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Should Regulators Reveal Information About Banks?

Hidden Value: How Consumer Learning Boosts Output

Introducing the Philadelphia Fed Nonmanufacturing Index

Research Rap

INSIDE

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Should Regulators Reveal Information About Banks?

BY YARON LEITNER

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egulators collect and produce information about banks. This information helps regulators monitor the safety and soundness of the banking system, and it also helps policymakers preserve financial stability. A key issue is whether this information should be made public and, if so, to what extent. In this article, we will explore some of the tradeoffs involved.

What information do regulators collect? Banks are required to file comprehensive quarterly reports, such as balance sheets, income statements, and derivative and off-balance-sheet items. Regulators also maintain large examination staffs that function as external auditors, while large banks are subject to continuous on-site examinations. These examinations are a key input into banks' so-called CAMELS scores.¹ Another way that regulators assess the soundness of banks is to conduct stress tests to evaluate how banks would fare under extreme scenarios. Stress tests are mandated by the Dodd-Frank Wall Street Reform and Consumer Protection Act as part of the regulatory reform following the financial

¹ CAMELS stands for capital adequacy, asset quality, management, earnings, liquidity, and sensitivity to market risk. Banks receive CAMELS ratings of 1 to 5, with 1 being the strongest. In addition to the bank's overall rating, ratings are assigned for each component. Banks rated 3 or lower are subject to closer scrutiny, and those rated 4 or 5 may be required to impose stronger controls on loan quality or to raise new capital.

crisis. Currently, CAMELS ratings are released only to the top management of the bank, not to the public. When the Federal Reserve conducted stress tests in 2009, it disclosed bank-level results, such as projected losses under an extreme stress scenario. But when the Fed conducted stress tests two years later, it disclosed less detail.³

An important question is whether revealing more of the information regulators collect on banks would help regulators come closer to meeting their goal of preserving the safety and soundness of the financial system.

PROS AND CONS OF DISCLOSURE

A widely used argument in favor of disclosure is that it helps discipline banks. The idea is that more information allows investors to better distinguish between risky banks and less risky banks. This allows investors to re-

² For more details about stress tests conducted in the U.S. and Europe and what was disclosed, read the article by Til Schuermann.

ward banks according to their actions. Banks that engage in activities that are considered less risky should be able to raise money at a lower cost, while banks that engage in riskier activities will find it harder to raise money, or they will need to borrow at higher interest rates. This may induce banks not to take too much risk to begin with.

More generally, the argument in favor of disclosure is that it leads to more informative market prices — that is, prices that reflect the bank's fundamentals (such as profits and risks) more accurately. Examples of such market prices are a bank's stock price or the price of its debt. The benefit of more informative prices is that a bank is made accountable for its actions. Another benefit is that the regulator can learn from prices. Market prices are helpful, since they aggregate the views of many private investors who carry out research about the bank's risk, profitability, etc. The regulator can use these prices as another source of information to help guide its regulatory decisions.

While the arguments above may sound plausible at first, they are far from being obviously true. One problem is that they do not take into account the fact that disclosure may reduce the regulator's ability to obtain information in the first place. Disclosure may also reduce the incentive of market participants to produce information on their own and trade based on it. In this case, market prices may become less informative and less useful for the regulator. Another problem is that the argument implicitly assumes that it is better that market participants know more. However, as I discuss below, this is not necessarily true.



Yaron Leitner is a senior economist at the Federal Reserve Bank of Philadelphia. The views expressed in this article are not necessarily those of the Federal Reserve. This article and other Philadelphia Fed reports and research are available at www.philadelphiafed.org/research-and-data/publications.

THE ABILITY TO EXTRACT INFORMATION FROM BANKS

One of the arguments against disclosing information such as CAMELS ratings is that if the regulator discloses to the market information that it receives from banks, banks will be less willing to cooperate with on-site examiners; therefore, the regulator will find it harder to collect information. Banks may be reluctant to reveal bad information, such as low profits, for fear of being penalized by the market by, say, higher borrowing costs or lower prices on the banks' stocks.

The underlying assumption here is that banks are worried about the consequences of revealing bad information to the market, but they are not worried, or are less worried, about the consequences of revealing bad information to the regulator. While this assumption may not always be true, it is plausible in some cases. Consider a bank that faces temporary financial problems. The bank may not want market participants to know for fear they will make it harder for the bank to borrow or even bet against it by selling its stock. The regulator, by contrast, might help. The bank may be able to obtain a loan from the regulator through a program called the discount window. In this case, the bank would not like to reveal bad news to the market but would not mind revealing bad news to the regulator.

However, the example above relies on another assumption, namely that the market cannot observe the regulator's actions in helping the bank; for example, the market does not know that the bank obtained a loan through the discount window. Whether this assumption is reasonable is arguable. The Fed publishes national aggregate data on borrowing from the discount window on a weekly basis. While the Fed does not publish the names of individual banks, some economists have argued that the market might be able

to infer which banks have borrowed, so there can be a stigma attached to borrowing from the Fed.³ This stigma may reduce banks' willingness to borrow through the discount window. So, if a bank cannot be completely sure that its interactions with the regulator will not be detected by the market, the bank might be reluctant to interact with the regulator in the first place.⁴

To conclude, under some assumptions, disclosing information may reduce banks' incentives to reveal

information to the regulator. This, in turn, may reduce the regulator's ability to collect information.⁵

If a bank cannot be completely sure that its interactions with the regulator will not be detected by the market, the bank might be reluctant to interact with the regulator in the first place.

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Partial disclosure may elicit more information from banks. The issue so far has been whether "to disclose or not to disclose." More generally, it might be best for the regulator to disclose some information, but not everything. In a theoretical model, I illustrate this point. In particular, I show that under some conditions, to be able to extract information from

³ For a discussion of this issue and a summary of related literature, see the paper by Huberto Ennis and John Weinberg.

⁴ Under Dodd-Frank, regulators are required to disclose the identities of borrowers at the discount window with a two-year lag. This may be viewed as a form of partial information disclosure.

⁵ For a formal model that illustrates this point, read the article by Edward Prescott. This article also discusses the possibility that the regulator conducts audits and imposes penalties when it detects that the bank lied. Since these audits may be costly in the sense that they require a lot of resources, the regulator may prefer to rely more on banks' cooperation and less on audits and penalties.

banks, the regulator should reveal *partial* information.⁶

In my model, the regulator needs banks' cooperation in order to extract information about complex transactions that banks enter into, such as credit default swaps. These swaps are essentially insurance contracts under which the seller of the swap agrees to compensate the buyer if the buyer loses money on a loan to a third party. In many cases, the seller may be tempted to sell more insurance contracts than

it can actually afford to pay because the probability that the third party will default and the seller will actually have to pay is, or is believed to be, very low. This was one of the problems during the financial crisis (think, for example, of AIG) and has led regulators to work toward the establishment of a clearing-house for credit default swaps. The idea is that if all contracts are registered in a central place, it should be easier for the regulator to monitor and ensure that banks and other financial institutions do not create liabilities that they cannot afford to pay.⁷

The issue, then, is whether banks will cooperate; that is, will banks register all their trades through the clearing-house and tell the regulator about all the contracts they enter into?

In my paper, I show that under some conditions, banks will indeed report all their transactions to the regu-

⁶ See Leitner (2012).

⁷ See Cyril Monnet's *Business Review* article for other arguments in favor of a central clearing-house.

lator. In these cases, whenever a bank enters into a contract, the bank voluntarily reports the contract terms and counterparty's identity to the regulator, and hence the regulator can keep track of each bank's total positions. Why does a bank voluntarily report every trade? Because if a bank does not report a trade, the regulator loses count of the counterparty's positions. This hurts any bank that doesn't report because its counterparty can now sell too many contracts on which the counterparty will ultimately default. In other words, banks fully cooperate with the regulator to ensure that their counterparties do not default.

Interestingly, to be able to extract information from banks, the regulator should not disclose all the information that it obtains, but it should reveal some information. The regulator should set a limit on the number of insurance contracts that a bank can sell — a "position limit" — and reveal only whether a bank has reached its limit. The position limit depends on the bank's financial strength; therefore, stronger banks obtain a higher position limit.

The reason the regulator should reveal whether a bank has reached its limit is straightforward: The regulator wants to make sure that no bank can sell too many insurance contracts.

But why shouldn't the regulator reveal the exact position of the bank? This is a little trickier. Realistically, reporting trades to the regulator involves some cost for the bank, so a bank will report its trades only if its counterparties would otherwise enter into a large number of contracts and default. The risk of its counterparty defaulting is the stick that drives each bank to report its trades. Thus, the regulator's disclosure policy must permit a bank to enter into lots of contracts if its counterparty *does not* report the trade. In some cases, the disclosure policy must even permit a bank to enter into more

contracts than the bank actually enters into in equilibrium. But this is possible only if the regulator does not reveal the total position of each bank.⁸

To conclude, partial disclosure can facilitate banks' incentives to disclose information to regulators in situations in which the bank's report contains information about both its own risk and its counterparties' risks. I will discuss additional reasons for partial disclosure further on.

As an important caveat, note that we are dealing here with theoretical models. While these models may provide useful insights to clarify our thinking, they clearly cannot capture all aspects of the real world. Hence, one should be cautious before drawing hard conclusions about the design of regulatory policy in the real world.

INVESTORS' INCENTIVES TO PRODUCE INFORMATION

One of the concerns about information disclosure is that it might reduce the incentives of private investors to acquire information and trade based on it. This, in turn, might undermine market discipline. It may also limit the regulator's ability to learn from market prices.

Philip Bond and Itay Goldstein examine this issue in a theoretical model. In their model, the regulator intervenes in financial markets by taking actions such as closing weak banks or alternatively providing temporary support. The regulator's action depends on the regulator's views — for example, whether it thinks that forbearance for banks will help achieve financial stability. The regulator's action also depends on information that the regulator has when deciding on an action.

⁸ If the regulator reveals a counterparty's actual position, the counterparty will not be able to reach its maximum position limit. As it nears its limit, other banks will conclude it will default on all its contracts, and so they will not enter into additional contracts with it.

The regulator uses two sources of information. The first source is the regulator's own information; that is, information that the regulator collects and produces on its own by, say, conducting stress tests. The second source is information that the regulator obtains by looking at market prices, e.g., the price of the bank's stock, prices of credit default swaps, etc. As I noted earlier, these market prices are a useful source of information because they aggregate the views of many investors who carry out research about the bank's fundamentals.

One of the points that the authors make is that when the regulator discloses its information, it may reduce the incentives of investors to produce information on their own; this may reduce the regulator's ability to learn from prices. This is especially true when the regulator reveals information about matters that investors are also researching, such as the profitability of an individual bank. The idea is that an investor has an incentive to spend time and resources on analyzing a bank only if he expects that by doing so he will make a bigger profit. But if everyone has the same information, or similar information, the profits from trading based on such information are reduced.

However, the authors also point to an opposite effect. This effect is powerful when the regulator reveals information about matters that investors can't research, such as more detail about the regulator's own policy governing intervention. The idea is that by revealing this type of information, the regulator reduces the uncertainty that investors face. But then investors may be willing to trade more, and when they trade more, they also produce more information.

To summarize, the model above suggests that disclosing information about issues that investors are also researching may induce investors to ac-

quire less information on their own, but disclosing information about matters that investors cannot research may spur them on to produce more information.

INVESTORS MAY OVERREACT TO PUBLIC INFORMATION

Another concern is that market participants may overreact to the public release of information by the regulator. When the regulator reveals bad information about banks, market participants may panic and ignore other pieces of information, even though these pieces of information indicate that things are not so bad.

This issue was raised in an influential paper by Stephen Morris and Hyun Shin, who examine a market in which investors want to act like other investors. I illustrate their point in the context of uninsured depositors who decide whether to keep their money in a bank. Uninsured depositors care about two things: the banks' fundamentals (such as profits or portfolio performance) and the behavior of other depositors. If all other depositors are engaged in a run on the bank (withdrawing their money all at once), an uninsured depositor will not want to be the only one keeping his money at the bank, because the bank will go bankrupt. To pay all its depositors, the bank will need to sell its long-term assets. But since this sale will typically be at fire-sale prices (i.e., below what the assets are truly worth), the bank will not be able to raise sufficient funds to pay all depositors. So if all other depositors try to withdraw their money, an uninsured depositor will try to be the first in line so that he can get at least some of his money back. In other words, an uninsured depositor acts based not only on his own information and views about the bank's fundamentals but also based on what he thinks other depositors will do. This is one example in which investors want to act like other investors.⁹

Public disclosure of regulatory information regarding banks' fundamentals may induce investors to put too much emphasis on this information and ignore or put too little emphasis on their own information. The reason is that since all depositors use the same public information as one of the ingredients in their decision-making, public disclosure helps investors guess what other investors will do. This may lead investors to overreact to public information.¹⁰

So even if the regulator is not much more well informed than private investors, these investors may end up acting on the regulator's announcement. Depositors may run on a bank in response to bad news from the regulator even when their own information about the bank's fundamental health is not so dire. This is a bad outcome from the point of view of investors, and it also undermines market discipline because it breaks the link between the bank's financial health and whether it is punished. Morris and Shin conclude that investors will benefit from the regulator's releasing information only if the regulator's information is very precise.¹¹

⁹ This assumption is very plausible in financial markets. Following Keynes, economists refer to it as a "beauty contest" motive. More generally, this is a type of "strategic complementarity." George-Marios Angeletos and Alessandro Pavan show that disclosure is undesirable in a fairly wide class of models with strategic complementarities.

¹⁰ Note that in the previous section, we discussed a situation in which public information may reduce investors' incentives to produce information and then trade based on that information. Here we show that even if investors can produce information without any effort, they may put less emphasis on it.

¹¹ Itay Goldstein and Haresh Sapra discuss some empirical evidence that supports this theory. They also suggest some implications for disclosure of stress test results. For example, they suggest that disclosing aggregate results rather than individual bank results may reduce the destabilizing effect of information; however, this may come at a cost of less market discipline at the individual bank level.

INFORMATION DISCLOSURE AND RISK-SHARING

Until now, we have focused on the effect of disclosure on the regulator's ability to collect information and on private investors' incentives to produce information or to trade based on the information they have. Next, we discuss the effects of disclosure on facilitating trade under severely stressed conditions. As the financial crisis demonstrated, in times of serious financial stress, trading among banks may break down. Information disclosure may play a role in thawing out frozen markets.¹²

In normal times, banks trade with one another for various reasons, one of which is to share risk. For example, suppose that a bank will suffer a big loss if the value of its assets falls below some critical level, say, \$100. This is one way to capture the idea that when the value of a bank's assets is too low, the bank is less likely to honor its obligations to its creditors and hence may find it more difficult to raise money to make profitable loans to households and businesses. Suppose that, depending on the financial conditions of the bank, the future value of the bank's assets will be either \$140 or \$80, and that, taking this into account, investors are willing to pay \$110 to purchase the bank's assets today.¹³ Then the bank can protect itself against the possibility that the value of its assets falls below \$100 by selling its assets at the current market price.¹⁴

This type of insurance works during normal times but may not work

¹² The discussion below is based on a working paper that Itay Goldstein and I wrote.

¹³ This happens, for example, if each future scenario has equal probability, investors are risk-neutral, and the risk-free rate is 0 percent.

¹⁴ As noted below, the idea that a bank sells its assets to reduce risk is a simplification to capture the idea that, in reality, banks may enter into more complicated risk-sharing agreements and insurance contracts.

during bad times. Suppose that during bad times there is a 50 percent chance that the bank is “strong” and the fair value of its assets is \$110, just as in normal times, but there is a 50 percent chance that the bank is “weak” and the fair value of its assets is only \$60. But even for a weak bank there is a chance that the future value of the assets will be more than \$100; it can be either 0 or \$120. If the bank and other market participants are uncertain whether the bank is weak or strong, the market price will be based on the average fair value of assets of weak and strong banks; that is, $0.5 \times 110 + 0.5 \times 60 = \85 . But since this market value is less than \$100, a bank that sells its assets will surely suffer a loss, as it will surely have less than \$100. So when market participants cannot distinguish between weak and strong banks, a bank cannot protect itself against a fall in the value of its assets. The bank is better off keeping its assets, hoping that their value will rise above \$100. Hence, no bank sells its assets. In other words, the market breaks down.¹⁵

In reality, banks engage in many types of risk-sharing agreements or insurance contracts that are more complicated than the type of insurance in the example above. For instance, it may be the case that when some banks face cash-flow shortages, other banks have extra cash, and vice versa; in this case, banks can create

¹⁵ Note that I illustrate that the market can break down even when there are no issues of asymmetric information; that is, when banks don't know more than other market participants about their own financial condition. It is easy to see that the market will also break down when each bank has private information as to whether it is weak or strong. Strong banks will clearly not sell at \$85, which reflects the average of both strong and weak banks. However, if only weak banks sell, the price would be \$60. In that case, the weak banks are better off keeping their assets, hoping that future values will turn out to be more than \$100.

financial arrangements so that banks with extra cash help banks that need cash.¹⁶ But the ideas above remain. These types of agreements can work only during normal times when banks view the banking system as a whole to be strong. If instead the average value of a bank is below the critical level, or if there is insufficient liquidity in the banking system to overcome the cash-flow shortages of all banks, the arrangements above break down.¹⁷

During normal times, it is better not to disclose information so that all banks, not just the strong ones, can insure against a fall in the value of their assets.

Full disclosure will thaw markets. Suppose that by conducting stress tests, the regulator can learn which banks are weak and which banks are strong. To achieve financial stability, the regulator would like to minimize expected losses in the banking system. In our example, this can be done by ensuring that asset values remain above the critical level for as many banks as possible.

Suppose first that the regulator does not disclose any information. As we saw above, in this case the market price is based on the average of weak and strong banks, and during bad times this leads to a market freeze in which no bank can insure itself against a fall in the value of its assets. Now suppose that the regulator discloses its information so that all market participants can distinguish between weak banks and strong banks. The outcome is that weak banks will not sell their assets, but strong banks will. For a

¹⁶ For a formal model, see the seminal paper by Franklin Allen and Douglas Gale.

¹⁷ For a formal model that illustrates this point, see my paper on financial networks.

weak bank, the market will offer to buy the assets for \$60, but because this is less than the critical level, the weak bank is better off just keeping its assets, hoping that the future value will rise above \$100. Strong banks will be able to sell their assets for \$110, just as they could in normal times. Therefore, strong banks will be able to guarantee that the value of their assets does not fall below the critical level, but weak banks will not. Yet, this outcome is an

improvement over the case in which the regulator does not disclose any information.

So, the example above suggests that during bad times, disclosing information is preferable to not disclosing it. However, during normal times, it is better not to disclose information so that all banks, not just the strong ones, can insure against a fall in the value of their assets.¹⁸

Partial disclosure can yield even better results. Interestingly, during bad times the regulator can reduce expected losses in the banking system even further by revealing only partial information. In this case, some of the weak banks can also insure against a fall in the value of their assets.

The regulator can give each bank one of two scores — high or low — with all the strong banks obtaining the high score but some of the weak

¹⁸ Matthieu Bouvard, Pierre Chaigneau, and Adolfo de Motta reach a similar conclusion in a different context. They show that during normal times disclosing information is undesirable because it can lead to bank runs, but during crises, disclosing information is desirable because it can prevent some runs.

banks also obtaining the high score.¹⁹ The idea is to assign scores such that, on average, the value of assets of banks receiving a high score is at least \$100. Then each bank receiving a high score can sell its assets for more than \$100 and protect itself against a fall in the value of its assets. This is a better outcome than that which is obtained under full disclosure, because under full disclosure only the strong banks can guarantee that their values are above the critical level; with partial disclosure, all strong banks, but also some of the weak banks, can guarantee that.²⁰ Since the strong banks receive less than the full expected value of their assets, they are effectively cross-subsidizing the weak banks that receive high scores.

Suppose that there are 10 strong banks and 10 weak banks and that the regulator gives a high score to all 10 strong banks as well as to two of the weak banks; the remaining eight banks receive a low score. Then for banks that receive a high score, the average value of the assets is $(10 \times 110 + 2 \times 60) \div 12 = \101.67 , which is more than the critical level. Therefore, by selling their assets, banks that obtain a high score can protect themselves against a fall in the future value of their assets. The table summarizes the results.

¹⁹ The idea that all weak banks are exactly the same is a simplification. In reality, weak banks are typically not identical, and the regulator will need to select the weak banks that receive a high score according to some predetermined rule. Itay Goldstein and I discuss this rule.

²⁰ Note that while the regulator does not provide all the information it has, the regulator does not lie. Rather, the regulator follows a predetermined rule, and everyone knows what the rule is. Also note that a high score does not necessarily mean that the bank is strong or that the future value of the assets that the bank sells will definitely be high. It only means that, on average, the value of assets of banks that receive a high score is more than some cutoff (in our example, the cutoff is \$100).

More generally, the regulator faces a trade-off: Disclosing some information may be necessary to prevent a market breakdown. But revealing too much information destroys risk-sharing opportunities for the weak banks.²¹ So, given this trade-off, how can the regulator minimize losses in the banking system?

In our working paper, Itay Goldstein and I provide a formal theoretical model to analyze this issue. We show that during normal times, it is optimal not to disclose anything, but during bad times, the best policy is to disclose *partial* information. We also discuss what regulators should actually disclose to minimize expected losses in the banking system. We show that in some cases, it is best that the regulator gives all banks one of two scores: high or low. All strong banks obtain the high score, but some of the weak banks also do, so that on average, banks that obtain the high score have assets whose values are just at the critical level.²² We also show that in other cases the optimal disclosure rule does

²¹ The latter relates to what economists refer to as the Hirshleifer effect. See the seminal paper by Jack Hirshleifer.

not take such a simple form and may involve more than two scores. This can happen if the information that the regulator has about a bank is already known to the bank but not to other market participants.

CONCLUSION

There are several potential pros and cons of information disclosure. Revealing information can help enforce market discipline and facilitate trade. However, revealing too much information may reduce trading opportunities for the weaker banks. Revealing information may also reduce investors' incentives to produce information or to use information they obtain from other sources. Disclosure may also reduce the regulator's ability to collect information in the first place or to learn from market prices.

In some special cases, the best policy may involve partial disclosure of the information collected by the regulator. For example, if the regulator wants to ensure that banks do not sell too many insurance contracts, it might

²² This type of disclosure is in the spirit of the Bayesian persuasion solution proposed by Emir Kamenica and Matthew Gentzkow.

TABLE 1

Effect of Disclosure During Bad Times

		Strong banks	Weak banks
Number of banks		10	10
Future asset value		\$80 or \$140	\$0 or \$120
Current fair value of asset (Bank can avoid loss only if value \geq \$100.)	<i>Full disclosure</i>	\$110	\$60
	<i>No disclosure</i>	\$85	\$85
	<i>Partial disclosure*</i>	\$102	\$102 (high score) \$60 (low score)

* Under partial disclosure, all strong banks plus two weak banks receive high scores; the remaining weak banks receive low scores. Values are rounded.

Other Issues Related to Information Disclosure

Some other effects of disclosure are worth mentioning:

While disclosing information may help discipline banks, it may also lead to “window dressing,” meaning that banks may take actions that make them look good in the short term but reduce their values in the long term. To learn more about this issue in the context of the disclosure of results from stress tests, read the article by Itay Goldstein and Haresh Sagra.

Disclosure can also impose discipline on the regulator: It allows the regulator to commit to a predetermined rule regarding how to act based on, say, stress test results. It is worth noting that such a commitment has both pros and cons. By committing itself, the regulator can reduce uncertainty but lose the flexibility to act under unexpected circumstances.^a

Finally, note that we have focused on information disclosure by the regulator rather than by banks themselves. The Dodd-Frank Act requires not only the regulator to conduct stress tests; it also requires systemically important financial firms to conduct such tests and publish a summary of the results. Interestingly, some of the insights that we developed in this article also apply to disclosure by banks. For example, we showed that disclosing too much information may destroy risk-sharing opportunities. For this effect to occur, it does not matter whether the regulator or the bank discloses the information.

Hence, the discussion in this article suggests that the regulator might want to consider restricting banks from disclosing too much detail about the results of their own stress tests. Alternatively, the regulator might not want to certify the results. To learn about other aspects that relate to disclosure by banks, read the *Business Review* article by Mitchell Berlin.

^a The paper by Alan Morrison and Lucy White and the paper by Joel Shapiro and David Skeic provide theoretical models to examine how reputational concerns may affect the regulator’s actions and its disclosure policy.

be best to disclose whether a bank has reached some previously announced position limit, but without disclosing the bank’s actual position. Or if the regulator is concerned about the stability of the financial system and would like to minimize aggregate losses in the banking system, the best policy might involve disclosing whether a bank has obtained a high score or a low score. However, a high score does not necessarily mean that a bank is strong; it only means that, *on average*,

the value of assets of banks receiving a high score is above some previously announced level.

Note that determining the best regulatory disclosure policy is a complicated matter. This article has focused on only some aspects, leaving out other prominent concerns. See the accompanying discussion, *Other Issues Related to Information Disclosure*.

Likewise, it is crucial to keep in mind that this discussion has been based on using theoretical models,

which examine simplified pictures of the world to clarify our thinking. While these models provide a lot of useful insights — in particular, the models often alert us to matters that were not immediately obvious — at this point there is no consensus about the correct answers. Hence, one should be cautious before drawing hard conclusions about the design of regulatory policy in the real world. 

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Hidden Value: How Consumer Learning Boosts Output

BY LEONARD NAKAMURA

Iphones. I pads. Wikipedia. Google Maps. Yelp. TripAdvisor. New digital devices, applications, and services offer advice and information at every turn. The technology around us changes fast, so we are continually learning how best to use it. This increased pace of learning enhances the satisfaction we gain from what we buy and increases its value to us over time, even though it may cost the same — or less. However, this effect of consumer learning on value makes inflation and output growth more difficult to measure. As a result, current statistics may be undervaluing household purchasing power as well as how much our economy produces, leading us to believe that our living standards are declining when they are not.

This disconnect has implications for policy. Economists are more familiar with how learning makes us better workers by increasing our productivity, typically reflected economywide in higher inflation-adjusted wages and output per capita. However, how learning makes us better consumers is less likely to be captured by official measures of consumption and output. To the extent that these statistics might be imprecise, economists are liable to be led astray in assessing the economy's successes and failures, and policymakers may be misled in deciding which actions to adopt.

But how can one measure the impact of consumer learning on the well-being of households? First, we need to explore just how learning affects value.

Then we will turn to theories of consumer preferences and behavior that take learning into account. They may point us toward more accurate ways to estimate inflation and output growth than measuring prices directly.

MORE BENEFIT PER DOLLAR SPENT

In this era of rapid innovation and creativity, consuming so many new products typically involves learning both before and after we purchase them for the first time. Acquiring information about a product we haven't bought before is so automatic that we may hardly notice it as an economic phenomenon. Indeed, if the product is novel, we *must* acquire at least some information: First we find out that the

product exists and then what its characteristics and performance are like. This information acquisition in turn lowers the risk associated with any given purchase and, on average, will raise the amount of pleasure or use we get from it.

Consider all the information available to help us decide to see a movie. We can look at trailers in the theater or online; we can read reviews and compare the number of stars the movie gets from critics or fellow moviegoers; and we can ask our friends. Similarly, when deciding on a restaurant, we can consult online sources like Yelp, Zagat, or Chowhound; we can examine the menu and prices; we can read a review in the local paper; and we can listen to our friends' suggestions. All this information-gathering raises the probability that we will enjoy the movie or restaurant more than if we had chosen blindly. When we take the time to find out more information, we are able to select products most suited to our tastes and will generally experience higher satisfaction per dollar spent, given a fixed menu of choices, than we otherwise would. Raising our satisfaction per dollar may also make us more willing to buy more products within that category.

A second layer of benefits occurs through use: Using the features on my e-mail or word processing program becomes second nature as, one by one, I try out new tasks. This form of learning-by-doing raises the product's value in later uses; once I know that a feature exists and how to use it, I can more quickly find it and use it. As I learn to use my smartphone by



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making a call or finding a destination or taking a picture or watching a video clip, using it becomes faster and more successful.¹ Moreover, with cheap memory and computing power, we can customize the devices and applications to our needs. Using an application can also result in a valuable history to tap later: The letters I have written and the PowerPoint slides I have produced in the past may have pieces that I can insert into new e-mails and presentations. In many cases, the application has the ability to learn our habits and guide us to better choices, sometimes using the preferences of other users who make choices similar to ours. For example, Netflix looks at our past movie choices to suggest new ones.

What is economically significant about this form of learning is that the product is the same, but we value it more. Yet, standard measures of economic output miss this increase in value because the product appears unchanged. As a result, statistics measuring overall consumption may be too low.²

For example, let's consider how we value an Internet connection. Entrepreneurs keep developing search engines, aggregators, instructional sites, and various applications that make our use of the Internet more efficient. Plus, smartphones and tablets make it easier to connect whenever we want and wherever we are. All of this infor-

¹ Although this article does not explore the notion, it must be admitted that there is a countervailing truth: Our existing knowledge may become outmoded at a faster rate as new technologies race at us. This depreciation of our knowledge is a cost of rapid technological progress but is also something we have difficulty measuring.

² Another interesting implication of consumer learning is that it may be one reason that so-called early adopters are willing to pay a higher initial price for the latest technology. Even though they realize the price will drop later, they know they will become better off as they learn more about the product.

mation allows the smart consumer to choose movies, TV shows, restaurants, and a myriad of consumer products and services that are more to our liking. The cost of the better information that helps us make these better choices has fallen, allowing us to derive greater satisfaction from what we buy. Thus, our knowledge of the Internet enhances the value of — and spurs the development of — new ways to reach it.

Yet, so much of the content on the

has gone up, then this is not the right measure of our inflation rate, since the quality of the service has risen and we get more for the price.

Similarly, our cable TV bills (as measured in the U.S. CPI index of “cable and satellite TV and radio”) have risen at an average annual rate of just over 2 percent over the past five years. Does this rate fully reflect the greater value we derive from cable service? When we first use cable TV, we may

Does this improvement in our welfare show up in measures of real consumption and growth? Typically not.

Internet — videos, TV shows, music, and social media — is available at no extra cost. So, as we learn about the Internet, we use our connection to it more intensively, but we don't pay more. The Internet connection itself is unchanged; what is changed is the content and interactions it gives us access to. Because if the satisfaction we gain from the Internet connection is greater, we would be willing to pay more for it. But if the market for Internet connections is competitive, we don't have to: Competition prevents providers from charging more as Internet offerings expand, so we get more value for the same amount of money.

But does this improvement in our welfare show up in measures of real consumption and growth? Typically not. The monthly fee we pay to the Internet service provider this year is buying more for us than the monthly fee we paid five years ago. If the fee has gone up, we measure this as pure inflation: The price of “Internet services and electronic information providers” in the U.S. Bureau of Labor Statistics' consumer price index (U.S. CPI) has gone up at an annual rate of 1 percent. But if the satisfaction we have gained as we use the Internet more intensively

know only a few channels. Over time, as we channel-surf and learn more about the content shown on different channels, we may become attached to three or four channels we didn't know about before. As a result, access to cable TV becomes more valuable to us. But how can we measure that value?

MEASURING THE VALUE OF INFORMATION

Consider a traveler planning to go to a foreign city for the first time. Initially, the traveler sees that hotels A and B are equally priced and have similar luxury levels as measured by that country's rating scheme. But the Internet allows the traveler to see reviews from other travelers, detailed maps of the hotels' locations, and lists of the hotels' amenities. Let's say that the more knowledgeable concierge at hotel B is worth \$10 a day to the traveler. Learning about the concierge over the Internet makes the traveler better off by \$5: In the absence of this information, the traveler would have chosen randomly between the two hotels and would have gotten the good concierge half the time, for an expected value of \$5. But with the information obtained from the Internet, the traveler gets

the good concierge all the time, for an expected value of \$10. With better knowledge, the traveler gets more satisfaction from the same set of choices at the same price. Here we can quantify the improvement as \$5. The traveler knows how much to value the concierge and would have been willing to pay \$10 more to stay at that hotel than at the other.

But measuring this value may require new methods. Statistical agencies charged with measuring prices usually simply ask the hotels what prices they charge. Instead, an agency might have to survey consumers to elicit these evaluations. Alternatively, Internet-savvy hotel operators or tourist organizations could do experiments to elicit the extent to which customers are willing to pay more for superior information.

The effect of learning on value isn't limited to technology. For instance, learning to play an instrument often deepens our understanding and enjoyment of music. The information we gain isn't only steering us to the music we prefer; it also deepens our appreciation of the music. We make a human capital investment that improves our ability to consume, similar to a long-term investment in a home or an education that makes us better able to earn a living. Here we might wish to quantify the investment in information that consumers make in order to quantify the value of the information, in the same way that we might measure a consumer's investment in a home or a car.

To analyze consumption when learning is occurring, let's first explore some underlying theory regarding estimating changes in prices and output. This theory will allow us to construct a stable "utility function," a method of representing consumer preferences that permits us to assume that there are bundles of products and services across which a consumer is indifferent: He

or she would be just as happy with one bundle as another. It is this assumption — that we can find bundles of products across which consumers are indifferent — that economists rely on to estimate inflation and economic growth. We will then discuss how behavior is different in situations in which learning is occurring and how these changes in behavior influence pricing and welfare.

GENERALIZED UTILITY FUNCTION THEORY

In a classic 1977 article, "De Gustibus Non Est Disputandum,"³ George Stigler and Gary Becker argue that human tastes are fundamentally the same; they "neither change capriciously nor differ importantly between people." Where it appears that tastes vary, Stigler and Becker widen the notion of consumer preferences from specific goods and services to broad, unchanging categories that they call commodity objects of choice. These stable preferences have goods and services as inputs, but also the consumer's time and human capital such as education and the acquisition of information. Thus, individuals can actively shape the satisfaction they derive from specific goods and services by obtaining knowledge. But Stigler and Becker point out that this broader way of looking at preferences changes the nature of income and prices.

Stable preferences are key to measuring inflation. Ordinarily, if we can identify bundles of consumer goods and services about which a consumer is indifferent in two successive years, this starts us on the way to estimating inflation and output growth between the two years. We first look at what the consumer actually bought in the first year and then ask how much that exact set of goods and ser-

³ Translatable as "There's No Arguing About Taste."

VICES would cost in the second year. This provides us with a measure of the rate of inflation the consumer faces. Alternatively, we can measure the set of goods and services the consumer actually bought in the second year and ask how much that set would have cost in the first year. This second measure of inflation is typically lower than the first one.⁴ We can use either measure, or we can average the two.

If we believe that consumers have stable preferences over these products — that is, more or less unchanging utility functions — then we can say that if consumers' incomes in the first year rise at the rate of inflation, consumers could afford to buy approximately the same goods and services they had bought the year before and are just as well off. We then can say that their real incomes haven't changed. If their incomes are 2 percent higher than the rate of inflation, we say that their real incomes have risen by 2 percent, because they can buy 2 percent more than they could the year before. But if consumers' utility functions change over time, this claim might become dubious: If last year I liked fish and bought a lot of it, and this year I don't like it as much but still buy a lot because it is cheap, then I may be worse off, though I am buying the same amount. To be sure, our preferences may fluctuate; I may prefer fish one year, meat another. But these back-and-forth changes may not matter to our overall measures if these fluctuations cancel out — for every individual who likes fish less, another likes it more. What Stigler and Becker were concerned with were systematic changes in taste.

⁴ The bundle bought in the second year is typically cheaper because goods and services increase in price at different rates, and consumers tend to buy less of the more expensive goods. So the second year's purchases will typically have fewer of the goods whose prices rose more rapidly.

The generalized utility function is stable. To demonstrate how underlying preferences may be seen to be stable, Stigler and Becker cite what appears to be an example of a changing utility function: addiction — the phenomenon that “smoking of cigarettes ... or close contact with some person over an appreciable period of time often increases the desire (craving) for these goods or persons.” But if we reformulate the specific product *cigarettes* into the broader commodity *smoking*, or *close contact* into the commodity *loving*, perhaps we can understand them as stable human behaviors.⁵

Citing Alfred Marshall’s example of music — “The more good music a man hears, the stronger is his taste for it likely to become.” — Stigler and Becker argue that an individual can accumulate “consumption capital” in music, so that, for instance, buying tickets to a concert at one point in time increases the satisfaction derived from further consumption of music later. Thus, just as workers can invest in education to enhance their productivity at making objects or providing services, so can consumers invest in education to enhance their enjoyment of certain goods and services. This increasing satisfaction can be understood as “rational addiction,” in that consumers can understand and predict rationally how their consumption in one period may affect their consumption in future periods. Thus, I can decide not to consume a drug that I know I will enjoy this period but that will induce a craving in future periods, when I will

⁵ In another example they explore, Stigler and Becker view advertising as a means of providing information to consumers that improves their perceived benefit from the product being advertised. In this case, the maker of the product provides information that changes the value of the commodity consumed. They also discuss fads and fashions and the role of culture and traditions in the formation of tastes. See my *Business Review* article on advertising for further discussion.

enjoy it less. Another implication of this perspective is that when we are young, we may not like a certain type of music very much initially, but we may realize that we will gain human capital that will make the early investment worthwhile in retrospect.

Note that a given act of consumption — for example, listening to or playing music — may have both an aspect of direct consumption (our current enjoyment) and an aspect of investment (how our current consumption affects our future enjoyment). Both aspects increase our current willingness to pay for the item. This makes for interesting dynamics over time. As we age, the period over which our investment will pay off shortens, but our enjoyment rises because of past learning. Eventually, though, our rate of learning and the rate of increase in enjoyment slow

Just as workers can invest in education to enhance their productivity at making objects or providing services, so can consumers invest in education to enhance their enjoyment of certain goods and services.

down, so we are less willing to pay because the investment value is falling, even though our direct enjoyment is still increasing.

As we become more willing to pay for something, do we have to pay a higher price? A drug dealer may offer the first dose of a drug for free, in hopes the customer becomes addicted. This depends on there being some likelihood that the person offered the free drug will remain a customer of the dealer, so that the addiction can be exploited. If the producer has a monopoly on the good whose value to us has increased, then the price may rise over time. This may be why

pharmaceuticals under patent typically rise in price faster than inflation. Even absent monopoly, learning is one of the main reasons why customers may find it difficult to switch from one supplier to another.⁶

MEASURING INFLATION AND OUTPUT

There are two ways in which we can be better off economically: We can have more products and services, or we can make better use of what we already have. It is easier, however, to measure quantity than quality. To think this through, consider how we currently measure output and inflation.

Suppose I spent \$20,000 on consumer goods and services in 2013 and \$21,000 in 2014. Is my well-being higher in 2014 than it was in 2013? The test that economists normally use is to ask whether I could have bought

the same goods and services in 2014 as I bought in 2013. If so, I must be at least as well off, because I could have bought the same goods but didn’t. Therefore, I must have preferred the goods I did buy to the goods I didn’t, since I can freely choose what I buy. So I strictly prefer what I consumed this year to what I consumed last year.

However, as we have seen, when consumers learn about a product, it

⁶ As we use products and services, our learning may result in what are known as increased switching costs. See Paul Klemperer (1995), Carl Shapiro and Hal Varian (1999), and Luis Cabral (2014), among others.

can provide more satisfaction than it did initially. In this case, we may want to consider my consumption as having increased, even though what I consumed did not change physically. But if the good or service in question is unchanged, how do we measure the increased satisfaction it offers, that is, its increased utility? There are at least two routes that we might take.

Consumer investment in consumption. One view is that in learning about, say, music, consumers are investing by directly raising the satisfaction they receive from music. In principle, an investment in consumption is no different from an investment in durable consumer goods, such as cars and refrigerators, or in real estate, such as a single-family home. Any investment is expected to return value to the investor — either in cash or well-being — over an extended period.

If we are learning about a technology that we expect will be around for a long time, then our learning may be valuable for a long time. Just as an investment in understanding music is likely to bear fruit over an entire lifetime, so may an investment in touch-typing, which enhances the speed and accuracy with which we can write e-mails and Internet posts. Even though the specific items we purchase — PCs, tablets, smartphones — may last only a few years, touch-typing is valuable in using all of those products and may enhance our ability to communicate over many years.

So to measure the increased satisfaction gained from such a consumption investment, we want to measure both the money and the time invested. Then we want to estimate the rate of return on those investments. Because we need to know over what period of time the investment will create returns and how much consumers value those returns, we have to survey consumers.

Willingness to pay. Alternatively, we can attempt to directly measure how the consumer's willingness to pay has changed. For example, if the price of a good rises and the consumer consumes as much of that good as she did previously, or if the price remains the same and the consumer consumes more of the good, then we may be able to measure an increase in the consumer's willingness to pay.

Consider pharmaceuticals. Suppose the efficacy of a drug improves over time as doctors and patients share information about its effects and as treatment regimens are fine-tuned accordingly. We may be able to directly measure the drug's increased value to both doctor and patient as a result of this social learning. A similar case can be made for medical procedures. An interesting possibility is that a given intervention — for example, use of a checklist in anesthesiology or surgery — may result in a widespread improvement in the quality of medical care.⁷ Again, as the intervention becomes widely adopted, we may be able to measure the joint value of this social learning as the quality of a variety of treatments (different surgeries, say) improves.

CONCLUSION

Does measuring the benefits — and the costs — of consumer learning matter, particularly if they are difficult to measure accurately? Even if economists cannot put numbers on them, it is important to understand the limits of what can be measured. If we cannot measure the improvement in our well-being from learning about products, then we underestimate our progress as consumers, and we overestimate both

the rate of inflation and the increase in income necessary to keep our welfare constant. We may think that living standards are falling when they are, in fact, rising. After all, when we discuss how we might raise productivity or consumer welfare, we typically rely on our existing measures of output and inflation. But to the extent that we think we might be getting this measure wrong, we might decide to temper or slant our objectives. For example, how we think of price stability is tempered by beliefs that our inflation measures are likely subject to a measurement bias, and we have a rough idea of the size of that measurement bias. As a consequence, a small but positive inflation rate may be viewed as achieving price stability.

But it would clearly be desirable if economic statistics measured output and inflation more accurately. The report of the Commission on the Measurement of Economic Performance and Social Progress seeks to move national statistical measures closer to an ideal measure of progress in national well-being. The commission's report points out that policymakers and others use these statistics to measure economic success. To the extent that current statistics are biased, policymakers are liable to be led astray. Thus, it would be valuable to consider how best to measure the impact of education, learning, and information on the well-being of households and to incorporate these measurements into our statistics. As new technology and learning make measuring inflation and output growth more difficult, we may not be able to rely on direct price measures; rather we may have to use surveys or econometric methods to estimate inflation and growth. 

⁷ Atul Gawande, a surgeon and journalist, has written about this in his book *The Checklist Manifesto*.

⁸ See Stiglitz, Sen, and Fitoussi.

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Introducing the Philadelphia Fed Nonmanufacturing Survey

BY ELIF SEN

T

o assess the health of the economy, it sometimes helps to look beyond the numbers and listen directly to business managers. That is why the Federal Reserve Bank of Philadelphia and a handful of other regional Reserve Banks and private firms such as the Institute for Supply Management conduct a variety of monthly surveys of business activity. Such qualitative surveys offer the advantage of providing timelier insight into economic activity prior to the official monthly employment and quarterly gross domestic product data releases as well as insight into regional and local trends. And now economy-watchers have a new survey in their toolkits: To complement our Manufacturing Business Outlook Survey — the nation's oldest regional manufacturing survey — the Philadelphia Fed has introduced a survey of nonmanufacturing firms in Pennsylvania, New Jersey, and Delaware called the Federal Reserve Bank of Philadelphia Nonmanufacturing Business Outlook Survey.¹

Surveys gather “soft” data in the form of responses from business owners, executives, and managers. These sometimes-subjective responses supplement or confirm the signals being sent by the hard numbers — say, the dollar value of exports or the average number of hours worked per employee — that economists use to measure the performance of a sector, region, or country.

¹ Formerly named simply the Business Outlook Survey, our manufacturing survey is now formally called the Manufacturing Business Outlook Survey (MBOS) to differentiate it from our new Nonmanufacturing Business Outlook Survey (NBOS).

Despite their qualitative nature, manufacturing survey results tend to be tightly correlated with overall economic conditions. This close relationship between movements in manufacturing survey results and movements in aggregate economic data means the survey results are closely watched not only by economic forecasters but also by investors and the news media. Although little research has been done on the correlation between nonmanufacturing surveys and the ups and downs of the overall economy, the long-term shift from manufacturing to services as the main driver of U.S. economic growth may make nonmanufacturing surveys

increasingly valuable for gaining a fuller picture of the economy.

MANUFACTURING SURVEYS OFTEN TRACK THE ECONOMY

The value of manufacturing surveys. Manufacturing is cyclically sensitive, with activity rising during economic expansions and falling during contractions, so there is reason to believe that surveys of manufacturing activity can provide useful information for tracking the business cycle. As a result, manufacturing surveys have been widely used at the national and regional levels in this vein for quite some time. The national Institute for Supply Management (ISM) manufacturing survey has been in existence since 1948. Six Federal Reserve Banks produce regional manufacturing surveys. The Business Outlook Survey of local Third District manufacturers has been conducted by the Philadelphia Fed since 1968 and is the nation's oldest regional manufacturing survey.²

By preceding the releases of national economic data, the ISM survey can provide early insight into the state of the economy, which can be valuable information for forecasters formulating gross domestic product (GDP) predictions or for businesses deciding whether to expand. The monthly ISM manufacturing survey asks respondents to qualitatively assess the change in various business indicators and conditions, such as new orders or employ-

² The Federal Reserve Bank of Philadelphia serves the Third District, which comprises eastern Pennsylvania, southern New Jersey, and Delaware.



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ment, as better, worse, or the same. The results are released as diffusion indexes for each indicator, which the ISM calculates by adding the percentage of respondents reporting improvements (better) and half of the percentage of respondents reporting no changes (the same).³ Values above 50 indicate expansion, while values below 50 indicate contraction. Results are released on the first business day of the month after the survey was conducted. More often than not, this day occurs before the first Friday of that month, which is when the Bureau of Labor Statistics usually releases national employment data. GDP data, on the other hand, are released quarterly, with the third estimate for a quarter made available near the end of the following quarter.⁴

Many researchers have shown that monthly national manufacturing surveys do provide value in explaining current-quarter economic activity. In his study, Evan Koenig found the ISM purchasing managers index,

³ For example, if 20 percent of ISM survey respondents report that conditions are better, 70 percent report no change, and 10 percent report worse conditions, the diffusion index value would be 55 (20% + (1/2 × 70%)). The construction of these indexes can vary among institutions.

a composite of five subindexes, to be a useful indicator of economic activity and GDP growth.⁵ Matthew Harris, Raymond Owens, and Pierre-Daniel Sarte found that the ISM national survey of purchasing managers at manufacturing firms tracks real-time GDP movements and can be used to forecast real (that is, inflation-adjusted) growth. More recently, Kajal Lahiri and George Monokroussos found that certain ISM indicators improved the accuracy of GDP “nowcasts” — that is, forecasts for the current quarter’s GDP growth rate.

The value of regional manufacturing surveys. Regional Fed surveys have been found to provide useful information on their local economies. Leonard Nakamura and Michael Trebing found that the diffusion indexes from the Philadelphia Fed’s survey of

⁴ In 2009, the Bureau of Economic Analysis ceased using the term “final” to designate the third of the three estimates it releases for a given quarter of GDP growth. Its first estimate remains known as the “advance” figure, after which come the “second” (formerly “preliminary”) and “third” estimates, followed by comprehensive annual and multiyear revisions. See <http://blog.bea.gov/tag/gdp-revisions/>.

⁵ The five subindexes are new orders, production, employment, supplier deliveries, and inventories.

Third District manufacturers significantly predict changes in the Philadelphia Fed’s state coincident indicators.⁶ In some cases, these survey results also reflect national trends, boosting their usefulness as gauges of broader economic activity. Timothy Schiller and Trebing found the MBOS to be as accurate as national manufacturing surveys in predicting the monthly change in the U.S. industrial production index for manufacturing. This finding is particularly significant because the MBOS is released earlier than the national ISM survey, on the third Thursday of the month rather than the first business day of the following month, providing an even earlier clue about the state of the national economy despite the regional focus of the survey.

William Keeton and Michael Verba examined the relationship between the Federal Reserve Bank of Kansas City’s Manufacturing Survey and national and regional conditions. Although they found that the Kansas City Fed’s survey provided little additional information about national activity beyond that provided by the ISM survey, Keeton and Verba showed that the employment indexes from the Kansas City survey are useful indicators for current and future manufacturing employment in the 10th Federal Reserve District (consisting of Colorado, Kansas, Nebraska, Oklahoma, Wyoming, northern New Mexico, and western Missouri). Harris, Owens, and Sarte found that the monthly indexes published in the Federal Reserve Bank of Richmond’s Survey of Manufacturing Activity are highly correlated with the ISM’s. Richmond’s regional manu-

⁶ The MBOS diffusion indexes are calculated differently from the ISM diffusion indexes and represent the percentage of respondents reporting increases in activity less the percentage reporting decreases. If, for example, 20 percent of respondents report increases and 10 percent report decreases, the MBOS diffusion index value would be 10 (20% – 10%).

Follow Our New Survey

To more fully capture economic activity in the tristate region, the Federal Reserve Bank of Philadelphia has created the Nonmanufacturing Business Outlook Survey, with results posted monthly at <http://philadelphiafed.org/nonmanufacturing-BOS/>. This new monthly survey complements our monthly survey of factory activity, now called the Manufacturing Business Outlook Survey, <http://philadelphiafed.org/manufacturing-BOS/>. Visit www.philadelphiafed.org/newsroom/economic-release-calendar/ for the release schedule.

Participants in our surveys provide valuable feedback about regional conditions that Fed economists use in preparing their economic assessments for the Federal Open Market Committee, which conducts the nation’s monetary policy. Nonmanufacturing firms in the Third District interested in participating in the new survey should contact Elif Sen at elif.sen@phil.frb.org or go to <http://philadelphiafedresearch.org/surveyparticipationform.htm>.

facturing index also showed a high correlation with personal income in the Fifth District (covering Maryland, Virginia, North and South Carolina, and most of West Virginia), and the employment index led changes in district manufacturing employment by one quarter.

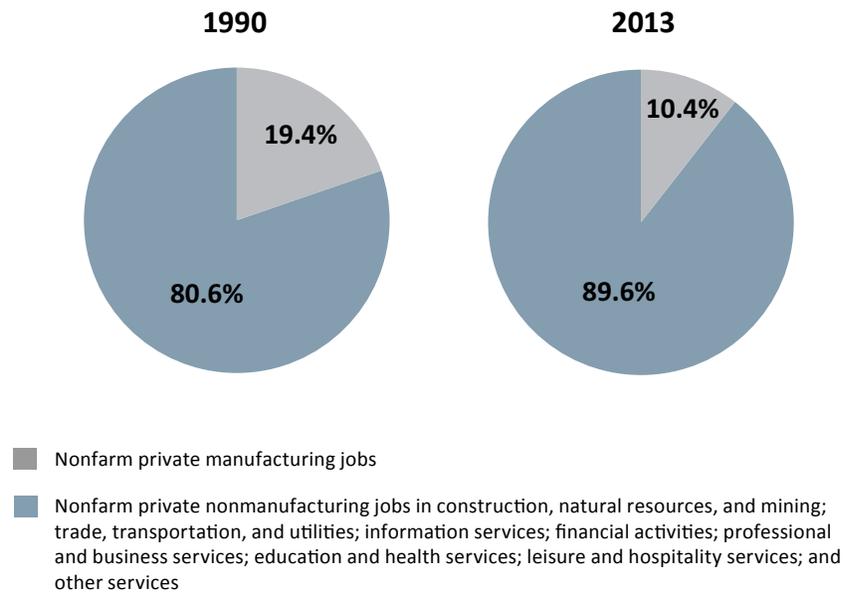
Output and employment shift away from manufacturing. The markets and the news media pay a lot of attention to manufacturing surveys, both national and regional in scope, since these surveys provide valuable information on current economic conditions. To the extent that manufacturing is more cyclical than other sectors, manufacturing surveys remain helpful to economists in tracking the business cycle. However, the manufacturing sector also accounts for increasingly smaller shares of employment and output as the U.S. continues to shift toward a service economy. In 1990, nonmanufacturing businesses represented less than 81 percent of total national private nonfarm employment, and the manufacturing sector represented 19 percent, on average (Figure 1).⁷ By 2013, the share of manufacturing employment had fallen 9 percentage points, to roughly 10 percent, as the nonmanufacturing share had grown to nearly 90 percent. As we will see, our regional economy has also shifted toward nonmanufacturing.

Because of this trend, it is reasonable to assume that nonmanufacturing or service sector surveys can help provide a more complete picture of economic activity. Acknowledging this, in 1998 the ISM began publishing a monthly survey of nonmanufacturing purchasing managers to comple-

⁷ Nonmanufacturing sectors include construction, natural resources, and mining; trade, transportation, and utilities; information services; financial activities; professional and business services; education and health services; leisure and hospitality services; and other services.

FIGURE 1

Distribution of U.S. Employment



Sources: Bureau of Labor Statistics; author's calculations.

ment its manufacturing survey. Other Federal Reserve Banks also publish nonmanufacturing survey results.⁸

NONMANUFACTURING SURVEYS HAVE VALUE

The monthly ISM nonmanufacturing survey is released a few days after the release of the ISM manufacturing survey. The nonmanufacturing survey asks questions similar to those of its manufacturing counterpart; questions cover changes (increase, decrease, or no change) in business activity, new orders, employment, supplier deliveries, prices, inventory change and sentiment, backlog of orders, export orders, and imports. As it does with the manufacturing survey, the ISM

⁸ The Dallas Fed publishes the Texas Service Sector Outlook Survey, and the Richmond Fed publishes the Fifth District Survey of Service Sector Activity. In January 2014, the New York Fed began publishing the Business Leaders Survey.

calculates a diffusion index for each category and a composite nonmanufacturing index, which is composed of four equally weighted diffusion indexes: business activity, new orders, employment, and supplier deliveries.

Unlike the case with the manufacturing survey, little research has been done on the relationship between the nonmanufacturing survey indexes and national aggregate economic data, partly because the nonmanufacturing series is much newer than the manufacturing data. However, limited research does suggest that the ISM nonmanufacturing survey provides valuable information about the current state of the economy. Lahiri and Monokroussos found that current-quarter nowcasts of GDP using ISM nonmanufacturing information are as good as or better than nowcasts of GDP using composite index data from the ISM manufacturing survey.

Let's examine the relationship between aggregate economic data, mea-

sured by real GDP, and corresponding ISM nonmanufacturing survey indexes. The more closely the ISM nonmanufacturing indexes track with the business cycle, the more useful they are as indicators of economic activity. Figure 2 shows the relationship between GDP growth and selected indexes from the ISM nonmanufacturing survey. The graph plots the year-over-year change in quarterly real GDP on the left vertical axis against the four nonmanufacturing survey indexes on the right vertical axis.⁹ The ISM nonmanufacturing composite index, shown in blue, tracks with GDP growth, shown in red, particularly between 2001 and 2006. The ISM nonmanufacturing composite index also indicates a recession (index values below 50) during 2008 and 2009. Real GDP decreased roughly 4.3 percent from its peak in the fourth quarter of 2007 to its trough in the second quarter of 2009; in a similar period, the quarterly nonmanufacturing composite index fell 12.6 points, to a historical low of 41.1.¹⁰ Similar patterns are evident between real GDP growth and the ISM nonmanufacturing indexes for business activity, new orders, and employment.

Table 1 shows the cross-correlations between annual GDP growth and the various indexes of the ISM nonmanufacturing survey as a way to quantify the relationship at different times. A correlation value closer to 1 indicates a stronger relationship between the two measures and that

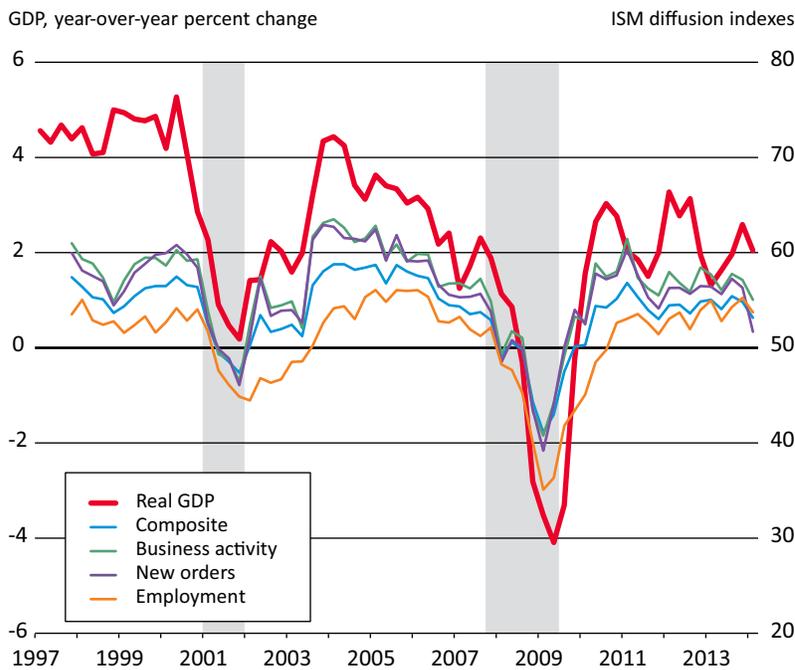
⁹ The ISM nonmanufacturing indexes (NMI), which are monthly, were converted to quarterly observations using the following formula to calculate quarterly weighted averages, per the article by Koenig:

$$nmi(t) = (1/9)NMI(t-1,2) + (2/9)NMI(t-1,3) + (3/9)NMI(t,1) + (2/9)NMI(t,2) + (1/9)NMI(t,3)$$
 where $NMI(t,i)$ is the level of the NMI in the i th month of quarter t .

¹⁰ Peak and trough quarterly readings of the ISM nonmanufacturing index occurred in the third quarter of 2007 and the first quarter of 2009, respectively.

FIGURE 2

ISM Nonmanufacturing Indexes Track GDP



Note: The ISM expansion/contraction threshold is 50.
 Sources: Institute for Supply Management; Bureau of Economic Analysis.

they move in the same direction. The table includes lags and leads of the survey data, measured in quarters, and the largest correlation for each index is in bold. For instance, the first column of Table 1 shows the correlations between the annual GDP growth rate in a given quarter and the composite ISM nonmanufacturing index value from the same quarter as well as the index values from preceding and subsequent quarters. The current-quarter composite index value is more tightly correlated with annual GDP (0.8603) than is the prior quarter's composite index value (0.7994).

The ISM nonmanufacturing indexes are highly correlated with GDP growth, particularly in the quarters immediately before, during, and after a given quarter of GDP.¹¹ The highest correlations occur concurrently for

each index. This may indicate that the ISM nonmanufacturing indexes offer little advance insight into economic activity in future quarters, thus limiting their predictive power. Yet, the indexes may provide valuable insight into the revised GDP values for a given quarter. As Harris, Owens, and Sarte point out in a similar analysis focusing on the ISM manufacturing indexes,

¹¹ Interestingly, over the same period, the correlations between GDP growth and similar ISM manufacturing survey indexes (composite, new orders, and employment) are weaker than the correlations with the nonmanufacturing survey indexes. The average of the highest correlation for each of the three manufacturing indexes is 0.6420, compared with 0.8344 for their nonmanufacturing counterparts. This result could indicate that although the manufacturing indexes have been shown to be cyclical, they are potentially noisier than the nonmanufacturing indexes in this period.

it is important to bear in mind that these correlations use revised GDP data, which are not released until after the end of each quarter. On average, the ISM data are available one month earlier.¹² Table 2 shows similar cross-correlations between the ISM non-

¹² Data used in this article are current as of the second estimate of first quarter 2014 GDP, released May 29, 2014.

manufacturing indexes and real-time annual GDP growth at the time of initial release.¹³ The correlations between the nonmanufacturing indexes and real-time GDP growth are smaller than those between the indexes and revised GDP growth. These results and the

¹³ Initial release data for real GDP were obtained from the Philadelphia Fed's Real-Time Data Research Center.

timing of the GDP data releases suggest that the ISM nonmanufacturing indexes provide more useful information in real time about revised GDP figures — which are more accurate because they incorporate additional incoming data — than they do about the initial figures.

Drawbacks to nonmanufacturing surveys. The ISM nonmanufacturing survey is much younger than the

TABLE 1

Cross-Correlation of GDP with Nonmanufacturing ISM

Revised annual GDP growth rates and nonmanufacturing index values, 1997Q4–2014Q1

	Composite	Business activity	New orders	Employment
3-quarter lag	0.4767	0.5047	0.5177	0.3803
2-quarter lag	0.6592	0.6769	0.6929	0.5722
1-quarter lag	0.7994	0.7938	0.8064	0.7277
Current quarter	0.8603	0.8332	0.8285	0.8145
1-quarter lead	0.8035	0.7386	0.7309	0.8130
2-quarter lead	0.6644	0.5711	0.5628	0.7239
3-quarter lead	0.4931	0.3849	0.3861	0.5862

Sources: Institute for Supply Management; Bureau of Economic Analysis.

TABLE 2

Cross-Correlation of GDP with Nonmanufacturing ISM

Initial annual GDP growth rates and nonmanufacturing index values, 1997Q4–2014Q1

	Composite	Business activity	New orders	Employment
3-quarter lag	0.4516	0.4758	0.4980	0.3456
2-quarter lag	0.6753	0.6930	0.7189	0.5504
1-quarter lag	0.8239	0.8152	0.8395	0.7090
Current quarter	0.8447	0.8077	0.8127	0.7739
1-quarter lead	0.7417	0.6716	0.6642	0.7309
2-quarter lead	0.5630	0.4666	0.4589	0.6170
3-quarter lead	0.3849	0.2768	0.2873	0.4764

Sources: Institute for Supply Management; Bureau of Economic Analysis.

ISM manufacturing survey (by about 50 years), making its usefulness as an indicator of overall economic activity more difficult to evaluate. The longer the time series, the better the understanding researchers will have of the relationship between the survey results and aggregate economic data, as well as any seasonality — predictable movements tied to the time of year — in the data. Additionally, unlike the manufacturing sector, the service sector is less cyclical and so may not signal turning points as strongly. This may be due to the size and diversity of the service sector: Signals from data on a firm that provides services that are sensitive to business cycles may be muted by data from another firm that is less sensitive to the business cycle.

Federal Reserve Bank non-manufacturing surveys. Despite these potential shortcomings, some Federal Reserve Banks see the value in non-manufacturing surveys. The Dallas Fed began collecting data in 2007 and started publishing results for the Texas Service Sector Outlook Survey in 2011. Recent research by Jesus Cañas and Emily Kerr found that the survey indexes are a good fit for explaining service sector employment, retail industry employment, and retail sales in Texas. Richmond's Fifth District Service Sector Survey of Business Activity dates back to November 1993, and its service sector index of revenues moves with the ISM nonmanufacturing business activity index in a similar pattern, according to Robert Schnorbus and Aileen Watson.

How well do these regional indexes move with a national index? Table 3 shows the correlations between the seasonally adjusted monthly Federal Reserve regional nonmanufacturing indexes and the ISM composite nonmanufacturing activity index, as well as the dates of coverage for each survey. Both the Dallas Fed's general business activity index and the

Richmond Fed's revenues index are positively and strongly correlated with the nonmanufacturing ISM, with correlations above 0.75.¹⁴

A NEW PHILADELPHIA FED SURVEY

The shift away from manufacturing toward services is slightly more pronounced in our region compared with the nation. The three states in the Third District — Pennsylvania, New Jersey, and Delaware — had a higher share of employment in the service sector from 1990 to 2013. The share of total private nonfarm employment in the manufacturing sector fell roughly 10 percentage points in that period, from 19.3 percent to 9.5 percent, as shown in Figure 3. In 2013, nonmanufacturing sectors represented

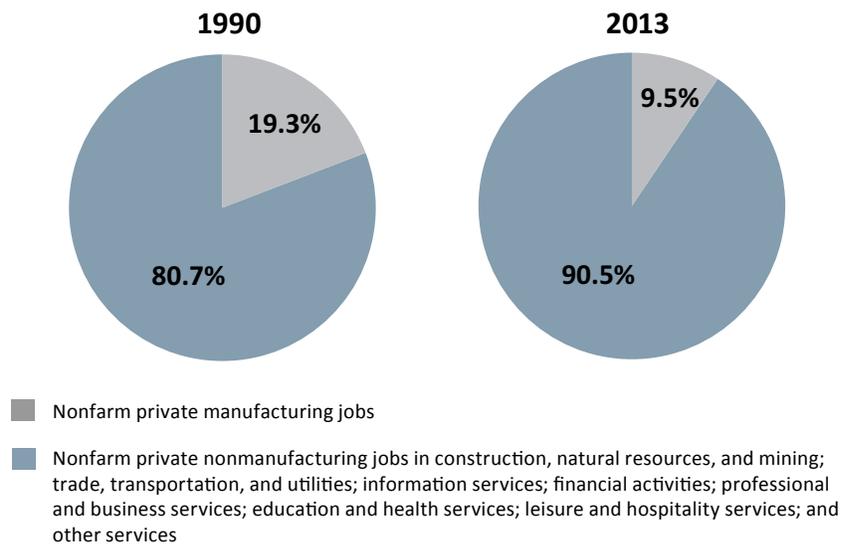
90.5 percent of total private nonfarm employment in the three-state region, up from 80.7 percent in 1990.

The Philadelphia Fed recently developed the Nonmanufacturing Business Outlook Survey to complement its manufacturing survey and more fully capture economic activity in the Third District. The survey asks respondents to categorize the change from the previous month to the current month in general business activity as well as 12 specific indicators as higher, lower, or the same. Respondents also provide their assessment of general business conditions over the next six months. As with our manufacturing survey, the diffusion indexes for our nonmanufacturing survey represent the percentage of firms reporting increases minus the percentage reporting decreases. Values above zero indicate expansion, and those below zero indicate contraction. All nonmanufacturing sectors except natural resources and mining are represented among the respondents, with

¹⁴ The Richmond Fed's survey does not include a general business activity index, so the revenues index was used instead.

FIGURE 3

Distribution of Third District States' Employment



Sources: Bureau of Labor Statistics; author's calculations.

TABLE 3**Cross-Correlation of Regional Fed Indexes with Nonmanufacturing ISM**

	Coverage	Correlation
Dallas general business activity index	January 2007–May 2014	0.8564
Richmond revenues index	July 1997–May 2014	0.7572

Note: Data are seasonally adjusted.

TABLE 4**Cross-Correlation of Regional Fed Indexes with Nonmanufacturing ISM**

March 2011–May 2014	
Philadelphia general activity index (region)	0.5364
Philadelphia general activity index (firm level)	0.5855
Dallas general business activity index	0.6343
Richmond revenues index	0.5847

Note: Data are not seasonally adjusted.

greater representation from the professional and business services, financial activities, and health and education services sectors. Survey participants include company presidents, CEOs, CFOs, managers, and partners. Table 4 includes correlations of two measures of general activity from the new survey with the ISM composite nonmanufacturing index.¹⁵ The Philadelphia nonmanufacturing indexes are not seasonally adjusted because of an insufficient number of observations; therefore, for consistency, these correlations use an unadjusted ISM composite series.¹⁶ It is important to note that the results shown here are preliminary and are based on a small sample of respon-

¹⁵ The Philadelphia Fed indexes begin in March 2011.

dents. Though preliminary, the results are promising: The nascent indexes are positively correlated with the ISM nonmanufacturing composite, with a correlation of 0.5364 for the index of general activity in the region and 0.5855 for the index of general activity at the firm level. For comparison, Table 4 also includes the correlations for the nonseasonally adjusted Dallas and Richmond indexes with the ISM nonmanufacturing composite index over the same time frame. The correlations for the Philadelphia indexes are

¹⁶ A nonseasonally adjusted series for the ISM nonmanufacturing index was constructed using the formula for the construction of the seasonally adjusted nonmanufacturing index series: a weighted average of the nonseasonally adjusted business activity, new orders, employment, and supplier deliveries indexes, with each component equally weighted at 25 percent.

comparable to those for the established indexes.

CONCLUSION

Although U.S. nonmanufacturing is generally not as cyclically sensitive as manufacturing, nonmanufacturing firms make up a growing share of the U.S. economy in terms of both GDP and employment. Nonmanufacturing indexes are highly correlated with national economic data. Useful information can be gleaned from survey data focusing on the service sector to complement the information from national and regional manufacturing surveys. Since activity can vary from region to region, it is also important to develop a regional nonmanufacturing survey to better capture a significant portion of the Third District's economy. Accordingly, the Philadelphia Fed has launched a monthly survey of nonmanufacturing activity in the Third District. 

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Meeting Technologies and Optimal Trading Mechanisms in Competitive Search Markets

In a market in which sellers compete by posting mechanisms, the authors allow for a general meeting technology and show that its properties crucially affect the mechanism that sellers select in equilibrium. In general, it is optimal for sellers to post an auction without a reserve price but with a fee, paid by all buyers who meet with the seller. However, the authors define a novel condition on meeting technologies, which they call invariance, and show that meeting fees are equal to zero if and only if this condition is satisfied. Finally, the authors discuss how invariance is related to other properties of meeting technologies identified in the literature.

14-15. Benjamin Lester, Federal Reserve Bank of Philadelphia; Ludo Visschers, University of Edinburgh and Universidad Carlos III; Ronald Wolthoff, University of Toronto.

The Evolution of U.S. Community Banks and Its Impact on Small Business Lending

There have been increasing concerns about the declining number of community banks and that the acquisitions of community banks by larger banks might result in significant reductions in small business lending (SBL) and disrupt relationship lending. This paper examines the roles and characteristics of U.S. community banks in the past decade, covering the recent economic boom and downturn. The authors analyze risk character-

istics (including the confidential ratings assigned by bank regulators) of acquired community banks, compare pre- and post-acquisition performance and stock market reactions to these acquisitions, and investigate how the acquisitions have affected small business lending. The authors find that community banks that were merged during the financial crisis period were mostly in poor financial condition and had been rated as unsatisfactory by their regulators on all risk aspects. They also find that the ratio of SBL lending to assets has declined (from 2001 to 2012) for all bank size groups, including community banks. The overall amount of SBL lending tends to increase when the acquirer is a large bank. The authors' results indicate that mergers involving community bank targets so far have enhanced the overall safety and soundness of the overall banking system and that community bank targets are willing to accept a smaller merger premium (or even a discount) to become a part of a large banking organization. Overall, the decline in the number of community banks during this period does not appear to have adversely impacted SBL lending, and larger bank acquirers have tended to step in and play a larger role in SBL lending.

Working Paper 14-16. Julapa Jagtiani, Federal Reserve Bank of Philadelphia; Ian Kotliar, Rutgers University; Ramain Quinn Maingi, Rutgers University.

How Do Exogenous Shocks Cause Bankruptcy? Balance Sheet and Income Statement Channels

The authors are the first to examine whether exogenous shocks cause personal bankruptcy

through the balance sheet channel and/or the income statement channel. For identification, they examine the effect of exogenous, politically motivated government payments on 200,000 Canadian bankruptcy filings. The authors find support for the balance sheet channel, in that receipt of the exogenous cash increases the net balance sheet benefits of bankruptcy (unsecured debt discharged minus liquidated assets forgone) required by filers. The authors also find limited support for the income statement channel, in that exogenous payments reduce bankruptcy filings from individuals whose current expenses exceed their current income.

Working Paper 14-17. Vyacheslav Mikhed, Federal Reserve Bank of Philadelphia; Barry Scholnick, University of Alberta.

Financial Benefits, Travel Costs, and Bankruptcy

The authors are the first to show that the cost of personal bankruptcy filers traveling to their bankruptcy trustees affects bankruptcy choices. The authors use detailed balance sheet, income statement, and location data from 400,000 Canadian bankruptcies. To control for endogenous trustee selection, the authors use the location of local government offices as an instrument for the location of bankruptcy trustees (while filers interact with trustees, and trustees interact with local government, filers do not interact with the local government). The authors find that increased travel costs reduce the number of filings. Furthermore, for those individuals who do file, the authors find that their increased travel costs need to be compensated by increased financial benefits of bankruptcy. Filers without cars (higher travel costs), as well as those with jobs (higher opportunity costs), receive larger per-kilometer financial benefits from bankruptcy.

Working Paper 14-18. Vyacheslav Mikhed, Federal Reserve Bank of Philadelphia; Barry Scholnick, University of Alberta.

Partisan Conflict

American politics have become extremely polarized in recent decades. This deep political divide has caused significant government dysfunction. Political divisions make the timing, size, and composition of government policy less predictable. According to existing theories, an increase in the degree of economic policy uncertainty or in the volatility of fiscal shocks results in a decline in economic activity. This occurs because businesses and households may be induced to delay decisions that involve high reversibility costs. In addition, disagreement between policymakers may result in stalemate, or, in extreme cases, a government shutdown. This adversely affects the optimal implementation of policy reforms and may result in excessive debt accumulation or inefficient public sector responses to adverse shocks. Testing these theories has been challenging given the low frequency at which existing measures of partisan conflict

have been computed. In this paper, the author provides a novel high-frequency indicator of the degree of partisan conflict. The index, constructed for the period 1891 to 2013, uses a search-based approach that measures the frequency of newspaper articles that report lawmakers' disagreement about policy. The author shows that the long-run trend of partisan conflict behaves similarly to political polarization and income inequality, especially since the Great Depression. Its short-run fluctuations are highly related to elections but unrelated to recessions. The lower-than-average values observed during wars suggest a "rally around the flag" effect. The author uses the index to study the effect of an increase in partisan conflict, equivalent to the one observed since the Great Recession, on business cycles. Using a simple VAR, the author finds that an innovation to partisan conflict increases government deficits and significantly discourages investment, output, and employment. Moreover, these declines are persistent, which may help explain the slow recovery observed since the 2007 recession ended.

Working Paper 14-19. Marina Azzimonti, Federal Reserve Bank of Philadelphia.

Macro Fiscal Policy in Economic Unions: States as Agents

An important component of the American Recovery and Reinvestment Act's (ARRA's) \$796 billion proposed stimulus budget was \$318 billion in fiscal assistance to state and local governments, yet the authors have no precise estimates of the impact of such assistance on the macroeconomy. In evaluating ARRA, both the Council of Economic Advisors (CEA) and the Congressional Budget Office (CBO) used instead the impacts of direct federal spending and tax relief. These estimates miss the role of states as agents. The authors provide estimates of aid's multiplier effects allowing explicitly for state behavior, first from an SVAR analysis separating federal aid from federal tax relief, second from a narrative analysis using the political record for unanticipated federal aid programs, and third from constructed macroeconomic estimates implied by an estimated model of state governments' fiscal choices. The authors reach three conclusions. First, federal transfers to state and local governments are less stimulative than transfers to households and firms. Second, federal aid for welfare spending is more stimulative than is general purpose aid. Third, an estimated model of state government fiscal behavior provides a microeconomic foundation for the observed macroeconomic impacts of aid.

Working Paper 14-20. Gerald Carlino, Federal Reserve Bank of Philadelphia; Robert P. Inman, The Wharton School, University of Pennsylvania.



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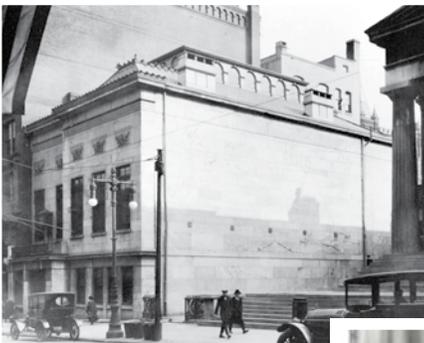
Seeking to prevent banking panics and the recessions they often caused, Congress established the Federal Reserve System in late 1913. Within weeks, an organizing committee was holding meetings around the country to hear local businessmen, bankers, farmers, and others make their case for why a regional Reserve Bank should be located in their city or state. National banks were also polled on their choices for Reserve Bank cities. The result was the creation of a dozen Federal Reserve Districts headquartered in Boston, New York, Philadelphia, Cleveland, Richmond, Atlanta, Chicago, St. Louis, Minneapolis, Kansas City, Dallas, and San Francisco — the same districts in existence today.

On November 16, 1914, all 12 Reserve Banks opened for business, with the Federal Reserve Bank of Philadelphia operating out of offices at 406-408 Chestnut Street and with Charles J. Rhoads as its first governor.

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Third Federal Reserve District



Charles J. Rhoads
First Philadelphia Fed Governor



First Philadelphia Fed Board of Directors, 1914



Philadelphia Fed Employees, 1915

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