

Monetary Policy, Economic Modeling, and Unknown Unknowns

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In answering a question at a U.S. Department of Defense news briefing,¹ Secretary of Defense Donald Rumsfeld famously said,

[A]s we know, there are *known knowns*; there are things we know we know. We also know there are *known unknowns*; that is to say we know there are some things we do not know. But there are also *unknown unknowns*—the ones we don't know we don't know. ... [I]t is the latter category that tend to be the difficult ones [emphasis added].

I find these categories useful for thinking about economic modeling, financial stability and monetary policy. I think recognition of the existence of unknown unknowns is particularly important for monetary policy at this juncture. Before I apply Rumsfeld's paradigm to economic modeling and monetary policy, I will first illustrate the paradigm in a simple and familiar context.

A maritime illustration: the *Titanic*

Consider the maiden voyage of the *Titanic* and the decisions her captain made regarding course and speed, based on what he knew and believed.

Here is a thumbnail caricature of the situation in which each of the three categories is reduced to a single item:

- **Known known (KK)** The number of watertight compartments required to be flooded before the ship would sink.
- **Known unknown (KU)** The location of every iceberg in the shipping lanes across the North Atlantic.
- **Unknown unknown (UU)** The potential for a breach in the hull large enough to sink the ship (which could depend on such factors as the metallurgical properties of the steel in the hull and the possible ways of striking an iceberg that could produce flooding in a large number of compartments).

Every captain of every ship must assess the risks associated with KUs in light of the Kks. In particular, the captain of the *Titanic*—taking into account only the Kks and the KUs—may have believed the ship would not sink if it hit an iceberg, and therefore his decision to steam at high speed through waters where icebergs were likely carried with it an acceptable risk.

But how can any captain of any ship take into account the risks associated with UUs? By definition the specifics of UUs are unknown and so it is undoubtedly difficult to assess the risks. Nevertheless, a healthy regard for their *existence* might have led the captain of the *Titanic* to change course or reduce speed.

The captain's apparent disregard for UUs does not by itself imply that he was not an able seaman;² indeed, he had decades of distinguished service that brought him to the position of captain of the *Titanic*. Nor does it imply that his intentions were anything but good; in fact, his intentions may well have been praiseworthy. Quite the contrary, it is possible that the captain's ability and good intentions contributed to his underappreciation for UUs. He may have believed his ability was sufficient to deal with whatever may come (because ability seems to imply the absence of significant UUs), and he may have felt his good intentions helped support his decisions (because good intentions provide more weight in favor of the perceived benefits of a decision relative to whatever risks there may be).

Knowledge and imagination (and their limitations)

Before we leave this illustration, it is important to understand that the categorization of a particular item is not absolute: rather, it depends on knowledge and imagination. For example, with today's technology (including satellite imagery and the Global Positioning System) it may now be possible to know the location of every iceberg, with the consequence that what had been a KU becomes a KK.

Imagination too can play an important role. For example, with sufficient imagination about the ways in which the hull of the *Titanic* could come in contact with an iceberg (and the potential consequences of such contact given the construction of the hull), the captain could have converted the UU into a KU and consequently made a more appropriate assessment of the associated risks.

So the question arises: Should the captain be faulted for lack of imagination? The answer would seem to be no since it is not possible to imagine everything. But this limitation implies there will always be UUs. If the captain were to be faulted, it should be for failing to appreciate the significance of the limits of imagination.

The role of circumstances

For many decisions the existence of UUs is not of paramount importance. A stable environment—in which decisions produce actions, the results of which are relatively predictable—furnishes experience that both provides a guide to the Kks and the KUs and also limits the scope for UUs. When experience does not provide a guide—either because the environment in which decisions are made has changed significantly or because the actions that follow from decisions are of a different sort with less predictable results—then the existence of potentially important UUs becomes more of a concern.

As an example close to home, most commuters in Atlanta have extensive experience driving to and from work, but little experience driving on icy roads—for which there appear to be significant UUs associated with applying the brakes. For the captain of the *Titanic*, experience with crossing the North Atlantic in a ship was plentiful, but experience with crossing in an unsinkable ship was nonexistent.

The art of economic modeling

A central tenet of economic theory is that agents respond to incentives. It follows that decisions by policymakers that affect those incentives will change the behavior of those agents; and those changes may affect the incentives and behavior of other agents as well. Economic knowledge is used to predict the way in which all of those behaviors change.

Economic knowledge comprises both theory and knowledge of institutional details, the latter of which includes (among many other things) the organization of markets and firms, regulation, and taxation. These institutional details are largely responsible for the incentives that agents face. Determining just which institutional details are important in a given setting—and which can be ignored—is the art of economic modeling. Both types of economic knowledge, theoretical and institutional, are necessary to make well-founded policy decisions; but even together they may be insufficient to characterize the consequences of actions solely in terms of Kks and KUs. In the face of novel institutional details, there may well be significant residual UUs.³

Kks versus KUs in economics

The categorization of items between Kks and KUs is particularly problematic in economics. The reason is that evidence bearing on the effects of economic policy can rarely be obtained from direct experimentation. The experimental studies that exist (such as those involving rats in cages or MBA students in study carrels) typically do not provide applicable answers for a variety of reasons. The bulk of evidence brought to bear on policy questions comes from the statistical analysis of observational studies—studies in which there is no experimental control. The statistical analysis of economic propositions is called econometrics.

Over the years, econometricians have made great strides in providing statistical tools to analyze observational data properly. Nevertheless, causality is difficult to establish. Statistical results in economics and in other nonexperimental disciplines are overturned regularly with the availability of both new data and new tools of analysis.

A consequence of this situation is that what appears to one economist to be a definitive result may not appear so to another economist. Where the first economist sees a KK (e.g., "X is true"), the second sees a KU ("X might be true"). And a third economist, relying on other information, may completely disregard the result and continue to see a KK of a different color ("X is false").

Monetary policy, Kks, KUs, and UUs

In the two decades prior to the global financial crisis, monetary policy was conducted within a relatively stable environment of Kks and KUs. Evolutionary changes in the financial environment and the incremental changes in the conduct of monetary policy during this period meant that most of the time there were no significant UUs for monetary policy. Monetary policy amounted to adjusting the fed funds rate by varying the limited supply of reserves. For the most part, movements in the targeted funds rate were relatively small and quite persistent and the effects of such policy were fairly predictable.⁴

The collapse of the housing market in the United States in 2007 had enormous negative consequences for financial institutions around the globe. By and large, economists who witnessed that collapse assigned little if any probability at that time to the kinds of consequences implied by the linkages among institutions that are now clear. Thus, the potential consequences of such linkages were UUs at the time. One could argue that devoting more resources to converting such UUs to KUs

would have been a sensible investment. Indeed, the current endeavor involving research focused on financial stability—as well as regulatory exercises such as stress testing—may be part of an effort to convert UUs to KUs.⁵

Since the beginning of the global financial crisis the number of innovations in institutional details related to monetary policy and financial regulation is staggering. These include the payment of [interest on excess reserves](#) (IOER), the use of a large-scale [reverse repurchase agreement](#) facility (RRP), higher and changing [FDIC assessments](#), new liquidity and capital requirements for large banks and the many other changes emanating from the [Dodd-Frank Act](#). As a consequence of the extreme novelty of the current situation, the potential for significant UUs would seem to be quite large.

With regard to monetary policy, the 800-pound novelty is the size of the [Federal Reserve System's balance sheet](#). The balance sheet has expanded from \$870 billion in 2007 before the crisis to over \$4.4 trillion currently (in 2014), a fivefold increase in seven years. Conducting monetary policy with a balance sheet of this size is without precedent; there is no pool of experience to rely on.

Recently, the Federal Open Market Committee (FOMC) released its "[Policy Normalization Principles and Plans](#)" in which it discussed two aspects of normalization: the target level for short-term interest rates ("the stance of monetary policy") and the size and composition of the balance sheet ("the Federal Reserve's securities holdings"). The statement (along with other communication) makes two things clear. First, the FOMC expects to raise its target for short-term interest rates in the next year or so (depending on economic circumstances). And second, the FOMC does not anticipate significant reduction in the size of the balance sheet from the sale of securities; rather, it intends to rely on attrition with no subsequent reinvestment of the proceeds. Such reductions are likely to occur gradually over the next decade or so.

A reasonable conclusion then is that the balance sheet will remain very large for some time. It follows that normalizing "the stance of monetary policy" does not, any time soon, return the Fed to the tried-and-true operating procedures that were in place prior to the crisis. Those operating procedures are predicated on a substantially smaller balance sheet and the scarcity of reserves that go with it. Rather, the envisioned normalization puts the Fed in the position of devising new operating procedures to provide control over short-term interest rates at least during the period in which excess reserves remain large. In other words, normalization does not imply a return to an environment governed largely by Ks and KUs. The UUs will be lurking everywhere.

Why not instead plan to reduce the size of the balance sheet more actively and return to the time-tested operating procedure? There are at least two schools of thought on this subject. One school is opposed to this sort of normalization because it postulates great costs—costs that are consistent with the great benefits that are believed to have been conferred with the earlier increase in the size of the balance sheet. According to this school, both the benefits of the past and the costs of the future are Ks.

For another school of thought, however, the supposed benefits of increasing the balance sheet are seen as less significant—either because they are KUs (the benefits may not be large) or because the evidence is taken to mean that the benefits *cannot* be large.⁶ According to this other school, the costs of reducing the balance sheet are concomitantly much smaller and, given the potential for UUs associated with the alternatives, reducing the size of the balance sheet sooner rather than later is prudent.

Topsy-turvy: the story of IOER

The introduction of IOER provides an illustration of how the performance of a policy innovation can hinge on previously unimportant, and thus largely ignored, institutional details.

The [Federal Reserve Board](#) announced its policy of paying interest on excess reserves (IOER) in a press release dated October 6, 2008, saying

Paying interest on excess balances should help to establish a lower bound on the federal funds rate. ... [And] will permit the Federal Reserve to expand its balance sheet as necessary....

The balance sheet did indeed expand, but IOER did not provide a floor for the federal funds rate or other related overnight rates. Indeed, IOER seems to be more like a ceiling than a floor.

The claim that IOER would provide a floor was supported by models that rely on the following logic:⁷ If overnight rates happened to be below IOER, then a bank could realize a risk-free profit on the spread by borrowing in the overnight markets and earning IOER on the proceeds (i.e., by lending to the Fed). These transactions would constitute a costless arbitrage, and banks, by undertaking such transactions in arbitrarily large amounts, would effectively eliminate the spreads and thereby enforce the floor.

In fact, the fed funds rate and other overnight rates have traded substantially and persistently below IOER. The spreads between these rates and IOER opened up because some large institutions (Fannie, Freddie, and other government-sponsored enterprises) were willing to lend in overnight markets at less than IOER—in part because they are not eligible to earn IOER. And the spreads were not closed because, as it turned out, the "arbitrage" involves significant costs to banks on both sides of the transaction.⁸ On the borrowing side, lenders impose credit limits, limiting the amount a bank can borrow at the lower overnight rates. On the lending side, a bank faces costs associated with the size of its balance sheet, such as FDIC assessments, reducing the net earnings from the transaction. The existence of these costs makes it unprofitable for banks to enforce the floor.

Some have called IOER a "leaky" floor. Indeed, there has been much concern recently about how to "plug the leaks." The most direct solution would be to eliminate the leaks at the source by reducing the size of the balance sheet and thereby reducing the amount of reserves in the banking system. But, as discussed above, the cost of this fix is considered to be too high by many. Instead, a number of stopgap repairs have been proposed. These repairs attempt to reduce the *effective* amount of reserves without actually reducing the size of the balance sheet. The repairs come in the form of a number of new facilities such as the Term Deposit Facility, the Term Reverse Repurchase Facility, and the Overnight Reverse Repurchase Facility. The full impact of these facilities remains an open question, just as the performance of IOER-as-a-floor was previously.

Summary

The "Policy Normalization Principles and Plans" reflects consideration of the Ks and the KUs. As we go forward, a healthy imagination about the potential UUs is called for. A sanguine attitude about the ease of conducting monetary policy in this new regulatory world and with a large balance sheet would be a risky strategy.

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¹ February 2002. The question was about the lack of evidence linking the government of Iraq with the supply of weapons of mass destruction to terrorist groups.

² This is not to say there was no evidence that he was not an able seaman.

³ In the context of this paper, [David Rowe's](#) analysis of structural change implies that changes in institutional detail will cause Ks to become KUs.

⁴ There is an open question as to whether the monetary policy of low and predictable short-term interest rates contributed materially to the collapse in the housing market by encouraging the run-up in housing prices in the first place. The evidence supporting this assertion is an example where one economist's KK may be another's KU.

⁵ My colleague [Larry Wall](#) argues that more would be better even now.

⁶ A recent [Wall Street Journal piece](#) describes some of the conflicting views on the impact of the asset purchase programs.

⁷ For example, see the analysis by Federal Reserve Bank of New York economists [Todd Keister, Antoine Martin, and James McAndrews](#).

⁸ Some of the costs are associated with regulations that were not implemented until after the inception of IOER.

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