the debate from the impact on capital to the impact on TFP. Including looking at the allocation within sectors.

This has important implications for public policy as well because it says that when you think about tax reform, it's not just what you get the rate to that matters, which is a single minded focus on the accumulation of capital. But instead, that you could have really large potential benefits from revenue neutral tax reform, and that you want to get them by making a tax system that's neutral, that doesn't distort economic decisions. So that when you're a business you're doing something because it has the highest rate of return to the economy before taxes, not because that decision has changed because rates of return vary after taxes.

And one shorthand way of putting that is the tax reform becomes about the quality of capital, not about the quantity of capital. In terms of the neutralities that one wants to try to achieve, in some sense then, it becomes less, you know, you can pick whatever rate you want. Eighty percent, ten percent, what you want to do is look at the rates on different activities and see how they vary.

And one thing we used to do, for example, when we looked at tax reform proposals, was we would look at about ten different sectors, and calculate the standard deviation of tax rates across those ten sectors, and we'd always look at that metric when we looked at different tax reforms. And the goal was to make that number as low as possible, in fact ideally that number should be zero so you don't get over investment in equipment or in structures just because of the tax code.

The paper discusses the debt equity distortions in the tax code. I think it only talks about one of the three issues that that presents. The issue that the paper discusses is if you want to finance something risky and high return like R&D, you can finance that more easily through equity. It allows someone to share the upside than through debt where they can walk away in the downside scenario. So that's one of the channels.

The second channel is that overly leveraged firms are more fragile, more prone to bankruptcy, there can be enormous destruction of value in bankruptcy, fire sales, and firms can be tempted to gamble for resurrection in those types of circumstances.

And then the third issue with over leveraging is just the macro economic consequences of greater financial fragility and what that does to the economy as a whole. The third issue, which is discussed in this paper, is wanting to have the same tax rate on businesses regardless of whether their pass-throughs of sea corps, which is a big issue here in the United States, whether they're the formal or informal sectors, a big issue in developing countries.

And then a topic which this paper doesn't discuss but is another important margin for neutrality that Mihir has made on important contributions in his research on, is having the same tax rate on a range of international decisions, where you locate yourself, how you organize your production relationships, where your headquarters are. And I addressed some of this the last time I spoke on this general topic, and the paper on that was available outside.

These issues are quite large in the United States. This gives you a sense of the tax rates on range from ten to twenty-seven percent, depending on whether you're looking at utilities or at wholesale and retail trade. Debt equity difference in the United States is forty percentage points, the largest is I'll show you in a moment, of any country.

We tax our corporate businesses a little bit more heavily than we tax our pass-throughs, our pass-throughs tend to be better lobbyists and I think, my prediction if we ever get tax reform it's more likely to widen that disparity than narrow it given the political context.

We tax income very differently depending on what country you earn it in. And then one that's quite important to underscore beyond the scope of this paper, but we tax business income much more heavily than housing, which actually we subsidize. So looking across countries, you see a lot of heterogeneity across countries in tax rates on the different forms of investment. In the United States, we tax equipment more heavily than we tax structures, which means we under invest in equipment and over invest in structures, all things being considered.

There's a lot of other countries in the G20 that are in the exact opposite end of the scale. But an absolute value, that distortion is relatively large in the United States compared to the G20. The distortion that's even larger in the United States compared to the G20, other G20 economies, is the difference between the tax rate on debt financed investment and equity financed investment.

I should say, this is just showing you numbers at the corporate level. To evaluate this, you want to look at an integrated basis on the individual level and that shrinks the gap some because at the individual level you pay more taxes on interest than you do on dividends, at least in the United States. But that disparity is quite large.

And both of these I'm talking about ways to improve the tax system by shrinking these towards zero that, as I said, is invariant to where the overall rate is. But it's not entirely unrelated to where the overall rate is. So this chart shows you the statutory corporate rate on the X axis, the effective corporate rate on the Y axis. One thing to notice is everything in the lower right, so everyone's effective rates are lower than their statutory rate.

The line that connects those would be flatter than a forty-five-degree line, so the higher your statutory rate on average, the larger the discrepancy between that and your effective rate. And that's certainly something you see for the United States in red. But what becomes important, and the reason why rate reduction can matter outside of cost of capital, is a lot of these other non-neutralities are easier to solve and less consequential at lower rates.

That's less true for the disparity of tax rates between equipment and building investment, which you see here on the Y axis, is largely unrelated to what your tax rate is. But it's very strongly true for the debt bias. The higher your statutory tax rate, the higher your debt bias is. Now in theory you could eliminate that debt bias, for example, by shifting to expensing and no longer allowing the deductibility of interest. So you could do that without bringing the rate down. But just about any system that broadens the tax base and lowers the tax rate is going to reduce that disparity between debt financed investment and equity financed investment and have the economic benefits. Some of, a subset of which are documented in this paper.

So I'd say in conclusion, looking as a general macro rule, looking at firms and trying to aggregate them up I think is something that is a very fruitful and productive activity. For trying to learn the sources of productivity, for trying to learn the sources of inequality, and it opens up new avenues for thinking about policy where you're thinking not just in crude aggregate terms about quantities of capital, but you're thinking of quality of capital.

Some of that leads you in the same direction that one would have thought about before in terms of tax reform. Lower rates can help make the tax system more neutral, but they're neither necessary nor sufficient for making the tax system more neutral. And the first thing policy makers should be looking at is these types of wedges and disparities, shrinking them to zero using the tax rate as a goal to help achieve that. As a means to help achieve that goal but not an end unto itself. Thank you.

Mihir Desai: Thanks very much. It's a real pleasure to be here. And thanks to Adam for the invitation and to Vitor and Laura for the paper. I guess I'll put myself in the fool me once category. This is my first time. I should have talked to Jason beforehand I guess.

It's a really interesting paper and like Jason I have the same reaction, which is for too long in public economics we've been focused on this idea of efficiency just in quantities and actually firm level productivity we know varies so much. And in fact, that is what we should be caring about. So this paper gets that point I think exactly right.

So let me just try to take you through a couple of ideas about this. And these are really questions on the margin more than anything else. But I think they're useful for thinking about the paper. I'm just going to quickly review the results, talk a little bit about moments, and then talk about these three versions of this.

I have a little bit to say about multinationals and then the policy prescriptions that come out of the paper. So like Vitor, I love this picture too. I think it's fantastic. You know, the short version is that the dispersion of firm productivity is much larger in these less efficient countries. The paper is a little ambiguous about what countries fall into which camps. It would be nice to see some lists of the countries you're talking about in different settings. I can understand why that might be but it would always be useful to see a little bit more granularity on what countries we're talking about.

So that's the first piece of this and then of course the second piece is the this thought experiment. And I think the thought experiment is really important. And I'm actually unclear about the thought experiment and so let's just try to envision what it might be. So just go to that picture on the right hand side, and as you can tell the blue line is somewhat flatter and to the left of the red line or the red curve.

So the question is what is the thought experiment in terms of the potential productivity gain? I think in the original sheet Klanau papers it was about moving the distribution towards a regular distribution. For example, like the United States moving China and India towards the United States kind of distribution.

One could do that exercise and one could for example, try to move that blue country towards what the red country looks like. There's another exercise, which one could try to move the firms that are below the median to the median. I think that's one exercise it's engaged in. And then there's a third exercise, which is you could move all the firms to the top of their firms in that country, which I think is what is actually happening in the paper.

So I think, while it's some version of kind of moving people to the best, with the 90th percentile or some version of a very good outcome. And so if that's the case, I guess, and maybe I'm wrong about that because the paper does it a bunch of different ways, right. So it does it to the median, it does it to the 90th percentile and it does it to the top performer.

And so you know, in my mind the thought experiment has a nice analogy in sports, which is you know, if you're a fan of major league baseball or premier league or whatever, imagine that high, high productivity player and then imagine shifting people towards that high, high productivity player, and think about what that sport would look like in that context.

So that kind of blows my mind when I think about shifting a lot of people to the highest productivity players in some of these sports, it kind of blows my mind as to what might actually happen. So then we actually come to what the effects are. And so the effects are, as we suggested, .7 in annual growth rates for the advanced, 1.3 for emerging and .9, and then we have the story that came out. I'm leaving out the formality piece of it but that's roughly what comes out of this.

I do want to say that my other favorite picture is that picture on the right, which is just stunning, which is about the growth of small firms in countries that have a special tax rate. That is an incredible picture and really gives lie to the logic and rhetoric we hear about small businesses all the time, which is a pet peeve of mine. Which is we just hear about small businesses all the time and that can be good but preferential regimes put in place to help them have this small business trap effect, which I think is really, actually in many ways for me, the most important thing and the interesting that comes out of the paper. I think it's really, very, very important.

So you know, I confess to being a little bit contrary to Vitor, a little underwhelmed by the numbers. They are large, but it really depends on what the thought experiment is. And maybe I got how we're shifting the distribution wrong. But if we're shifting people to that 90th percentile, which is what I understood to be happening, it's almost a little, perhaps disappointing, you know, not to see larger effects.

And so it depends on how you think about that thought experiment. I viewed it as a very thought experiment, which you know, which is to say we're really changing a lot of firms and we're pushing them towards the frontier. And then I almost in some ways, expected more.

I think there's an interesting puzzle about why the low income folks, the low income countries don't have as much as a kick as the emerging market countries, and it would be nice to hear something about that. I didn't see as much in the paper as I like to.

And then the final piece is, you know, is, you know, I think Jason laid this out and Vitor laid this out, you can think about this at an aggregate level, you can think about this at a cross sector level, and you can think about this at a cross firm level. This paper is largely about the cross firm level. And as I understand it the previous paper was kind of at the aggregate level.

I think a lot of what we may be talking about is at the cross sectoral level and so it's important to just think about whether that's a missing piece of the puzzle here. And that comes particularly true when we talk about some of the particular effects that they're talking about.

So you know, the first thing to say is on these three pieces, which is the cross asset. So now this is, you know, crossed asset distortions, cross financing distortions then the size one effects. So here's the, a little bit of the tricky part about this, which is when we do this exercise within these tightly narrow industries, which is absolutely the right way to think about it, and obviously it's done very, very well. The question is, then I have to think about why and how technological production functions are different across firms inside these tightly narrow industries.

And so the first approximation, I think the point of narrowing the industry is to actually homogenize the production function. And so them I'm left not understanding quite as much about how machines and buildings and that distortion plays out within these narrowly defined industries, if in fact the technology production function is roughly the same inside that narrow industry.

That's another way of saying, maybe we'd expect to see that more across sectors where I think it might play a little bit more largely. And the similar thing for debt equity if you think about capital structure then you know, a lot of predictions about capital structure are actually at the industry level, they should be similar within industries. So the homogenization of that, I'm not sure exactly how this works.

What I love is the size and the formality effects, which I think are so teed up for the setting that they're in. You know, within industry, looking at size and formality is just right and the way they nail that is great. And I think that's the headline for the paper. And it's a very, very important headline.

Final thing just to say about this is about multinationals, I think I would love to have seen a little bit more about multinational firms, that's my own bias. But I think that also may be because of what the paper's about, which is if we think about heterogeneity in productivity we know if you take some classical models that low productivity firms are domestic, higher productivity firms are exporters, the highest productivity firms are multinational firms. That's a hierarchy that comes out of a lot of different trade models. Then it would be nice to focus on them a little bit more.

And so, and in particular in the data, I think that's important. That's just a little niggling point, which is some of the really high productivity players might actually be multinational affiliates, and that would be good to know because then we'd think about them a little bit different. And by the way they might be high productivity for good and bad reasons, either because they're making themselves look like massive profit centers, or because they are high productivity players. So I would just have loved to see a little bit more you know, about that.

And then I think the paper does something nice, which is it kind of gives you the traditional logic about why we're super concerned about the transfer pricing activities of multinational firms. But then it turns it on its head a little bit, which I think is correct. You know, which is we should be careful about thinking about these firms that are very high productivity players, and very mobile. And assuming that we want to restrict those kinds of activities, and so I think the paper gets that just right as well.

And so finally in terms of policy levelers, I think they go where one would have wanted them to go, which is the allowance for corporate equity and these cash flow taxes. I think that's right. I think it's largely on the asset and financing distortion piece, right. So it's about the crossed asset, getting that right, it's about the cross financing and getting that right. I'm less enamored of those, I'm more interested in the size and the formality because I think that's really what you're capturing very, very nicely here.

I also think one of the things we struggle with in public economics is we've had these ACE's and cash flow taxes around for a long time. And we've propounded them. It is worthwhile just realizing that you know, as we are in the current U.S debate, contrasting an idealized version of a cash flow tax with our current income tax, and the notion that by the time that idealized cash flow tax goes through the legislative process it's going to look anything like an idealized version is kind of fanciful. So it kind of tilts the biased towards an idealized example as opposed to what might actually obtain in reality.

And that's why I think in many ways the size distortions actually could play in these systems, right. We often see in ACE proposals or cash flow proposals little small firms get opted out. And I think you want to be a little bit careful about that. Final thing is the recommendation on small to new I think is interesting. So they kind of basically say, let's stop with the small, but let's go to the new. And I think I would've preferred to say let's not try. You know, let's be clear about the fact that that's a highly complicated exercise, and small has its problems as we've just seen. And new might have its own problems. You could see churning of firms; you could see a lot of different things. So I think the lesson there is more about not doing the targeting than about changing the nature of the targeting.

I think it could have been interesting to talk a little more about broader movement away from income taxation. My story that I take away from this paper because it's about size and formality for me is just administration, administration, administration, which is this is about tax authorities, and this is about the way they do their job and doing it well, and making them not corrupt. And of course that's what the Fund does really well and works around the world on. I think that is a really, really important piece of this.

And then the final thing I'll say, which is you know, along with some of these other comments, unfair, which is when we think about dispersion of productivity at the firm level, we have to think about managers. And there's now a rich literature about managers and the way they contribute to productivity. And in fact, some of the productivity, things we see in the United States are associated managerial effects, or some of this work claims. If we believe that then we have to really think about the individual income tax.

You know, we have to really think about managerial incentives and make sure that we understand that broader picture. And I think that's beyond the gambit of your report so it's an unfair comment. But I think when we think about this, we shouldn't isolate the entity level or corporate level for thinking about this problem. We should be more expansive if we believe managerial incentives and managerial quality actually dictates some of this dispersion. So that's another way of saying I'd love even more out of this paper since I can't quarrel as much as I can with substantive. So thank you. We really enjoyed the paper.

Adam Posen: Well thank you very much, Mihir and Jason. I guess it's my fault not for not making them read the paper ahead, but for not finding someone to say all the obvious horrible, horrendous faults with the paper. I assume there will be someone in the audience who can take care of that for us. May I invite our two speakers and our two discussants to come up? I thought we were having a seat for Laura. I'm sorry. There should be one more. Anyway, I apologize. We will, we will deal with it.

I am going to open this up. You'll get your commemorative nameplate in a moment. I'm going to open this up for discussion in a moment but I wanted to pick up on something that ran through I think, all the presentations. So there is this fascinating fact and great set of charts that Jason put up and Vitor muttered this is one of his favorite bits, is the discussion of different tax treatment of equity in debt.

And certainly as a macro financial stability kind of person I'm very cognizant of that, and I had discussions with people over the last few years about trying to change the overemphasis on debt in the U.S and UK and other places, solely on that basis, not even thinking about tax efficiency. But I'd like to ask our panelists to go a little bit further on this in two ways.

First is do we have enough variation in the data set? There seemed to be a lot in the chart that I guess it was Jason showed. There seemed to be a wide range of debt versus equity tax treatments. But the actual dispersion of growth rates, the unexplained dispersion of growth rates in the OECD or in a large sample isn't that large, right. By the time we put in savings, inflation, demographics, basic growth stuff. So it's a long winded way of saying you guys all seem to think this is really big, but it's nice to see it at the micro level, but why don't we see it at the macro level? Or am I misreading the evidence and there is clear evidence at the macro level that it matters?

The second question is one of the things that's been amazing about the recent tax discussions in the U.S. is that the Ryan Brady proposal included, and Jason has picked up on this in some of his recent writings and I know Vitor is well aware of this, has included essentially getting rid of the interest deduction. And when we were talking about this during the financial crisis, I'm thinking, macro people rather, the tax people, we all thought that was, you know, even if we wanted to do that we could never do that. Because there is so many small businesses and people who weren't so into this. Yet in the U.S. right now it barely seems to get commented on. So is this, and especially Vitor, maybe you know this from other places, is this easy? Have we been missing a trick? Is it just you know, we can all just wish and the debt, the debt preference will go away tomorrow with no political resistance? Why is this so under discussed? Okay, I'm done.

Vitor Gaspar: Would you allow me three quick reactions before I go to your two questions?

Adam Posen: Of course, I ask you for three quick reactions.

Vitor Gaspar: So my three quick reactions would be the following. One of the reasons I'm so excited about this line of research is because it shows as the two discussants emphasized, that micro matters. Going to a very detailed level of information using say, firm's individual data, using establishment individual data allow us to learn about effects that we would not properly capture without micro data. And going forward that we at the IMF and researchers elsewhere will be using this micro, very large micro data sets quite systematically and that's likely to become a very interesting industry. So we will see a lot coming out of that.

So we wanted to emphasize very much the impacts on allocation. And that's why, and I'm going to make a slight detour to tackle your first question on the debt bias, that's why we focus on innovation rather than on something else. It is precisely in the area of innovation, because young novelty firms have to use equity to finance their activities, right. Giving information as symmetry problems that the debt bias has more severe allocational consequences.

Now we have been working on the debt equity bias quite a lot in the fiscal affairs department. And Nick Keen and Rude Demoi have looked the debt bias for non-financial corporations and financial institutions. And they have put together a synthetic control method that allow one to look at the effects for countries that have adopted, for example, allowance for corporate equity, and the example that normally they present is Belgium. And you do see that introducing allowance for corporate equity leads to a substantial reduction of in debt levels. And they argue that that is important not only for neutrality reasons like Jason was emphasizing, but also for financial stability reasons. Because more leverage firms are more vulnerable, more likely to go bankrupt, and of course when you have very high debt levels you have heightened risks to financial stability. So this is kind of like my first remark, the first thing that I'm passionate about.

The second point that I want to emphasize was something that Mihir emphasized as well. But I feel so strongly about this that I want to repeat it. The way we look at taxation in the fiscal affairs department of the Fund is we look at taxation very much following Joel Slambroad and coauthors, we look at the tax system. And a tax system takes tax policy and revenue administration together. One cannot really figure out the impact from tax policy without knowing how debt is actually implemented.

And so taking tax policy and revenue administration together makes a tremendous amount of difference. And we have exciting results, which are quite surprising for most policy makers, that revenue administration has macro-economic consequences. Revenue administration, we show in this chapter, has implications for the efficiency and the allocation of resources. So for economists using time to look at revenue administration actually pays out. And if you would ask us about our results on tax compliance, we will be most happy to answer those.

Now on your question about whether it is easy to get rid of interest deductions, if you go around the world you see that many countries, more than fifty countries have limits on the ability of firms to deduct interest payments. So they have done that. You don't have examples in which debt has been put in place in a neutral way, which answers your question about politics. So clearly these things are highly political. It's very, very hard to do it in a neutral way.

In the cases that we have looked at, the experience is much more limited so about a do--, sorry, a half dozen countries have allowance for corporate equity and in those countries the treatment is much closer to neutral in the sense that Jason pointed out. So it does seem that an allowance for corporate equity is easier as a political object in terms of delivering a tax reform which is closer to neutrality. On limits on debt deduction, we're not as close to neutrality as we would like.

Adam Posen: I'm interested obviously in Mihir, Jason and Laura's comments but just let me push you on one thing Vitor.

Vitor Gaspar: Mm hmm.

Adam Posen: You said there are roughly fifty countries that do put limits on interest deductibility that you're aware of. Can you say anything about how binding are those limits, or what are the common attributes of those countries or is it just a random set?

Vitor Gaspar: So I'm pretty sure it's not a random set. Rude and Meek put out about some months ago, I think it was in November, a blog in which they did--

Adam Posen: Yeah, but I didn't read it so what did it say?

Vitor Gaspar: They have all of that. What they emphasize is that there is a lot of hydrogenating. So you don't seem to have any simple way of characterizing patterns, at least they did not report on it. And I'm pretty sure that they looked for them.

Adam Posen: Thank you. Mihir?

Mihir Desai: I was just going to mention on the debt equity question. I think I'm less enamored of that as a problem than I think many people are. And I think the reason for that is you know, in the finance literature it has been hard to find tax effects on capital structure. And that's because there are a lot of other things going on. And so I don't know if it's quite as big a deal as we think it might be. And of course, even the macro effects may not be quite as big a deal as we think. I mean the dominant fact about U.S. corporations for the last two decades is how under levered they have been, how much cash they hold, and how under levered they've been up until really, you know, just the last year.

So, and there are big incentives to use that. So I think that may not be quite as big a deal as we think. Obviously the systematic problems you're pointing to Adam have a lot to do with how financial institutions use leverage, and how households leverage, but I think the corporate sector being over levered is not something that resonates with me. And I don't know if it, you know, is coincident with the facts.

And the second point is on why somehow the DBCFT has managed to not provoke as much ire as others. The one, maybe two answers to that. One is because it's been coupled with expensing and people are quite excited about that. The people who might have you know, have been the worst off are really quite happy about expensing and that's a trade that they may actually like.

And then the second point is that you know, the people who really will get hit is the private equity industry in the United States is the ones who will potentially get quite hit. And I think there's enough in the rest of the plan that gives them, makes them feel okay. So I think, that I think helps them. The way they think about losses for example, I think that gives them enough.

Adam Posen: Thank you. Jason?

Jason Furman: On your first sort of metaquestion I think it's almost always the case that bottom up studies add up to more than top down studies find. You see that in the energy efficiency literature and climate change. When we asked the recovery act, all the different agencies in the government to estimate the total number of jobs created by all their different little programs, I think the number was like three hundred million. And you see that here.

And now it's possible that everyone's making offsetting errors so that would reconcile in macro with the micro. You know, in this case it was about a quarter point with the growth effect of all of this. I find it plausible that the difference between a really good business tax system that gets this perfectly right and one that's not is a quarter point, so I didn't think that was overly stretching it. But I agree that that's a general point.

I mean this gets to one of Mihir's analytic criticisms, I did think that more of the mileage is between sectors not within sectors. The paper is not equipped to study things between sectors because of the way the empirical model is set up. The fact is though, that it empirically does detect these differences across firms that have, within the same industry, that have different ratios of equipment to structures, or that have different debt equity structures for whatever reason.

And so sometimes it didn't assume this result, it found this result, I found in some ways it puzzling, because it found it not in the place I thought it as likely to be. I took that to mean it was a little bit more powerful. In terms of the interest deduction, I think I agree with everything that's been said. I mean one thing that the Ryan Brady plan did brilliantly was include border adjustment. And we've all spent so much time talking about border adjustment we didn't even notice this other huge thing in it.

There are ways to get halfway to the huge thing. In Germany, it's like a, I think you're only allowed to deduct interest up to thirty percent of your profits or something to that effects. And there's different ways to do haircuts than cap rules of which we sort have very unbinding ones here. I think ultimately though you have a lot of conservatives excited about interest expensing. I mean, expensing and the interest deductibility because they think it's a consumption tax. And when democrats realize what Mihir said, that it actually closes the private equity loophole, maybe it'll get done.

Adam Posen: Thanks. I don't want to make this ping-pong but I just do have to point out as someone who had a sort of mid-level, neither micro nor macro studied Germany versus U.S., I mean I find a lot of resonance with what Mihir said. So Germany has had that limit and it's very visible in different behavior in say, household real estate market or household debt. But in corporate structure, German firms are always vastly more leveraged than American firms. I mean, the debt finance, the preponderance of debt finance there is huge. And similarly despite having a better equity issue, the German's always raise the issue of we don't have an aktienkultur, an equity investment culture. So yeah, I don't want to debate here but it's not just the sleight of hand that micro doesn't add up to macro, there is something else as Mihir said, about corporate structure here.

Vitor Gaspar: Can I?

Adam Posen: Yeah.

Vitor Gaspar: There was something that I completely forgot to clarify. So in terms of the bench mark for the estimate of the one percentage point, what we do is we assume that the country that we are considering would have a distribution identical to the country that is in the 90th percentile. So since we don't do that with the firm that is at the 90th percentile but distribution of the country, I think that we're less vulnerable to the concern that you had that we were in a sense being too optimistic about what could be achieved. And we're comparing distributions with distributions and from that viewpoint we're not disturbing the game that much. So my intuition was that the effect was large for the experiment that we were conducting and I still believe that that is the case.

The other thing that I believe--

Mihir Desai: Can I just ask a question on that Vitor? Because this was very helpful, because I don't think I quite understood that. So you're taking the most precise distribution, right, the country with the most precise distribution and then what are you doing with the average? So I mean, I'm a low efficiency country, Jason's the high one, so I assume, I take on his dispersion and do I keep my average? Or do I take on his whole distribution or do I just take on the dispersion?

Vitor Gaspar: So – you want--

Adam Posen: Yeah. I was waiting for the switch to Laura.

Laura Jaramillo: Yes, so actually it's taking on the dispersion. What we're suggesting is that the more efficient firms in the country would become larger and the less efficient firms would, you know, because they're less efficient, have to drop out.

Mihir Desai: I have to drop out, okay.

Laura Jaramillo: So it doesn't mean that we're all of a sudden making the less efficient firms more productive. I mean, there are many reasons why they're less productive, because the manager--

Mihir Desai: But you take them out and you make the big ones bigger?

Laura Jaramillo: So you're actually shifting the resources from those that are less productive to those that are more. So we're not making an emerging market an advanced economy because there are other reasons why--

Mihir Desai: Sure.

Laura Jaramillo: --they have that, they're productivities. But we're just saying that the resources that they do have, they should be assigned to the more productive.

Mihir Desai: Okay. Great. Sorry to interrupt Vitor.

Adam Posen: No, this is great. So thank you. Let me open it up now to – no. Let me open it up now to questions.

Vitor Gaspar: I, I--

Adam Posen: No.

Vitor Gaspar: No? Really?

Adam Posen: Let me open it up now to questions. So there's a microphone at back and there's a traveling mic up front. I guess since none of our guests are speaking we'll go to an internal questioner.

Nicolas Véron: Nicolas Véron here at the Institute. Thanks for the very thought provoking presentations and my question is on this, I think, very compelling view of the small business trap that you gave us as part of the paper. And starting from Mihir's comments I have a question to the paper authors and a question to Jason. So question to Jason is how do you view this question of the small, this issue of the small business trap from a U.S perspective because in the U.S we often hear that the SME's are paying more tax because they are less good at exploiting loopholes than large business, so what would be the U.S. view on this? And to the author's, just how to you react to Mihir's skepticism again shifting from small to new, we all know the political drivers of the preferences for small businesses, but how would you take his critique into account to sort of do a sexy or compelling policy [inaudible 01:11:21] a bit like the IMF has done for you know, ending shoe subsidies and things like that?

Jason Furman: So should I go first? So in general small businesses pay lower taxes in the United States than larger businesses with a lot of heterogeneity in both. That's one, because small businesses are more likely to be pass-throughs, so they'll only pay one level of tax rather than larger businesses, which tend to be sea corps which are paying two levels of taxes. There's certain things in the tax code which are preferential. So small businesses get to expense all of their business investment already and they get to deduct their interest on it. The large businesses don't get to do that. And then just what the paper very politely calls informality, which could also be tax cheating, is far more extensive, and is massively concentrated in the small business sector. Although of course, there's many wonderful tax paying small businesses and I love them too. And patronize the--

Adam Posen: You're no longer in government, Jason, you don't have to say that.

Jason Furman: I don't need to say that. None of them. No. So in general, so I had never seen empirical evidence on the small business trap in the United States. But that resonated with me as a problem in our tax system.

Vitor Gaspar: So on the small versus new and innovative companies, we looked at the issue in detail one year ago when we were looking and identifying these externalities having to do with innovation which are important at the sectoral level, at the national level and at the global level. So our conclusion one year ago was that it was worthwhile to subsidize these activities and we went into issues of design, right. In order to be able to do that you have to be able to target firms that actually innovate.

The evidence that we collected shows that the way it is done is quite challenging in terms of the administrative capacity that it requires. But we did show that it can be done properly so it's not, it's a very good design question but some countries have been able to tackle that quite effectively.

Adam Posen: Laura, do you want to add something?

Laura Jaramillo: I'd like to add something. So we do recognize that small businesses will tend to face higher tax compliance costs. So even though their tax rates might be lower, it's more costly for them to submit their tax payments every month or every quarter. So that's why part of our report we're saying that governments should really try to reduce those compliance costs because they will very quickly reduce the costs on small and young firms and they'll be able to grow and be more productive.

Adam Posen: Thank you. Another question from the audience? Yes, please.

Sherry Stevenson: Thanks very much to the panel. I am not an expert on taxes, I hope this is relevant but--

Adam Posen: I'm sorry. Your name and affiliation please.

Sherry Stevenson: Oh sorry. Sherry Stevenson with the International Center for Trade and Sustainable Development based in Geneva, Switzerland. It's a think tank. I heard a program recently in the U.S. discussing how the U.S. has become effectively de facto a tax haven for a lot of basically unidentified money and even money laundering, and how it's possible to open a company in Delaware with absolutely no information, not even an ID, just a name and even that becomes a number and that this has basically de facto attracted a lot of elicit capital and so forth. And I was just wondering how this might impact your productivity numbers. I know you looked at it in terms of informal versus formal, but part of the informality would seem to me to be this kind of underground or elicit economy that is clearly not covered by the tax code as well. And this might have a bigger impact in countries which apparently now seems to be the United States that are easier to, where it's easier to basically place these unidentified funds. Thanks.

Adam Posen: Can I just sort of ask for a slightly expanded answer building on Dr. Stevenson's question. I mean, Mihir mentioned multinational corporations, we just talked about small businesses. How much is tax competition and tax havens effecting the kind of results that you're thinking about? What do you think of the size of that issue? Obviously we'd love to fix both problems. But sort of picking up on Dr. Stevenson, you know, how much should we be, if there's a limit around political capital, how much should we be worrying about BEPS versus worrying about domestic tax reform on simplification? I mean, how do we prioritize these things?

Vitor Gaspar: So if I may go first, the fiscal monitor chapter two looks at the general outline of your question and it shows, and that's something that I believe is very important, that the way taxes are enforced matters a lot for the allocation of resources. So typically when we think about tax evasion, the first thing that comes to mind is that tax evasion undermines the ability of the state to collect revenue. What the fiscal monitor shows is that the fact that you have some firms that do not pay taxes, or do not pay all taxes they should, while some of the firms are fully compliant, creates a misallocation of resources which is quite significant and does show in macro-economic statistics. I think that at least to the best of my knowledge, we are the first to emphasize that macroeconomic side of it. So it's a very important thing.

On your question about domestic versus international, the chapter two of the fiscal monitor is mostly about national tax systems. Of course everything that has to do with corporate tax has potential international ramifications. We have put out in 2014 an international tax spill overs report where we look at these types of things. And international cooperation in the area of tax is one of the areas where global cooperation is most important. But from the viewpoint of the activities of the fiscal affairs department, most of our activity in tax is about domestic national tax systems.

Adam Posen: Thank you very much, Vitor.

Mihir Desai: I was just going to – on this question, I think it's a really interesting question. So this idea that the U.S. is a tax haven has two pieces to it at least. One is at the corporate level, it is the case that a lot of foreign multinationals don't report any profits in the U.S. and that's for a variety of reasons that they're able to do that. At the individual level what you're hinting at is more on the individual level or some notion of pools of capital, nefarious pools of capital out there. I think that's probable less clear. The real problem in the U.S. is that we allow for so much anonymity with the creation of those entities. But a lot of those flows are taxed at the portfolio level as opposed to the entity level. If you're looking for a tax haven that people don't talk about you might look at the UK because of the non-dom rules there is a lot of activity in the UK that might be associated with that.

And then finally on tax competition generally, and this you know, relates to the DBECFT, you know, one of the puzzling facts despite all the high end ringing is that corporate tax revenues have been relatively robust. So we're acting as if they're falling and they're going to plummet and they're going away. That may happen but it's not showing up yet. And so that is one of the curious things about this, which is we do a lot of high end ringing about this problem and yet corporate tax revenues are not falling off a cliff. Now it is true that corporate profitability has been massive. And so maybe you want to have more corporate tax revenue than you've had. But the idea that it's disappearing I think is not exactly consistent with what's going on today.

Jason Furman: It's not disappearing but if you look at the share of income for sea corps versus pass-throughs, I think it's gone from about 75 percent in 1980 to about 40 or something percent now. So you do see a large, part of why it's not disappearing is you sort of have this self-help where everyone's moved over into a different system that doesn't have some of the same issues at least.

Adam Posen: Great. All right, one last question or? Please.

Speaker: Thank you, I'm [inaudible 01:20:54] with Goldman Sachs. Two quick questions. First one, there seems to be better TFP or R&D activity where there is more equity issuance. Have you looked at the causality, could it be the other way around? So where firms are more productive and more successful they have an easier time issuing equity. And so are we looking at it sort of, the wrong way? And this links to what Adam was saying about the equity culture in some countries, right. So some investors don't like the idea of losing money on their principal, so would you get to the point of recommending subsidizing equity ownership as a way of fostering this improvement in the structure of capital of the corporate sector? Thank you.

Vitor Gaspar: So we always worry about issues of causality and one of the techniques that we have been using systematically in the last months is the idea of the synthetic control method. So you try to look for a country that has introduced a change in policy that has not been followed by some other countries that are similar, and by looking at how they are different. We believe that we have some evidence that the thing is causal. Of course it's not fully conclusive as you well know. But it's a way of trying to get around these issues. When it comes to innovation and the link between innovation and equity and whether we go as far as to argue for subsidizing equity, we don't. So if we look at tax rules around the world, the discrimination against equity is so large that eliminating it seems to be a large enough experiment for one to look at. And we do have that experiment in countries that have adopted this allowance for corporate equity and it does look like, in terms of reducing levels of debt, and increasing levels of equity, the effects seem to be large. And we have those estimates. What we do argue should be subsidized is innovation because we believe we have been able to estimate quite sizable external effects and that does justify a subsidy that could have important effects on allocations of resources and growth.

Adam Posen: Does anyone else, Mihir or Jason or Laura want to comment? Okay. Well thank you all very much for engaging. This is obviously an in depth dive and I give great credit to Laura, Vitor and their colleagues in the fiscal affairs department at the Fund for continuing to advance really relevant important research. And thanks as well to Mihir and Jason for reading the paper. This meeting is adjourned.