

For India, the 1990s was a transformative decade that cut tariffs, delicensed many industries, and cut regulatory red tape and stimulated private enterprise. I believe these reforms changed India's growth trajectory in a very important way.

Y: And you continued economics. And then how did it go?

G: I came to the US to do my PhD at the University of Washington in Seattle. One of my professors, Richard Startz, strongly encouraged me to transfer to one of the top five PhD programs, which is how I ended up doing my PhD from Princeton. Startz played a pivotal role in my life, and I am grateful to him. My advisors at Princeton—Ken Rogoff, Ben Bernanke, Pierre-Olivier Gourinchas—were all hugely supportive. My first summer at Princeton I worked as a research assistant for Ken Rogoff and Maury Obstfeld writing solutions for their textbook—two predecessors of my current job! Given all the hurdles women face in economics I was lucky that I had three advisors who were very encouraging and supportive.

Y: And now you've moved to Washington, DC, to work for a totally different system from academia. How do you balance work and your own time?

G: I confess my "own time" seems almost nonexistent, but I will not complain as I am thoroughly enjoying what I do. I do like watching TV shows—like right now I am watching *True Detective* on HBO.

Y: Especially in academia, thinking about research and papers, it's just an ongoing process—weekday, weekend...

G: Exactly. Research is always on your mind, though I think I have gotten slightly better at compartmentalizing things. At Harvard I used to spend long hours working, but they tended to be mainly quiet hours. Here I spend a lot more time meeting people, talking to people, communicating through many platforms. That's one of the main differences. I have to say that one of the most important events in my life was meeting my wonderful husband, because of whose support and advice I am where I am. I think it's as simple as that. And I have a son who is 16 years old. He's quite independent and a lot of fun to talk to and spar with. I also have a little dog, a Maltese named Oreó, who is adorable.

Y: How do you see our research feeding into the operational work of the Fund?

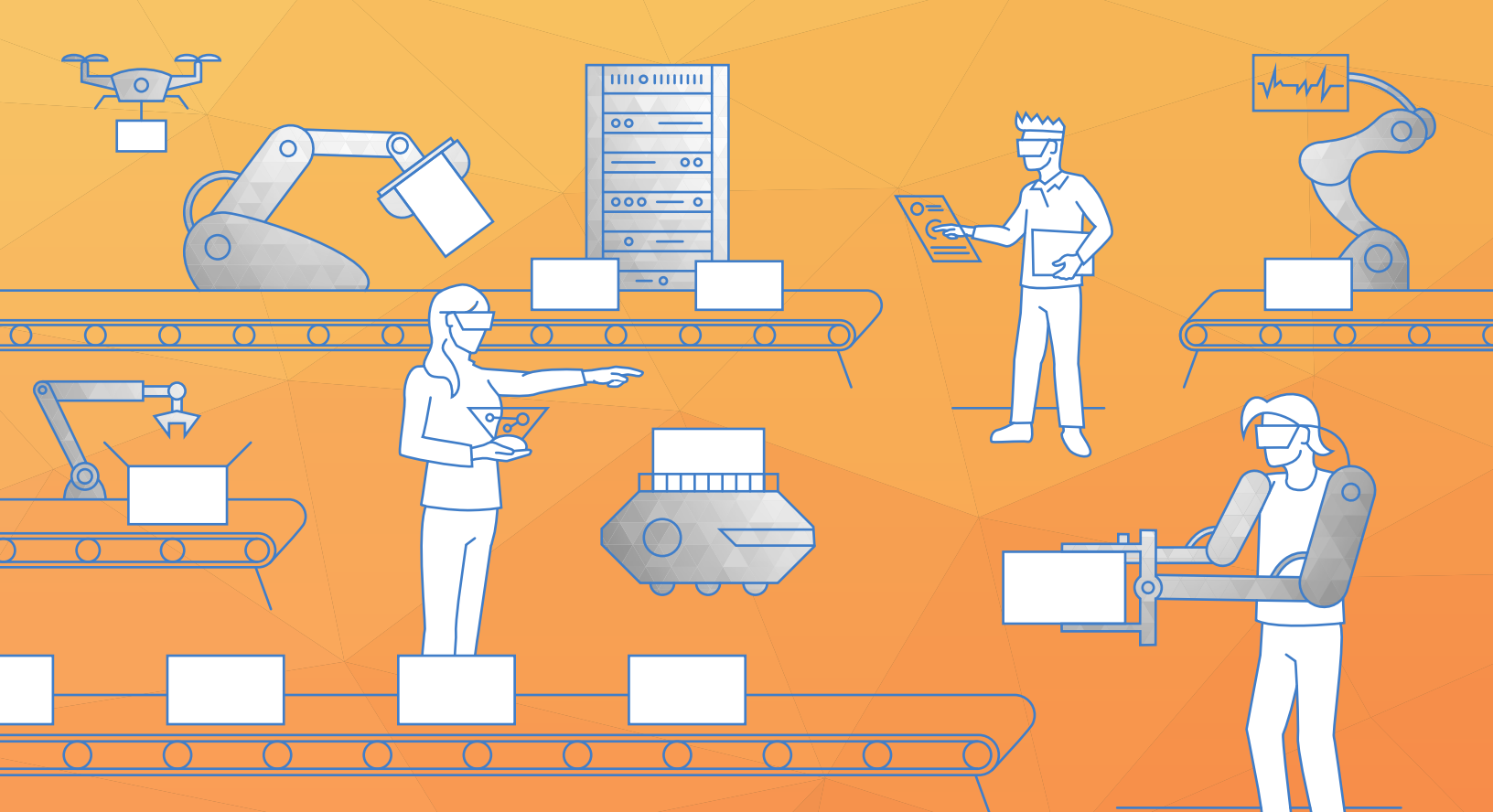
G: The work the research department does is central to the operational work of the Fund. Our research department flagships—the *World Economic Outlook* and the *External Sector Report*, the modeling work, multilateral surveillance, our many publications—all directly feed into the operational work of other departments. There's a lot of important research work being done on market power, international trade and exchange rates, the integrated policy framework, and structural reforms and many more topics that form the basis for policy advice to our members.

Y: Thank you very much for your time.

G: Thank you for doing this.

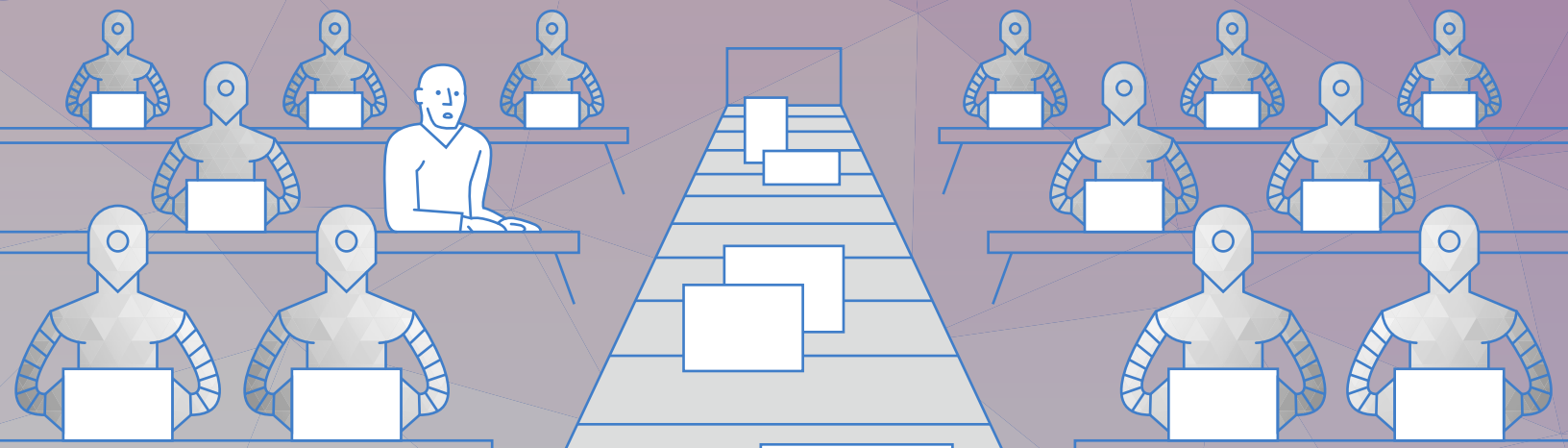
GITA GOPINATH: INTRO INTERVIEW

Gita Gopinath discusses the work agenda and priorities of the IMF amid rising risks and changes in the global economy.



Technological Change and the Future of Work

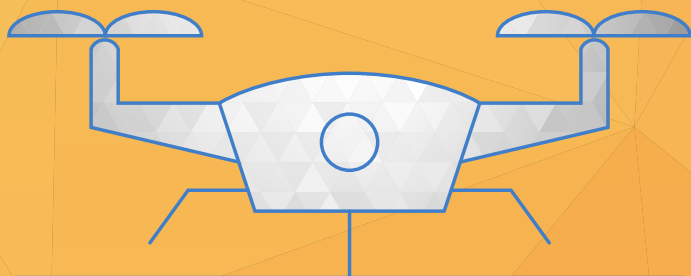
The Impact on Africa and the G20



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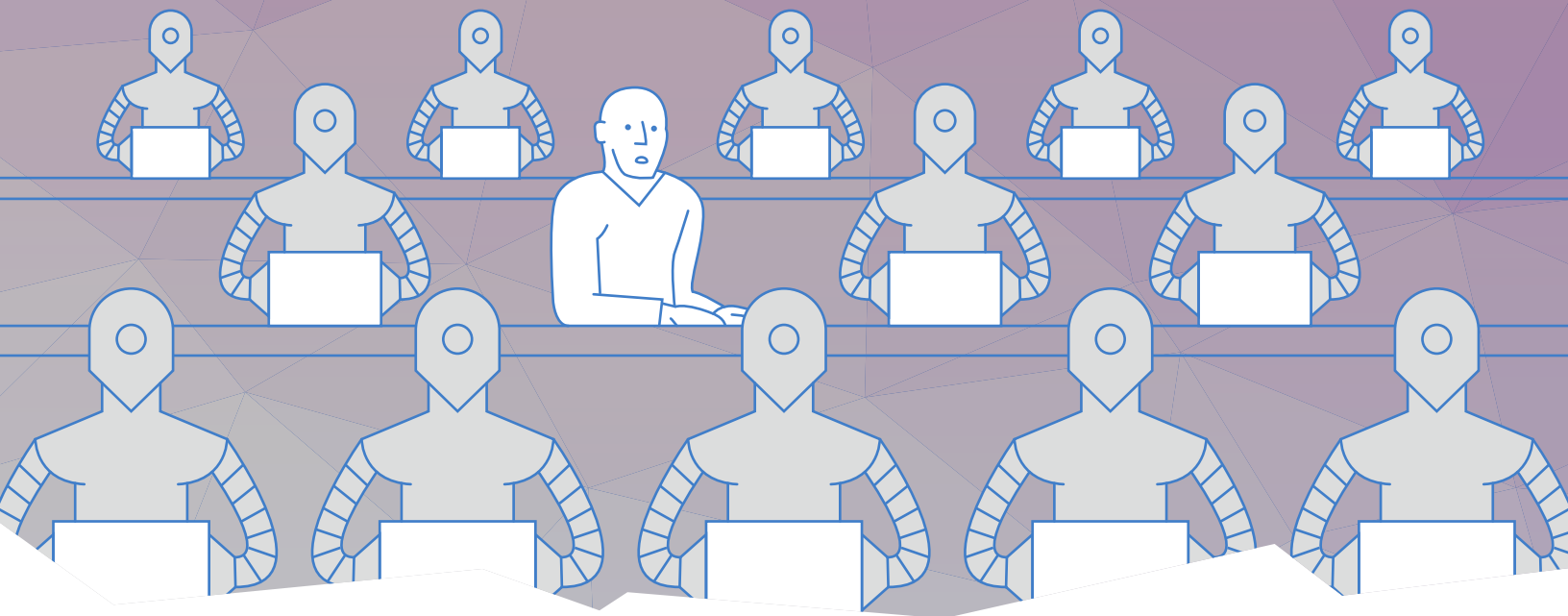
Robotics, automation, and artificial intelligence are transforming the production structure of countries and regions. This is not the first time such profound transformation has happened. At the turn of the 20th century, the industrial revolution moved 25 percent of the labor force from agriculture to manufacturing and related sectors over four decades. The adjustment was long (and painful). Protests involved displaced workers attacking factories and destroying machinery. The 20th century also witnessed political revolutions and two world wars until the stabilizing influence of modern welfare states and international cooperation emerged.

Will continued technological change benefit all? Or will it lead to even more polarization? The IMF has conducted research on these questions to distill policy advice for its membership: What policies are needed today to prepare for tomorrow?

Different Opportunities and Challenges for Different Country Groups

In G20 economies, automation provides opportunities to address the economic implications of demographic changes, but it also leads to job losses in some sectors and increasing income inequality. Countries with declining populations face the challenge of providing for a growing number of retirees with fewer people working. Here, replacing a shrinking labor force with robots can be a welcome opportunity to maintain living standards, as shown for Japan in Schneider, Hong, and Le (2018). However, in other G20 economies, the immediate challenge is to tackle the implications of job displacements and income polarization. The threat of new technologies replacing jobs across the skill spectrum is the key issue.

For sub-Saharan Africa, the challenges are different. The region's population is projected to increase from 1 billion in 2018 to 1.7 billion in 2040. To keep up, sub-Saharan Africa needs to create 20 million jobs a year over the next two decades. Some fear that automation could make this more difficult, though low labor costs may provide some protection. Alternatively, technological advances can provide opportunities for leapfrogging and can spur development. Indeed, we see many examples of this in sub-Saharan Africa today, including the rapid spread of mobile money, which originated in East Africa, the adaptation of ride sharing to motorbikes (for example "boda-bodas" in Uganda), and the delivery of blood to remote health facilities by drones.



Modeling Provides a Framework for Thinking about the Implications of Automation

[IMF](#) (2018) and [Peralta-Alva and Roitman](#) (2018) study the impact of automation on growth and income distribution in G20 economies. They turn to closed-economy models, with rich sectoral interlinkages capable of matching macro and household-level data. Their simulations suggest that for G20 economies the more easily capital substitutes for labor, the higher productivity and economic growth. At the same time, this leads to increased inequality by favoring income from capital and higher-skill work. Simulations suggest redistribution comes at the cost of efficiency, but with the right policy design, all income groups can gain.

Abdychev and others (2018) adapt the basic modeling approach in Berg, Buffie, and Zanna (2018) to a two-region setting. The two regions—think advanced economies and sub-Saharan Africa—differ only in their level of productivity. Labor and robots can either be substitutes or complements. If they are substitutes, an increase in robot productivity leads to a divergence in per capita GDP in favor of advanced economies—where it is more profitable to invest in robots because wages are relatively high. The labor share declines in both regions. However, if labor and robots are complementary, greater robot productivity helps sub-Saharan Africa—where it is more profitable to invest in robots combined with relatively cheap labor—progress toward convergence of per capita GDP with advanced economies. The labor share increases in both regions.

Scenario Analysis to Think about Fundamental Uncertainties

It is difficult to predict the relationship between robots and labor. Where will robots substitute for people and where will we continue to need people in jobs that currently exist or have yet to be created? Given this fundamental uncertainty, Abdychev and others (2018) turn to scenario analysis to explore what the future of work in sub-Saharan Africa might look like. They sketch three scenarios.

In the Africa Arisen scenario, technology increases productivity, and economies around the world remain integrated. These opportunities are successfully leveraged by sub-Saharan Africa, creating an emerging vibrant middle class. However, in a gig economy, frequent job transitions and income fluctuations are the norm.

In the Africa for Africa scenario, advanced economies turn to protectionist policies demanded by technology-displaced workers. Sub-Saharan Africa charts its own course toward regional integration, which spurs growth. Low labor costs mean that automation proceeds much more slowly in sub-Saharan Africa than in the rest of the world. With limited tax revenue, governments struggle to keep up with education, health, and infrastructure needs.

In the Africa Adrift scenario, rapid automation leads to reshoring of manufacturing to advanced economies. In sub-Saharan Africa, development policies are thwarted by these global developments, leaving most economies stagnant and in debt. Informal jobs in subsistence agriculture and low-productivity services remain dominant.