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WEBINAR

GROWTH AND DISTRIBUTION IN THE DIGITAL ERA

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Panel 2: Technology, Jobs, and Inequality:

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P R O C E E D I N G S

MR. COULIBALY: Good morning. Good afternoon. And to our friends in Asia, good evening. It gives me great pleasure to welcome you all to this book launch event on the growth and distribution in the digital era. We would have loved to have seen you in person here at Brookings, but unfortunately, we have to do this event virtually because of the continuing pandemic. But hopefully, we will be able to continue in person in the near future.

To start, I'd like to thank in particular our colleagues from the Korean Development Institute or KDI who are joining us later this evening. As you know, it is a 14-hour time difference between Washington and Sol. KDI is our valued partner in this work and greatly appreciate your collaboration and support.

Technological change driven by the digitalization and artificial intelligence is a defining future of our time. It is transforming economies ultimately in growth and distribution of dynamics and re-shifting public policy agendas. This plan which was underway before the COVID-19 will likely accelerate in the post-pandemic world.

The book we are launching today, *Shifting Paradigms: Growth, Finance, Jobs, and Inequality in the Digital Economy* examines the challenges of digital transformation and suggests how responsive policies can make it more productive and inclusive.

You see the second book on the economic implications of technology continues to produce the joint research product of Brookings' and KDI. Their first book, the *Growth in a Time of Change: Global and Country Perspectives on a New Agenda* was published back in 2020.

Technological change is posing many questions for investors, business leaders, workers, policymakers such as these rising market concentration inevitable with new technologies. How can the benefits in raising productivity be more widely shared across firms? How can the progress of digital innovation and finance be captured while managing the risks? Or should workers fear the new automation by technological driven shifts in business and what causes economic inequality for others.

What new challenges arise for public policy in areas such competition, regulation? Work force development, social protection and taxation? And what new thinking and adaptations are needed to realign institutions and policy within the digital economy?

The book being launched today addresses all these questions. And we are very fortunate indeed to have an excellent group of presenters, moderators and panelists including many of the book's authors. I'm sure we are in for a very stimulating discussion.

Finally, I would like to thank the leadership of KDI for their support of the joint research project with Brookings including former president, Jeong Choi, former Senior Vice President and Chief of Research Officer, Bong Kyun Kang and current President Jang Hong as well as the current Senior Vice President and the Chief Research Officer, Youngsun Koh.

I would like to thank Brookings and KDI scholars and the seven partners for working with us for the very useful research also that they have produced. Their research reflected in the two books provide valuable analysis and policy guidance on some major issues in our time of change.

I look forward to continued collaboration with KDI on joint research on harnessing the promise of new technologies in ways that promote broad based improvements and economic prosperity.

KDI President Hong kindly recorded his remarks for this event in a video that I would like to be played at this time.

MR. HONG: Good morning. My name is Jang-Pyo Hong, President of the KDI. I want to begin by thanking, Mr. Brahim Coulibaly, Vice President of the Brookings Institution, for joining me early this morning. My appreciation also goes to Mr. Ayhan Kose, Director of the Prospects Group of the World Bank, and Professor Danny Leipziger at George Washington University for moderating today's panel discussions. Last but not least, I convey my deepest gratitude to all the contributing authors and panelists of the joint project and to all who are attending online.

Today, we conclude and reflect on the four-year joint research conducted by two of the world's leading think tanks, Brookings and KDI, under the theme of 'New Growth Agenda.' Came out in 2020, the first report looked at the growth paradigm shift brought its effect from a global perspective and suggested implications for policy directions.

The subsequent report, which we are launching today, provides an in-depth discussion of the impact of technological change on productivity, finance, labor market, and inequality and its implications for overall economic policy.

Two years of the COVID-19 pandemic have presented the world with unparalleled social

and economic challenges. And the pandemic's prolonged physical distancing worldwide has accelerated digital transformation as well as transition into the 'Ontact' era. While well-aware of the positive changes in productivity and economic growth, we should not overlook the consequences of digitalization on social disparity.

It is because the digitally disadvantaged are at risk of being increasingly marginalized, and the digital divide could further split our societies. Against this backdrop, the Korean government has recently announced the "Korean New Deal" to tackle the crisis.

This initiative consists of three pillars: the 'Digital New Deal' for promoting digital transformation, the 'Green New Deal' for shifting to a low-carbon economy, and the 'Human New Deal' for stronger employment and social safety net. As seen in the sheer scale of the plan, we need unprecedented countermeasures in the great transformation into the post-COVID-19.

I hope this book will allow us to delve into the important challenges of our time and guide us forward. Lastly, in order to proactively respond to changing domestic and international landscape, collaboration and convergence research like the joint Brookings-KDI project is vital and urgently needed. Accordingly, I would like to take this opportunity to ask for your continued attention and support to the new, upcoming agenda of the joint research between Brookings and KDI.

Once again, thank you all for your participation out of busy schedules at this hour.

MR. COULIBALY: Thank you so much, President Hong for these thoughtful observations. I would like now to invite Youngsun Koh, Senior Vice President and Chief of Research Officer of KDI to chair the next session. Over to you, Youngsun.

MR. KOH: Good morning. I am very happy to share the first session because of the time constraint I will limit myself to introducing the two main authors, Zia Qureshi and Cheonsik Woo, who both of whom were the coordinator from the Brookings' side and the KDI side to complete the wonderful publication. So, Zia, will you start?

MR. QURESHI: Thank you very much, Youngsun, for the introduction. As earlier speakers have noted technological transformation lead by digital technologies and artificial intelligence is the defining feature of our time. The Brookings/KDI research project and the two books produced under it examine how this transformation is reshaping economies and public policy agendas.

I would like to thank my coeditors, Cheonsik Woo and Yang Woo Kim and our coauthors. The research analyzes the implications of digital transformation from both global and country perspectives including a specific focus on Korea. In the few minutes that I have I will highlight some global teams and findings of this research. In his presentation that follows, Cheonsik will highlight findings more specifically from the perspective of the Korean economy. Next slide please.

The new technologies hold great promise. They create new avenues and opportunities for a more prosperous future, but they also pose new challenges. When digital technologies have dazzled with their potential, they have so far not fully delivered the expected dividend in higher productivity. Indeed, productivity growth has slowed in the past couple of decades in many economies. Consecutively, economy growth has trended lower.

At the same time, income inequality and related disparities have increased particularly in advanced economies stoking a social discontent and political vehement. Specific trends differ across countries but the gifts of the United States, the global leader in digital transformation illustrates well the twin trends of slowing productivity growth and rising inequality over the period of digital transformation.

As shown in this chart in the last decade or so, labor productivity growth has averaged less than half the growth rate of the decade prior to the slow down. The income share of the richest 10 percent, one measure of inequality has increased from 35 percent to 27 percent since the 1980s. Next slide please.

One important reason for these outcomes is that policies have been slow to adjust to the unfolding transformations. As technology reshapes markets and alters growth and distributional dynamics, policies must ensure that markets remain inclusive and support wide access to the new opportunities for firms and workers. In cross economies there has been uneven participation in the new opportunities.

Firms at the technological frontier have broken away from the rest, acquiring dominance, increasingly concentrated markets. Productivity growth in these firms has been strong, but it has stagnated or slowed in other firms depressing aggregate productivity growth.

Technology diffusion across firms has been weak. And increasing automation of low to middle skill tasks has shifted labor demand towards higher level skills hurting wages and jobs at the lower

end of the scale spectrum.

Education and training have been lagging in the race with technology. With the new technologies favoring capital, winner take all business outcomes and higher-level skills, the distribution of both capital and labor income is becoming more unequal and income is shifting from labor to capital.

This should not cause despair however. With more responsive policies, more productive and more inclusive outcomes from digital transformation are possible. The digital economy must be broadened to disseminate new technologies and productive opportunities to smaller firms and wider segments of the labor force. Next slide please.

New thinking and adaptations are needed to realign policies and institutions with the digital economy. Policy needs and priorities, of course, differ across countries, but broadly our research points to five areas that need more focused attention from policymakers.

First, competition policy should be revamped for the digital age. Antitrust laws and enforcement should be strengthened. The digital economy poses new regulatory challenges that must be addressed including issues surrounding the regulation of data. Competition issues relating to digital platforms that have emerged as gatekeepers in the digital world. And market concentration resulting from tech guides that resemble natural or quasi-natural monopolies because of the economies of scale and network effects associated with new technologies.

As in product markets, policymakers need to ensure that financial markets remain sufficiently competitive and address regulatory challenges relating to the new world of digital financial products that forms algorithms. Also, new frameworks are needed for international collaboration in areas such as regulation and taxation of cross-border digital business.

Second, the innovation ecosystem should be rebalanced. Aging pattern systems should be updated to the new innovation dynamics of the digital economy. They should better balance incumbent interests with the need to promote and disseminate technology more widely.

Investment in research and development should be rebalanced by revitalizing declining public R&D programs to foster technological progress that serves a broader economic and social goals rather than the interests of narrow groups of investors. Incentives should be rebalanced by correcting biases and tax systems that favor capital relative to labor and push technology toward what Daron

Acemoglu and Pascual Restrepo call excessive automation, which destroys jobs without enhancing productivity.

Third, the foundation of digital infrastructure must be strengthened through increased uplink investment and frameworks to encourage more private investment to improve digital access for underserved groups and areas. The digital divide remains particularly wide in developing economies. Stronger digital infrastructure and literacy will be crucial for these economies as technological change forces a shift away from growth models heavily reliant on low skill, low wage manufacturing.

Fourth, investment in education and training programs must be boosted and reoriented to emphasize skills that complement the new technologies. This will require innovation in the content, delivery and financing of these programs including new models of public private partnerships. With the fast-changing demand for skills and growing need for upskilling, reskilling and lifelong learning that availability and quality of continuing education must be greatly scaled up. And persistent inequalities in access to education and training must be addressed.

And fifth, labor market policies need to shift to a more forward-looking focus on improving workers' ability to move to new and better jobs. Rather than seeking to protect existing jobs being rendered obsolete by technology. Social protection systems covering social insurance and benefits such as pensions and healthcare, which traditionally have been based on formal long-term employer and employee relationships will need to adjust to a job market with more frequent job transitions and more diverse work arrangements including and expanding a big economy.

How social contracts provide opportunity, risk sharing and security needs to be rethought for the digital age. So to conclude, enabling broader participation of firms in the digital economy, widening the diffusion of new technologies and building complementary capabilities in the workforce can deliver both stronger and more inclusive economy growth.

Reforms in these areas can reduce inequality and economic insecurity more effectively than fiscal redistribution alone. In capturing the full promise of digital transformation, the growth and inclusion agendas are one and the same.

Inevitably, major economic reform is politically complex. But one thing reform should not be paralyzed by is continued try debates about conflicts between growth and infusion. Research

increasingly shows this to be a false dichotomy. Thank you.

MR. WOO: I'm sorry about this. On mute. So this is a shifting paradigm. It's in the Korean case study, okay. Still looking at these issues, keyword growth in the jobs inequality in the digital transformation age from the perspective of Korea.

Provides three excellent papers. Hence, for all authors about it. Two micro kind of very scientific analysis. And the one, it's a bank perspective. A very ambitious and very well-structured paper. Next slide please.

So it's a three-part overview and a chapter summary in the remarks, but I'll focus on the chapter summary, okay? Because I have two authors here, Jungsoo Park and Sunghoon Chung, at this panel so I guess I hope to have the chance to (inaudible) what I introduce this thing.

So four chapters after this overview, which I contributed just a week ago. And then the three is about these technologies. And chapter six is by Sunghoon Chung, who is with us today and Sangmin wants to execute as fellow now working at the University organizing for this contribution at the form level. So form of the micro study.

And last, the chapter eight is a big picture study. One of the most impressive studies I've seen these days by my dear colleague, Jungsoo Park at the Segang University. The technological change and inequality in Korea. Next slide please.

So chapter three first is the theme and introduce the idea. This is the role of this digital technologies and intangible assets as the drivers for productivity. Secure this type of technology in tangible asset and form productivity. And this is the form lever by database produced anew by this paper in the manufacturing and the service industries.

And the main findings, number one is the investment in digital technologies and intangible capital to make a stronger contribution to the estimated total vector of activity, okay. It probably what makes a (inaudible), but this is one of the few that might prevail and entry for this study using the form level data.

Second one is the complementary input just like as management practice. And combined with intangibles and digital technology can boost and deliver the full potential of firm productivity. So prior to technology and so additional technology, the management level is very

important.

And now, this third is about the divide between the large leading companies and smaller scale sized SMEs. Although the Korean, as you know well is a home to very much a global level, very competitive high-tech companies, the diffusion of new technologies among SMEs has been pretty much weak so limiting the gains from digital transformation. They have larger and larger this gap so this is the kind of dual economies infrastructure. It's becoming more constricted.

And finally, successful promotion of technology diffusion in Korea entails attention to the diverse needs of different-sized firms, instead of one-size-fits-all solutions. Although, Korea has made a good effort and some success in using and having more of diverse, well-developed policies. Still, we have this type of tendency having systemwide uniformed type of policy.

So this is just a little bit of what I guess Sunghoon Chung could elaborate on. So though the Korean government subsidizes SMEs to install smart technologies, smart refractory. This outcome has kind of ability so only to find it underused. And so, the government effort not only to introduce but it disseminate and to use information on the uses of digital technologies that many fourth industrial revolution general for most technologies will prove essential. Next slide please.

So this is the chapter six. I'm sorry. But by Chung and Aum. This is about this importance of workers, human empowerment in the factory firm level but only at this formal education, institutional level. So stepped-up worker retraining and lifelong learning, using this is the Korean database on HR policies, on firms' adoption of new digital technology. So the main findings, number one is continuous learning there OJT, vocational additional training, supported by firms themselves shows a strong, positive relationship with technology adoption.

Kind of very interesting and maybe controversial finds that in contrast hiring in workers -- hiring works with more formal education like hiring higher education, college, does not show a significant relation with technology adoption. So this is then continuous learning at the factory or company level thus far does not lead to formal education itself, okay? That is important work is technology adoption.

So it naturally concludes that intensive support for learning, technology empowerment of the firm level's part is very much a must and important to raise productivity. And surely the role of institutions of the formal education basically the university in the higher level will remain important but the

role of the firm as a teacher and a supporter of learning will grow.

And just as seen in Korea this human capital investment at the firm level is pretty much relative compare to the other industrial country. So this is the area we need to focus on and emphasize more.

So on-the-job training in the firms and deeper cooperation (inaudible) to cooperation between government, educational institutions and firms with a key to spur overall these digital transformation. The last, okay? Next slide please.

This is the chapter eight by Jungsoo, which is said is very, very ambitious and very, very thought promoting, provoking, okay. This is the relation to analysis of technology and inequality dynamics. Inequality, this also, you know, associated with the disparity and creates a very problematic and a very much in trouble now. But the innovation of this paper to use both macroeconomic and micro. The firm, the worker and household level data. This is very much a well contrived and big picture analysis.

Now, the main findings. Number one is very, very notable. Contrary to some other studies, they show a decline labor income sharing in Korea in recent years. That Dr. Park show the long-run labor share appears relatively stable in Korea. The large self-employed sector is correctly taken into account. For your reference is the share of the self-employed sector is a lot between the five to 27 it's project of the full employment. So this is the kind of outlier, the big sector among (inaudible) country.

And second is also very, very notable. Is the wage disparity has increased over time due to wage gaps across different sized firms. This is the size of dual economies structure based on the big leading companies as one, medium sized the rest, okay. And surely disadvantage the smaller firms lag behind in terms of capacity, human capital and everything, the capital investment and innovative activities including technological induction.

And third is very, very also important. Growing inequality is largely due to a persistent rise in female labor participation which is still somewhat low compared to the other countries, about 54 percent or 55 percent. And thus, increasing number of double-income households. So this is the sum selections, the main issue which is very interesting and must be (inaudible) or closely (inaudible) from a technological perspective.

So recommendation (inaudible) is the purpose of (inaudible) is improvement in the business environment and first SME, it's approved. The second is to strengthen that social safety net to make this ecosystem natural in and out of firms and the workers', you know, more desirable in work and treated the way this is approach. This type of firm of level and the work level.

And finally, refurbishing, the redistribution policies more in the view of labor market participation and demographic transitions. So this is from macro figure perspective. Not only can be seen on the micro level OSC design intended to directly improve with distribution.

So finally, let me give the conclude with the remarks. Next slide. So here are many of the research has found in KDI and in Korea. But I just mentioned just the four. The one is the very impressive, very compressive study by OECD, the Review of Inclusive Policy in Korea, the OECD commissioned by KDI and the Korean government, published about one year ago.

This is a good first of all foremost reference to have a better understanding of the Korean economy in the fields of these three chapters. And second is the work done by myself. It's a Comparative Study on Inclusive Growth in Eight Countries. This is seven, you know, European countries and Australia. This five (inaudible) is this growth in inequality, jobs, productivity and wellbeing agree using the same things of this global team project.

And the third is the Digital Transformation and the Korean Economy society, volume one and two. Volume one and two is the case studies of Germany, Japan and the United States. Volume one is there. A compilation of definitive (inaudible) topical issues. This has been published one year ago.

And finally combine all these, all of the futures and strategy of Korea. And this is the conference held about one month ago by Ministry of Finance and Economy and National Assembly of Future Institute and KDI. And unfortunately, except for the first volume (inaudible), we have Korean reference only. But day I hope that you'll have some of this available in English to be shared of this perspective with all of you. Okay. Thank you.

MR. KOH: Thank you, Cheonsik. Thank you for completing your presentation on time. We have several questions from the floor. Are we supposed to answer those questions now or do we have time for discussion later on?

MR. QURESHI: We will now move to the panel and the moderator there can then pick up

some of the questions that are coming in.

MR. KOH: Okay. Great. Thank you very much.

MR. QURESHI: Thank you.

MR. KOSE: Good morning. Good evening. Wherever you are following this event. Let me first congratulate Zia and Cheonsik for putting together an excellent volume on probably the most important challenges of our times covering technological change in different segments of our economies and taking the roles of policies to play -- to translate these technological changes into better growth and equity outcomes.

The book offers a loaded agenda however you look at it. When I was reading the book, I was thinking this is all about of course future growth. And to some extent whether the 2020s could be the roaring event. As some of you know, there is this idea that you can look back to the 1980s Spanish Flu and hope for a decade of rapid global growth after this COVID-19 pandemic. Reminiscent of these roaring 20s of that era.

So what happened during that period is that building on technological breakthroughs in earlier decades, North America and Europe enjoyed rapid modernization and strong economic growth in the 1920s. Automobiles replaced horse drawn transportation and they became widely utilized as improvements and assembly lines cut costs.

Then we built electrical grids paved the way for rapid industrial and household electrification. The economies of the United States, Japan and some European countries became more productive. Global growth that averaged 3.6 percent in the 1920s was double that of the proceeding two decades. So now, we have been witnessing rapid technological change so maybe we are on the verge of another roaring 20s if we follow the prescriptions this book presents. I will get back to this issue later in this session.

We have an excellent panel to talk about the wide range of issues covering technology, productivity, industry and finance in light of the insights from the book. Let me briefly introduce our panelists. Sunghoon Chung is a Research Fellow in the Department of Economic Policy and Strategy in KDI. Chiara Criscuolo, Head of Productivity, Innovation, and Entrepreneurship Division in the OECD. Thomas Philippon, Max Heine Professor of Finance, Stern School of Business at New York University.

And Marty Kaufman is Assistant Director in the IMF.

So the game plan is very clear in the panel. I will ask the panelists two rounds of questions. In the first round my questions will cover the big picture problems. In the second round, I will ask policy responses to basically address these big picture problems. I suggest panelists to keep their responses under four minutes so we will have time to collect some questions from our audience after the first two rounds. There have already been some questions coming.

Let me start with Chiara. Chiara, for the book, you produced a very nice chapter on technology division this is staggered productivity growth. In fact, weakening productivity growth for an extended period of time around the world. What is the role of technology division in these weak productivity outcomes behavior we see? Chiara?

MS. CRISCUOLO: Thank you. Thank you, Ayhan. Indeed the point that we try to make is the fact that the launch is the pandemic is playing. The global for the productivity slow down. And obviously, there are specificities as Cheonsik priorly mentioned in specific countries like Korea.

So we believe that technology diffusion especially diffusion of digital technologies might not be as homogeneous as one would expect. That indeed what we find is that the larger diffusion which is a complex process and a course of convention to information about technologies and (inaudible) frustration to decision of adoption and to effective use these technologies is very different across different firms according to whether they have -- they're in doubt with the schemes, with the complementary assets that they need to benefit from these technologies.

And indeed, as you mentioned, it might be the COVID-19 crisis might make a process which normally takes a long time finding those (inaudible) outs. Like give a push to technological adoption.

However, when these might be spurring the activity growth, it might also increase the productivity in foremost divergence that we are already seeing across firms if what we see is that more tech savvy firms, for example, are more likely adopt more technology, more advanced technologies. And if anything, what we will see is that this divergence across firms might actually increase after COVID.

So this is, I think, a point that is important to make but especially in that digital world where most of these developments of technologies is proprietary. The role of policy to allow, let's say,

lagging firms to be able to absorb this knowledge and to access this knowledge is better (inaudible).

MR. KOSE: Thank you. Thank you, Chiara. I'll get back to you on this policy issues. One of the nice things about this book, it just brings this dimension of technological change in financial markets. Thomas Philippon, I think wrote this wonderful piece, how digital transformation effecting these markets, the financial markets.

Thomas, obviously digitalization in financial markets brings huge benefits, but there are some significant risks as well. In your chapter, you discuss these issues. What are the benefits and risks associated with digital innovations and technological transformations we see in financial markets?

MR. PHILIPPON: Thank you very much and good morning, everyone. So I think the basic problem is comes from what's wrong with finance in the first place.

And broadly speaking, you can say finance is too expensive and that access to good financial services is too unequal. So I think that's the starting point. That is very true around the world. It's very true even in an advanced country like the U.S. If you look at a long period of time, the cost of financial services has remained relatively high, definitely higher than we would have hoped given technological advances.

And if you look at access to financial services, you see that it's still very skewed towards rich households and discrimination is still very prevalent. So that's the starting point.

And now comes Fintech. And it tells us that I think that there is really a very significant change that can then help a lot in both dimensions. Fintech is already bringing innovation to finance. By doing so, it's putting competitive pressure on income (inaudible). So in pretty much every market where we saw significant entry by Fintech, we saw income events react by reducing their fees. And so, that means (inaudible) is now becoming cheaper thanks to Fintech. Both because of innovation, which can then be onboarded by big banks and because of share competitive pressure.

Another part that I find absolutely fascinating is the impact on discrimination. When I wrote the chapter, there were like maybe three or five papers that showed that Fintech firms do less and getting less discrimination. There was a very nice piece of research by (inaudible) and (inaudible) and (inaudible).

And since then, I've seen another author, half a dozen papers confirming in many

countries, in Africa, in India, in the U.S. and Brazil the same thing which is that algorithms do not discriminate as much as human beings. And so, we already see the benefit there of Fintech in lowering discrimination across minority groups.

So I think that's the big compromise. And the big challenge is going to be how do we adapt the regulation in real time so that what is today really a compromise of Fintech can become -- can be fulfilled.

MR. KOSE: Thank you, Thomas. And indeed, we see the reduction in cost then. I am very happy to hear those also reduction in discrimination associated with the use of Fintech when it comes to of all types of things including, of course, the credit applications.

Now, let me turn in a little bit about these labor market issues and how to make sure firms are able to find a workforce with the necessary human capital competitive with this digital era. Sunghoon, you have this very nice chapter in the book about how firms need to organize to take advantage of utilization of. And you are using this Korean data, a very rich data.

When we look around, we see that that some firms do embrace these technological innovations, quickly adopt them. But some others take a long time to adjust to technological changes. My question to you, why do some firms become early adopters of new digital technologies while others wait and see? And what is the role of firms' employment policies in the adoption of new technologies? Sunghoon?

MR. CHUNG: Yes, Ayhan. I've been wanting to thank you for having me today. Since you mentioned there's significant hydrogenating adopting digital technology across firms.

And I specifically looked at firms' internal organizational factor that is complementary with the digital technology adoption. So organization and technology complementary has been studied a lot in the literature. And you may think that digital technology is in large part just an upgraded version of existing IT hardware and software. And in that case, organizational fitness with digital technology would be mostly the same with the fitness with information technology.

But I do think digital technology is different from the traditional information technology especially in a business strategy perspective in the sense that digital technology is mostly used collectively and cross-functionally to provide a new way of solving business problems. Whereas,

traditional information technology is functional and subordinate to the firm's already chosen business strategy.

So and key here is it is a people who realize the digital technology can provide this kind of new business strategy and new ways of absorbing business problems. So I focused on how to manage people can be significantly associated with digital technology adoption.

And in the chapter, I find that the continuous learning within firm is one of the most significant a firm's characteristics that is complementary with digital technology adoption. And surprisingly, I did not find that firms with just more skilled workers necessarily adopted digital technology faster. Whereas, they tend to adopt information technology.

So interpretation for that result is that when technology is just used functionally and independently as the traditional information technology does, the preferred worker skill is just the ability to understand and utilize the existing technology well. But digital technology becomes, as I said, it's different from IT when and only when it is used across functionally collaboratively and extensively.

So good use of digital technologies necessitates workers' creativity, communication skills and adaptiveness and I think this requires continuous learning opportunity within firms and may not be as simply obtained in the classes at universities or colleges.

MR. KOSE: Fascinating, Sunghoon. I think the kind of main message is that it is not just a stockhold of knowledge. It's basically how technology expands and the continuous learning is critical to basically facilitate adoption of technology and I find that result quite interesting, and I read your piece.

I'm going to come back to you about the kind of the policies to foster technological adoption in firms and how that can be done through the kind of the broader labor market, educational policy options.

But let me turn to Martin. Martin, we covered quite a bit of ground here. We discussed financial market. We discussed the broader technological change and productivity. The technological diffusion of it. Also, talked about, of course, labor market policies.

Then when we think about advanced economies especially. And already some emerging market economists, there's this challenge of aging. Of course, the aging societies are increasingly more prominent in many countries. Can you tell us your views on the implications of this technological change

in the context of aging?

MR. PHILIPPON: Thank you very much. And thanks for inviting me to this fantastic panel. And I have to say that I read the book and I think it's not just quite impressive but quite timely. I mean it's not timely only timely for the challenges that advanced economies are facing but also for the challenges that are developing and emerging economies are facing.

So let me make two points. One is the challenge is or what does the digital economy mean for development strategies, and second for challenges associated with aging and aged societies that, as you said, it's not just a problem for advanced economies.

So on the first point, on what, you know, digital technologies mean for development strategies? I think if we step back, in principle, digital technologies should be a force for good to accelerate growth in developing economies, developing and emerging economies.

Let me mention two points here. One is it could facilitate (inaudible) and I think that can be quite beneficial. And two areas that we can quickly think of. One is access to finance and we have seen a lot of examples where a significant segment of the population were unfinanced and with Fintech suddenly they become -- they have access to finance. I think that can be incredibly beneficial.

The second is information and communication technology. Again, significant segments of the population in developing and emerging markets did not have access to these technologies. And suddenly, they have access to cell phones when they didn't have a land phone, okay? A landline.

So I think there are these elements that are very important to consider when thinking about the implications of developing studies. But let me add one more. And the other one is I think digital technologies can lower barriers to trade. And I think that means that both small and medium size enterprises and low and emerging economies can, you know, take greater advantage of globalization and integration into the global economy.

And I think this is an issue that we shouldn't or we should consider quite carefully. I'm not going to talk too much on the challenges that developing economies will face because I think the book covers them very well. And we know that developing economies, they need to have much more problems in terms of addressing those structural reforms.

But maybe one area that I would like to highlight is that particularly automation and

digitalization can render some of the development strategies absolute. And I think this is a very important point for authorities in developing and emerging economies to consider.

The picture I want to develop a little bit instill in your mind is that when we started talking about data being the new all. I think emerging economies and developing economies need to think differently about their developing strategies. So that's the first point about the implications of the digital technology economy for developing strategies.

The second point is the point you mentioned. Unfortunately, age societies are no longer in the realm of advancing obviously because many economies have become old or are becoming old before they are at reach. So then, you know, they will have really, really hard challenges ahead and transitional challenges.

So to the extent that these digital technologies can be harnessed by these emerging economies, I think -- and to the extent that there is an increasing amount of activity which is not a trivial thing as we just heard from the panelists. And the recent increasing in growth and total (inaudible) activity, the challenges of a lower, you know, labor force growth can be managed much better.

I think there are also elements where the digital technologies can help maintain living standards. In fact, increase labor force participation because it can complement or help some older people stay in the labor force for longer. And also, can transform pivotal services in healthcare and medicine.

So it can be, you know, the digital transformation can be also very, very important for, you know, developing and emerging economies that at first age.

Last and since, you know, I work at the IMF. I have to say that it can be quite important in an aging society to make sure that productivity and growth is kept up because it will facilitate the transitions associating with fiscal and pensions sustainability, which can be really, really large. And it can be a huge burden to all of these economies.

Let me stop here since I was told to be brief, but I'm happy to come to this point. Thank you.

MR. KOSE: But you did, Martin. We are discussing these issues that they have huge implications when we think about the fiscal policies and we think about post-monetary policies, structure

policies down the road. And Asian complicated the challenges associated with all types of changes we see around. But at the same time, bringing all types of benefits.

So prior we had discussed the big picture problems. I would like now to turn to the importance of policies and how policies can help address some of these problems we have discussed. And I'm going to start with Chiara again.

Chiara, you talk about the role of technology diffusion and weakness of when we think about productivity. What are the main policies for improve, you know, diffusion of productivity across firms, sectors and countries to promote productivity growth? There is this idea that there is a lot of technological innovation but we don't see the technological innovation, you know, translating into productivity growth in aggregate even though there are some firms, they register very large productivity data as you mentioned in the chapter. Chiara?

MS. CRISCUOLO: Yeah. Absolutely. I mean this is exactly correct. As I said before, among most of the productivity advantage of these frontier firms, as we call them, comes very much from these complementary assets that are propriety.

So there is a first role for policy if we want to make this productivity growth more inclusive in the TSA. The two should go hand in hand and there isn't really a paradox position there. It's to really make sure that these firms who are more productive, more digital and that can really benefit. Don't infringe themselves at the (inaudible).

So here, for example, the role for an (inaudible) to policy for transparency. A role for when we think about, for example, the new (inaudible) is marking for all these, you know, data. Data transfer being really make sure that there is that competitive environment that Thomas was mentioning was growing forth in the financial sector. This would be the case everywhere.

And in the same vein of really making sure that this is a competitive environment place continue to allow for entrepreneurship and for new potential commerce to really enter the market without facing not only the (inaudible) barrier but also barriers that come from being too distance from (inaudible). So I would say let's make sure that there's no infringements at the top and let's make sure that there is (inaudible) towards at the bottom of this (inaudible). So that's the first thing. I would say policy. In this big policy too (inaudible) mentioned.

The second one is one that has been mentioned for, I think, you know, from the intervention of KDI President, the last intervention by Martin and Sunghoon which is really the role of schemes. In a digital knowledge is advancing economy has absolutely (inaudible) where (inaudible) technology is very important. One area where we really need to see in the lacking firms being reach is schemes. Not only digital schemes but also all those things that are very much complementary for digital technologies.

This includes, you know, theme played, management, you know, information sharing and (inaudible). It's not just the (inaudible) that we all sort of problem solve normally. And this is something that is something that is particular important if you want to make sure that there are no losers (inaudible) from digital (inaudible). Scheme policies, relocation of resources as well is why it's very important.

And thirdly, as Thomas and Martin mentioned, access to finance which especially we are in a world where (inaudible) for but we still have to use them as collateral for small enterprises and for (inaudible). So that's where venture capital is different forms of financing is very important.

And the last, and I would say and not least is one of openness as Martin said. These investments to really be working and have significant returns, they need to have scale. If there is no scale, you know, as more firms -- for small firms it's hard to invest, for example, in a digital change because it requires organizational change and (inaudible). For these openness, it's particular important both, I think in a developing economy. And that's where policy, international policy, (inaudible) policy can really make a difference.

I stop here because I go into my four minutes, but I think, you know, there is a big (inaudible) is what I would like to say. And it is just, I would say that the point of the iceberg. The (inaudible) who go on for a while on this.

MR. KOSE: Thank you, Chiara. You really laid the ground basically headline all the big, I think policy interventions necessary in different realms.

I'm going to turn to Thomas immediately. Thomas, you talked about benefits and risks associated with Fintech. How can policymakers improve the benefits of Fintech while minimizing the risks associated with it?

MR. PHILIPPON: Yes. So I think first we need to think about what's special in finance.

So, you know, I mean if you think about Fintech as innovative firms, disruptive firms then the definition of an innovative firms is that it does not play by the old rules. That's the definition of disruption.

But that could mean two different things depending on which rule you're thinking about. It could be a technological rule so they come out with this better product quality or better ways or a cheaper way to do stuff. Or it could mean the regulations. So in one case, we would say that's technological innovation and a lot of guys would say, it's a regulatory arbitrage.

Now, so this tension between, you know, true innovation and regulatory arbitrage to be clear is true in every industry, right? If you look at a company everybody knows like Airbnb or Uber. We're they successful? Well, it's a mixture of arbitrage and true innovation.

So then you would say, well, then nothing is special in finance. Well, that's not quite right because finance has one particular feature which is the regulations aren't very heavy, which means that -- and I would argue some of the times for good reasons, some of the times for bad reasons, but that's besides the point. Whatever the reason is the reasons are heavy in finance. So what that means is that the directive balance has shifted towards regulatory arbitrage because it's very regulated, there's a small school for regulatory arbitrage.

So I think the first thing to recognize is that the one challenge is to avoid regulatory arbitrage in finance. Now, how do we do that without, you know, killing innovation? So I think the obvious, you know, strategy that has been used first in the U.K. but then everybody realized it was a good idea so people started doing the same is sandboxing. So sandboxing, people who don't know -- you dig in the sandbox like little kids.

That means you let firms play in the sandbox without too many rules so that they can grow and then when they graduate to being a lot of firms then you start imposing the same rules or titles, okay? So that is clearly the good way to do it. I think there's a lot of learning by doing in that world. And the tricky issue is how do you define exit from the sandbox?

When is a firm big enough that you want to impose on the firm all the balance of existing regulations, okay? So I think that's kind of point number one. I think we know more or less the strategy which is adopted sandboxing. The details are going to be tricky and I think that -- I'm quite (inaudible) because I think countries -- the U.K. is a good leader. I think people have learned from what they have

done. I think there is kind of a framework there that has a chance of working.

The second big issue is the one that regulated what Chiara just said which is one danger of digital innovation in finance just like in many other sectors is the fact that many of the returns just getting finance happen at the firm level, okay. So that's how they manage to give product for cheap to everybody which by the way is one of the reasons organization is good and is improving is because once (inaudible) figure out a way to do robot advising, they do it because they want to do it for their clients not because there are actually poor people. But once they've done it, they can provide the same service essentially at a moderate cost for poor people. So that's the great part.

Now, for the flip side of it is that because of the nature of this fixed cost that tends to be a relatively high concentration on the supply side, okay. Like the firms in digital because of this effect there you want it to be loud. So the key issue then is to avoid excessive concentration in finance. Some may choose to do that some (inaudible) in this space so I won't mention them. The one that's specific finance is the data part. So it's not a cure for all, but I think that one thing you need to do to be a bit proactive and forward thinking in respect to data.

So we know that the solution is going to look something like rules on data showing ownership together with APIs because the key thing is you want to force -- you want to kind of embed in your organization the fact that once you are big and successful and you have a lot of data, you need to have APIs that are accessible. So APIs are like the interface (inaudible). Other firms do access data from your system and they have to be secure and everything.

But that's the way to then allow entry by other firms, okay, so that you cannot just close your data. So I think the key there in finance is that the intersection of data ownership and APIs. So that's point number two.

And point number three I think is the issue is algorithms and form. So the regulation of algorithms is from the regulation of human beings. In the case of actors who are kind of mostly benevolent. I think it's actually that tricky because if you think about the formulas of regulations, there's no reason to think it's harder to regulate an algorithm than a person and many actually think it's easier.

The one place where it's tricky though is that algorithms are becoming very, very smart and they are looking very smart at exploiting behavioral biases in humanity, okay. Now to be fair though.

Humans, we're very good at doing need to themselves. So we have like 30 years of research showing essentially how metro asset management is flawed. Like they send product to people who don't need them at high fees that may not be there. So that has been going on with human beings.

So it's not as any of the algorithms are going to do much worse, but they're going to get smarter. And by getting smarter they're going to be very -- potentially very able to explode behavioral biases in humans. So -- and there, you know, once you enter that realm, the distinction between biases, bad advice, and outright fraud is very gray. It's all kind of the same. So that's my one point of concern. I don't think it's like the end of the world, but I think it's the one point of concern that needs to be keeping that. Thank you.

MR. KOSE: Well, thank you, Thomas. I think that this new frontier, the part, the regulating algorithms is the most challenging when I think about the policies. Sunghoon, let me turn to you. How can policymakers help firms to adopt technological changes and make sure that the overall workforce have the skills to compete for this new type of technology intensive jobs? What can be done?

MR. CHUNG: Yes. So first let me present you just a famous quote titled as a second machine age. It's written by Brynjolfsson. I'll send a copy.

They argued in that book, there's fears to lose our jobs in this type of era, but fortunately human being is still better than machine in their terminology ideation. Which means some coming up with a new ideas and concepts. So they argue that individuals in the digital era need to take advantage of skills, of thinking outside box. And governments should then have a purpose to help individuals to improve the soft skills of ideation by providing them better education.

And to do so, teachers need to be better paid and also schools need to develop well design curriculum instead, et cetera. Of course, I agree with that and it's important, but one thing I think the problem is the current formal education is lagging behind industrial needs. It takes us several years, for example, for a university to receive the demand and develop the proper curriculum and teach the students.

And, you know, given that the faster technology changes, the time lag may get bigger in the future. So that's why I emphasize the lifelong learning and especially within firms. So I think the role of management firms are undervalued in the discussion of lifelong learning because they mainly focused

on the supplier side of education mostly school or tech institutions.

I saw the one comment in chat. There was a former education includes not only does the school but all tech institutions as well. So I think firms in the digital era can and also should be the supplier of continuous learning and I think government should also incentivize the firms to do so.

So one example in Korea, I would say, we have such a government supported program called Main Bees which is basically a program that evaluate how innovative a firm is in its business management and providing workers a better learning environment is one major part of that evaluation. So one a firm is certificated as innovative as a Main Bees firm, it becomes eligible for several benefits including lower interest rate or some export subsidies.

So this kind of policy may help to incentivize firms especially managers to encourage their workers to learn further within or outside a firm.

And another policy can be provide business consulting to improve their management on employees' learning. And even this maybe packaged with support, the financial support for digital technology adoption is up so. That could be some kind of examples, I think.

MR. KOSE: This is a business part question and it's situated in chat as well. I will ask immediately.

MR. CHUNG: Okay.

MR. KOSE: This probably is certain education threshold for minimal tech literacy. And that is necessary among workers to enable, facilitate, you know, continuous learning and technology adoption. So there's still, you know, the kind of the very important role for formal education now.

MR. CHUNG: Sure, sure. Yeah, of course. There is a minimum technology requirement, a knowledge to understand what is the new digital technology? How do we utilize these kind of technologies?

What I argue is that those minimum technology knowledge -- knowledge about minimum technology is not a sufficient condition to adopt digital technology. Maybe in a necessary condition but not sufficient condition. And especially in this fast changing technology environment, we need to try to continuously learn about not only technology itself, but also how to utilize the technology to come up with new idea in terms of business strategy.

MR. KOSE: Thanks a lot. Thank you. So let me put the question to Martin. Martin, we covered the develop of ground and as Chiara mentioned kind of the three issues. What's the role of intellectual trade when we think about technology adoption, diffusion, the kind of cross border trade of financial services? If you can provide a brief answer maybe around two minutes then when thinking of asking some other questions. I'm taking questions from the floor. Thank you.

MR. KAUFMAN: Thanks. The same question. I'll try to be very brief. I think international corporation in general will be critical going forward in a digital economy for all the reasons that the other panelists mentioned.

I think negotiations to improve the lateral training system provide both and good visibility into what are going to be the critical areas? But also, the challenges because these negotiations are very, very complicated.

Let me give you, given the time, give you four areas of what I think this international corporation and negotiations will be critical. One is, as Chiara was saying, openness is really critical. It does complement the need for (inaudible) and the location of resources from shrinking, sectors -- expanding sectors. If we don't have greater openness that will be the gravely challenges, but that's number one.

Number two, I think when we look at different tier of trade policy, we see certainly digital trade and I would also services intrinsically linked to the digital trade. It's a clear area. And what do we see there? What we see there is that the importance of non (inaudible) barriers. So those are the ones that need to be tackled which are regulations and other barriers that are quite intrinsic to this including, for instance, market access or investment controls, okay? So these are the agents that will need to be tackled importantly.

Further we discuss data. And I think dataflows. Cross border dataflows will be critical. Yes, there is a very important need to preserve privacy, security, but also at the same time the excessive control of data can be -- that would lead to not having enough openness to explore the benefits of the digital economy.

Last, I think talking about competition policy to prevent concentration and dominance and foster (inaudible) let me just finish by saying that trade is foremost competition policy. So that's why I

think openness is quite critical. So thank you very much. Let me stop here.

MR. KOSE: Well, thank you. In the market ultimately, we really need to make sure it is rule based global trading system functioning in a way there is actually diffusion of technology across borders and all countries are able to take advantage of these technological innovations in an equitable manner.

So we have only five minutes left. I'm going to end the panel with that kind of open question. Thinking that kind of going around this media is going to be available and we are going to watch it maybe, maybe not. But I would like to basically get your, you know, impressions of the future based on what we learned in this book and based on the work you have done.

I started the panel with this observation about the roaring 20s. So we had the Spanish Flu in 1918 that was followed with this incredible decade of prosperity based on the technological advances in previous decades actually.

Here we are essentially later, we experienced, unfortunately, another pandemic in 2020. It's still with us. And thanks to incredible medical advances, we have very effective vaccines to cope with the virus. We just need to make sure everyone, everywhere getting vaccinated.

Prior to 1920, there were significant technological advances and the '20s saw the benefits of these advances, 1920s. Here we are. We have seen incredible technological changes including these, of course, medical changes over the past three decades. The question to every panelist are we on the verge of roaring 2020s in terms of our economies and financial markets? If you say yes, why? And if you say no, why not? So I'm going to give one minute to each panelist to make a prediction about the future. Let's start with Chiara.

MS. CRISCUOLO: Can I say maybe? I think (inaudible) is a bit over play. I think we have the tools and the digitalization and the pictures of transformation is a great tool. I mean it's allowed a lot of resilience during COVID. We are all having this conference despite not being able to travel. So to me that's a very good sign, but it also bears a lot of risks and especially risks equality and, you know, for fairness and for, you know, as some of the audience raised, respect of privacy. So I think policy has a big role to play.

We face also increasing, you know, global challenges of just climate change. Again,

digital can be a great tool for that, but again, you know, we have a great opportunity with policies now with the finding that government have put in place. We need to use it well. So I think it will all depend on how well we spend the funding that have been put in the hands of government right now.

MR. KOSE: Thank you, Chiara. So Chiara said maybe. Thomas, what do you think? Are we on the verge of an incredible decade of prosperity?

MR. PHILIPPON: No.

MR. KOSE: Why not?

MR. PHILIPPON: I think that much of the hype around digital technological is pure hype especially for advanced economies. I would say something different for emerging markets too. I think for them, yes.

I think that -- so my best scenario is that the digital -- so first of all, the true thing that I find really amazing has nothing to do with digital. Like the new vaccines that we developed for COVID. It has literally nothing to do with digital, okay. It's better than (inaudible), but that's technology we had before, okay. So I think that that's the one that's going to be very important for everyone.

The rest? I don't know. Like electric driving cars. We are years away. This thing is not working and it's nowhere near going to be -- I mean if we have it for the highway within five years, we should all be happy, but that's about it, okay. And everything else I said is not going to happen. So I don't buy it. So no. There will be no burst of growth for the economy.

But my best guess scenario is that actually if we do it right, I do believe that digital transformation can speed up the catch up of other countries. And that kind of in many different ways it could be sharing, better sharing, better outsourcing, better intervention in the global economy. There's stuff we can do now thanks to digital technology where we can trend. Essentially, one way to think about digital economy is you can trade stuff that couldn't trade before especially in the (inaudible) sector.

So I think that's for the catch up. That's great. That would also by the way boost the advanced economies. And the other thing that digital can do is allow some of the, again, less economies to leapfrog, okay. So some of the stuff we do here with the heavy hand of the infrastructure. You can leapfrog above that.

Banking is an obvious one. I mean many countries that won't have bank branches will

probably not have many bank branches at all, and they won't need them. So that is leapfrogging and I think and I think that will actually boost the growth of lower income countries. So but as otherwise, no.

And then on the downside, I do believe that inequality is going to keep rising because of that and I don't think that the way -- I think that if we (inaudible) somebody, the big issue is education and education services. The most backward, zero productivity growth, increasing cost that you can imagine. No entry, no competition. I think it's pretty close to a disaster and that is what we would need in order to digitalize access to digital technologies in advanced economies. And I don't see that happening at all.

MR. KOSE: Thomas painted a rather pessimistic picture. Sunghoon is there any reason to be optimistic for the 2020s?

MR. CHUNG: To be honest with you, I'm not an expert on this issues of -- my quick and my hopeful answer is I hope so and hopefully, but that's all I can say right now.

And by the way, I saw one comment in the chat. Someone asked by linkup in a Korean agency that provide incentives to business to innovative and provide some training. I think they have a website, but I don't think they have English website so if you want really discuss about it, please personally contact me. Thank you.

MR. KOSE: Thank you. Thank you, Sunghoon. I think that we need to find a way to make sure the policies of that institution are known by other entities around the world and that will be one way of diffusion of policies, good policy, of course. But let me turn to Martin.

Martin, you and IMF are there good reasons to be optimistic about 2020s?

MR. PHILIPPON: Yeah. I hope they're not the 20s that we saw before because what followed the 20s is not good. But I mean (inaudible) come conditionally, potentially this can be harnessed and I think there are significant benefits. I agree with Thomas that emerging markets have a lot to benefit from it, but I'm hopeful but conditionally. Thank you.

MR. KOSE: Okay. So what I see is that there is hope, there is a bit of pessimism, but when you look at the data it shows it. Obviously, potential growth has been slowing along with productivity growth. In all likelihood the estimations such as the potential growth will continuing slowing down. This is something we discussed actually in the first round. KDI and Brookings put together under Zia's leadership.

And if you look at consensus growth forecast over the long term, those forecasts also suggest that growth is going to slow down. But there is, I think a hope if policymakers do the right thing and receive the kind of the type of transition in economies with the help of policy interventions taking advantage of these technologies.

There are good reasons to be optimistic and I think there are good reasons to be very cautious and think through these issues as Thomas articulated very nicely. Let me thank our panelists for joining us today for this discussion. And let me thank Zia and Cheonsik for allowing me to moderate this session on their wonderful book. And let me recommend to those watching this session to check the book. It is an excellent collection of data and recent analysis and policy insights. Thank you again and I hope to see everybody in person sooner than later. Bye.

MR. PHILIPPON: Bye.

MS. CRISCUOLO: Thank you. Bye-bye.

MR. CHUNG: Thank you.

MR. LEIPZIGER: Okay. I think we're ready to move onto the next panel. And I see that our panelists are live. So I'm Danny Leipziger. I'm going to moderate this second panel. We've had a very good start. We heard from the organizers of this very important book, Zia and Cheonsik, on some of the overarching themes.

We heard that digitalization has a lot of potential benefits. We heard from Zia that its diffusion has been unequal or uneven among firms. That we have seen increase market concentration and increase labor force polarization. Then he focused as did Professor Philippon on the competition issue as being rather key.

From Cheonsik, we then heard that in the case of Korea small firms don't benefit that much from these new technologies. That we also see a declining share for labor and that we see increasing wage disparities. So that's sort of the overarching set of observations.

The first panel, I think was excellent and I hope we can do as well as they did. And I think we heard very much that, you know, there are some positive possibilities but that there's some real constraints to making the best use of these new technologies. So my suggestion for this panel is that we reverse the intellectual order a little bit and start with, you know, what is it that about the Korean economy

that is problematic that can be either helped or worsened through this new age of digital technologies.

So let me begin by introducing our distinguished panelists. We have three. Harry J. Holzer is the John LaFarge Professor of Public Policy at Georgetown University. He's the founding Faculty director of Georgetown Center on Poverty and Inequality and the former Chief Economist at the Labor Department and also involved with the Hamilton Project at Brookings. So I'd like to welcome Harry.

Our second panelist was to be François Bourguignon as you know, Founding President of the Paris School of Economics and former Chief Economist of the World Bank. But François has a personal reason why he cannot join us today, but he is very ably represented by Lucas Chancel who is the Codirector of the World Inequality Lab at the Paris School of Economics and a Professor at Sciences Po and a coauthor of a number of important papers with Piketty, Saez and many others on inequality.

So we have a labor market expert. We have an inequality expert and third, we have Professor Jungsoo Park from Sogang University, the Director of the Nam Duck Woo Research Institute. For those of you who are not familiar with Korea, Nam Duck Woo is the leader of the Korea trade association that was behind the 60s and 70s great expansion in Korea's exports. So Jungsoo Park is an academic with a law background in work on technology and productivity.

So these are the panelists that we have. I'm suggesting that we follow the pattern of the first panel and that we go through rounds of questions. That we ask for our distinguished panelists to limit their remarks to four to five minutes each. They have each produced a very powerful chapter in the volume that I hope you will all be able to read.

And it's very difficult, you know, set of short interventions to try and summarize these very important chapters. So that's why I think the Q&A kind of format may work better. And I'm going to ask each of you to hopefully answer in four or five minutes what you think the book and your chapter and your research can help in terms of understanding better what the benefits and potential cost to Korea might be of the digital age.

So let me begin with Lucas. And I know that you and François have worked together and know each other well so I feel that I can ask you this question. So Korea is a contradiction in a way since it's inequality -- income and inequality measures are quite good and sort of in the same category as France. Yet, it's poverty rate is 16 percent.

And so, I'm wondering with this new age of digitalization and progress, how do you see inequality moving in Korea? Should we expect that it's going to get worse from its currently fairly good position? So you know a lot about what's happening in all these countries. So let me ask you, Lucas, to comment on what you think will happen with inequality as a result of digitalization.

MR. CHANCEL: Thank you, Danny, for the introduction. Good morning, everyone. Perhaps first a little note. I'm here to replace François Bourguignon and myself, I've just COVID. So I was almost going to get replaced but I felt that would be, you know, too much of a cascade of replacements. So I'll try to be here the best I can despite a little fever, but all right.

So with respect to the general topic here, I'd like to thank, you know, François for putting up this chapter which I really encourage everybody to read if they didn't have the opportunity to do so far. And I very much, you know, agree with the general lines that François summarizes in this chapter looking at the impact of automatization and digitalization both on the distribution of earnings and the distribution of capital incomes. And I think it's important that we really look at these two dimensions.

You know, to me the general way to think about, you know, what is going to be the impact of future digitalization on an equality in Korea and elsewhere is first to, you know, acknowledge this great diversity in inequality trajectories across advanced economies over the past 30 to 40 years. These diversities observed when we look at disposable incomes. So after the operation of social insurance and redistribution mechanisms in Korea or in France, in the U.S., et cetera. But it's also is diversity in inequality trajectories also visible when you look at market incomes.

And I think this is very important because, you know, many of these countries have been exposed in similar ways to automatization or to digitalization. So there are variations across countries of course but there are also very broad similar trends. And we do observe this diversity. And Danny was mentioning that, for example, France or for instance South Korea have been, you know, relatively resisting to this rise of inequality. And what I want to say is that this is not just due to redistribution. This is not just due to the fact that some countries have no developed compensation mechanisms to compensate potential losers from automatization, digitalization in the realm of their disposable incomes.

This is something that is happening before. This is something that is happening on the market. And of course, you know, this very general way to think about this relationship is the skilled bias

technological change of framework and the, you know, the golden and cast race between education and technology approach where the supply for skills did not meet the supply of new technology.

Now, what I would like to say here is that even though we do observe and I think François, you know, points this out well in his chapter. We do observe that in countries where inequality rose very fast, we do observe a lesser supply of high educated workers as compared to other countries.

For instance, in the U.K., there was a faster rise, faster growth in college education in the U.K. versus the U.S. But, you know, these differences are not that clear when you look at other European countries. And, you know, there's different shaded growth in the supply of high educated college workers is not necessarily what is going to explain why France has resisted so far to the rise of inequality or to the rise of, you know, market inequality.

So a general message that I would like to put forward here is that, you know, on top of the standard skill bias technological change approach to these issues, it's important to perhaps introduce a, you know, wealthy bias institutional change approach or WBIC on top of the SBTC approach. That is, you know, what can expand the divergencies across countries is also often due to divergencies in terms of tax policies, in terms of deregulation policies, in terms how countries prioritize or not certain sectors of the economy.

What choices were made in terms of revalorization or not of the minimum wage. For instance, in the U.S., the fact that the minimum wage today is 25 percent below in real terms is valued in the 1970s is not, you know, particularly due to or doubtedly due to effects related to digitalization, automatization of the economy. The fact that this wage increased over the same period of time in France, between the 1970s and today by factor four, five is not, you know, it's essentially due to institutional, political choices.

And so, the answer to your question, Danny, is what is going to happen? To me, it's not necessarily going to be driven by the supply of technology, but essentially by the policy institutional responses to these technologies. And these really are going to fall into the domain of what type of tax policies are implemented? What types of regulatory policies are implemented? What type of minimum wage policies are we going to implement?

So less about technology. A lot about the supply of, you know, skills and also a lot about

how we ensure that high educated people get to good paying jobs, which is not necessarily a dower correlation. You're going to have the good education and a bad paying job if you don't have the institutional framework that is going to warrant that.

MR. LEIPZIGER: Okay. Thank you so much. We'll come back to the policy framework questions. But I wanted to turn to Harry.

And I'm sure you know that there's some peculiarities of the Korean labor market insofar as they rely quite a bit on temporary workers and university graduates have very high unemployment rates. And there's a lot of part time work particularly among the elder poor.

So it's a -- and in my opinion. I'm not a labor economist, but I find it to be a particularly odd labor market compared to others. And so, I'm wondering with this additional level of stress, of disruption that digitalization can bring with it. What does your research show us that has worked in other countries? And what do you think might happen with respect to labor markets in Korea? Holzer

MR. HOLZER: Well, thank you, Danny, and good morning. I must confess I am not an expert on the Korean labor market, but I can talk more generally about industrial countries and especially the U.S. I focused my work very heavily on the U.S. labor market and especially low wage workers. So let me put out at least some broad ideas about ways of thinking about the automation challenges and a broad bucket of policies that I think would help not just in the U.S. but in many industrialized countries and in Korea as well.

I think the right way to think about automation and workers is that automation doesn't display entire occupations, they displace the performance of specific tasks. And the tasks focused way of thinking about the labor market I think is important because if for any group of workers if the tasks being displaced are a small fraction of what these workers do, odds are there will be incentives for the firms as well as the workers to have retraining and get them to do other kinds of jobs. But if the tasks are a large fraction of what workers do, they are at much higher risk of displacement.

So what we want is to train workers to be able to perform tasks that are more complementary with the automation, not so substitutable. A lot of that is about education and training policy and more broadly ways to upgrade workers so that workers share more in the benefits of whatever product to be gains the automation will produce.

So let me put out some ideas. And I hope they have some relevance to the Korean context. I believe they will. And they are certainly relevant for other industrial countries.

So in the realm of education and training, what can we do to ensure that many or most workers are more complementary rather than substitutable by the automation or at a minimum to prepare them to be retrained in a way that's complementary. Something that is very relevant is the extent to which workers are trainable or retrainable.

So the foundational skills that they get coming out of elementary and secondary education are very important. So first of all, I think elementary and secondary schools around the world must transition to a set of skills that some stylists call the 21st century skills. The kinds of skills that really are much more complementary. That's less about performing specific routine tasks. It's more about broader analytical thinking, critical thinking and, of course, the ability to make judgments. Artificial intelligence no time soon will be able to make complicated judgments of competing factors, I think in ways that humans will continue to be.

Some of those skills as I said are critical thinking. Some of them are communication and teamwork based and some of them are actually more creative. So these are things that our education system could emphasize more.

Secondly, firms could be incentivized to do a better job. And one of the speakers of the previous panel talked about these incentives. And, you know, as Zia pointed out. In America, some economists like Daron Acemoglu and Pascual Restrepo think that our tax system has created a bias towards automation. We could try to fix that. I think some of those tax features are pretty well entrenched.

But maybe we could have other things that raise the costs of employers to displace workers and lower the costs of retraining those workers into a more complementary set of tasks.

So one could imagine something like a worker displacement tax. Not a robot's tax. A tax on displacement to encourage firms when they implement automation to do it in a more worker friendly fashion and subsidies for all kinds of on-the-job training. Tax credits, technical assistance, a broad range, things to encourage firms not to displace workers so much as to retrain them for other jobs.

And then thirdly, of course, for the workers who are displaced, we do need some kind of

a system of lifelong learning. And those maybe different in the Korean context and in the American context. But I can imagine things like lifelong worker training accounts. One could imagine withdrawing a little bit of each worker's payroll and investing it in an account that they can tap throughout their entire lives if they need retraining.

One could also imagine helping the training providers. In America, the community colleges are the most important. To provide more of this kind of training in the high demands sectors to help workers get a good new set of skills to replace the ones that they have lost.

And of course, online education will feature prominently in this. We don't do a great job with online education and training right now, but we can get better and learn how to do it better.

On top of education and training, let me just put out three broad ideas. And again, the specifics might vary from one country to the next. But first of all, at least in America, and I think this is true in most organizations. Employers actually have a fair amount of discretion about the quality. And this is also similar to what Lucas just said.

Employers have discretion over what kinds of jobs they create and the extent to which they compete on the basis of very, very low labor costs and very low compensation. Or whether they invest more in worker productivity, worker performance and with a higher compensation worker. Since the higher compensation worker, a bit of a public good. I think public policy can do more to encourage employers to take what some people call the high road in compensation to create good jobs and to still be able to compete on that basis.

So encouraging more good job creation as a lot of jobs are wiped out and new ones replace them and it could be very important.

Secondly, some people will end up in lower wage jobs. That's just inevitable. And I think a broad range of policies to make work pay even in some of those low wage jobs is, right, what we're talking about is various forms of wage subsidies, various forms of subsidies for childcare and transportation and other things that are very important for what workers can do. I think could do the trick.

But I agree with Lucas, by the way, that higher minimum wages can also play some role. I do worry a little more. I think that Lucas knows about the loss of employment that could result if, for instance, if in America we had a federal \$15 minimum wage. But we can talk about and what might be

that kind of optimum level of minimum wage.

And thirdly, now, I think this is very important. Workers need some form of voice in the workplace. In America, the private sector unions have almost completely disappeared. The rate of collective bargaining in the private sector record is down to six percent. There's ways of pushing back against that but there's also alternative mechanisms of worker voice.

And the studies, by the way, show that when workers are unionized or firms that are unionized, the firms do implement the technology in a more worker friendly way. And there are lower displacement rates from any automation that's implemented. So workers need some voice. And if it's not going to be done through unions and collective bargaining, there are other models like the Works Councils that many countries in Europe have for workers to have that voice.

So there's a variety of things that we can do. Some on the education training side, sometimes on the job quality side and compensation side and we can talk about how to do those in the context of specific countries and their legal institutional frameworks.

MR. LEIPZIGER: Thank you. Thank you, Harry. Well, there are a lot of possible interventions and we can come back on those.

But I wanted to get from Professor Park his take on some of these issues that you heard in the previous session as well. There are a lot of observations that imply that wage polarization is a problem and equality is a problem. Some of the productivity may not be -- some of the technology may not be productivity enhancing.

But a lot of it has to do with the investment structure of a country. And so, you better than anyone know the limitations, I would say, in Korea and the dominance of smaller firms and et cetera that make some of the policy prescriptions harder to implement in Korea and lead one perhaps to think that things might get worse before they get better. In other words, the nice Gini coefficient that Korea currently enjoys may not persist.

So you've done so much work on productivity and technology, let me turn to you.

MR. PARK: Okay. Thank you, Danny. Thank you for having me here. I learned a lot from the panels here. Good discussions. I agree with many opinions that Harry and Lucas have presented.

First of all, you know, to your question what I have done in this chapter is I guess I realize it was too ambitious than what I could, you know, swallow but I had to do it because I was so curious about what's happening in Korea. And one thing that we have to consider in Korean economy versus other economies that Korea is very peculiar in the sense that there's a kind of dual economy where, you know, as you said the industrial structure is very different.

It's a small number of large firms. Globally competitive firms which is leading the country and leading the value added, but with a smaller -- about 20 percent of the employment is represented in the larger firm. Whereas, there's a large (inaudible) of small SMEs. About 80 percent of the employment is in there, which is lagging behind with low productivity and so forth.

So we need to first take into account the fact that we have this peculiar structure which is not presenting in any other countries. So what I wanted to do in this chapter was try to see, you know, as the chapter title is How Technological Change is Having an Impact on the Inequality. I wanted to make a connection. What is a channel of this technical change at the macroeconomic perspective?

First of all, it was really difficult to link and identify quantifiable data variables to link these two very large topic, you know, technological change in inequality. But what I had to do is -- what I did in this chapter was seeing that Korea, in Korea, what you have talked about in digital transformation, automation actually happens usually in the global large firms. Whereas, in the small SMEs it's really rare to happen. There's a small number of firms about doing this digital transformation.

So one thing that I wanted to look into was that whether these technological change, these highly creative and highly, you know, high capacity large firms whether went -- what you have talked about in this panel is -- it's all happening in that section. It's all happening in that section.

And the macro-impact may not be -- what's happening in that fashion may not be representative in a macroeconomic perspective. What I'm saying is because they have a very small number of employment proportion in these large firms. Even if the automation, you know, happens, it may not appear in the macroeconomic variables. And that's what I found in this analysis.

First of all, what I found in Korea was that first of all we thought, you know, the labor income share in most other countries has been declining because of -- we thought that, you know, in other countries because of new technology. But in Korea when I measured it, labor share, income share

has been very relatively stable, okay?

So I have to look into more into what's happening behind this thing. You know, why is that declining? But my guess is that it maybe because of what Harry has said. It maybe because that there's an unskilled and skilled. And skilled which is complementary to the new technologies. It's benefiting from this technological change, and they are compensating more in that case.

So maybe, you know, it's benefiting the skills. So the sum of the labor share maybe it could be stable. So what I meant was it's leading wage disparity. And that's the next dataset that I looked into. And I found in the wage survey and also the business survey. And when I looked at also -- I found that the wage disparity has been increasing overall in Korea.

But recently, it has been slowing down. You know, wage disparity has increased up to, for example, 2010. And after 2010, disparity has been relatively stable and mildly increasing. And then what I wanted to do was link this wage disparity because it's individual data with the household data.

You know, I saw the chatting window and there are lots of misunderstanding there because, you know, you have to look at the book. Read the book to find out what I analyze.

Anyway, to link the wage -- because the difference between the wage disparity and the household income. Is the household income there could be multiple income, right? There could be single income base and the household double income base. So what I found was between mid-1990s and up to 2000, wage disparity actually contributed to higher household income inequality.

But overall, all period, you know, after 2005 or more actually rates disparity as a very small contribution to the household income inequality. But overall, what, you know, what Dr. Woo has, you know, he has presented in the previous slide was that team labor participation has increased. I'm not trying to say, you know, we need to cure that. What I'm saying is Korea is under development stage.

So it's a very natural thing that the female labor participation is rising. And we have to offset because of these single income-based household transforming to the women from the household families, we are experiencing some rise in the income inequality which is very natural. And we think that once it gets stabilized, I expect that the income inequality will fall because with every, you know, many of the female heads -- many of the household is double income then it will be more equal.

So we have to realize what's happening and then, you know, produce, you know, policy

prescription. We cannot link everything for, you know, this is because of technological change. There are some portions of inequalities which is attributable to natural consequences of development. So in that sense, you know, I want to, you know, I want to make it clear that to the audience that if there's misunderstanding about my findings.

And about, you know, income inequality, Dan, you told me -- you said Korea is a very good, you know, a low-income inequality. But in Korea, we think it's very high. You know, we always emphasize that we have a too high incoming policy. So it is one of the top priority in this country that we want to solve. So I said too much so I'll stop here, okay.

MR. LEIPZIGER: No, thank you. You said quite a lot. We'll maybe come back on the female labor force participation issue, which is complicated. I understand the context in which you found that a double income households, you know, have an impact. But obviously, as you said yourself, that the policy prescription is not to reduce single labor force participation. Quite the contrary, given demographics of Korea.

So we'll come back to some of these issues, but I wanted to go to the second round. And, Lucas, if your COVID has not kicked in further in the last few minutes. I wanted to ask you the following more general question about income inequality. And I would have asked François but I can ask you because you're both French.

When you look at the OECD data, you see that France's income inequality is not very good prior to transfers and taxes. And then after redistribution which was a little contrary to what you said before that, you know, you worry more about market incomes rather than the final disposable incomes. But anyway, but France makes a big effort. You know, the difference between the two Ginis is enormous.

Whereas, for Korea, similar to the U.S. but U.S. distribution is worse, there's not that much change. You know, between Korean post-tax and transfers. So one implication for that could be that Korea has more space to do further work on the tax and redistribution side particularly if income disparities start to rise.

So I wanted to link that up with this concept of the basic universal income, which I'm sure is something that you know a lot about. Is that something that Korea might consider? And what has been the experience in some countries? And obviously, you only have a couple of minutes to respond to

that, but is that a possible way for Korea to think about things going forward? Because I think we probably will see a rise inequality in Korea. You haven't found it yet, Professor Park, but I think it's coming.

So the question is what policy prescriptions can you look at that have worked elsewhere?

MR. CHANCEL: Thanks, Danny. So first point on the understanding of the situation. And here, yeah, I'd like to challenge a bit this standard OECDU that, you know, France or Europe in general managed to really keep inequality in check thanks big, stronger distribution from pre-tax to post-tax incomes.

In fact, so we have this paper with my colleagues, Blanchet and Gethin in the American Economic Journal. The title is *Why is Europe More Equal than the U.S.* And in fact, basically we show that essentially things are happening on the market income distribution. And a country like the U.S. actually is going to have a more overall progressive system of taxes and transfers, but the problem is than European countries, and that France. The problem is that it's way too unequal to start with the United States.

And so, why the misunderstanding to start with between what we show which comes from the distributional national accounts methodology where we really try to distribute the totality of national income to individuals and what the OECD statistics here that you mentioned reveal. A part of the answer is that with these statistics don't really have this granularity at the very top of the distribution so they tend to see a bit less inequality in countries like the U.S. because of the data sources used.

But perhaps a more fundamental approach here is that in European countries, you know, a big part of the pension systems or socialized pension systems are not capitalized pension systems. Meaning that when you look at market incomes there's a lot of very poor people in European societies because their market incomes are zero and before redistribution.

So sometimes what these metrics that I think you're referring to, Danny, tell us is basically that Europeans have or French have, you know, collective pension systems that go through staggered distribution and other countries don't. But they don't really inform us about the dynamics within the distribution of earnings of the workers. So that was the first part.

Now, the second part, universal basic incomes or other systems. Well, you know, UBI I

think, you know, can be something that is, you know, in principle interesting but sometimes, you know, if it's proposed as a measure that is going to be a substitute to other forms of, you know, social support, health insurance or, you know, other types of support that Harry was referring to before in terms of, you know, helping people accessing transportation, accessing other forms of, you know, of basic goods that they need to access to is not necessarily the right way to go forward.

So in countries like Germany or France, you know, you have these minimum incomes for people that are outside of the labor market. That, you know, they don't have an employment insurance schemes any more. And I think that, you know, this should be generalized to basically everybody in society and this would be very close to UBI.

But making, you know, UBI as the, you know, key solution to automation is not necessarily the way to go. And here I really would like to, you know, come back to what Harry was saying about, you know, education. You know, lifelong education and I'd like to connect this and that will be my final word with minimum wage.

Basically, in a country like France, for instance, where you have basically governments are bound to increase minimum wage every year. And, you know, this contributes to make sure that, you know, bottom part of the distribution sees their wage increase. And I think it's can also be seen as an incentive for governments to make sure that the supply for high skill education is on par with this increase in minimum wage.

So it's also an incentive to go further in terms of your supply of good education that is fit to the current technological setup. And this is not what you observe in other countries. So I think in terms of, you know, this ecosystem above educational policies, minimum wage policies and finally tax policies and I think François Bourguignon in his papers, he's full roles for tax policies influence the pace and the direction of innovation and he discusses this very rapidly with Harry before.

You know, but also finance the success to education and to finance this safety nets. And François has also other roles for taxation. I'll leave that for the discussion in the interest of time.

MR. LEIPZIGER: No. Thank you very much. I feel like we have both you and François. So we got two for one here. So thanks very much for that intervention.

Let me come back to Harry on the education. You know, I don't think you can go to any

one of these panels, and ours is no different and the one before is no different, without hearing that the answer lies in lifelong learning. It lies in learning different skills and you correctly identified a lot of that.

Isn't, you know, the traditional measure that countries use to see how they're doing the old piazza tests. Don't seem to be testing what you and others have said is important in terms of the skills that workers need to be adaptable and to adjust in new technologies. So would you be in favor of changing those piazza metrics? Because, you know, a lot of countries including Korea do very well on those. But you could also argue that what's being measured is not necessarily the skills that the 21st century worker will need.

So this link between labor market outcomes and education I think is sort of key. And you're the right person to tell us about that.

MR. HOLZER: Well, thank you. So a couple of things about that. You know, first of all the piazza test is for children. And it's designed to measure these very general foundational skills. It does a decent job with that but it may need some updating in terms of these more 21st century skills that will be, in fact, more complementary to work and towards automation.

So it might involve updating piazza, but there is a second test called the PIACC test, P-I-A-A-C. It's also distributed to OECD countries and it's more aimed at adults and what they do on their jobs. So the PIACC test is like a complement to the old piazza test. And I think that will improve our understanding.

But there is also a literature that has been developing on the tasks that are necessary to be performed in various kinds of occupations, the extent to which automation replaces those tasks. And we have -- you know, sometimes that literature is backward looking. Looking at the extent to which robots have replaced blue collar manufacturing workers or other context. Sometimes, it is more forward looking. And I do want to cite the work of a young economist named Michael Webb who has used these data on tasks to try to estimate what artificial intelligence will mean in terms of future displacement, which might be very different from the robotics of the past or the automation of the past.

And there is at least the possibility Webb's work finds this maybe some others disagree. Webb believes that a much wider range of occupations will now see task displacement. It will go much higher up into the education skill distribution, possibly into the realm of professionals, doctors, lawyers,

financial analysts, accountants, et cetera. Because the more routine parts of their work will now be done increasingly by artificial intelligence.

But I think that's also in addition to the tests, updating the tests, I think it's important to pay attention to that kinds of work and to get a better sense of where the automation will proceed quickly. What kinds of tasks it will replace? And how that will affect the distribution of future task performance and work?

I do believe that there will remain a skill bias in this sense because I think that when professionals -- if people like us face some task displacement by automation, we will have a better sense of how to pivot quickly towards new tasks performance than a lot of less educated workers. So I think a lot of what we said in the previous rounds. It will still continue to be inequality enhancing and let's pay attention to that.

And let me just make one final comment about UBI since that was one of the issues on the table. I have not been a fan of Universal Basic Income. I think it's very, very important to keep these workers in the labor force and that's why I prefer make work pay policies, wage subsidy types of policies rather than a universal base. I updated my thinking a little bit in the American context because I think children do need some kind of a universal basic income.

And of course, in the United States at least for 2021, we had a new child tax credit where the parents of every single child gets some kind of tax credit to keep them -- to make sure their children live at a sort of universal basic income level. So I prefer that form rather than a broad based UBI. I think we all -- all these countries need policies to make work pay. To make the market-based incomes more equal. And one way or the other to encourage workers to stay attached to the labor force.

MR. LEIPZIGER: Thank you. Thank you very much. Let me move now back to Jungsoo and ask you two very difficult questions.

And one has -- well, the premise is basically that as most of you know, Korea faces a presidential election in March. And I don't know, you know, what the outcome will be and what policies the two major candidates are espousing.

But coming back to the lifelong learning question. Since I think the data is roughly that 20 percent of Korean labor is temporary workers, which makes lifelong learning even more difficult if you

want it to be firm based. Of course, if you take Larry's idea of some sort of a national account that you draw on that would make life easier.

But again, in the Korean context more complicated because of the work force. And also, you know, the proportion of elderly that are poor or are far below the poverty line is alarming for an OECD country. And the previous administration, the current administration in Korea has tried through a number of means. Some of them counterproductive like raising minimum wage, which displaced a lot of elder workers in their temporary jobs.

So maybe what Lucas suggested that there be some sort of minimum incomes at least for the elderly so it doesn't displace work, but it provides a safety net that is more, you know, important for the elderly and as you said, some countries in Europe have this.

So this is a roundabout way of throwing a few things at you to say, okay. So now I've made you the new advisor in the Blue House for the new administration, whoever wins. What can you do to fix problems and to prevent some inequality issues or disparity issues from getting worse?

MR. PARK: I would first decline your offer. It's going to be really, really difficult to solve. And I think, you know, everyone, you know, either party, you know, whether you're in the right or left. We are recognizing, we are facing this inequality problem and it's getting worse.

But first of all, you know, I want to clarify. If you look at the recent Korean data about the redistribution rate, you know, the market income inequality and the after-taxing inequality. It then measures increasing really rapidly. That means the market income inequality has been barely rising in the recent years, but actually be the after mass. The disposable income inequality has fallen in the last five years.

And the cap is exactly what you're talking about, Danny. But we are giving a lot of money to the elderly people, you know. The very disadvantaged people focusing on we have a system which is giving a huge -- you know, we are increasing that portion as you have recommended. So that's kicking in because more and more proportion of the population is becoming older and automatically the redistribution factor is getting stronger and stronger.

Now, going back to Lucas. I'm sorry about in Korea, we have a -- you know, there is a candidate that is trying to promote UBI, you know. But UBI, you know, if it's manageable, I think you can

do it but I think we are at the stage of about 30,000 per capital income. And obviously, it's going to be very difficult financially. The fiscal policy because, you know.

And so, what we wanted to do is concentrate all these money into the very poor class and the disadvantaged workers or the disadvantaged elderly people. And I think that will be a more appropriate way to approach inequality.

And also, the education and all that also I think both candidates are agreeing on -- it has seeing education system as a whole, okay. I don't know if that's going to be a good answer, but --

MR. LEIPZIGER: No, no. It's a very good answer, but I should also say that since you're the only Korean academic that we have on our panel. In terms of what it is that university graduates need to have in terms of skills. Do you see any change in the curriculum and the way things are being taught because university graduates, you know, their unemployment rate is whatever, 10 to 15 percent?

So the question is is it on the supply side? Or is it on the demand side? Or obviously, probably some in each?

MR. PARK: Yeah, I think it's both sides. You know, first of all in Korea there's a huge, tremendous change in curriculum. You know, and they're responding to the industry demand about, you know, AI, machine learning. Even in our university, we're developing all these programs and I don't know whether it's going to be effective or not, but we're trying at least.

So that would be -- there's a tremendous change, but my worry is that even if we train all these college graduates with the AIs and all these new technology will there be enough jobs out there? Because I don't know. You know, given that, you know, we have only a small number of globally competitive firms. I don't think they're going to absorb all these people. So what we are trying to target is startups. Try to, you know, startups to make new businesses and to absorb these new technology trained people into these startups and ventures and, you know, firm the whole thing and so forth.

So there is an ongoing change in Korea. Hopefully, we have a good result.

MR. LEIPZIGER: Well, that's encouraging. I think the startups is the right place to go, but of course it relates back to the previous panel in terms of competition policy and structure of industry, et cetera.

I'm reminded on your observation on the demand side that as I recall something like

200,000 university graduates take the exam to be Samsung intake and only 2,000 are accepted. So 99 percent don't make it. So that's a problem on the demand side.

MR. PARK: Right, exactly. Exactly. We need more good firms. More large firms. You know, Samsung entity, but we need more of those like advance countries, yeah.

MR. LEIPZIGER: Okay. Let me wind up. We're a little bit over, but I think we were starting a little bit late. Let me ask each of you if there's one minute that you would like to add one more thing that you thought of or that you want our listeners to walk away with. And then we will close up hopefully by 10:10.

Lucas, let me start with you.

MR. CHANCEL: Thanks, Danny. Not much to add except perhaps from the fact that I think it's really important to perhaps on the research side pay a little more attention to this vast diversity of inequality, you know, post-tax and pre-tax inequality trends across countries.

And we have not yet fully gotten the wealth of information and of potentially policy relevant conclusions coming from a better understanding of these diversity when we look at digitalization and automatization.

MR. LEIPZIGER: No. Thank you very much. And I must confess that I take the OECD data at face value and haven't dug into it the way you did. So that was very much appreciated. And let me also thank you very much for stepping in for François and we appreciate that and we hope your COVID illness passes quickly.

Harry, can I turn to you? Any last-minute thoughts that you want to share with the audience?

MR. HOLZER: Well, to be very brief, I'll just say one thing. It is clear that automation will have a wide range of effects and therefore it will require a wide range of adaptive strategies but from the part of workers and firms and the government. There will be no single silver bullet.

Some of this is about education and training. Some of this is about finding other ways to be supportive of workers whether they are displaced or not. Whether they face more competition. So let's look at the broad package. Education training plus other things that address some of the inequalities that Lucas has talked about and that Jungsoo has talked about as well. It will be a package of responses,

not a single silver bullet.

MR. LEIPZIGER: Thank you. That's a very good admonition and I think it's one of the conclusions of this panel that there are a wide range of policy areas that need to be addressed who wants to deal with this issue.

Jungsoo, last word?

MR. PARK: Yeah.

MR. LEIPZIGER: You're sure you don't want to go to the Blue House? I mean I think you would be good there.

MR. PARK: No thank you. I will recommend you. Okay. So thank you so much. It's a really beneficial for me. And what I wanted to say is that, you know, we have micro evidence and we have some episodic evidences. But looking at all these macro data and these comparison data, what I found was we have to be really cautious about just, you know, jumping into conclusion.

You know, linking micro evidence into just macro evidence. It doesn't work in some cases like Korea because Korea has undergoing a lot of transformation and it will be very hard to identify one in a macro evidence as the key, you know, driver of macro changes.

So I just want to be -- to make a comment that we need to have a correct diagnosis to get the correct policy description in order to do that type thing. We need to be cautious about, you know, looking at the data. I think we need more -- you know, we have to be -- we'll get the more comprehensive data and more analysis before jumping into a conclusion.

MR. LEIPZIGER: Well, thank you. I'm just looking in the chat box where we were remiss and not coming back on some of the questions.

I think covering the issue of women in the labor force is one that I think requires a little further discussion in terms of wage gaps and other issues that affect women. And I think giving Korea's demographics, getting more women into the labor force is definitely what you want to do and if there's some second order impact that can be dealt with through other policies.

But I think the main intervention should be to make it easier for women to be in the labor force. To come back into labor force. And I note that, you know, Korea always looks at Japan. And Japan's actually labor force participation rate for women now is higher than Korea's. So you're the worse

in the OECD. So that needs some attention by the new administration. So when you get to the Blue House, please take care of that.

But let me thank our panelists for a very spirited conversation. I think a very practical set of policy observations. I think admonitions to be more careful in looking at the data, market incomes, disposable incomes. And also looking at a wide range of policy interventions that can affect income disparities.

Obviously, just, you know, disruptive technologies will persist. The question is how governments deal with them in areas where there are market failures, externalities, regulatory issues, competition policy issues. So that's why I think the consensus view of the panel that there's a wide range of policy interventions that can be brought to bear is important.

So let me end by saying that I think this section volume by Brookings and the KDI has added a lot to our understanding of issues and to understanding better what Korea faces and can face in the future. Looking at experiences from other countries and bringing, you know, top notch scholars both from the KDI as well as from other universities into this project.

And so, I think I can close by telling Zia and Cheonsik that they've done a wonderful job. And hopefully, the panels will also have added to what people need to do, which is to buy the book and read it. So good night in Korea. And good afternoon in Europe. And a late good morning to everybody here. Thank you very much for joining us.

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I, Carleton J. Anderson, III do hereby certify that the forgoing electronic file when originally transmitted was reduced to text at my direction; that said transcript is a true record of the proceedings therein referenced; that I am neither counsel for, related to, nor employed by any of the parties to the action in which these proceedings were taken; and, furthermore, that I am neither a relative or employee of any attorney or counsel employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.

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