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PRODUCTIVITY SLOWDOWN AND WAGE STAGNATION: CAUSES AND POLICY IMPLICATIONS

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P R O C E E D I N G S

MR. QURESHI: I would like to welcome you all to this event. I'm Zia Qureshi. I'm a Visiting Fellow in the Global Economy and Development Program here at Brookings. It's great to have you here, and great to see a full house.

We have a very interesting and topical agenda for our discussion today. Productivity growth, which is the main driver of economic growth and rise in incomes in the medium to long term, has slowed over the past couple of decades.

There is much debate and ongoing research about whether we are measuring productivity correctly, especially in the new digital economy, issues such as accounting for new services, products and services of the digital economy, such as Google searches.

So, that debate and research continue, but overall research suggests that the slowdown in productivity growth, for the most part, is real, not illusory or an artifact of mismeasurement.

Another important trend over the same period has been that wages have been decoupling from productivity, growing even more slowly than productivity growth, particularly at low to middle wage levels, causing the labor sharing income to fall, and wage inequalities to rise.

The result of these trends has been that incomes have been rising more slowly and more unequally, and these outcomes are a part of the dynamics behind today's rising societal discontent and political populism, and fears about the future of growth rising from the new technologies, fears about what some call the "Coming Robocalypse" only add to societal anxieties.

To varying degrees, the trends of slowing productivity, median wage stagnation and rising income inequality are reflected in many or most major economies. Recent U.S. experience illustrates these trends, particularly directly. In the past decade average labor productivity in the U.S. was lower than half of what it was in the previous

decade.

As productivity slowed, wage growth slowed even more. With the real median wage growth amounting to only about a quarter of labor productivity growth over the past two decades, and over roughly the same period income inequality in the U.S., for instance, as measured by the share of the richest 1 percent in income more than doubled.

So, these trends lead to the important questions. Why has productivity growth slowed despite a boom in new technologies? Why do we see this paradox? Amid the current buzz about the digital transformation and the Fourth Industrial Revolution one would expect productivity growth to accelerate rather than slow.

What it's the -- who is right in the debate between the techno pessimists who say that innovation has weakened, and today's new technologies, inherently, intrinsically are less consequential for productivity than past technological breakthroughs, such as electrification, internal combustion engine.

And on the other hand, techno optimists who say, no, digital technologies and continuing new advances, in particular in artificial intelligence, are truly transformative in terms of their productivity growth potential, and a burst in productivity growth is delayed or constrained only by various lags and barriers.

Regarding wages the question is: why are they decoupling from productivity growth causing the labor income share to fall and wage inequalities to rise? Are there some common factors behind these productivity wage and income distribution trends? And what are the implications for public policy?

So these are the questions we have. And we have a very strong panel with us today to address these questions.

Starting from my immediate left we have Heather Boushey, who is Executive Director and Chief Economist at Washington Centre for Equitable Growth. Next, we have William Maloney who is Chief Economist for Equitable Growth, Finance and Institutions at The World Bank; then Cyrille Schwellnus who is Head of the Labor Market

Workstream in OECD's Economics Department; and then Jeromin Zettelmeyer who is a Senior Fellow at the Peterson Institute for International Economics.

You have their bios in the event handout and they're also posted online. So I will not go into the details of the bios, but I would only say that our panel today has authoritative credentials to speak about the questions at hand. And also, it so happens that each of them has recently published a book on related issues.

On productivity, Bill Maloney has coauthored the book, which is here, "Productivity Revisited: Shifting Paradigms in Analysis and Policy".

And Jeromin Zettelmeyer has co-edited the book, "Facing Up to Low Productivity Growth" which actually has been published just this week by the Peterson Institute.

On wages and inequality, Cyrille Schwellnus is the lead author of the latest "OECD Economic Outlook" which has a special focus on the issue of productivity, wage decoupling.

And Heather Boushey who co-edited the book, " After Piketty: The Agenda for Economics and Inequality", this is heftier. So, we have four recent books on these issues, which I would highly recommend that you look at if you haven't already.

So, without further ado let me turn to our panelists. We will first have a discussion within the panel for about -- for up to an hour, which should leave us a good amount of time for questions from the floor.

So let me turn first to the issue of productivity, and to Bill. Bill, from the vantage point of your recent book, how do you see the productivity paradox? Why do we see this paradox, what factors explain the slowdown in productivity amid a seeming boom in new technologies?

In your book you discuss improvements in productivity data, and analytics, and what you call the second wave of productivity analysis: What new light does the second wave shed on the productivity dynamics that we have seen and we are seeing? At the firm

level, do the data show an increasing productivity divide between successful firms at the technological frontier, and the vast majority of other firms whose productivity has slowed, or is stagnating?

So, frontier firms' productivity remains robust, the vast majority of other firms there's a severe productivity slowdown, or stagnation. Recent OECD analysis, and a similar -- and other recent analysis shows that that is indeed the case, that there is this increasing divergence in productivity across firms which is bringing down average aggregate productivity growth.

If that is correct that would suggest that it's not innovation that has weakened as claimed by techno pessimists, but rather it's diffusion across firms. In other words, it's not that the innovation engine has slowed, but it's the diffusion engine that has slowed. So, from your recent work, if you would, to provide your perspective on this. Thank you.

MR. MALONEY: Thank you, Zia. Thank all of you for coming. The issue of productivity -- I'm from The World Bank, we deal mostly with developing countries, but nonetheless you see that developing country growth and productivity growth tracks advanced country growth reasonably well. So that if we can -- if we expect a slowdown in productivity growth in the advanced countries, sooner or later that is transmitted to lower growth in the developing countries, and that makes it harder to eliminate the remaining pockets of poverty that we are going after.

As a result of that we started something, we are calling it Productivity Project, which right now is a three-volume series, but there's going to be a fourth and a fifth coming on, looking at various different aspects of productivity and how we should be thinking about it. And this particularly volume we call: "Second Wave Productivity Analysis", because over the last 15 years there have been a lot of rethinking of how we should conceptualize productivity, what we're talking about, and how we infer causality about productivity, what's driving it, and the causes as well.

And so, at least from the point of view of our practitioners, it's been very important to walk through these changes and see a little bit how they shed light on the advanced country productivity growth, but then also to explain the bigger question for us which is: why developing countries don't catch up faster than they do, which is what I'll call the trillion-dollar question.

So, briefly, one aspect of that is -- revisit us -- when we talk about TFP growth what are we talking about? And frequently we think, okay, that's just efficiency gains, but when you break it out more carefully, and this is what part of second wave is doing, it includes things like quality growth, it includes things like market power, both bad market power, and good market power that comes.

If I have a good idea, a good trademark, I get higher value added. That's good, and that all winds up in our TFP calculations as we normally do them. So that changes our priorities a little bit from the point of view of practitioners that we are looking at.

But it also makes some of the inference to data about what drives productivity ups and downs a little more suspect, because we have a trade liberalization that affect both efficiency, it also affects the amounts of rents I get as a producer, and those two things can move in opposite directions and cause us to make the wrong inference about what the impact of, for instance, trade liberalization on productivity is.

Another aspect of the second wave has been revisiting the rule of distortions in the economy, and how much we should be focusing on that.

Pete Klenow and Chang-Tai Hsieh wrote a very influential paper about 15 years ago arguing that you could use a dispersion of TFP. And Zia is telling me I'm getting too technical, and I'll stop that.

And we can therefore look at distortions in the economy that are preventing the reallocation of resources from those laggard firms to those faster-moving firms and how that can happen. There's been a lot of reconsideration of that on conceptual grounds and a lot of -- and subsequently on empirical grounds, what we can really say from that, and how

much we can say. Now this is a problem of distortions in the business environment that's causing the slowdown, that's what's driving it.

And that's been important because one of the hypotheses about why we've seen a slowdown is precisely an increase in the kind of regulations that are increasing throughout the advanced world. There's a problem here, which is that, the productivity slowdown has been coordinated across all the major countries, social policy has not been, labor policy has not been, competitive policy has not been, competition policy has not been.

So there's a little bit of an issue there of how far can we really go with this. And as a result I think, John Haltiwanger, you know, thinks of that as a very important element, and I think he's probably right, but whether that's going to get us all the way we need to go, I think is suspect.

And that kind of gets us to some things like, well, it could be the composition of our spending in the economy, as we get richer we spend less on manufacturing, manufacturing goods which are really easy to engineering, to engineer a productivity increase, and much more on string quartets and rock groups which will always require four people. So, productivity just cannot go up, whether it's Led Zeppelin or the Kronos Quartet, it's going to be four people.

So, that is an important element that we've got to work on, and it gives us almost (inaudible), but that, again, can't explain everything we've seen.

And so there's been a lot of look at mismeasurement, and again though, it's not been so much the kinds of measurement of the second wave thing, about how we're measuring productivity, per se, it tends to be things like: are we really measuring the contribution of YouTube, of these other new digital technologies and things, and Chad Syverson says, okay, well, let's give it the largest contribution that could come from this, and it doesn’t come close to explaining the slowdown.

Recently, another paper with Syverson, Rock and Brynjolfsson has come up with what they call the J-Curve. You know, why is it we have all this new -- Why can't I think

of the word? Well, very advanced technologies for searching datasets, and like I can't -- the timeline right now is (inaudible), old age.

And the fact is that in any new technology there a bunch of accompanying things, accompanying factors that have to go along, and that takes a long time to build up. And so Syverson and company were arguing what was probably going on here is simply that we're not -- we're throwing all those investments into costs, but we are not getting any kick out of it now, so we're underestimating TFP now, but give us 20 or 10 years, and we're going to see big increases in TFP.

That we know, that's an incipient part of the literature right now, but in the end, I think the real question comes down to, at least from my point of view, is to the kind of review is -- have we really seen a slowdown in the arrival of important, new technological advances? Or whether you take Gordon's point -- yeah where you take Gordon's point of view that everything that was really cool to invent, we invented at the beginning of the century, and everything else is now shiny but inconsequential.

And I think this is probably too pessimistic a view from our point of view. If you look from 1900 to about 1920, the rate of productivity growth is roughly the same as it is now. Somehow from about 1919 to 1973 there was a doubling of productivity growth, for about those chunks of decades, and this recent productivity slowdown isn't since the crisis, and it's not even just before the crisis, it's from the '70s. Okay?

So there are very long movements that we have to explain in productivity growth, and those very long movements are probably exactly related to agglomerations with new technologies that come on, and I'll work through the system, and there are various different estimates.

How long did it take for the IT revolution to work through the first wave? About 20 years is the best guess. And then Chad Syverson says, yeah, not only that though, if you look at earlier things, there were multiple waves, the same technology kicks in first here, and then kicks in again 10/20 years later. So, we may be seeing multiple waves.

So the question is: whether you think these technologies, and we're not talking about YouTube, which you can wave away, but things like CRISPR, this ability to sequence genes, you know, and slice them up, and now we clone humans.

These are all new technologies that are not only giving us entirely new industries, and vast new industries, but there are also new tools for discovery. So we can expect a tremendous increase in rate of discover going forward, and the rate of discovery of more consequential investments.

And you throw on the fact that, whether we like it or not, there are other big countries in the world that are coming online in terms of very good scientists, and they're inventing stuff too. And we may be unhappy if they take our electric car, but if they discover the cure for cancer that will be very nice of China to do.

So, and we see a greater linkage and a greater -- that's a division of labor globally in terms of research and science. You see the major multinationals from Taiwan and the United States, for instance, outsourcing intermediate-level R&D tests to China and to India.

So, there's efficiency gains coming, not only from the rise of a tremendous increase in the stock of new scientists, but also just from how they're deployed globally, that I think are also going to kick in to increase the rate of discovery of consequential technologies.

So, I'm bullish, if you can't tell. And I have to be because I have a lot of people still in poverty we have to pull out, and that means the big countries need to grow fast. But I think that none of the new things in terms of the new measurement issues that we've been discussing recently in the literature really have come close to sorting out why it is we see the slowdown right now. Because if there's something about the crisis, fine, but I really think that in the long run this is a question of working these new technologies through the system and seeing what they give us. Thanks.

MR. QURESHI: Thank you. Let me turn to Jeromin now. If you could,

please focus on the relationship between competition and productivity slowdown. Do you see a weakening of competition in markets as an important factor in the productivity slowdown that we have seen; and also, the concurrent sluggishness in investment despite low-borrowing costs and high corporate profits?

There are various indicators that show that competition in markets has weakened. The rise in market concentration, and monopoly power, and increasing concentration of profits at the top end, boosted by higher markups and monopoly rents prompting some to call our era a new Robber Barron era, or a new Gilded Age.

In the U.S. market concentration has increased over the past couple of decades practically in all sectors of the economy, and these trends are more pronounced in the more technology-intensive sectors.

So there is a shift in markets toward less competition, increased monopoly power, more oligopolistic structures. Are there -- first, do you see the link between these developments in markets and the productivity dynamics that we see the slowdown?

And also related to that, are there forces inherent in the new technologies that produce a dominant firm, superstar firms, the winner-take-all outcomes; factors such as first mover advantages, network effects, economies of scale, the leverage that comes with big data, regulatory advantage? So, if you could address that relationship between competition in markets and productivity dynamics? Thank you.

MR. ZETTELMEYER: Thanks so much. So, maybe to start with the second point: so there are definitely these forces but -- so in other words, we have a type of technological innovation, particularly on the Internet platforms where there is a specific type of increasing returns to scale, so to speak, which are these network externalities. It's just efficient to have lots of users on the same platform, and that will tend to reduce competition.

But it will do it efficiently. Right? That's the trick. And so, you know, while this may contribute to the concentration, at least in some industries that has been observed, it couldn't really expand the productivity slowdown unless of course, you know, that market

power is then abused with respect to additional markets, which don't have these efficiency gains. Right?

And that's, in principle, something that competition authorities can prevent. I think they have the instruments. So, while I think that the superstar phenomenon is relevant phenomena, I don't think it can explain, first of all, concentration increases across, many, many industries, particularly in the U.S. Second, the observed correlation between concentration increases and the productivity slowdown, it just doesn't go the right way.

So, there's something else that might be going on, or has to be going on. So, to your broader question, you know: how much is this competition story a contributor? So, you know, Bill doesn't know, and I know less than Bill, so I don't really know.

My sense is this is part of the story in the U.S., and we have some pretty good papers in the U.S. that document this. I'm not sure how much -- what the contribution to the overall story is, even in the U.S., and I'm not sure how much it contributes to the global story.

So, with respect to the global story, I have seen a little bit of contradictory evidence on that, but my sense is that the increase in concentration is particularly a U.S. phenomenon. It's not as much of an issue in Europe. So, there's data by Thomas Philippon that shows essentially the concentration is flat in Europe, markets have not really gone down much.

So it's, again, you know, since the productivity slowdown, is the global phenomenon accomplished and cannot be the main story, or it would have had to go in the same direction everywhere, and at least in terms of extent, it has not.

And then as far as the U.S. is concerned, you know, I'm kind of with Bill that if you look at these -- I mean the basic regularities in these productivity cycles, these are long cycles, and there is -- it's hard to think that, unless you have a true sort of sea change in a factor that drives competition, you can switch from one cycle to the next because of competition changes. Right?

And as I said, you know, for me the network externalities are not the game changer because they do not explain what's going on in many industries, and then they produce the wrong correlation.

I don't think this is sort of the main story, but I think it could be an important story, and so there a bunch of papers that document to that, and the nice thing about this story is that we know how to think about it. Right? So that always helps.

So, there's less of a mystery here, because we are more in the sort of realm that we are used to thinking about as economists. And so basically there are two channels, one is a decline in business investments or competitive pressure -- or less competitive pressure would lead profitable firms to invest less and just sit on their rents.

And that is something we do observe. And then the decline in business dynamism, so that could be the other story; so one is that investment goes down so, you know, labor productivity would go down because the production then becomes less capital intensive, than in a more competitive environment.

The other story is about entry and exit. So, business dynamism goes down because of lower competition. It is a way of describing, you know, to competition, and that, in turns, would reduce total factor productivity growth, basically by allowing less productive firms to exist for a longer time.

And so we have some really nice papers. There's a very nice one by Germán Gutiérrez and Thomas Philippon from NYU that actually finds sort of a causal relationship between competition, and both the decline in investment and the decline in business dynamism, using sort of natural experiments and also some other econometric techniques.

And it's broadly consistent with the other set of work that Bill already mentioned by Ryan Decker and John Haltiwanger, and co-authors, who first of all confirmed that the decline in business dynamism, so lower entry and exit has contributed to the productivity slowdown in the U.S. And then also in another paper it documented that the

decline is mainly as a result of declining in the responsiveness of entry and exit to shocks rather than having actually less shocks.

So then, you know, the million-dollar question is: why does concentration go up? And so like I said before, you know, I view the evidence as being inconsistent, at least with the pure, super-strong, firm view which then would basically have the opposite prediction on how concentration should be correlated with productivity and investment across industry, so that would be sort of the good market power story that Bill told.

And so that sort of leaves you with alternatives that could have to do with either regulation, so there could be just more barriers to entry through regulation, or possibly competition enforcement, so how competition authorities actually operate. And so there's some evidence for both of these stories, and particularly there's sort of a nice contrast between Europe and the U.S. Right?

So, Europe of course on regulation, if you don't like regulation, Europe is worse than the U.S., on competition enforcement it's been tougher than the U.S. So there is generally a move towards laxer competition enforcement that has happened here, but not in Europe, and so, you know, conveniently it's also true that investment, broadly, has held up better in Europe than in the U.S.

So if you put all this together, it has some nice implications, and one particularly nice implication which is drawn in a paper by Jason Furman and Peter Orszag that's in our book, is this idea that maybe the decline in productivity growth and the increase in wage inequality are sort of two sides of the same coin, because they both could have to do with more concentration, for whatever reasons, but maybe particularly for these regulatory or enforcement reasons, and so on.

On one hand, you have less investment, less entry and exit, on the other hand, you have bigger rents, these rents are then, you know, first of all they lead to a higher share of capital with respect to labor, but also, importantly, they lead to increasing wage inequality, because some of these rents are passed on to the firms that earn the rents,

whereas the firms that do not earn the rents are poorer and pay their workers less.

And so there's also a lot of evidence consistent with the story that the increases in wage inequality in the U.S. have to do with across firm, or across establishment differences in pay, not so much across professions.

And that's a nice way of tying these stories together. So, I think it's a relevant story. I'm not sure it's the story that explains the productivity slowdown.

MR. QURESHI: Thank you. I think you're right. The trend toward a weakening of market competition seems to be much more pronounced in the U.S. And a couple of numbers that may be of interest to you from recent research, work by Eckerson and others recently estimated that the share of monopoly rents in the U.S. national income rose from as low as around 3 percent in 1985, to almost one-fifths in 2015. That's a whopping increase.

And another study, this one by Mordecai Kurz at Stanford, estimates that the share of total U.S. stock market value which he estimates reflects a monopoly power, what he calls "monopoly wealth", that that share of total U.S. stock market value has risen to as high as 80 percent from negligible levels around 1985. So one can quibble about some of these numbers, but they show an unmistakable trend, certainly in the context of the U.S. economy.

Let me turn now to Cyrille, on what's been happening on the wage side. Cyrille, your work at the OECD shows that productivity growth has slowed. But at the same time wages have decoupled from productivity and they've been growing even more slowly, with labor income share falling and wage inequality rising.

What are the factors that you see behind these outcomes? Is it: technological change favoring capital and more sophisticated worker skills, globalization and off-shoring, the rise of market power, and winner-take-all dynamics that we just touched on, the weakening of labor market institutions, a combination of all of these perhaps?

And also, are the -- and I think Jeromin just touched on this -- are the

slowdown in productivity growth, and the wage stagnation and decoupling that we have seen, are they linked by common factors, common drivers?

MR. SCHWELLNUS: Thank you, Zia. So, you know, a short answer, yeah, it's a combination of all these. But let me just maybe start with the motivation of why we looked into this question of decoupling of, you know, middle wages, median wages from productivity. So, you know, even if real wages perfectly tracked productivity, you know, a slowdown in productivity growth would be bad news for workers, but what we realized is that in many countries, by no means in all countries, wages don't even track this feeble rate of productivity growth.

You know, in accounting terms that reflects declines in labor shares as average wages have decoupled from productivity, and increases in wage inequality as median wages have decoupled from average wages.

Now, you might wonder: why are we concerned about this? You know, after all, we know that the simple tax model by which wages are equal to revenue, productivity is not, it doesn't hold in reality.

So, I think there are two reasons why we care about this: one is we care about the market distribution of income, and clearly a decline in the wage share has an impact on the market distribution of income since capital, and therefore capital income is very concentrated on the (inaudible).

So, for many households in OECD countries wages are the only source of market income. So, as a question of, you know: how are these declines and labor shares linked with the distribution of market income?

And I think a second broader question is, and that motivates this work is that actually, you know, this decoupling might tell us about, you know, more fundamental changes in the economy. Up until the 1970s, I mean for all the countries for which we have data, actually the text-book model was pretty accurate.

So, median wages and average wages tended to follow productivity growth,

so that indicates that, you know, something foundational might have changed so maybe, as Zia said, you know, technological change might have become more labor-displacing, there might be an increase in market power. So in your competition relate to trends, as Jeromin said, or there might also be, you know, as Robert Solow tends to argue, a change in the social contract by which there is a change in how we should distribute our market trends between workers and capital (inaudible).

You know, the second part of the question: So what are the drivers? And so I think from my point of view, I mean, we have to be very humble about what we can actually say. So, it's very difficult, in empirical terms, to distinguish between the effects of trade, technological change and institutional change.

So, everything happens at the same time, so empirically I mean there are limits of what we can say, and obviously, you know, trade and technological change are linked, so we should be humble about what we can say, but how we approach this is that obviously these changes, the technological change, globalization, institutional change, don't happen at the same time, in all the countries, in all industries.

So we can use this variation across industries and countries, you know, to get a rough idea of the quantitative orders of magnitude. So, what we find here is, you know, the drivers of this decoupling are a combination of global factors and more domestic country-specific factors.

So, in the group of the global factors, there's technological change which we measure by, you know, the change in investment prices which over our sample period are mainly changes in ICT equipment. So we look, you know, in our empirical analysis from the 1990s to around 2015, and we find that technological change, you know, has not only been skill-biased, but it has also been labor-displacing.

In the sense that these declines in the price of investment goods, lead to a substitution of capital for labor and, you know, the capital-intense -- the increase in capital intensity which we would expect to lead to real wage gains has actually only led to a

moderate wage gain. So that's one factor, technological change that becomes labor displacing, to some extent.

A second factor, you know, is offshoring so the offshoring of the most labor-intensive status of production abroad, which also leads similarly to production becoming more capital intensive and not necessarily leading to big wage gains. Perhaps also because, you know, this offshoring changes the relative bargaining position of workers in capital owners.

So, quantitatively what we find is that, you know, both these effects are at play but, you know, the effect of technological change is about, you know, on average three times bigger, or spans three times what the offshoring explanation can explain.

And that might be because, you know, up to now offshoring has mainly affected the manufacturing sector whereas, you know, the technological change, the ICT revolution has been affecting both manufacturing and services.

So, that's the global factors, but in terms of domestic factors, there are -- of course what Zia said -- these are differences in labor market institutions, and what we really need to understand is that, you know, this decoupling has not been homogenous across countries. So, there are big differences across countries, in the U.S., in Japan, to some extent over some periods in Germany, we've seen big declines in labor shares, increase in wage inequality, but in other countries you don't.

So, you know, in the U.K. we don't observe that, in France we don't observe that, so it's not totally generalized, so there must be some country-specific stuff going on that can explain that.

You know, labor market institutions are one part of the story, so I think in some countries we've observed a weakening of labor market policies in institutions like employment protection, collective bargaining, you know, which in many countries has become more decentralized. In some countries we've also seen a decline in minimum wages, and all this might contribute also to declines in labor shares, and an increase in

wage inequality.

But I want to focus on an additional explanation that can, to some extent, explain differences across countries which is differences in firm dynamics. So, what in our research, what we observe is that in countries in which the labor share has declined new firms with very high productivity and very low labor shares displace firms at the technological -- incumbent firms at the technological frontier.

And so that, you know, since these new firms at the technological frontier have very low labor shares. That contributes to the labor share decline, and it might to some extent reflect when I take most dynamics as Jeromin has already discussed.

So, I have to speed up, so I'm going to get to the third part of the question, which is: you know, whether these developments in productivity, so productivity slowdown, and the decoupling of median wages from productivity are linked?

And so I think one interesting observation is that, you know, the decline in productivity growth and the decoupling have coincided with growing performance gaps in terms of revenue productivity as Bill said, so it's not -- you know, we would like to measure physical productivity, but we measure revenue productivity, have coincided with growing performance gaps and revenue productivity.

And so, here there are two stories. Right? As Jeromin already said, they might -- you know, on the one hand it might be a pure technology explanation, so it might be growing performance gaps between firms, the technological leaders and the rest, because there are barriers to technology diffusion. Okay? Because, of whatever, a complement that -- there's a need for complementary investments to adopt new technologies, and that might lead to some diversions across firms.

And I think there's the second explanation which Jeromin has focused on is increased market power. So, you know, the successful firms, you know, take advantages of economies of scale, economies of scope to raise their productivity, but also gain a dominant market position might be able to raise their markups.

And, you know, that might be a reward to innovation so that would be a good thing, it would be the efficient response to, you know, to technological change. I think, you know, I'm more positive about this explanation than Jeromin, but there's of course the other explanation that it reflects anti-competitive forces.

So, you know, we've observed that there is decline in business dynamism, there's increase in M&A activity, and so that might also drive rents. But, you know, maybe we can get back to this discussion later. Thanks.

MR. QURESHI: Thank you, Cyrille. Heather, your recent work is focused on, a major focus inequality, employment and wages in the U.S. So, if you could, please, focus on the case of the U.S., some of the trends that we -- Cyrille was just talking about the productivity wage decoupling, the fall in labor income share, the rise in wage inequality, the rise in overall income inequality, and these trends have been much more pronounced in the U.S. than in some of the other major economies. Why is that so? How do you see that?

MS. BOUSHEY: Well, that's a good question. We are a leader in so many ways here in the United States on inequality and in so many other things. Thank you very much. I've actually learned a lot already on this panel, and fortunately, so that we can keep on time, some of the ideas that I wanted to touch on, on competition and concentration, have already been elevated. So I can go over that part briefly.

But at the Washington Center for Equitable Growth, we have spent the past five years investigating the question of whether and how inequality affects the economic outcomes. We funded over 180 scholars; I've given away $4.5 million investigating various aspects of this question.

And so what I want to actually weave into my answer here, is some of the research findings that we've discovered that get at this question of the intersection between inequality and productivity. But I'll start with just a few things about inequality and why it's so different in the U.S.

So the United States is clearly and outlier, you know, for many decades,

certainly when I was coming up to graduate school and beyond, the big answer for why we had rising inequality in the United States was because of skill-based technology change. Because technological change was moving in a direction that meant that there was more demand for higher-skilled workers, less demand for less-skilled workers. This is what was pulling apart at the U.S. labor market.

But increasingly, there is more and more evidence that this is not an adequate explanation for what's been happening. You see, and you've brought my very heavy book there, "After Piketty" as I was saying to Bill, it's seven pages shorter than the original, but Thomas Piketty's work with Emmanuel Saez, and many other scholars, has documented that in the U.S., it isn't just that inequality has risen, but that we've seen this pulling apart of people at the very, very top of the income spectrum in ways that we haven't seen for over a century, and in ways that really make us an outlier internationally.

But it's not just along the lines of income, it's also along the lines of wealth, and I think therein lies some, where a lot of the new research and evidence is pointing to an intersection between these trends and income inequality, the trends in wealth and equality, rise in economic concentration, and what this means for wages and productivity.

So, one other implication of rising inequality in the United States is the U.S. has also seen lower economic mobility. So the probably that a kid born in 1980 is out earning his or her parents today, is a little over half the probability as it was for somebody born in 1940. This is from research by Thomas Chetty, and a number of folks. I see Bill, like nodding, yes. We're sort of familiar with this.

MR. MALONEY: I'm supporting it.

MS. BOUSHEY: Yeah. No, no, but I mean it's good. So this is the new fact at the U.S. economy, and of course one of the things that they found in that research, is the biggest reason, or that in order to have seen higher mobility, we would have had to see much less inequality in recent years. So that's really a part of this problem with mobility.

And I want to point -- so of in making the link to productivity, to another

piece of research also by Chetty that we helped fund Equitable Growth with a team of amazing scholars, where they looked at what leads to people becoming innovators. And I know that Chetty spoke about that here at Brookings about a-year-and-a-month ago, but what they found is that if you -- and actually before I say what they found; let me describe their data, because it's super cool and interesting.

Their data on individuals who filed for or receive patents, their income, they also had data on that person's test scores when they were in third grade, and that person's parental income when they were in third grade, along with their race and gender, and like millions of observations.

And so the first thing they found was, you know, was quite sort of sensible, that if you actually scored good on your third grade math test, much more likely to grow up and become an innovator. It seems perfectly logical to me. Right?

Then, when they overlay the other data they had, they found that the probability of becoming an innovator, even if you scored high on those third-grade tests, was vastly reduced if you came from a non-wealthy family.

And that data point, in terms of how inequality is affecting productivity I think is very -- for me I find it very palpable. Right? And now, we can have a long conversation about what patents mean; so, setting that aside for a minute, happy to talk about that if we get to the Q&A.

But what that means is that because of inequality there are millions of smart young kids, whose opportunity is being obstructed in some way from becoming the innovators that they could be in our economy. Now I am not an expert on international comparisons of the innovation or productivity, meaning that the other folks here on the panel are, but I do know that the United States is and has been a leader in innovation.

And if our high inequality today is leading to these obstructions for kids, and for low-income families, and women, and people of color, because those are both also overlaid in this particular study, then that could be having a very important effect, both in the

United States and worldwide.

That's just one of the pieces of evidence of the ways that there is this intersection between inequality and productivity and growth. Now, one of the interesting studies that a number of folks have pointed to, I think Jeromin, a chapter in the book that you wrote, by Jason Furman and Peter Orszag, points to this. Kind of rejects a little bit the idea that inequality is leading to declining productivity in favor of the answer that it's actually -- because there might a common cause, which is this rising concentration.

And I won't repeat what other folks have said up here, but I hope, as you walk away from this panel, the idea that rising economic concentration, and that there are no piles of papers, of research papers that are making a very coherent case, that that inequality is a really important piece of the puzzle is, I hope, a takeaway for you all.

One thing I want to underscore is: it isn't just the rising concentration across firms, but the rising concentration in ownership across firms, because we're seeing that as well, and this is a new, sort of cutting-edge place of the literature, a number of working papers, some published bit really sort of where the next generation is, that because you have a small number of people who are owning majority stakes in a large number of firms in a particular industry that, too, is having this effect. And of course these are all connected when you look at the data.

So, I think that, you know, first, I do think that there is evidence that the U.S. is an outlier in our inequality trends. It can't be explained by the traditional ways that we've thought about them.

The way that inequality looks in the United States, there is growing evidence, and I've just given you one data point, that it is obstructing the factors that lead to productivity and growth, and in a variety ways, both inside firms and across human capital development, but also this way that the rising concentration is subverting the processes that lead to growth. And with that I'll pause.

MR. QURESHI: Thank you. So, let me turn quickly to what the policy

implications of some of these trends and analysis might be. And so if we can take just no more than three minutes each, because we want to leave some time for questions. So, first, Bill. With respect to the productivity paradox, how can technological change be harnessed better to produce better productivity outcomes and more broadly-shared productivity outcomes?

It's not just the firms at the frontier achieving productivity growth, but more broadly that there is more diffusion. And of course the agenda varies from across countries, but what would be some of the main sort of headline messages from your analysis on that?

MR. MALONEY: So, we tend to think of technological diffusion as something abstract. Someone has a great idea and it diffuses, and what's missing there is of course that somebody, a human operating in some context is doing the diffusing. So part of the barrier to diffusion within the advanced countries can be exactly the kinds of distortions or increased industrial concentration, for instance that prevents people from coming in, (inaudible), all those things could be partly barriers.

And certainly in the developing world if you think about what we call the enabling environment, or the operating environment, there are many, many things which are missing, which a person who either identified and idea, and abroad that they wanted to take to a developing country and implement it, would find a barrier -- would find barriers to them actually implementing that idea, and diffusing it throughout their local context.

But one of the things we stress is, that's not the whole story, and that's a little bit what we're pushing against this all in the operating environment, it's all in the supporting environment, that a lot has to do with human capital, but human capital, not as we're talking about in the human capital index of, you know, secondary education, just what it takes to actually be an entrepreneur who has the capability of identifying a new idea, understanding the potential for profitability, undertaking a risk analysis of how risky it's going to be and what he can do to mitigate those risks.

And that actually is a very advanced set of skills, and as technology

becomes more and more complex you can imagine that the set of skills to really evaluate what AI can do for my company, is going to be increasing over time, and understanding the risk around it, and how your market is going to be changing as a result of this, is going to require more and more capabilities on the part of the entrepreneurs, as we call them.

So, at the same time when we're talking about -- we have to keep in mind that any such decision to try to import a technology to -- to take a technology whether to my firm or to my country, it's fundamentally an informed bet. This is risk. Okay?

And we have to think that development in general, and growth in general is a bunch of people placing bets. So we really have to think about particularly in the kind of countries I deal with it, is how well we have done in terms of creating experimental societies, that is where the environment enables people to learn about new possibilities, new bets they could take, and helps them mitigate and manage risk.

And that's on the one hand. On the other hand, the part of these experimental societies is precisely individuals who are capable of taking those risks. And that requires all those capabilities I was just discussing.

And I think, we have to work on both ends. I think my beloved institution has been a little bit guilty of focusing entirely on the enabling environment, and that once we get rid of all the distortions, boom, everyone is going to take these ideas from the U.S. and the U.K., France, and take them to Ghana.

It takes a special kind of person to make that happen too, and I think we need to be focusing more and more on that. And I think that's both in the developing world, but I also think to manage the new kind of technologies that come along, it's a lot harder than saying, oh, I see, if we take one of these new motors and harness it to some bicycle parts we can make a car. That's a different kind of technological adoption in 1930 than what we've got today.

MR. QURESHI: Jeromin, from the vantage point of your recent book that focuses on the potential consequences of a sustained slowdown in productivity growth, how

do you see the policy implications of slower productivity growth in terms of whether we focus on reversing the slowdown, in other words, mitigation, or living with it, in other words, adaptation?

And on competition policy, competition, you've already addressed that, but from your -- given your European perspective, you've worked in the German Government, and EBRD. How do you see the competition policy agenda playing out in Europe in terms of any significant developments there?

MR. ZETTELMEYER: Thanks a lot. So, let me make three points. So, the first is about this, what we call adaptive policy changes. So, basically in this book we went through a thought experiment, which is to say, you know, if the productivity slowdown was sustained, in the sense that we keep seeing mediocre and low productivity growth, essentially frozen at the average level since the Great Recession continued for another 20 years, what would happen to the world. Right?

Apart from the obvious thing, that is we would be poorer relative to the counterfactual. And so, if you go through these experiments first, we would have more fiscal pressures because even though we would expect to live in a lower-interest environment, some of, you know, primary expenditures like related to poverty, or expenditures that are indexed to inflation, and as such do not go down, when productivity growth goes down it would go up, and some sources of revenue where productivity growth helps you.

So, in the U.S., for example, there's a theme called Real Bracket Creep, which means revenues tend to go up with real growth. They wouldn't be there, so at the margin it makes the U.S. fiscal problem in particular worse. It creates, also essentially, a continuation of the low-interest environment that we have lived in for a long time, which generates financial risks, it complicates the conduct of monetary policy, it can lead to bubbles.

And of course, we argue that it's also -- this whole environment is conducive to high inequality to the extent that it has to do with concentration. And so, you know, what

would you do? You can think about policies that deal with the symptoms, so to speak, which is, you know, you need to defend fiscal space, you don't what to give big tax cuts in this type of environment. You want to strengthen automatic stabilizers to help monetary policy, you want to be particularly tough on macroprudential regulations, or generally, you know, supervision of financial sector to prevent these bubbles.

You would want to rebalance maybe tax incentives to encourage labor force participation to sort of offset the slower wage growth. And of course you would want more redistributive tax system.

So, in other words, you want more or less the opposite of what the Trump administration has been doing in the last couple of years.

Now, the point though is, another important lesson from this work is, to the extent that you think that in fact, higher inequality and low productivity growth are related, there is actually not much of a conflict between this form of more adaptive policies, and the types of policies that you want to implement to push against the slowdown in productivity growth. Right?

So, in particular, anything that helps competition is good for both. That's sort of music to Heather's ears. Right? So, this is, you know, it dissipates rents, it reduces the market power firms against other firms, and particularly against workers, and of course competition also enhances innovation and creates incentives to invest.

Anything that strengthens the bargaining power of workers, from the point of view of improving their ability to move across firms, is good, so it could be geographic labor mobility, it could portability of health care, so single-payer health care would be great in that respect, for example.

I don't want to get too political, but it would be good, you know, because it would essentially make -- increase business dynamism, and at the same time it would be good for productivity of workers, and reduce inequality.

And so that is kind of that set of implications. Now, on final point on

competition: so you would think that in a sense the fact that we are in this relatively rare situation where we are no longer in the sort of typical Washington Consensus, you're either for it or against it thing, but we sort of tend to think that there's a whole important sets of policies that both good for growth, and both good for increasing inequality.

You would think this makes, you know, pro-competition, pro-mobility, pro-worker policies easier. Now, the big problem with this is that the whole economic nationalism stuff throws a wrench into this favorable picture. Because, you know, everyone is obsessed with: how do we deal with China? And so this China phenomenon is triggering a backlash, and in many cases, in Europe, and in particular, sort of an anti-competition move, because suddenly the priority is: we need enormous firms that we are going to have to subsidize, we'll save money, or at least we need to allow their creation, which means we need to -- we can merger a law.

And so, you know, right now it's not looking that pretty. So, the political environment for these types of reforms, particularly in areas of the world that have picked the low-hanging fruit, like in Europe, we have (inaudible) of tax systems, we have a universal health care, and all those sorts of things, tends to push in the wrong direction.

And so this is a battle that you're going to see in the next year or so. So that the German Government, for example, has just published, I think they call National Industrial Strategy 2030, which is in a sense the German answer to Made in China 2025, but also to Trump in some respects. It's the sort of German style economic nationalism, there's a big call for industrial policy there which is completely in this form, alien to the German tradition, it's closer to what the French have done.

And there is the sense that, you know, maybe new competition policy which we all view as -- at least I do -- as a benefit, both for growth and for equality in Europe. Maybe that's the problem; that we need to water that down to allow these big mergers. So there's a conflict point brewing there.

MR. QURESHI: Thank you, Jeromin. With respect to labor market

outcomes, Cyrille, as the digital revolution continues, and in the next phase led by artificial intelligence, are the declining labor market income, a rise in wage inequalities, are these here to stay? Are these the new -- the stylized facts of the new digital economy? Or are there policies that can achieve better results, both respect to productivity, and labor market outcomes? Briefly, in three minutes, please, just the headlines.

MR. SCHWELLNUS: Well, I don't think I would have an answer, if I had several hours. But I'd let me try to summarize in three minutes. So, I think well artificial intelligence, and I would add something else, remote intelligence will do, so the increased ease of telework across borders is that, you know, a lot of the things that have up now affected the manufacturing sector are going to affect white-collar jobs and the services sector.

And so that's going to be a big change. You know, we don't know anything about the long term, that's highly speculative, you know, it's likely that in the long term that will lead to more productive jobs, and better jobs, but the problem is the short term.

And in the short term, you know, what we see is that the right of job displacement might actually outpace the right of job creation, and so at the OECD, you know, we have a few numbers on, you know, believe them or not, and on the percentage of jobs that are at the risk of a disappearing, and so more or less that's 10 percent.

I mean, there are other estimates around that are higher and, you know, an additional significant share of jobs are at risk changing very rapidly. And so, you know, what has to be done is to prepare both workers and firms for these changes. So, you know, we've already discussed a few worrying signs, so a lot of firms are actually decoupling from the productivity frontier, so that's an increase productivity dispersion, increase in productivity gaps.

We also see that the employment rate of low-skilled male people is declining, across OECD countries, so not only in the U.S., across the OECD, and that, you know, skills of people remaining in employment, especially in, you know, skills relating to

working in a digital environment are very, very weak.

And so that implies that, you know, I think for an ideal policy mix would be to support the broad-based adoption of technologies across all firms, and obviously one thing you need for that is, as Jeromin already discussed is, you know, a good level of product market competition, you know, easy entry and exit into product markets, easy access to finance, so one problem for technology adoption I think is that increasingly in the digital age, you know, intangible assets become more important and, you know, you cannot use intangible assets as collateral, so a lot of firms don't have access to finance to adopt these new technologies.

We need to promote managerial capacities of workers and firms, and so that's one part of the ideal policy response. I think the second part is, you know, to have a fairly generous wealth, and to support workers who lose their jobs.

You know, one example is Denmark. You know, they have very high replacement rates, at very low levels of wages. But the replacement rate is capped at USD2,000. So if you lose your job, you are a low-skilled worker, you'll support it, but, you know, the third element is that you need to also activate these workers, you cannot just support them, whatever, but you activate them through training policies, you know, job search, job counseling, relocation, and sometimes even wage subsidies.

So, I think there's nothing really new about the policies we need, it's the vigorous implementation of these policies that we need in the digital age.

MR. QURESHI: Thank you. The last question to Heather, focusing on the U.S. economy, how to achieve more inclusive outcomes. Often, discussions of policies to improve equity focus narrowly on redistribution, tax, and transfer policies. Of course they're important but there's a big agenda of pre-distribution.

How to make the growth process itself, more inclusive? So that leads you to the domain of reforms in product markets, labor markets, up-skilling, re-skilling workers. How do you see, briefly, priorities from the U.S. standpoint in that agenda? And then we'll

take some questions.

MS. BOUSHEY: Yeah. I actually want to note back to something that you said in one of the introductions a little bit earlier on, that over -- I think it was you who said -- over the period from 1920 to 1973 we doubled productivity. Was that the (inaudible)?

QUESTIONER: Really close.

MS. BOUSHEY: Doubled growth, right --

QUESTIONER: Productivity growth.

MS. BOUSHEY: -- productivity growth over this period. That period over which we saw this strong productivity growth, and strong economic growth was of course also the period over which we saw less inequality, and we had stronger institutions that were creating a balanced between competing economic powers. So, I think that we do need to shift our thinking, in terms of where we want to start answering the question.

So I like the focus on the pre-distribution, the redistribution, because it gets us thinking, what is the proper role of government, both in thinking about the tax and transfer system, but the role of government in terms of regulation, in terms of making sure that the market is fair, that market outcomes are just, and that there is evidence that we've talked about.

And I think actually we could have done like a four-hour panel up here, because I think there's a lot of evidence for the different ways that this intersection between inequality and productivity plays out.

So let me just touch on a couple here. I mean, so first, one of the things that has changed significantly in the United States; is that they're now, as a share of the private sector, there are fewer in the union in the United States than there were back before we made unions legal in the 1930s.

So, there is no longer a balance within firms, within the economy, within the labor market, between the interests of workers, and their ability to bargain on their behalf, and what's happening in capital. When you combine that with the rising significant

concentration across firms, and the wealth concentration, and what's that's done to our political process, that is a severe imbalance, not just on the shop floor, but they're flowing throughout our economy.

So, I would start with figuring out ways that you recreate that balance between labor and capital, be that traditional unions or other sorts of mechanisms. And, you know, whether or not we need other mechanisms, I think actually gets a little bit to the heart of this question about the -- you've said this so wonderfully, "roboapocalypse", and I think I've added another syllable, which I think is a really -- I mean, I think it's interesting to kind of throw that up to a panel, here where we're talking about a productivity slowdown, but yet the robots are going to take all of our jobs.

Those two ideas are -- they don't make sense when you put them together and pushing us to really have that conversation. The way that I think about it of courses is that the robots don't actually need income. They don't need to feed themselves, right, that's what people need, and how, if we actually are moving towards and economy where, significant shares of workers are going to be redundant, because we can mechanize those jobs in some way or another, you've got robots doing it AI.

That is a problem that actually -- and I do not want to dis any of my panelists up here -- but I think it's beyond economists, because this would be a massive society-wide problem that we need to be thinking about, because the humans are not going to sit aside and allow themselves to all become redundant without getting a little bit frustrated with that.

But I do think, thinking about what it means to have capital. I mean, right, so fundamental -- and you're seeing that the robots are taking all the jobs, it's because capital is replacing labor and it's taking all the income and it's not sharing. Right? And that's an old problem. That's not a new problem, and we have a lot of policies that we can think about on that.

I want to actually get to two more. One is just, briefly, we've talked a lot about competition, I would say from the U.S. perspective, one of the biggest and most

important agendas we need to pursue is antitrust enforcement. You know, we live in an era where we need stronger presumptions against conduct that is likely to be anti-competitive, which is not where the current policymakers start.

We need tougher standards against mergers, front page of today's paper. We need better remedies for both government and private plaintiffs, and we need of course to ensure that the antitrust agencies that enforce the laws of the United States are actually funded so that they can do their jobs.

And as we've seen concentration increased, we've actually seen the funding for the agencies that work declining, and that makes no sense. And that in the grand scheme of things it would be a lot of money.

But then finally, one of the things that we have talked a little bit about up here on the panel is the role that government plays in productivity growth. The role that government plays through, you know, from access to universal education, and higher education, to the investments that government makes like, you know, in creating the Internet, and all sorts of other things that it creates -- you know, in sending a man to the moon, that then in the United States created all of these positive externalities that allow the private sector to take those and commercialize them.

The United States of course now is looking at a future where revenues, tax revenues will be somewhere between 15 and 16 percent of U.S. GDP, which is a historic low, and we should be closer to where our economic competitors are, which is something around 22 percent of GDP.

Let's just split the difference and call it, let's go for 20 percent. We've been there before in the United States, in areas where we are more competitive at higher productivity growth, but I think that's a missing plank here, that we also need to be conscious and aware of.

MR. QURESHI: Thank you very much. So, the floor is now open for questions. So we will take three questions at a time. So, please identify yourself. Keep

your questions short, and if you want to direct your question to a particular panelist, please identify the panelist. Thank you.

MR. WESLEY: I am Glen Wesley, ex-IDB and World Bank. Just a quick note as much as anything, that having just finished Steven Brill's "Tailspin", there's a lot of --

QUESTIONER: (off mic) not hearing.

MR. WESLEY: Okay. Having just finished Steven Brill's "Tailspin", the story of kind of the decline of the U.S. in the last 50 years; there's a lot of explanations for growing inequality that go way beyond economics. There are economic explanations. As well as the other great book, and this is Hacker and Pearson's "Winner-Take-All Politics", but I'll leave it at that.

MR. FINNERAN: Kevin Finneran at the National Academy of Sciences. All of you sort of touched on the fact that there are difference between sectors like manufacturing, industrial sectors, and some of the service sectors, I think particularly, if we're thinking about health care and education. But when we wind up talking about solutions and where we're going, it seems to me that most of the time, we're addressing a model that applies to industry. I'd like to hear people address a little bit more, how they imagine productivity and wages working out in sectors like health care, education, care for the elderly in particular.

MS. POPLIN: I'm Dr. Caroline Poplin. My principal qualification for this is I was born in the 1940s, and I lived through the Great Compression when productivity and wages were tightly coupled, that all ended in the 1980s. And wouldn't you agree that even if productivity does go up faster, it won't make any difference if it's decoupled from wages.

And I would give you two examples: Amazon, Jeff Bezos is the richest person in the world, and the people in his distribution centers, the distribution centers are all sub-contracted out, they pay minimum wage plus a little tiny bit, and they pull down the wages everywhere else.

The other example I will give you is Wal-Mart. The Waltons own something

like, the same amount as 40 percent of the people in the country, and they also pay very low wages, that's what is their -- that's their technological innovation, and that's what it's used for.

MR. QURESHI: Thank you. Heather, can you take the last first question first?

MS. BOUSHEY: Oh, sure. I'll take that one, briefly. But I think it's also kind of connected I think to Kevin's question as well. So, it's interesting that you would ask this question. We've done a lot of work thinking about: How is it that you measure growth? How is it that we should be -- what's the metric of success in an economy? And I've been talking a lot about how it is that we can connect the income distribution data to the aggregate GDP data, so tomorrow GDP numbers are going to come out, and if we have our way, at some point in the not-too-distant future, we won't just see what that aggregate GDP is, which of course is not trickling down, but what that looks like across the income distribution.

So, if growth tomorrow is 2.5 percent, what share of that 2.5 percent went to whom across the economy? That I think would be a really important first step so that your comment, Dr. Poplin, is actually at the forefront of policymaker's mind, and news commentators' minds, rather than an afterthought.

So I would argue that part of the way we got here is by thinking: we could focus on growth or productivity, and everything else would just magically take care of itself, because in the '40s, '50s and '60s and '70s it did, and I think that what we -- I mean my increasingly, and this is an untested view, I haven't written about this yet, so really so this is like, you know, not even hot off the press.

But increasingly my conclusion is that many of the institutions that supported that strong stable growth in the '40s, '50s, '60s and '70s, like unions, like -- I mean, I think there are a lot of other institutions. But sort of a long list, community institutions, I'm thinking about the first -- Glen's comment about other explanations for rising inequality, and norms, that those actually made the market work. Right? And so we let go

of that in large part because economists, kind of, we didn't think that. You know, we're like, oh well, the market if perfect we can -- those things are the, those are the distortions.

When in fact, you needed those to actually have a market that worked as the textbook thinks it does, because without those, you have this highly concentrated capital that is creating distortions that vastly outweigh almost anything else you can look at.

So that would be, but one other thing on the manufacturing versus services. You know, I think we -- it's interesting because you're never going to get the same kind of productivity increases in the services that we think require humans, unless you decide that those are no longer caring professions in some way. Right?

I mean you could decide, and there's a Sci-Fi movie that I saw once about this, where, you know, you had robots providing child care, and elder care, you know, remotely from a center in Mexico. It was like this. But unless we want to do that, it's very difficult to imagine that you're ever going to get -- you're never going to get the kind of productivity gains in those sectors, because fundamentally the cost is what you're paying the worker, which is the antithesis of what we're struggling with up here, when you're thinking: what are going to pay people to do when machines can do so much?

So, to me, it seems like we have to flip that question on its head, which is: how are we going to give people jobs that have meaning and value, and pay them, if the robots can do everything, which seems like a great problem to have, if we could just reframe the question.

MR. SCHWELLNUS: Zia, can I just have --

MR. QURESHI: Okay.

MR. SCHWELLNUS: A 20-second intervention. I think it will be a mistake to say that, you know, productivity growth doesn't matter because, you know, it doesn't matter for workers because, you know, wages have decoupled from productivity, so anything that happens to productivity is irrelevant to wages. I think first of all, you know, less evidence for the United States that any productivity shock is still transmitted to wages. I

mean, this work by Larry Summers and Anna Stansbury that shows that --

QUESTIONER: In our book?

MR. SCHWELLNUS: Yeah. In the book; that actually shows that, precisely that. Now, I think, so productivity growth is good for workers, you know, but the real question is, could it be better for workers and I think there's a lot of things you could do that these productivity gains get better shared.

I mean so one, is as Jeromin said, that, you know, there are questions of, how do you strengthen the bargaining power of workers? And in the U.S., I think, you know, you can discuss collective bargaining, you can discuss non-compete clauses. There's a lot of things you could do that these productivity gains are better shared.

MR. QURESHI: We'll take one or two more questions, if there is interest, quickly. Yes, please?

QUESTIONER: My name is Miriam Zia, and I'm a student of Applied Economics at UMD. My question might be somewhat basic or it's stupid, maybe, because the way you know economics is far, means -- it was than what I know about economics. So, in our micro class we study that if you decompose monopolies, then it might increase competition in market.

So, can there be a way that government can decompose monopolies by some policies, or can there be a stronger role of government in regulating the market which can increase productivity, or which can translate into greater gains for society? Thank you.

MR. QURESHI: Bill?

MR. MALONEY: That sounds like a Cyrille or Jeromin questions.

MR. ZETTELMEYER: Does this work?

QUESTIONER: No.

MR. ZETTELMEYER: No. Now? So, it's not a stupid question at all. So the answer is, yes, it has happened several times in history. Right? So, famously Standard Oil was broken up in the U.S. because it was a monopoly of oil companies. AT&T was

broken up. In Germany there was a consortium or a monopoly in the chemical industry, that was created in the 1920s and it was broken up in the 1940s. So we have historical examples.

The question is whether this is sort of a good policy tool for dealing with concentration. Now, I would say most economists would probably think that the -- unlike Standard Oil, unlike AT&T, or IG Farben which was the German conglomerate; the kind -- monopolies in advanced countries were not created in an environment in which there was essentially no competition law, or the state actually encouraged the formation of these cartels.

And so the case is weaker. Right? So these are companies that have grown by themselves, for the most part and, you know, for the most part we've had pretty good enforcement in preventing mergers for these mega companies. That said, my former boss, Sigmar Gabril, who was the Minister for Economic Affairs, famously called for, in an article in 2015 for a breakup of Google.

He didn't get far with that. Right? And I'd say I'm not quite sure I agreed with him, but that's not a completely crazy idea. But I think the real battleground right now is: how tough should we be on mergers; right? And that's where people basically disagree.

MS. BOUSHEY: I'm just going to add to that very briefly, because I do think that there is more to be done here in the U.S. I think I take a more interventionist view of the current situation. You know, many of the new platform firms look kind of like a utility at this point, it doesn't make sense to have, you know, 100 different Facebooks. Should we think of those as utilities especially given the important role that they're playing in terms privacy and data?

But you do see so much of the anti-competitive behavior that these firms have engaged in. Amazon, Google, all of them, Facebook, the way that they have stifled competition in the marketplace really does, I think, warrant a deep dive and a look into whether or not it makes sense to all this to continue.

And I think that -- so, I take a little bit of it. We've done it before, but we haven't been enforcing the law in the same way over the past few decades in the United States since the 1980s, and I think we have to take that into account, in terms of what we've allowed to happen.

MR. QURESHI: I see our panelists are warming up for more debate. But unfortunately we have run out of time. So I would like to thank you for coming, and for your participation, and I would like to thank the panelists.

These are complex issues, and many of them there is continuing research. But I would like to thank the panelists for sharing their insights, their thoughts, their findings. So we appreciate that. Let's give them a big hand. (Applause)

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