Emmanuel Farhi

A young Emmanuel Farhi knew that his father, who passed away when Emmanuel was 10 years old, was an economist. But the boy never fully knew during his father's lifetime just what an economist was.

Three decades later, Farhi is one of the preeminent macroeconomists of his generation in both the United States and his native France. It was a roundabout journey: At age 16, he won first prize in the French national physics competition. Two years afterward, on the threshold of entering university, he attained the highest score in the nation on the entry exam for France's elite engineering school, the École Polytechnique. But he turned it down for another coveted institution, the École Normale Supérieure in Paris, often called ENS. (Today, ENS is also the alma mater of numerous other notable French economists, including the University of California, Berkeley's Emmanuel Saez, MIT's Esther Duflo, Farhi's Harvard colleague and frequent co-author Xavier Gabaix, and Thomas Piketty, author of the 2014 bestseller *Capital in the Twenty-First Century*.)

At ENS, he planned at first to be a mathematician, but became drawn to economics instead. In his spare time, he read MIT professor Paul Samuelson's classic economics text.

"I think what drew me in particular was the ability to model economic phenomena," he says. "And I thought that was a powerful way of deeply understanding these forces and how they were shaping the world."

At the urging of his mentor at ENS, an economist named Daniel Cohen, Farhi (pronounced "far-hee") continued his studies as a doctoral student at MIT. After receiving his Ph.D., he joined the faculty of Harvard in 2006 and received tenure four years later.

Here, he talks with *Econ Focus* about, among other topics, the rising demand for safe assets, the future role of the dollar in a multipolar world, and how economists have misunderstood productivity trends.

David A. Price interviewed Farhi in his office at Harvard in August 2019.

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EF: You've done research in a variety of areas, but a major part of your work has centered on the international monetary system. What led you to those issues and what do you find particularly interesting about them?

Farhi: There is very little academic work on the topic today. There is a general notion that the concept is a bit amorphous. Many economists also seem to believe that these questions are not so important any more — maybe it mattered back when we had the gold standard and things like that, but these are remnants of the past and we've graduated from them.

I think it's a big mistake. The international monetary system played a major role in history and it remains important today. Just think about the role of the gold exchange standard in propagating the Great Depression. Think about the end of Bretton Woods, the advent of flexible exchange rates, the liberalization of capital accounts, the explosion of capital flows. There are a lot of very pressing policy questions that pertain to the international monetary system and its workings nowadays.

These questions really haven't been resolved. They are coming back to bite policymakers and policymakers are searching for answers. How should we conduct monetary policy in an interconnected world economy? Should we seek to generalize inflation targeting or should we somehow manage exchange rates? How should we regulate

international capital flows? Is there a role for capital controls? How should we regulate the international financial cycle? How should we integrate macroprudential policy and monetary policy into the international macroeconomic policy framework?

These are very pressing questions that are begging for answers. Practice is ahead of theory there. You go to central bank conferences in the developed world or in the emerging world and you see central bankers grappling with these issues, trying to innovate, trying to come up with new solutions. They are really thinking ahead of theoretical practice. So I think we in academia have a big role to play there and there is not enough work on these issues. That's why I find them interesting and important to work on.

> It's hard to imagine right now a run on the dollar because there is nowhere else to go. There's no good substitute. But as substitutes start emerging, there will be a place to go if you start doubting the financial or fiscal solidity of the U.S. And I think that could create a lot of instability.

EF: When you say "generalize inflation targeting," what do you mean by that?

Farhi: If you look at developed economies, most of them conduct monetary policy by implementing some version of inflation targeting. The idea is that the first and foremost responsibility of the central bank is to deliver stable prices or a stable inflation rate with some consideration for the overall level of economic activity.

But if you look at the way monetary policy is practiced in many less developed countries, what you see is that they're not straight inflation targeters. In particular, a lot of them seem to be managing the level and volatility of their exchange rates. So you really have a variety of coexisting regimes ranging from strict inflation targeting, to managed floats, to strict currency pegs, to dollarized economies.

One question is whether these countries are gradually going to graduate to inflation targeting. Maybe that's the most advanced form of monetary policymaking, or maybe not. That's a question. There is a reason why they are doing things in that way. Are we going to move more in the direction of inflation targeting as the world develops or will we see some other kind of system emerge?

EF: You said earlier this year that the dollar is going to face competition for status as the world's reserve currency — that is, the world monetary system will no longer be dollar-centric. Why do you think so?

Farhi: If you look at the world today, it's very much still dollar-centric even though, formally, in the organization of the international monetary system, there is a priori no special role for the dollar. So it's a de facto dollar-centric world, not a de jure dollar-centric world.

This dominance manifests itself in several aspects. The U.S. is really sort of the world banker. As such, it enjoys an exorbitant privilege and it also bears exorbitant duties. Directly or indirectly, it's the pre-eminent supplier of safe and liquid assets to the rest of the world. It's the issuer of the dominant currency of trade invoicing. And it's also the strongest force in global monetary policy as well as the main lender of last resort.

If you think about it, these attributes reinforce each other. The dollar's dominance in trade invoicing makes it more attractive to borrow in dollars, which in turn makes it more desirable to price in dollars. And the U.S. role as a lender of last resort makes it safer to borrow in dollars. That, in turn, increases the responsibility of the U.S. in times of crisis. All these factors consolidate the special position of the U.S.

But I don't think that it's a very sustainable situation. More and more, this hegemonic or central position is becoming too much for the U.S. to bear.

The global safe asset shortage is a manifestation of this limitation. In my view, there's a growing and seemingly insatiable global demand for safe assets. And there is a limited ability to supply them. In fact, the U.S. is the main supplier of safe assets to the rest of the world. As the size of the U.S. economy keeps shrinking as a share of the world economy, so does its ability to keep up with the growing global demand for safe assets. The result is a growing global safe asset shortage. It is responsible for the very low levels of interest rates that we see throughout the globe. And it is a structural destabilizing force for the world economy.

It creates macroeconomic instability by pushing the world economy toward the zero lower bound. For example, if we were to experience a recession in the U.S., it's pretty clear that we would hit the zero lower bound. Monetary policy would then have a limited ability to deal with the recession. It also creates financial instability. The fact that interest rates are so low means that it's very cheap to borrow. It encourages leverage and reach for yield.

In my view, the global safe asset shortage echoes the dollar shortage of the late 1960s and early 1970s. At that time, the U.S. was the pre-eminent supplier of reserve assets. The global demand for reserve assets was growing because the rest of the world was growing. And that created a tension, which was diagnosed by Robert Triffin in the early '60s: Either the U.S. would not satisfy this growing global demand for reserve assets, and this lack of liquidity would create global recessionary forces, or the U.S. would accommodate this growing global demand for reserve assets, but then it would have to stretch its capacity and expose itself to the possibility of a confidence crisis and of a run on the dollar. In fact, that is precisely what happened. Eventually, exactly like Triffin had predicted, there was a run on the dollar. It brought down the Bretton Woods system: The dollar was floated and that was the

end of the dollar exchange standard.

Today, there is a new Triffin dilemma: Either the U.S. does not accommodate the growing global demand for safe assets, and this worsens the global safe asset shortage and its destabilizing consequences, or the U.S. accommodates the growing global demand for safe assets, but then it has to stretch itself fiscally and financially and thereby expose itself to the possibility of a confidence crisis.

More generally, the relative importance of the U.S. is going to keep shrinking. Other global powers are going to assert themselves. There is going to be rebalancing. It's happening today in foreign affairs and it's a safe bet that it's also going to happen in economic and financial affairs. Basically, I think that the role of the hegemon is becoming too heavy for the U.S. to bear. And it's only a matter of time before powers like China and the eurozone start challenging the global status of the dollar as the world's pre-eminent reserve and invoicing currency.

It hasn't happened yet. But you have to take the long view here and think about the next decades, not the next five years. I think that it will happen. These countries need to develop the ambition, the institutions, and the reputation necessary to play a global monetary role. It takes time.

EF: When did the shortage of safe assets emerge? And what do economists mean when they talk about safe assets in this context?

Farhi: A safe asset is a good store of value. It's an asset that's going to maintain its value in bad times and one you can liquidate without incurring too much cost.

The price of safe assets is inversely related to their yield. The yield of safe assets is the safe interest rate. And the unmistakable sign of the growing global demand for safe assets and of the safe asset shortage is that safe interest rates have been declining. It's not a recent phenomenon; it's a worldwide, long-term trend that started in the mid-1980s.

Now those rates are at historically low levels. There are a lot of conjectures as to exactly what is behind this long-run decline. One thing that I think is important and is sometimes ignored in these discussions is the fact that all rates of returns have not been declining in parallel. For example, there is evidence that the expected rates of return on riskier assets like equities have not been declining as much as safe interest rates since the turn of the century. There is something special going on with safe assets.

EF: If the dollar were to lose its special status as the reserve currency, what would we see happen?

Farhi: I think you have to distinguish the transition and the eventual new situation. This transition could be very turbulent and take a long time. In the very long run, when the transition is over, it's entirely possible that we will have a stable multipolar equilibrium with several global currencies. For example, it could be the dollar, the euro, and the renminbi. Perhaps there will be other players also, like digital currencies.

One historical precedent is the coexistence of dollar and sterling during the interwar years. It's not a particular happy precedent; it was a period of monetary instability. You saw frequent rebalancing of international portfolios into one reserve currency and out of another, which created a lot of volatility.

That should serve as a warning for us that the transition to a truly multipolar currency world is probably not going to be smooth. You can think about it in the following terms. Right now, the U.S. is completely dominant. So it's hard to imagine right now a run on the dollar because there is nowhere else to go. There's no good substitute. But as substitutes start emerging, there will be a place to go if you start doubting the financial or fiscal solidity of the U.S. And I think that could create a lot of instability.

EF: Would China need to increase its supply of safe assets before its currency could become the reserve currency? And if so, how might it do that?

Farhi: There are different attributes of a global currency. One is to be a reserve currency. As I mentioned before, that means you need to have a very liquid market for safe instruments denominated in the currency and that requires

Emmanuel Farhi

➤ Current Position
Robert C. Waggoner Professor of Economics, Harvard University

➤ Education
Ph.D. (2006), Massachusetts Institute of Technology; MSc. (2001), École Normale Supérieure

➤ Selected Publications
"Optimal Taxation with Behavioral Agents," *American Economic Review*, forthcoming (with Xavier Gabaix); "Productivity and Misallocation in General Equilibrium," *Quarterly Journal of Economics*, forthcoming (with David Baqaee); "The Macroeconomic Impact of Microeconomic Shocks: Beyond Hulten's Theorem," *Econometrica*, 2019 (with David Baqaee); "The Safety Trap," *Review of Economic Studies*, 2018 (with Ricardo Caballero); "A Model of the International Monetary System," *Quarterly Journal of Economics*, 2018 (with Matteo Maggiori); "A Theory of Macroprudential Policies in the Presence of Nominal Rigidities," *Econometrica*, 2016 (with Ivan Werning); "Fiscal Devaluations," *Review of Economic Studies*, 2014 (with Gita Gopinath and Oleg Itskhoki); "Fiscal Unions," *American Economic Review*, 2017 (with Ivan Werning); "Collective Moral Hazard, Maturity Mismatch, and Systemic Bailouts," *American Economic Review*, 2012 (with Jean Tirole); "An Equilibrium Model of Global Imbalances and Low Interest Rates," *American Economic Review*, 2008 (with Ricardo Caballero and Pierre-Olivier Gourinchas); *Reforming the International Monetary System*, Centre for Economic Policy Research, 2011 (with Pierre-Olivier Gourinchas and Hélène Rey)

volume. So, for the renminbi to become a reserve currency, China would have to develop large, deep, and integrated markets for safe instruments denominated in renminbi. And that's not there for now. But as China keeps asserting itself, it's entirely possible it's going to become a reality.

The second attribute of a global currency is to be a currency of trade invoicing. You want economic and financial contracts to be denominated in your currency. And China is very aggressive there in trying to push different kinds of economic agents to denominate their economic and financial contracts in renminbi.

And third, the government issuing the currency needs to be evolved to act as lender of last resort on a massive scale. There again, China is extremely aggressive right now in developing an international network of central bank swap lines. So I think it's a matter of time.

In the long run, the more multipolar system that I think will occur could provide a solution to the global safe asset shortage. You're going to have more suppliers of safe assets. That's the good part. I think the tricky period is the transition.

EF: In work with Ricardo Caballero of MIT, you've said that the rise in the demand for safe assets before the financial crisis helped to drive the creation of complex mortgage-backed securities. What was the connection between the two?

Farhi: The connection, I think, is the prices of safe assets. If you have a growing global demand for safe assets, the price of safe assets is going to go up. The interest rate on safe assets is going to go down. So it's going to be attractive to create these safe assets. It's also going to be attractive to create assets that maybe you can portray as being safe but that are not completely safe. And you saw a lot of that.

The demand for safe assets increased the incentive for leverage and it also increased the incentives for shenanigans and complacency. The financial system started manufacturing large quantities of assets that were not completely safe but were complex enough that people could persuade themselves they were safe. Obviously, they weren't safe.

EF: Where do the supply of and demand for safe assets seem to be heading?

Farhi: I don't have a crystal ball. But what you do see is that the rising demand is not a recent phenomenon. It's been with us for almost 30 years now and it's been intensifying. The underlying reasons are probably multiple but all of them are structural, not cyclical. There is no particular reason why we should expect it to go away soon.

In the long run, there are solutions on both the demand side and the supply side. As I described earlier, I think if we transition to a more multipolar system, that could provide a more ample supply of safe assets for the world economy. I think it is also important to strengthen the global financial safety net by institutionalizing the network of central bank swap lines, supporting reserve-sharing arrangements, and boosting the role and financial resources of the international institution at the center of the system, the IMF.

But realistically, the global safe asset shortage is going to be with us for a while.

EF: In recent research with your Harvard colleague Xavier Gabaix, you found that if individuals and firms are somewhat inattentive to changes in tax rules, several of the longtime tenets of economics in the area of taxation have to be reconsidered. Please explain this and why is it important?

Farhi: Public finance is a beautiful set of theories. But it also relies heavily on the assumption of rationality on the part of firms and households, including that they are highly informed with respect to these taxes and that they understand the environment quite well. Public finance delivers sophisticated insights into the way we should design taxes to take into account all sorts of spillovers and behavioral responses by individuals but always based on the presumption that these responses are rational. And there is accumulating evidence that it's not the case. It's important to confront that to come up with more sensible taxation recommendations.

There's something else that comes with recognizing that agents are behavioral, which is that they don't necessarily act in their own interest. One question, which is delicate, is whether you could try to alleviate these problems through the tax system or not. It also leads you to consider completely unconventional instruments that are used in policy but have no space in traditional public finance theory.

For example, nudges. A nudge is attractive from a policy perspective because it's a way of influencing behavior in a way that we think is helpful for individuals while preserving their freedom of choice. If they want to do something else, they can, at no cost. If you think agents are completely rational, nudges should have no effect whatsoever — yet people do implement nudges that seem to be effective. What we did in our work is to allow one, for example, to think about nudges and to think about how to design these nudges and integrate them into the public finance framework.

EF: If you're in public finance and you change your model to allow for taxpayers to be more human, less rational, what are some implications of that?

Farhi: I'll give you an example. There is a basic tenet of public taxation called the dollar-for-dollar principle of Pigouvian taxation. It says that if the consumption of a particular good generates a dollar of negative externality,

you should impose a dollar of tax to correct for this externality. For example, if consuming one ton of carbon generates a certain number of dollars of externalities, you should tax it by that many dollars.

But that relies on the assumption that firms and households correctly perceive this tax. If they don't — maybe they aren't paying attention — then you have to relax this principle. For example, if I pay 50 percent attention to the tax, the tax needs to be twice as big. That's a basic tenet of public finance that is modified when you take into account that agents are not rational.

In public finance, there is also a traditional presumption that well-calibrated Pigouvian taxes are better than direct quantity restriction or regulations because they allow people to express the intensity of their preferences. Recognizing that agents are behavioral can lead you to overturn this prescription. It makes it hard to calibrate Pigouvian taxes, and it also makes them less efficient. Cruder and simpler remedies, such as regulations on gas mileage, are more robust and become more attractive.

Yet another example, still related to Pigouvian taxation, is called the targeting principle. It says that if there's an externality somewhere, you should tax that externality directly. You shouldn't try to tax complements or subsidize substitutes but instead target the externality. For example, if you believe that there is a problem with fossil fuels, you should tax fossil fuels; you shouldn't subsidize solar panels. But if people don't really understand this tax on fossil fuels — and in particular, if some people are paying attention and some people are not paying attention — it becomes a very imperfect instrument. That makes room for auxiliary instruments like subsidies on solar panels and things like that.

EF: There is evidence that average markups of firms have been increasing over the past two decades. You've argued that this trend has led to inflated measurements of productivity growth. Can you explain?

Farhi: The purest measure that we have of productivity growth is aggregate TFP growth.

TFP is total factor productivity. How is this measure constructed? It's very mysterious. It's meant to measure how productive the economy is in using its factors of production — capital and labor — to produce output. To arrive at measures of this, economists look at how much output is growing and then they estimate how much of this growth in output is explained just by growth in inputs. It could be that all of the growth in output is coming from the fact that there is more capital and more labor. In that case, productivity didn't change. Or it could be that output grew because productivity grew while capital and labor didn't change. Or both could be happening at once.

David Baqaee of UCLA and I have embarked on a research agenda on aggregation from the micro level to the macro level. One of the things that we have done is to come up with better measures of productivity when you don't have perfect competition — when you have markups over and above competitive rates of return. And in particular, we have come up with a new definition that accurately measures aggregate TFP growth when you have markups.

According to our findings, there has been more aggregate TFP growth than what people normally measure. But there is something else, which we think is also very interesting.

Aggregate TFP growth reflects two different mechanisms. The first is that it reflects the different productivity shocks that are affecting all the different producers in the economy, holding the allocation of resources constant. We call that the pure technology effect. But in an economy that's not efficient — for example, when you have markups — you're also going to have changes in how efficiently resources are allocated in the economy. And what we find is that if you look at the past 20 years, for example, about 50 percent of aggregate TFP growth is due to improvements in allocative efficiency, not to pure technology effects.

So aggregate TFP growth, if you measure it correctly, hasn't been so slow. It's been higher than we imagined, but a lot of it is driven by improvements in allocative efficiency. And you can trace these improvements in allocative efficiency back to something that's happening in the microeconomic data.

If you look at the reason markups are increasing, you realize that it's not so much because individual firms are increasing their markups, but instead because high-markup firms are becoming bigger. In other words, the increase in markups is predominantly driven by a composition effect between firms, not within.

You have what other people have called superstar firms that are very profitable and are charging high markups and that are overtaking the economy. They are growing larger and larger at the expense of less profitable firms with lower markups. Mechanically, because these high-markup firms are becoming bigger, you see the average markup going up. The reason that improves allocative efficiency is that firms that charge high markups are too small from a social perspective compared to firms that charge low markups.

What you want to improve allocative efficiency is to transfer resources from low-markup firms to high-markup firms. And that's precisely what this superstar phenomenon is doing. It's reallocating resources from firms that were too big to begin with to firms that were too small to begin with from a social perspective.

EF: In the sense that the high-markup firms are more efficient?

Farhi: It's not that they are more productive. A lot of people go to this intuition that you mentioned. Productivity improves if I reallocate resources from less productive firms to more productive firms, but that's not what's going on here.

Reallocating resources toward a particular firm improves allocative efficiency if, compared to the social optimum, this firm was too small to begin with. That has nothing to do with how productive it is. If it's very productive, it has a low price and it's big. What makes it *too* large or *too* small is its markup. A firm that has a high markup is behaving too much like a monopolist compared to a firm that has a low markup. Allocative efficiency improves when you reallocate resources from the latter to the former.

The superstar phenomenon that's behind the rise in markups is driven by a reallocation from low-markup firms to high-markup firms, which improves allocative efficiency. And we show that that has been important to the growth of TFP over the past 20 years.

EF: Who have been your most important influences, and do you see yourself working in a particular tradition?

Farhi: I don't really see myself working in any particular tradition. I try to draw inspirations from many different sources and many different traditions, actually. For example, lately in this work with David that we've done on aggregation, we've been reading the work of post-Keynesians, which are typically neglected in the academic mainstream.

There's an interesting episode in the history of economic thought. It's called the Cambridge-Cambridge controversy. It pitted Cambridge, Massachusetts — Solow, Samuelson, people like that — against Cambridge, U.K. — Robinson, Sraffa, Pasinetti. The big debate was the use of an aggregate production function.

Bob Solow had just written his important article on the Solow growth model. That's the basic paradigm in economic growth. To represent the possibility frontiers of an economy, he used an aggregate production function. What the Cambridge, U.K., side attacked about this was the idea of one capital stock, one number. They argued that capital was very heterogeneous. You have buildings, you have machines. You're aggregating them up with prices into one capital stock. That's dodgy.

It degenerated into a highly theoretical debate about whether or not it's legitimate to use an aggregate production function and to use the notion of an aggregate capital stock. And the Cambridge, U.K., side won. They showed that it was very problematic to use aggregate production functions. Samuelson conceded that in a beautiful paper constructing a disaggregated model that you could not represent with an aggregate production function and one capital stock.

But it was too exotic and too complicated. It went nowhere. The profession moved on. Today, aggregate production functions are pervasive. They are used everywhere and without much questioning. One of the things David and I are trying to do is to pick up where the Cambridge-Cambridge controversy left. You really need to start with a completely disaggregated economy and aggregate it up.

EF: Disaggregated into firms and whatnot?

Farhi: Firms, products, agents. No aggregate production function, no representative agent.

And I think what I described about markups is a good illustration. If you try to model the macroeconomy directly by modeling aggregate relationships — productivity, investment, and aggregate markup — you're going to miss the picture. It's really important to understand what's going on at the micro level and how these patterns at the micro level are aggregating up to macro phenomena.

For example, when we see average markups going up, it's not obvious what implication it has for productivity. If you don't see that it's happening through this composition effect, whereby high-markup firms are becoming bigger at the expense of low-markup firms, you completely miss it.

EF: What are you working on now?

Farhi: I'm really fascinated by this work that I'm doing with David. We have a name for our vision. We call it "macro as explicitly aggregated micro."

The idea is you need to start from the very heterogeneous microeconomic environment to do justice to the heterogeneity that you see in the world and aggregate it up to understand macroeconomic phenomena. You can't start from macroeconomic aggregates. You really want to understand the behavior of economic aggregates from the ground up.

What many people used to do to tackle these issues is some kind of statistical aggregation. What you need to do is what you could call economic aggregation. You need to have a general equilibrium model with heterogeneity and aggregate this microeconomic heterogeneity into macroeconomic aggregates the way a national accountant would in the data. You need to do the same thing in the model and then understand the behavior of these aggregates in that way. You need to flesh out going from the micro to the macro in economic terms.

For example, you can't just come up with your measure of aggregate TFP and study that. You need to derive it from first principles. You need to understand exactly what aggregate TFP is.

I talked about aggregate TFP and markups, but the agenda is much broader than that. It bears on the elasticity of substitution between factors: between capital and labor, or between skilled labor, unskilled labor, and capital. It bears on the macroeconomic bias of increasing automation. It bears on the degree of macroeconomic returns to scale underlying endogenous growth. It bears on the gains from trade and the impact of tariffs. In short, it is relevant to the most fundamental concepts in macroeconomics. **EF**