Modern Macroeconomic Models as Tools for Economic Policy

I believe that during the last financial crisis, macroeconomists (and I include myself among them) failed the country, and indeed the world. In September 2008, central bankers were in desperate need of a playbook that offered a systematic plan of attack to deal with fast-evolving circumstances. Macroeconomics should have been able to provide that playbook. It could not. Of course, from a longer view, macroeconomists let policymakers down much earlier, because they did not provide policymakers with rules to avoid the circumstances that led to the global financial meltdown.

Because of this failure, macroeconomics and its practitioners have received a great deal of pointed criticism both during and after the crisis. Some of this criticism has come from policymakers and the media, but much has come from other economists. Of course, macroeconomists have responded with considerable vigor, but the overall debate inevitably leads the general public to wonder: What is the value and applicability of macroeconomics as currently practiced?

The answer is that macroeconomics has made important advances in recent years. Those advances—coupled with a rededicated effort following this recent economic episode—position macroeconomics to make useful contributions to policymaking in the future. In this essay, I want to tell the story of how macroeconomics got to this point, of what the

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key questions are that still vex the science, and of why I am hopeful that macroeconomics is poised to benefit policymakers going forward.

According to the media, the defining struggle of macroeconomics is between people: those who like government and those who don't. In my essay, the defining struggle in macroeconomics is between people and technology. Macroeconomists try to determine the answers to questions about entire economies. These questions really concern the outcomes of large-scale experiments, but there is no sensible way to perform such experiments in national or global laboratories. Instead, macroeconomists must conduct their experiments inside economic models that are highly stylized and simplified versions of reality. I will show that macroeconomists always leave many possibly important features of the world out of their models. It may seem to outside observers that macroeconomists make these omissions out of choice. Far more often, though, macroeconomists abstract from aspects of reality because they must. At any given point in time, there are significant conceptual and computational limitations that restrict what macroeconomists can do. The evolution of the field is about the eroding of these barriers.

OUTLINE

This essay describes the current state of macroeconomic modeling and its relationship to the world of policymaking. Modern macro models can be traced back to a revolution that began in the 1980s in response to a powerful critique authored by Robert Lucas (1976). The revolution has led to the use of models that share five key features:

a. They specify budget constraints for households, technologies for firms, and resource constraints for the overall economy.

b. They specify household preferences and firm objectives.

c. They assume forward-looking behavior for firms and households.

d. They include the shocks that firms and households face.

e. They are models of the entire macroeconomy.

The original modern macro models developed in the 1980s implied that there was little role for government stabilization. However, since then, there have been enormous innovations in the availability of household-level and firm-level data, in computing technology, and in theoretical reasoning. These advances mean that current models can have features that had to be excluded in the 1980s. It is common now, for example, to use models in which firms can only adjust their prices and wages infrequently. In other widely used models, firms or households are unable to fully insure against shocks, such as loss of market share or employment, and face restrictions on their abilities to borrow. Unlike the models of the 1980s, these newer models do imply that government stabilization policy can be useful. However, as I will show, the desired policies are very different from those implied by the models of the 1960s or 1970s.

As noted above, despite advances in macroeconomics, there is much left to accomplish. I highlight

three particular weaknesses of current macro models. First, few, if any, models treat financial, pricing, and labor market frictions jointly. Second, even in macro models that contain financial market frictions, the treatment of banks and other financial institutions is quite crude. Finally, and most troubling, macro models are driven by patently unrealistic shocks. These deficiencies were largely—and probably rightly—ignored during the "Great Moderation" period of 1982–2007, when there were only two small recessions in the United States. The weaknesses need to be addressed in the wake of more recent events.

Finally, I turn to the policy world. The evolution of macroeconomic models had relatively little effect on policymaking until the middle part of this decade.[1] At that point, many central banks began to use modern macroeconomic models with price rigidities for forecasting and policy evaluation. This step is a highly desirable one. However, as far as I am aware, no central bank is using a model in which heterogeneity among agents or firms plays a prominent role. I discuss why this omission strikes me as important.

MODERN MACRO MODELS

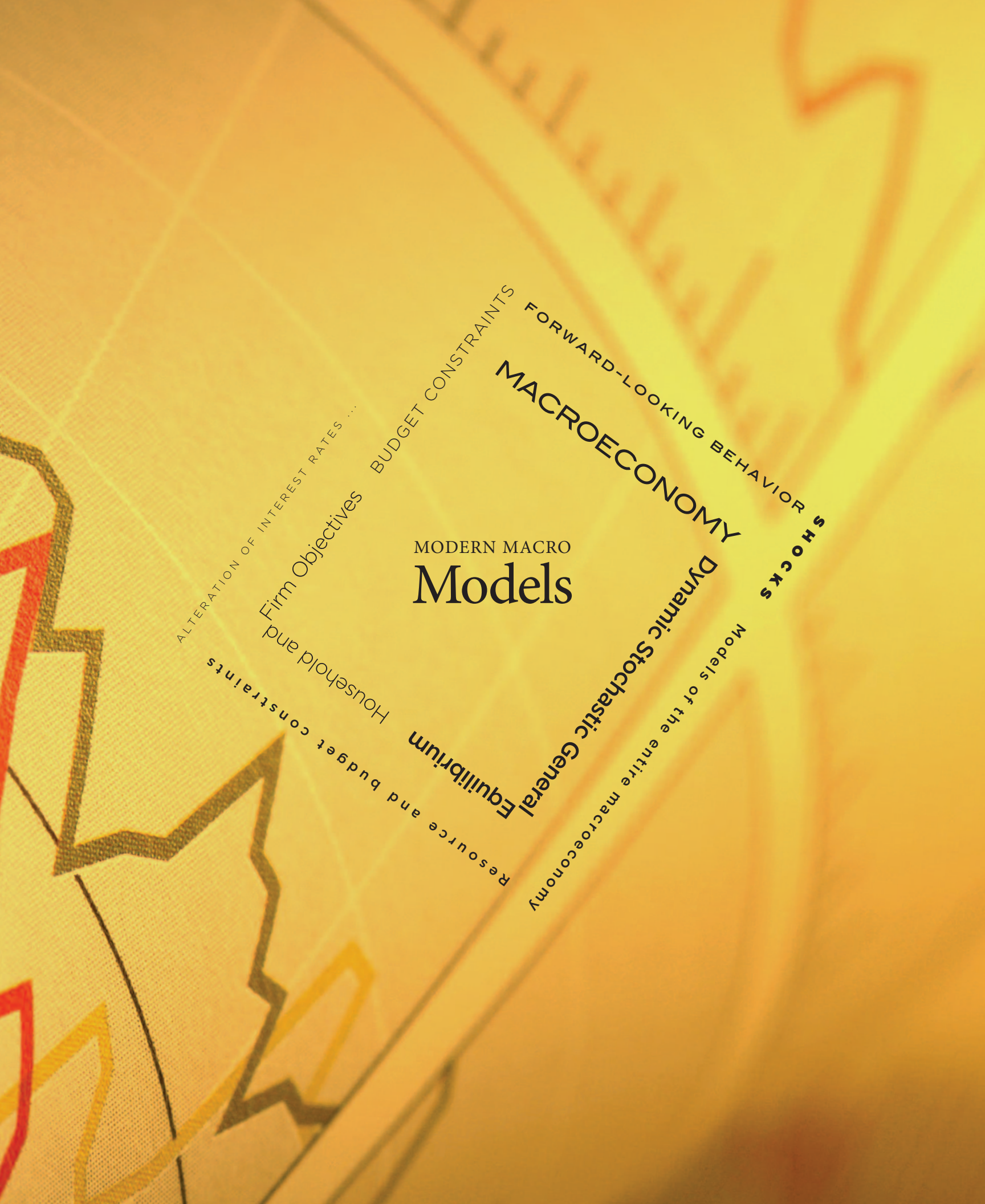
I begin by laying out the basic ingredients of modern macro models. I discuss the freshwater-saltwater divide of the 1980s. I argue that this division has been eradicated, in large part by better computers.

The Five Ingredients

The macro models used in the 1960s and 1970s were based on large numbers of interlocking demand and supply relationships estimated using various kinds of data. In his powerful critique, Lucas demonstrated that the demand and supply relationships estimated using data generated from one macroeconomic policy regime would necessarily change when the policy regime changed. Hence, such estimated relationships, while useful for forecasting when the macro policy regime was kept fixed, could not be of use in evaluating the impact of policy regime changes.

How can macroeconomists get around the Lucas critique? The key is to build models that are specifically based on the aspects of the economy that they all agree are beyond the control of the government. Thus, the Lucas critique says that if the Federal Reserve alters its interest rate rule, the estimated relationship between investment and interest rates must change. However, this relationship is ultimately grounded in more fundamental features of the economy, such as the *technology* of capital accumulation and people's *preferences* for consumption today versus in the future. If the Federal Reserve changes its rule, people's preferences and firms' technologies don't change. Models that are grounded in these more fundamental (sometimes called *structural*) features of the economy can do a better job of figuring out the impact of a change in Federal Reserve policy.

[1] To be clear: Policymakers did learn some important qualitative lessons from modern macro. Thus, in the wake of Finn Kydland and Edward Prescott (1977), there was a much more widespread appreciation of the value of rules relative to discretion. However, policymakers continued to use largely outdated models for assessing the quantitative impact of policy changes.


MODERN MACRO
Models
MACROECONOMY
Dynamic Stochastic General Equilibrium
Models of the entire macroeconomy
FORWARD-LOOKING BEHAVIOR
SHOCKS
BUDGET CONSTRAINTS
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Firm Objectives
Household and
Resource and budget constraints

Beginning in the 1980s, this argument (and other forces) led to the growing use of what I will term "modern macro" models. As I outlined earlier, modern macro models have five key features. First, they must include *resource* constraints and *budget* constraints. Resource constraints show how the members of society can use costly inputs like labor and capital to create goods. Budget constraints dictate that no entity can increase its spending without increasing its revenue (either now or in the future). These constraints prevent anyone in the economy (including the government) from creating something from nothing.

Second, the models must include an explicit description of individual preferences and firm objectives. Without such a description, as discussed above, the models are subject to the Lucas critique.

Third, the models generally feature forward-looking behavior. Macroeconomists all agree that households' and firms' actions today depend on their expectations of the future. Thus, households that expect better times in the future will try to borrow. Their demand for loans will drive up interest rates. An analyst who ignored these expectations would not be able to understand the behavior of interest rates.

In most macro models, households and firms have what are called *rational* expectations. This term means that they form forecasts about the future as if they were statisticians. It does not mean that households and firms in the model are always—or ever—right about the future. However, it does mean that households and firms cannot make better forecasts given their available information.

Using rational expectations has been attractive to macroeconomists (and others) because it provides a simple and unified way to approach the modeling of forward-looking behavior in a wide range of settings. However, it is also clearly unrealistic. Longstanding research agendas by prominent members of the profession (Christopher Sims and Thomas Sargent, among others) explore the consequences of relaxing the assumption. Doing so has proven challenging both conceptually and computationally.

Forward-looking households and firms want to take account of the risks that might affect them. For this reason, the fourth key ingredient of modern macro models is that they are explicit about the shocks that affect the economy. For example, most macro models assume that the rate of technological progress is random. Expectations about this variable matter: Households will work harder and firms invest more if they expect rapid technological progress.

Finally, just like old macro models, modern macro models are designed to be mathematical formalizations of the entire economy. This ambitious approach is frustrating for many outside the field. Many economists like verbal intuitions as a way to convey understanding. Verbal intuition can be helpful in understanding bits and pieces of macro models. However, it is almost always misleading about how they fit together. It is exactly the imprecision and incompleteness of verbal intuition that forces macroeconomists to include the entire economy in their models.

When these five ingredients are put together, the result is what are often termed *dynamic stochastic*

general equilibrium (DSGE) macro models. Dynamic refers to the forward-looking behavior of households and firms. Stochastic refers to the inclusion of shocks. General refers to the inclusion of the entire economy. Finally, equilibrium refers to the inclusion of explicit constraints and objectives for the households and firms.

Historical Digression: Freshwater versus Saltwater

The switch to modern macro models led to a fierce controversy within the field in the 1980s. Users of the new models (called "freshwater" economists because their universities were located on lakes and rivers) brought a new methodology. But they also had a surprising substantive finding to offer. They argued that a large fraction of aggregate fluctuations could be understood as an *efficient* response to shocks that affected the entire economy. As such, most, if not all, government stabilization policy was inefficient.

The intuition of the result seemed especially clear in the wake of the oil crisis of the 1970s. Suppose a country has no oil, but it needs oil to produce goods. If the price of oil goes up, then it is economically efficient for people in the economy to work less and produce less output. Faced with this shock, the government of the oil-importing country could generate more output in a number of ways. It could buy oil from overseas and resell it at a lower domestic price. Alternatively, it could hire the freed-up workers at high wages to produce public goods. However, both of these options require the government to raise taxes. In the models of the freshwater camp, the benefits of the stimulus are outweighed by the costs of the taxes. The recession generated by the increase in the oil price is efficient.

Scholars in the opposing ("saltwater") camp argued that in a large economy like the United States, it is implausible for the fluctuations in the *efficient* level of aggregate output to be as large as the fluctuations in the *observed* level of output. They pointed especially to downturns like the Great Depression as being obvious counterexamples.

The divide between freshwater and saltwater economists lives on in newspaper columns and the blogosphere. (More troubling, it may also live on in the minds of at least some policymakers.) However, the freshwater-saltwater debate has largely vanished in the academe.

My own idiosyncratic view is that the division was a consequence of the limited computing technologies and techniques that were available in the 1980s. To solve a generic macro model, a vast array of time- and state-dependent quantities and prices must be computed. These quantities and prices interact in potentially complex ways, and so the problem can be quite daunting.

However, this complicated interaction simplifies greatly if the model is such that its implied quantities maximize a measure of social welfare. Given the primitive state of computational tools, most researchers could only solve models of this kind. But—almost coincidentally—in these models, all government interventions (including all

forms of stabilization policy) are undesirable.

With the advent of better computers, better theory, and better programming, it is possible to solve a much wider class of modern macro models. As a result, the freshwater-saltwater divide has disappeared. Both camps have won (and I guess lost). On the one hand, the freshwater camp won in terms of its modeling methodology. Substantively, too, there is a general recognition that some nontrivial fraction of aggregate fluctuations is actually efficient in nature.

On the other hand, the saltwater camp has also won, because it is generally agreed that some forms of stabilization policy are useful. As I will show, though, these stabilization policies take a different form from that implied by the older models (from the 1960s and 1970s).

STATE OF MODERN MACRO

In this section, I discuss some of the successes of modern macro. I point to some deficiencies in the current state of knowledge and discuss what I perceive as useful steps forward.

Successes

In the macro models of the 1980s, all mutually beneficial trades occur without delay. This assumption of *frictionless* exchange made solving these models easy. However, it also made the models less compelling. To a large extent, the progress in macro in the past 25 years has been about being able to solve models that incorporate more realistic versions of the exchange process. This evolution has taken place in many ways, but I will focus on two that I see as particularly important.

Pricing Frictions: The New Keynesian Synthesis

If the Federal Reserve injects a lot of money into the economy, then there is more money chasing fewer goods. This extra money puts upward pressure on prices. If all firms changed prices continuously, then this upward pressure would manifest itself in an immediate jump in the price level. But this immediate jump would have little effect on the economy. Essentially, such a change would be like a simple change of units (akin to recalculating distances in inches instead of feet).

In the real world, though, firms change prices only infrequently. It is impossible for the increase in money to generate an immediate jump in the price level. Instead, since most prices remain fixed, the extra money generates more demand on the part of households and in that way generates more production. Eventually, prices adjust, and these effects on demand and production vanish. But infrequent price adjustment means that monetary policy can have short-run effects on real output.

Because of these considerations, many modern macro models are centered on infrequent price and wage adjustments. These models are often called *sticky price* or *New Keynesian* models. They provide a foundation for a coherent normative and positive analysis of monetary policy in the face of shocks. This analysis has led to new and important insights. It is true that, as in the models of the 1960s and

1970s, monetary policymakers in New Keynesian models are trying to minimize output gaps without generating too much volatility in inflation. However, in the models of the 1960s and 1970s, *output* gap refers to the deviation between observed output and some measure of potential output that is growing at a roughly constant rate. In contrast, in modern sticky price models, output gap refers to the deviations between observed output and efficient output. The modern models specifically allow for the possibility that efficient output may move down in response to adverse shocks. This difference in formulation can lead to strikingly different policy implications.

FINANCIAL MARKET FRICTIONS

The modern macro models of the 1980s and the New Keynesian models either implicitly or explicitly assume that firms and households can fully capitalize all future incomes through loan or bond markets. The models also assume that firms and households can buy insurance against all possible forms of risk. This assumption of a *frictionless* financial market is clearly unrealistic.

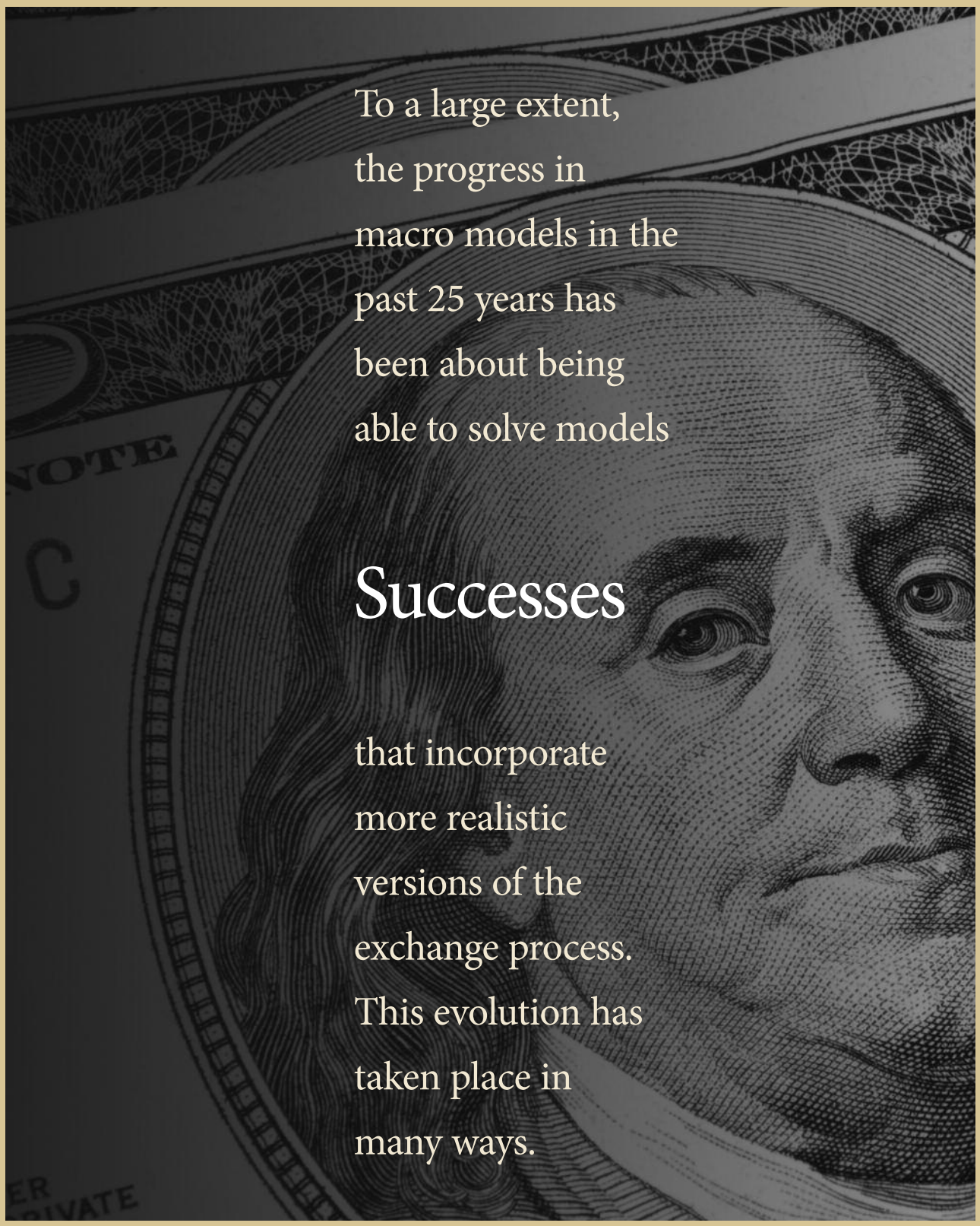
Over the past 25 years, a great deal of work has used models that incorporate financial market frictions. Most of these models cannot be solved reliably using graphical techniques or pencil and paper. As a consequence, progress is closely tied to advances in computational speed.

Why are these models so hard to solve? The key difficulty is that, within these models, the distribution of financial wealth evolves over time. Suppose, for example, that a worker loses his or her job. If the worker were fully insured against this outcome, the worker's wealth would not be affected by this loss. However, in a model with only partial insurance, the worker will run down his or her savings to get through this unemployment spell. The worker's financial wealth will be lower as a result of being unemployed.

In this fashion, workers with different histories of unemployment will have different financial wealth. Aggregate shocks (booms or busts) will influence the distribution of financial wealth. In turn, as the wealth distribution changes over time, it feeds back in complex ways into aggregate economic outcomes.

From a policy perspective, these models lead to a new and better understanding of the costs of economic downturns. For example, consider the latest recession. During the four quarters from June 2008 through June 2009, per capita gross domestic product in the United States fell by roughly 4 percent. In a model with no asset market frictions, all people share this proportionate loss evenly and all lose two weeks' pay. Such a loss is certainly noticeable. However, I would argue that it is not a *huge* loss. Put it this way: This scale of loss means everyone in the United States ends up being paid in June 2009 the same (inflation-adjusted) amount that they made in June 2006.

However, the models with asset market frictions (combined with the right kind of measurement from microeconomic data) make clear why the above analysis is incomplete. During downturns, the loss of income is not spread evenly across all households,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because some people lose their jobs and others don't. Because of financial market frictions, the insurance against these outcomes is far from perfect (despite the presence of government-provided unemployment insurance). As a result, the fall in GDP from June 2008 to June 2009 does not represent a 4 percent loss of income for everyone. Instead, the aggregate downturn confronts many people with a disturbing game of chance that offers them some probability of losing an enormous amount of income (as much as 50 percent or more). It is this extra risk that makes aggregate downturns so troubling to people, not the average loss.

This way of thinking about recessions changes one's views about the appropriate policy responses. Good social insurance (like extended unemployment benefits) becomes essential. Using GDP growth rates as a way to measure recession or recovery seems strained. Instead, unemployment rates become a useful (albeit imperfect) way to measure the concentration of aggregate shocks.

THE PROBLEMS

I have highlighted the successes of macro modeling over the past 25 years. However, there are some distinct areas of concern. I will highlight three.

Piecemeal Approach

I have discussed how macroeconomists have added financial frictions and pricing frictions into their models. They have added a host of other frictions (perhaps most notably labor market frictions that require people to spend time to find jobs). However, modelers have generally added frictions one at a time. Thus, macro models with pricing frictions do not have financial frictions, and neither kind of macro model has labor market frictions.

This piecemeal approach is again largely attributable to computational limitations. As I have discussed above, it is hard to compute macro models with financial frictions. It does not become easier to compute models with both labor market frictions and financial frictions. But the recent crisis has not been purely financial in nature: Remarkable events have taken place in both labor markets and asset markets. It seems imperative to study the joint impact of multiple frictions.

Finance and Banking

As I have discussed, many modern macro models incorporate financial market frictions. However, these models generally allow households and firms to trade one or two financial assets in a single market. They do not capture an intermediate messy reality in which market participants can trade multiple assets in a wide array of somewhat segmented markets. As a consequence, the models do not reveal much about the benefits of the massive amount of daily or quarterly reallocations of wealth within financial markets. The models also say nothing about the relevant costs and benefits of resulting fluctuations in financial structure (across bank loans, corporate debt, and equity).

Macroeconomists abstracted from these features of financial markets for two reasons. First, prior to December 2007, such details seemed largely irrele-

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Concerns

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vant to understanding post-World War II business cycle fluctuations in the United States (although maybe not in other countries, such as Japan). This argument is certainly less compelling today.

Second, embedding such features in modern macro models is difficult. There are many economic theories of high-frequency asset trading and corporate structure. Generally, these theories rely on some market participants having private information about key economic attributes, such as future asset payoffs or firm prospects. This kind of private information is hard to incorporate into the kind of dynamic economic models used by macroeconomists. Nonetheless, I am sure that there will be a lot of work taking up this challenge in the months and years to come.

SHOCKS

Why does an economy have business cycles? Why do asset prices move around so much? At this stage, macroeconomics has little to offer by way of answers to these questions. The difficulty in macroeconomics is that virtually every variable is endogenous, but the macroeconomy has to be hit by some kind of exogenously specified shocks if the endogenous variables are to move.[2]

The sources of disturbances in macroeconomic models are (to my taste) patently unrealistic. Perhaps most famously, most models in macroeconomics rely on some form of large quarterly movements in the technological frontier (usually advances, but sometimes not). Some models have collective shocks to workers' willingness to work. Other models have large quarterly shocks to the depreciation rate in the capital stock (in order to generate high asset price volatilities). To my mind, these collective shocks to preferences and technology are problematic. Why should everyone want to work less in the fourth quarter of 2009? What exactly caused a widespread decline in technological efficiency in the 1930s? Macroeconomists use these notions of shocks only as convenient shortcuts to generate the requisite levels of volatility in endogenous variables.

Of course, macroeconomists will always need aggregate shocks of some kind in macro models. However, I believe that they are handicapping themselves by only looking at shocks to fundamentals like preferences and technology. Phenomena like credit market crunches or asset market bubbles rely on self-fulfilling beliefs about what others will do. For example, during an asset market bubble, a given trader is willing to pay more for an asset only because the trader believes that others will pay more. Macroeconomists need to do more to explore models that allow for the possibility of aggregate shocks to these kinds of self-fulfilling beliefs.

Any economic model or theory describes how some variables (called endogenous) respond to other variables (called exogenous). Whether a variable is exogenous or endogenous depends on the model and the context. For example, if a model is trying to explain the behavior of auto purchases on the part of an individual consumer, it is reasonable to treat car prices as exogenous, because the consumer cannot affect car prices. However, if the model is trying to explain the behavior of total auto purchases, it cannot treat car prices as endogenous. In macroeconomics, all variables seem like they should be endogenous (except maybe the weather!).

MODERN MACROECONOMICS AND ECONOMIC POLICY

The modernization of macroeconomics took place rapidly in academia. By the mid-1990s, virtually anyone getting a Ph.D. in macroeconomics in the United States was using modern macro models. The situation was quite different in economic policymaking. Until late in the last millennium, both monetary and fiscal policymakers used the old-style macro models of the 1960s and 1970s for both forecasting and policy evaluation.

There were a number of reasons for this slow diffusion of methods and models. My own belief is that the most important issue was that of statistical fit. The models of the 1960s and 1970s were based on estimated supply and demand relationships, and so were specifically designed to fit the existing data well. In contrast, modern macro models of seven or eight endogenous variables typically had only one or two shocks. By any statistical measure, such a model would imply an excessive amount of correlation among the endogenous variables. In this sense, it might seem that the modern models were specifically designed to fit the data badly. The lack of fit gave policymakers cause for concern.

In the early 2000s, though, this problem of fit disappeared for modern macro models with sticky prices. Using novel Bayesian estimation methods, Frank Smets and Raf Wouters (2003) demonstrated that a sufficiently rich New Keynesian model could fit European data well. Their finding, along with similar work by other economists, has led to widespread adoption of New Keynesian models for policy analysis and forecasting by central banks around the world.

Personally, I believe that statistical fit is overemphasized as a criterion for macro models. As a policymaker, I want to use models to help evaluate the effects of out-of-sample changes in policies. A model that is designed to fit every wiggle of the existing data well is almost guaranteed to do worse at this task than a model that does not.[3] Despite this misgiving, I am delighted to see the diffusion of New Keynesian models into monetary policymaking. Regardless of how they fit or don't fit the data, they incorporate many of the trade-offs and tensions relevant for central banks.

In the preceding section, I have emphasized the development of macro models with financial market frictions, such as borrowing constraints or limited insurance. As far as I am aware, these models are not widely used for macro policy analysis. This practice should change. From August 2007 through late 2008, credit markets tightened (in the sense that spreads spiked and trading volume fell). These changes led—at least in a statistical sense—to sharp declines in output. It seems clear to me that understanding these changes in spreads and their connection to output declines can only be done via models with financial market frictions. Such models would provide their users with explicit guidance about appropriate interventions into financial markets.[4]

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[3] See, for example, Narayana Kocherlakota (2007) and V. V. Chari, Patrick Kehoe, and Ellen McGrattan (2009).

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Economic Policy

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A CONCLUSION ABOUT COMMUNICATION

Macroeconomics has made a lot of progress, and I believe a great deal more is yet to come. But that progress serves little purpose if nobody knows about it. Communication between academic macroeconomists and policymakers needs to improve. There are two related problems. First, by and large, journalists and policymakers—and by extension the U.S. public—think about macroeconomics using the basically abandoned frameworks of the 1960s and 1970s. Macroeconomists have failed to communicate their new discoveries and understanding to policymakers or to the world. Indeed, I often think that macroeconomists have failed to even communicate successfully with fellow economists.

Second, macroeconomists have to be more responsive to the needs of policymakers. During 2007–09, macroeconomists undertook relatively little model-based analysis of policy. Any discussions of policy tended to be based on purely verbal intuitions or crude correlations as opposed to tight modeling.

My goal as president of the Federal Reserve Bank of Minneapolis is to help on both of these dimensions. The seventh floor of the Federal Reserve Bank of Minneapolis is one of the most exciting macro research environments in the country. As president, I plan to learn from our staff, consultants, and visitors. I view a huge part of my job as translating my lessons both into plain language and into concrete policy decisions.

At the same time, I want to communicate in the other direction. Currently, the Federal Reserve System and other parts of the U.S. government are facing critical policy decisions. I view a key part of my job to be setting these policy problems before our research staff and the academic macro community as a whole. Of course, I do not know what answers they will generate, but I am sure that they will be informative and useful.

In other words, it is my conviction that the Federal Reserve Bank of Minneapolis can serve as a crucial nexus between scientific advances within the academe and the needed changes in macroeconomic policymaking. Indeed, this bank has a long history of doing just that. It was here that John Bryant and Neil Wallace (1978) illustrated the ticking time bomb embedded in deposit insurance. It

[4] In terms of fiscal policy (especially short-term fiscal policy), modern macro modeling seems to have had little impact. The discussion about the fiscal stimulus in January 2009 is highly revealing along these lines. An argument certainly could be made for the stimulus plan using the logic of New Keynesian or heterogeneous agent models. However, most, if not all, of the motivation for the fiscal stimulus was based largely on the long-discarded models of the 1960s and 1970s. Within a New Keynesian model, policy affects output through the real interest rate. Typically, given that prices are sticky, the monetary authority can lower the real interest rate and stimulate output by lowering a target nominal interest rate. However, this approach no longer works if the target nominal interest rate is zero. At this point, as Gauti Eggertsson (2009) argues, fiscal policy can be used to stimulate output instead. Increasing current government spending leads households to expect an increase in inflation (to help pay off the resulting debt). Given a fixed nominal interest rate of zero, the rise in expected inflation generates a stimulating fall in the real interest rate. Eggertsson's argument is correct theoretically and may well be empirically relevant. However, the usual justification for the January 2009 fiscal stimulus said little about its impact on expected inflation.

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was here that Gary Stern and Ron Feldman (2004) warned of that same ticking time bomb in the government's implicit guarantees to large financial institutions. And it was here that Thomas Sargent and Neil Wallace (1985) underscored the joint role of fiscal and monetary discipline in restraining inflation.

We (at the Minneapolis Fed) have already taken a concrete step in creating this communication channel. We have begun a series of ad hoc policy papers on issues relating to current policy questions, accessible on the bank's Web site at minneapolisfed.org. These papers, as well as other work featured in this magazine and on our Web site, will describe not only our efforts to better understand conditions surrounding such events as the recent financial crisis, but also our prescriptions for avoiding and/or addressing them in the future. My predecessor, Gary Stern, spent nearly a quarter century as president. Outside the bank, a sculpture commemorates his term. The sculpture rightly lauds Gary's "commitment to ideas and to the discipline of careful reasoning." I view my mission to serve as a liaison between the worlds of modern macroeconomics and policymaking as a natural way to carry on Gary's work.

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