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Financial Stability and Nominal GDP Targeting

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Nominal GDP (NGDP) targeting is a simpler, more intuitive, and more robust monetary policy strategy than the Federal Reserve's current approach, which is too narrowly focused on the economic circumstances of the 2010s. NGDP targeting also takes into greater account important links between how policy is conducted and the vulnerability of the financial sector—and the economy more generally—to adverse supply shocks. NGDP targeting can enhance financial stability and, at the same time, support the Federal Open Market Committee's full-employment and long-run-price stability mandates.

The Federal Reserve (Fed) has recently announced a new review of monetary policy strategy. The consensus among outside analysts is that the Fed's current strategy, which it adopted in 2020, is too complicated, too vague, and too narrowly tailored to the economic circumstances of the 2010s.[1] This paper argues that, additionally, the modeling framework the Fed used to arrive at its current strategy ignores important links between monetary policy and the economy's vulnerability to adverse supply shocks. Had those links received due consideration, policymakers might have paid greater attention to a monetary policy strategy—nominal gross domestic product (NGDP) targeting—that is at once simpler, more intuitive, and more robust than the one they adopted.

Overview

The threat of debt delinquency and default is key to financial crises, which in turn have helped to trigger our nation's deepest and most persistent downturns in real activity.[2] Unexpectedly low inflation can increase the threat of default if debt obligations are fixed in nominal terms. Through that channel, it can further depress activity and increase downward inflation pressure.[3] The zero lower bound (ZLB) potentially limits the monetary policy response to those downward pressures by preventing the return on safe, liquid assets from falling to the point where increased goods purchases by creditors offset the reduced demand from borrowers.[4] So, financial strains can jeopardize the Fed's full-employment and price-stability objectives. Debt default is costly to society for that reason, and also because of its direct costs and its ability to disrupt financial intermediation and established business relationships.[5]

Clearly, macroeconomic models that ignore fixed nominal debt obligations—models of the sort that dominated the Fed's 2019–20 framework review—are inadequate for assessing alternative monetary policy strategies. Debt is key to understanding the financial stability implications of alternative strategies, and also to understanding the most severe economic downturns.[6] Markus Brunnermeier and Yuliy Sannikov emphasized that at the Federal Reserve Bank of Kansas City's 2012 Jackson Hole Symposium. There, they noted that "[a]ny model that studies financial instability and the role of financial frictions must depart from representative agent analysis."[7] Amir Sufi concurred: "[R]epresentative agent models, including the standard New Keynesian framework, do not provide sufficient guidance for optimal policy-making."[8] It is past time for the Fed to more seriously consider the implications of alternative policy strategies for financial stability.

Partly for governance reasons, the Fed has tended to view the relationship between monetary policy and financial stability as a one-way street: Financial strains can sometimes complicate the conduct of monetary policy, but the Federal Open Market Committee (FOMC) can choose monetary policy strategy without regard for its financial stability implications.[9] Given appropriate regulation, a monetary policy strategy designed to suit an economy free of financial frictions adequately protects against runaway debt deflations, and that is enough. Protecting the financial system is a separate problem in this view, solved by strengthening financial regulation, enhancing financial institutions' liquidity, and—when necessary—recapitalizing insolvent institutions.[10]

An automotive analogy would be to deal with potholes (stress to the financial system) by installing heavy-duty shock absorbers (bank lending facilities) and axles (high bank capital and liquidity requirements) and making repairs after the fact (bank recapitalizations), but *not* by taking evasive action.

Research summarized here suggests that, to the contrary, there is a strong case for allowing limited, systematic deviations from price stability in response to real economic shocks. Properly disciplined price level movements can reduce the chances of serious damage to the economy's financial system—and spillover harm to the real economy—without compromising long-run price stability. They may help reduce the frequency and duration of encounters with the ZLB.

In particular, this recent research suggests that the Fed should encourage countercyclical movement in the aggregate price level. When output surprises to the downside, the price level should surprise to the upside; similarly, upside output surprises should be accompanied by downside price surprises. Under certain assumptions and conditions, discussed below, optimal strategy is approximated by announcing a target for NGDP and then adjusting short-term interest rates and other policy instruments as necessary to achieve that target.[11] The target NGDP path can be made consistent with any desired long-run average inflation objective.

Intuition is clearest (and results strongest) in the extreme case where there are nominal payment frictions but no price frictions—i.e., the case where debtors have pre-set nominal payment

obligations extending into the future, but output prices are perfectly flexible.[12] In such economies, a predictable nominal-income path assists debtors and creditors in their financial planning, helping them to avoid overextending themselves. Supply-shock risk is shared between debtors and creditors in a way that each, *ex ante*, prefers. The price level drop that accompanies a positive output shock under NGDP targeting increases the real value of the fixed nominal payments received by creditors so that they receive a proportionate share of the benefits from higher output. Similarly, the higher-than-expected price level that accompanies a negative output shock reduces the real burden of debtors' fixed nominal payments, so that they absorb only a proportionate share of the negative output surprise. With output risk broadly distributed, financial strains that might otherwise lead to loan delinquencies, bankruptcies, and damage to financial institutions are reduced.[13]

The desirability of a countercyclical price level in economies with realistic nominal payment frictions is robust to sluggish price adjustment, and in such economies an NGDP-targeting variant remains approximately optimal.[14] Large real-side shocks, in particular, are better handled with NGDP targeting than with strategies that treat all inflation variations as equally undesirable regardless of their correlation with output.

The brief analysis of NGDP targeting included in the Fed's 2019–20 strategy review ignored financial frictions and the vulnerabilities they create.[15] The current review needs to remedy that deficiency.

This paper begins with a quick review of how debt has been introduced into macroeconomic models, giving particular attention to models with clear financial stability or monetary policy implications. As already noted, it's advantageous for the price level to move countercyclically, and this emerges as a theme in the literature. This paper reviews objections to that conclusion before exploring considerations that reinforce the case for targeting aggregate nominal income. Finally, the paper considers empirical evidence bearing on the links between NGDP predictability and indicators of financial system stress.

Using Monetary Policy to Spread Risk

> "If one thinks about the important sets of contracts in the economy that are set in nominal terms, and which are unlikely to be implicitly insured or indexed against unanticipated price-level changes, financial contracts (such as debt instruments) come immediately to mind."
>
> — Ben Bernanke, 1995[16]

An active debt market requires that there be opportunities for beneficial intertemporal trade. Households must differ from one another either in the timing of their incomes, in when they prefer to consume, or in their access to technologies that allow resources at one point in time to be transformed into goods and services available for consumption later.[17] In a 2013 paper,[18] I take the first

approach in the simplest possible setting: a two-period endowment economy with two types of households that differ from each other only in the timing of their incomes.[19] Output is perishable. Households are risk-averse. Households with late-arriving incomes fund their early-period consumption by borrowing from those with early-arriving incomes. Households with early-arriving incomes fund their late-period consumption with interest and principal from the loans they make in the early period. Importantly, debt contracts are set in nominal terms before late-period real incomes are known, while the monetary authority determines the late-period price level *after* late-period real incomes are known. Households know the monetary authority's price-setting rule when negotiating their debt contracts.

I demonstrate that the competitive equilibrium in this economy is identical to that in the same economy with complete, state-contingent financial contracts *provided* that the late-period price level moves opposite to, and one-for-one, with realized late-period output. In other words, the monetary authority need only announce and adhere to a target for second-period NGDP in order to overcome the economy's nominal-debt friction. In the resultant equilibrium, debtor and creditor households share output risk equally: Each household type receives the same fraction of aggregate output in period 1 as in period 2. Thus, NGDP targeting converts nominal debt contracts into "equity share" contracts in aggregate output. As a result of this risk-sharing, debtor households are never unable to meet their period-2 obligations, regardless of how low late-period real incomes might turn out to be. Creditor households share in the pain if late-period output disappoints and share in the gain if late-period output is a positive surprise.

In his 2014 paper, Kevin Sheedy works through an exercise similar to the one above but then proceeds in a different direction. Instead of making households heterogeneous in the timing of their incomes, he makes them heterogeneous in their preferences, with one group of households impatient relative to the other.[20] Households in each group maximize utility over an infinite horizon. They are risk-averse. Output is produced using labor supplied by both types of households and a technology that is subject to productivity shocks. The financial friction is that debt contracts are non-contingent, specified in nominal terms.

If output prices are perfectly flexible, optimal monetary policy in Sheedy's economy is a generalization of NGDP targeting in which output and the price level don't necessarily receive equal weight. In particular, the monetary authority should adjust policy to keep $P + w^*Y = N^*$, where P and Y are the logarithms of the price of output and the level of real output, respectively; where N^* is a target to which the monetary authority has previously committed; and where w^* is a weighting coefficient that depends on household risk aversion, the exogenous maturity structure of household debt, and the stochastic process that describes the evolution of real GDP. NGDP targeting ($w^* = 1$) is optimal when the coefficient of relative risk aversion is one (so that household utility is logarithmic in consumption), *or* all debt is of infinite maturity (so that debt need never be refinanced), *or* real output follows a random walk (so that innovations to GDP growth are transitory). In the more realistic case—in which the coefficient of relative risk aversion exceeds one, some

fraction of debt needs to be refinanced each period, and output movements are persistent but impermanent—Sheedy's analysis implies that $w^* < 1$. That is, less weight should be placed on real output than would be implied by a simple NGDP target.

Sheedy next adds a Calvo-style pricing friction to his model. Price changes are staggered across firms when there is Calvo pricing, so that movements in the aggregate price level are (1) gradual and (2) imply dispersion in prices across firms. Price dispersion, in turn, implies inefficient cross-firm differences in production. If there were no financial friction, it would be optimal for the monetary authority to eliminate cross-firm production differences by holding the aggregate price level constant. When pricing and financial frictions are *both* present, however, Sheedy shows that under optimal policy there is a weighting coefficient, w', related to but different from w^*, such that $P + w'Y$ is a stationary time series. That is, under optimal policy, there is a weighted sum of price and output that is shock-invariant in the long run: The monetary authority should have a longer-run weighted NGDP target. Because of the pricing friction, though, the monetary authority should smooth inflation in the near term, so that P moves only gradually toward its equilibrium level, absent new shocks.[21]

Sheedy's estimates of the relative importance of financial and pricing frictions in monetary-policy design are discussed in the section on Empirical Evidence below.

Alternative Risk-Sharing Mechanisms

As already noted, the countercyclical variation in the price level implied by NGDP targeting is costly to a society with Calvo-style pricing frictions. Are alternative risk-sharing mechanisms available that might avoid those costs?

Bankruptcy

Bankruptcy laws might be seen as one such mechanism.[22] Bankruptcy puts limits on the downside risks borne by debtors, transferring any risk beyond those limits to creditors. However, bankruptcy is not costless. There are the obvious direct verification and adjudication costs. (What are the debtor's assets and liabilities? Which creditors' claims should take priority?) Unless the bankruptcy is clearly due to uncontrollable circumstances, the debtor may be unable to obtain new credit for a time, so credit-market functioning is impaired. If the debtor is a firm, bankruptcy may require the firm's employees to seek new jobs, and the firm's trading partners may need to undertake costly searches for new suppliers and customers.

Widespread loan defaults may threaten the solvency of financial intermediaries. In fact, bankruptcy—and the threat of it—are at the center of narrative accounts of financial contagion and debt deflation.[23] Bankruptcy is, in any event, too crude to optimally redistribute risk. It encourages excess borrowing, thereby driving up equilibrium debt, the equilibrium interest rate, or both.[24]

Bankruptcy is at best a *supplement* to NGDP targeting, useful for limiting the idiosyncratic risks outside monetary policy's reach.

Fiscal Transfers

A sophisticated and nimble fiscal policy, by increasing net transfers to debtors during economic downturns and to creditors during supply-driven booms, can in principle achieve a risk allocation similar to that generated by NGDP targeting.[25] In practice though, discretionary government transfers are less timely than monetary policy action and may be directed to groups with the greatest political influence rather than those in the greatest financial distress.[26] Automatic fiscal stabilizers, like unemployment insurance, are less subject to implementation lags and may more reliably moderate swings in aggregate nominal income than *ad hoc*, *ex post* debt relief (which is, in any case, likely to be opposed by creditors, taxpayers, or both). However, as with other transfer programs, the generosity of unemployment insurance is limited by moral hazard and fraud concerns.

NGDP targeting is the monetary policy equivalent of an automatic stabilizer: By spreading the risk from aggregate real shocks, it curbs the demands placed on fiscal authorities.

Wage and Wage-Payment Stickiness

Wage-payment stickiness may be another mechanism for redistributing risk between debtors and creditors. Workers with fixed nominal payment obligations will prefer employers who credibly promise to avoid cutting nominal wage incomes when revenues disappoint, using profits as a shock absorber.[27] To the extent that workers are more likely than shareholders to be net debtors, such arrangements can approximate the risk-spreading effects of NGDP targeting. One may wonder, though, how reliable this mechanism will be if the revenue decline proves deep or persistent.

Interestingly, in models where real wage rates play an active allocative role and money wage rates are pre-set, it's been shown that the monetary authority should encourage the price level to move countercyclically, much as it does under NGDP targeting.[28] Intuitively, an appropriately countercyclical price level achieves the same real wage as would prevail with a flexible money wage. So, wage stickiness has implications for monetary policy similar to those of nominal debt contracts.

Contingent Debt Contracts

If fluctuations in aggregate nominal income are of such great consequence for the distribution of risk in the economy and for financial stability, why don't borrowers and lenders agree to make loan and lease payments contingent on NGDP or another, similar nominal aggregate?

For the government (defined broadly, to include the central bank), non-indexed debt has an advantage: it can be deflated away in emergencies. Deliberate, systematic real devaluation of government

debt during wartime, or whenever the demands on government are unusually high, reduces the need for costly variation in distortionary tax rates.[29]

In the private sector, indexation incentives will be small to the extent that agents believe the central bank will act to stabilize aggregate spending. It is arguably the Fed's job to facilitate the use of money as the unit of account and medium of exchange. The Fed advances those objectives when, by minimizing nominal demand shocks, it also minimizes the need for debt contracts to be made contingent on those shocks. The lack of indexation in real-world debt contracts could, in other words, be a vote of confidence in Fed policy. Additionally, there may be a mismatch between the private and social benefits of debt indexation. Households would like to protect themselves against shocks to their income streams. Such insurance is not feasible, however, to the extent that each household's income depends on its own unobserved effort, introducing moral hazard. Households also have private information about their income risk, opening the door to adverse selection. Indexation to aggregate income would avoid those moral hazard and adverse selection problems, but might not be worth the bother for individuals, given the low correlation between individual and aggregate income, and given that the financial-stability benefits from indexation are broadly distributed.[30] A monetary policy that stabilizes nominal income achieves the equilibrium that everyone would choose if coordinated action had no cost.[31]

NGDP Targeting and the ZLB

An important driver of the Fed's 2019–20 strategy review was concern about encounters with the ZLB on short-term interest rates.[32] Once the policy rate hits the ZLB, adding accommodation becomes complicated. Indeed, at the ZLB, weak aggregate demand may lead to a decline in expected inflation, thereby driving *ex ante* real interest rates *higher*—the opposite of what policymakers desire. During its strategy review, which followed a long period of below-target realized inflation and near-zero interest rates, the Fed took this risk seriously. A related concern was that the full-employment, flexible-price, or "natural" real rate of interest—"r^*"—might have decreased. For a given target longer-run average inflation rate, a lower r^* translates into a lower long-run average nominal interest rate, which means less room to cut market interest rates before becoming constrained by the ZLB.

The Fed prioritized finding a policy strategy that would reduce the frequency and duration of ZLB encounters. The approach it finally adopted had the FOMC (1) commit to offset past inflation shortfalls relative to its 2-percent longer-run target while ignoring past excesses, (2) shift its focus from avoiding *deviations* from full employment to avoiding *shortfalls* from full employment, and (3) forswear policy tightening in response to purely prospective above-target inflation or realized above-target inflation judged to result from temporary shocks to aggregate supply.[33]

Notably, throughout its strategy review the Fed treated the apparent decline in r^* as exogenous with respect to its conduct. Arguably, that decision was unwise. As noted in my own work and

Sheedy's, any substantial unexpected decline in nominal income puts those with fixed nominal payment obligations in a financial bind.[34] Lenders react to increased default risk—and their own balance-sheet deterioration—by tightening credit standards. A considerable body of recent research has explored the consequences of such tightening.[35] Those consequences include a decline in the real, safe interest rate required to maintain full employment—a decline that can bring the economy up against the ZLB even in the absence of expected deflation.[36] The predicted decline in r^* accords well with anecdotal reports of flights to safety and liquidity during periods of financial strain. It also accords with the observed behavior of r^* estimates. For example, the Laubach-Williams and Holston-Laubach-Williams r^* measures plunged in 2008 and recovered only slowly and partially in the years leading up to the COVID pandemic.[37] These theoretical and empirical results suggest that monetary policy strategies that spread risk may help protect the economy from steep declines in r^* and, therefore, from encounters with the ZLB.

If the ZLB constraint becomes binding, what is the monetary authority to do? In their careful treatment of that issue, Gauti Eggertsson and Michael Woodford emphasize that "the key to dealing with [the zero bound] in the least damaging way is to create the right kind of expectations regarding how monetary policy will be used *after* the constraint is no longer binding."[38] Their analysis is conducted using a representative-agent model in which firms' output prices are sticky and r^* is subject to exogenous shocks. Because there are no pre-set nominal debt-payment obligations, the analysis lacks financial frictions that are key to the arguments I and Sheedy have made for stabilizing NGDP (and also to most accounts of real-world financial crises and ZLB encounters). Nevertheless, Eggertsson and Woodford find that in an economy that may come up against the ZLB, optimal monetary policy moves toward a type of NGDP level targeting. In particular, optimal policy requires a countercyclical price level and that the central bank commit to making up for target misses forced by the ZLB. (It must not "let bygones be bygones.") A level target for NGDP has both of those properties and performs well in simulation exercises. (More on simulation results below.) For those reasons, Woodford has suggested that NGDP level targeting deserves serious consideration in economies where the ZLB is of concern.[39]

Empirical Evidence

The main thesis of the literature surveyed here is that debtors, because they have obligations that are fixed in nominal terms, disproportionately benefit from positive nominal-income shocks, and disproportionately suffer from negative nominal-income shocks. Signs of debtor financial stress, then, ought to be inversely related to nominal-income surprises.

My 2013 paper directly examines that proposition by regressing the five-quarter change in the commercial-bank loan delinquency rate on the difference between realized five-quarter NGDP growth and the median forecast of five-quarter NGDP growth reported in the Survey of Professional Forecasters (SPF). Also included on the right-hand side of the regression is the difference between five-quarter realized and SPF-forecasted GDP inflation. That variable is included

to test the proposition, advanced by Irving Fisher, that surprise deflations are principally responsible for increases in debtor stress.[40] I find that NGDP surprises are important for changes in the delinquency rate, with the expected negative sign, and there is no evidence that inflation surprises matter at all except through their contribution to NGDP surprises.[41]

Similarly, David Beckworth uses International Monetary Fund forecasts to construct indexes of NGDP surprises for the United States and 20 other advanced economies and then looks at how various financial and real economic performance measures are related to those surprises.[42] He reports that NGDP surprises are positively correlated across countries with increases in private credit growth, and also with real GDP growth, money growth, stock-price growth, and home-price growth. They are negatively correlated with nonperforming loans and the unemployment rate. Follow-up panel and panel-local vector autoregression analyses suggest that NGDP surprises are causally and significantly related to financial and real performance indicators in a manner consistent with the cross-country correlations. In particular, positive NGDP surprises lead to reduced financial stress as reflected in faster private credit growth, a lower nonperforming loan rate, and faster home-price growth.

Consistent with the proposition that debtors with fixed nominal obligations are disproportionately affected by nominal-income shocks, Atif Mian, Kamalesh Rao, and Amir Sufi present compelling evidence that it was households who had piled up debt—often secured with residential real estate—who were most severely affected by the US Great Recession.[43] Increased actual and threatened mortgage defaults spilled over to adversely affect the balance sheets and creditworthiness of financial intermediaries, impacting business investment and the broader economy.[44]

Researchers have also compared the performance of alternative monetary policy strategies using simulations of calibrated models. Results have been mixed when that approach is applied to New-Keynesian, representative-agent economies subject to the ZLB constraint.[45] As previously discussed, optimal policy in those economies has the price level move opposite to the output gap, but by less than one for one. That is, the price level is more countercyclical than it would be with a price level target, but less countercyclical than with a NGDP level target. Whether price level or NGDP level targeting better approximates optimal policy depends on parameter values, the relative size of various shocks to the economy, and the stochastic process assumed for the natural real rate of interest, r^*. It also depends on details of policy implementation. For example, is the target level of NGDP adjusted to reflect changes in potential real GDP? (It should be, for best performance.) Moreover, the NGDP target path (or price level target path, under price level targeting) would ideally ratchet upward with each ZLB encounter, ratcheting more as the ZLB constraint binds more.

Intuitively, the promise of additional future accommodation stimulates current demand, assuming that the promise is credible. Therein lies a problem: The more complicated policy strategy becomes, the more difficult it is for the public to understand the strategy and monitor the Fed's

adherence to it, and, consequently, the less likely it is that any promise of future ease will be comprehended, believed, or effective. With the credibility problem in mind, Woodford argues that the simplicity and intuitive appeal of a pre-set NGDP target path—without any upward ZLB ratchet—make it an attractive, practical approximation to optimal policy.[46]

Sheedy introduces fixed nominal-debt obligations into a calibrated model economy with Calvo-style sticky prices. For various parameter settings, Sheedy determines the relative weights that policymakers should put on the financial and pricing frictions when formulating monetary policy strategy. The financial friction dominates. Nearly always, greater emphasis should be placed on spreading risk than on stabilizing the price level. In the baseline calibration, for example, social welfare is maximized when 89-percent weight is placed on neutralizing the financial friction by holding a weighted average of price and output to a pre-set course, as compared with 11-percent weight on neutralizing the pricing friction by avoiding inflation. Not surprisingly, this baseline finding is sensitive to the debt-to-GDP ratio and to the coefficient of relative risk aversion. If there is either not much debt in the economy or households aren't very risk-averse, then spreading risk between net-debtor and net-creditor households isn't important.

How much is lost by completely ignoring the financial friction and focusing exclusively on the pricing friction, as is customary? Relatively little, *on average*, Sheedy finds. But when a major shock hits the economy, risk-sharing considerations loom large, impacting the optimal conduct of policy and social welfare. For that reason, risk-sharing merits disproportionate weight in optimal policy design.[47]

Discussion

Monetary policy strategy affects financial stability—it is wishful thinking to pretend otherwise—and financial stability is critical to satisfactory economic performance. Financial-stability issues can only be addressed in models with financial frictions, and the most obvious and widespread financial friction is non-contingent nominal debt. It is not a coincidence that non-contingent nominal debt is prominent in narrative accounts of financial crises and the United States's deepest and most prolonged recessions. Yet, debt is missing from representative-agent macroeconomic models, including the benchmark New-Keynesian model. It follows that that model—the backbone of the Fed's 2019–20 strategy review—is unlikely to provide dependable policy guidance. However well it might describe the economy in "normal" times, the benchmark model doesn't capture the emergence of financial strains. Nor does it offer guidance on how monetary policy might prevent those strains from spilling over and threatening the Fed's full employment and long-run price stability objectives. It is important that the next framework review take financial frictions seriously.

Macroeconomic models that include realistic nominal debt prescribe countercyclical variation in the price level as a means for spreading the impact of output shocks evenly across risk-averse households. Such risk sharing is *ex ante* preferred by both debtors and creditors. When nominal

debt is the sole nominal friction, NGDP targeting is optimal in special cases, and a variant of NGDP targeting that allows for a less than one-for-one inverse price level response to output shocks is more generally optimal. When pricing frictions are present in addition to nominal debt, it is the financial frictions that are most important for optimal policy strategy. Risk-sharing pays off, especially when debt levels are high and output shocks are large.

The literature on the links between financial stability and monetary policy strategy is not without gaps. While several models describe how tight credit standards are transmitted to interest rates and real activity (and strong evidence that credit conditions matter for economic performance), the credit tightening in those models is generally treated as exogenous. Missing are models of how different monetary policy strategies affect credit conditions in various circumstances. Relatedly, while there is empirical evidence that credit growth, loan delinquencies, and asset prices are linked to NGDP surprises, the possibility that changes in credit *standards* are tied to current NGDP surprises, or to downward revisions to expected future NGDP, needs to be further explored.

Caveats aside, in an economy where fixed nominal-payment obligations are common it is intuitive that risk-averse households and firms will value predictable nominal income and revenue streams. The Fed does its part by minimizing NGDP surprises while maintaining long-run average nominal growth at a rate commensurate with growth in real potential GDP. That simple strategy would enhance financial stability and, at the same time, support the FOMC's full employment and long-run price stability mandates.

About the Author

Now retired, Evan F. Koenig served as senior vice president and principal policy advisor at the Federal Reserve Bank of Dallas.

Notes

1. For a critique of current strategy and criteria for improvement, see David Beckworth, "The Fed's 2024-25 Framework Review: Optimizing the Dual Mandate Through Nominal GDP Level Targeting" (Mercatus Policy Brief, Mercatus Center at George Mason University, 2024). See also the Symposium on [the] Federal Reserve's Monetary Policy Framework Review, *Brookings Papers on Economic Activity*, BPEA Fall 2024 Conference, September 26, 2024, https://www.brookings.edu/events/bpea-fall-2024-conference/, and the proceedings of the Brookings Institution conference, Michael T. Kiley, Michael D. Bauer, Anna Cieslak, et al., "An Agenda for the Federal Reserve's Review of Its Monetary Policy Framework" (Conference proceedings, Brookings Institution, June 14, 2024), https://www.brookings.edu/events/an-agenda-for-the-federal-reserves-review-of-monetary-policy-framework/.
2. See Robert Hall, "The Long Slump," *American Economic Review* 101, no. 2 (April 2011): 431–69, and Ben Bernanke, "Non-Monetary Effects of the Financial Crisis in the Propagation of the Great Depression," *American Economic Review* 73, no. 10 (June 1983): 257–76, where Bernanke identifies debt defaults and bank runs as two key contributors to the financial meltdown of the early 1930s.
3. Irving Fisher, "The Debt-Deflation Theory of Great Depressions," *Econometrica* 1, no. 3 (October 1933): 337–57, and Ben S. Bernanke, "Bankruptcy, Liquidity, and Recession," *American Economic Review* 71, no. 2 (May 1981): 155–9.
4. Hall, "The Long Slump," and Amir Sufi, "Lessons from the Great Recession: Household Debt in Macroeconomic Models," essay prepared for the May 2012 academic consultants' meeting at the Federal Reserve Board of Governors.

5. The potential damage to the economy from an impaired financial system has been emphasized by Ben Bernanke, Mark Gertler, and Simon Gilchrist, among others. See Ben S. Bernanke, Mark Gertler, and Simon Gilchrist in "The Financial Accelerator in a Quantitative Business Cycle Framework," in *Handbook of Macroeconomics*, ed. J. B. Taylor and M. Woodford (Elsevier, 1999), 1341–93; Ben S. Bernanke, "The Real Effects of Disrupted Credit: Evidence from the Global Financial Crisis," *Brookings Papers on Economic Activity* 2018 (Fall 2018): 251–342; and Mark Gertler and Simon Gilchrist, "What Happened: Financial Factors in the Great Recession," *Journal of Economic Perspectives* 32, no. 3 (2018): 3–30.

6. In his 1983 article published in *American Economic Review*, mentioned above, Bernanke has a nice discussion of the role of nominal debt in the Great Depression. Note that the "debt repayment obligations" referenced here encompass lease and pension obligations and any other nominal payment commitments (such as "buy now, pay later" plans) that extend into the future. What's fixed is the dollar payment required of purchasers per period over some interval, not the price per unit of output sold.

7. Markus K. Brunnermeier and Yuliy Sannikov, "Redistributive Monetary Policy" (Proceedings of the Economic Policy Symposium, Jackson Hole, WY, Federal Reserve Bank of Kansas City, August 2012): 331–84.

8. Amir Sufi, "Commentary: Redistributive Monetary Policy" (Proceedings of the Economic Policy Symposium, Jackson Hole, WY, Federal Reserve Bank of Kansas City, August 2012): 385–96.

9. In 2009, Carl Walsh described the pre–Great Recession professional consensus to which the Federal Reserve has subscribed: "Financial stability was . . . mentioned as desirable, but by and large, discussions of monetary policy took financial stability for granted, and models used for policy analysis almost always assumed financial frictions were irrelevant for policy design." See Carl E. Walsh, "Using Monetary Policy to Stabilize Economic Activity," (Proceedings of the Economic Policy Symposium, Jackson Hole, WY, Federal Reserve Bank of Kansas City, August 2009): 245–96.

10. For a recent overview, see Michelle W. Bowman, "Bank Liquidity, Regulation, and the Fed's Role as Lender of Last Resort" (Remarks at the Roundtable on the Lender of Last Resort: The 2023 Banking Crisis and COVID, Committee on Capital Markets Regulation, April 3, 2024, Washington, DC), https://www.federalreserve.gov/newsevents/speech/files/bowman20240403a.pdf. In 2018, Bernanke documented measures taken by the Treasury Department and Fed to protect the US financial system during the global financial crisis that began in 2007. See Bernanke, "The Real Effects of the Financial Crisis."

11. Evan Koenig, "All in the Family: The Close Connection Between Nominal-GDP Targeting and the Taylor Rule" (Staff Paper No. 17, Federal Reserve Bank of Dallas, March 2012).

12. Evan Koenig, "Like a Good Neighbor: Monetary Policy, Financial Stability, and the Distribution of Risk, *"International Journal of Central Banking* 9, no. 2 (2013): 57–82, and Kevin D. Sheedy, "Debt and Incomplete Financial Markets: A Case for Nominal GDP Targeting," *Brookings Papers on Economic Activity* (Spring 2014): 301–61.

13. Sharing the pain is more consequential for financial stability than is sharing the gain. It is more important for stability that negative output shocks be spread evenly across households than that positive output shocks be spread evenly. Efficient risk-sharing, though, is a two-way street: In return for accepting reduced consumption in hard times, creditors enjoy increased consumption in good times.

14. Sheedy, "Debt and Incomplete Financial Markets," 338–56.

15. Lars E.O. Svensson, "Monetary Policy Strategies for the Federal Reserve," *International Journal of Central Banking* 16, no. 1 (February 2020): 133–93.

16. Ben S. Bernanke, "The Macroeconomics of the Great Depression: A Comparative Approach," *Journal of Money, Credit, and Banking* 27, no. 1 (February 1995): 1–28.

17. This last approach is taken, for example, by Ben S. Bernanke, Mark Gertler, and Simon Gilchrist in "The Financial Accelerator in a Quantitative Business Cycle Framework" and by Mark Gertler and Nobuhiro Kiyotaki in "Financial Intermediation and Credit Policy in Business Cycle Analysis," *Handbook of Monetary Economics*, ed. B. Friedman and M. Woodford (Elsevier, 2010), 547–99. Only a subset of agents, entrepreneurs, has access to capital investment opportunities. Those agents are funded by worker-consumers, either directly or through financial intermediaries. Debt is state-contingent, entrepreneurs are risk-neutral, or both, so risk-sharing is not an issue. The literature is mostly

concerned with modeling how exogenous disruptions to funding can impact the economy and with finding empirically relevant measures of disruption, not on implications for monetary policy strategy.

18. Koenig, "Like a Good Neighbor."

19. For extensions to infinite-period, overlapping-generations models, see James Bullard and Riccardo DiCecio, "Optimal Monetary Policy for the Masses"(Working Paper No. 2019-009E, Federal Reserve Bank of St. Louis, revised July 2023); James Bullard and Aarti Singh, "Nominal GDP Targeting with Heterogeneous Labor Supply," *Journal of Money, Credit, and Banking* 52, no. 1 (February 2020), 37–77; and Costas Azariadis, James Bullard, Aarti Singh, and Jacek Suda, "Incomplete Credit Markets and Monetary Policy," *Journal of Economic Dynamics and Control* 103, no. 1 (June 2019): 83–101.

20. Sheedy, "Debt and Incomplete Financial Markets," 321–24. See also Veronica Guerrieri and Guido Lorenzoni, "Credit Crises, Precautionary Savings, and the Liquidity Trap," *Quarterly Journal of Economics* 132, no. 3 (2017): 1427–67, and Gauti B. Eggertsson and Paul Krugman, "Debt, Deleveraging, and the Liquidity Trap: A Fisher-Minsky-Koo Approach," *Quarterly Journal of Economics* 127, no. 3 (2012): 1469–513.

21. These results are for the case in which the level of aggregate output is exogenous. Sheedy relaxes the exogeneity assumption in simulation exercises.

22. See Koenig, "Like a Good Neighbor," and discussant remarks accompanying Sheedy, "Debt and Incomplete Financial Markets." In "Non-Monetary Effects of the Financial Crisis in the Propagation of the Great Depression," Bernanke notes that bankruptcy presumes financial-market frictions.

23. See Fisher, "The Debt-Deflation Theory of Great Depressions"; Bernanke, "Bankruptcy, Liquidity, and Recession"; and Bernanke, "Non-Monetary Effects of the Financial Crisis."

24. Koenig, "Like a Good Neighbor," 66–69.

25. Henning Bohn, "Intergenerational Risk Sharing and Fiscal Policy," *Journal of Monetary Economics* 56, no. 6 (September 2009): 805–16, and Koenig, "Like a Good Neighbor," 73.

26. Though implemented with exceptional speed, COVID-era financial relief programs received criticism for being poorly targeted and vulnerable to fraud.

27. For evidence suggesting that workers favor employers who avoid wage and wage-payment cuts, see George A. Akerlof, William T. Dickens, and George T. Perry, "The Macroeconomics of Low Inflation," *Brookings Papers on Economic Activity* 27, no. 1 (1996): 1–76.

28. Evan F. Koenig, "Targeting Nominal Income: A Closer Look," *Economics Letters* 51, no. 1 (1996): 89–93.

29. See Bohn, "Intergenerational Risk Sharing and Fiscal Policy"; V.V. Chari and Patrick J. Kehoe, "Optimal Fiscal and Monetary Policy" in *Handbook of Macroeconomics 1*, ed. John B. Taylor and Michael Woodford (Elsevier, 1999): 1671–745; and Hanno Lustig, Christopher Sleet, and Sevin Yeltekin, "Fiscal Hedging with Nominal Assets," *Journal of Monetary Economics* 55, no. 4 (2008): 710–27.

30. Income variation from aggregate shocks is positively correlated across individuals, and correlated risks pose the greatest financial stability threat. A broad increase in delinquency and default rates leads to a tightening of credit terms that further increases the stress on borrowers and may have adverse spillover effects on the real economy. Bernanke nicely describes this effect in "Bankruptcy, Liquidity, and Recession."

31. In "Lessons from the Great Recession," Sufi notes that in markets such as residential housing, where quasi-governmental entities have substantial influence, those entities might encourage indexed debt, reducing the need for policy action from the Fed.

32. The Fed uses a more general concept, the "effective lower bound" (ELB), which recognizes that policymakers might not wish for interest rates to fall below some low but possibly nonzero level, for fear of damage to the financial system.

33. See Richard H. Clarida, "The Federal Reserve's New Monetary Policy Framework: A Robust Evolution," speech at the Peterson Institute for International Economics, August 31, 2020, Washington, DC, via webcast, https://www.federalreserve.gov/newsevents/speech/files/clarida20200831a.pdf. At its September 2020 meeting, the FOMC, motivated by its new policy, publicly committed to hold the policy rate at zero until inflation reached 2 percent and was on track to moderately exceed that level, *and* the economy—in the committee's judgment—had reached full employment. The full-employment requirement delayed policy action until March 2022.

34. The greater the downward surprise to debtor incomes and the greater the debtors' preshock fixed nominal obligations relative to their preshock incomes, the greater the financial squeeze.

35. See, for example, Guerrieri and Lorenzoni, "Credit Crises, Precautionary Savings, and the Liquidity Trap"; Hall, "The Long Slump"; and Eggertsson and Krugman, "Debt, Deleveraging, and the Liquidity Trap."

36. As Gertler observes: "[C]redit market frictions increase the likelihood that the zero bound will bind. They do so by reducing the real market interest rate required to produce zero excess demand." (See Mark Gertler, discussion in "The Zero Bound on Interest Rates and Optimal Monetary Policy" by Gauti B. Eggertsson and Michael Woodford, *Brookings Papers on Economic Activity* 2003, no. 1 (2003): 219–27.)

37. The Federal Reserve Bank of New York's website includes helpful data and graphs at https://www.newyorkfed.org/research/policy/rstar.

38. Gauti B. Eggertsson and Michael Woodford, "The Zero Bound on Interest Rates and Optimal Monetary Policy," *Brookings Papers on Economic Activity* 2003, no. 1 (2003): 139–211. For additional insights and perspectives, see also Walsh, "Using Monetary Policy to Stabilize Economic Activity," and Robert G. King, "Discussion of 'Limitations on the Effectiveness of Forward Guidance at the Zero Lower Bound,'" *International Journal of Central Banking* 6, no. 1 (March 2010): 191–203.

39. Michael Woodford, "Methods of Policy Accommodation at the Interest Rate Lower Bound," (Proceedings of the Economic Policy Symposium, Jackson Hole, WY, Federal Reserve Bank of Kansas City, August 2012): 185–288.

40. Fisher, "The Debt-Deflation Theory of Great Depressions."

41. The coefficient on inflation surprises is small in magnitude (roughly one-quarter the size of that on NGDP surprises), statistically insignificant, and with a sign opposite what one would have expected based on Fisher's narrative.

42. David Beckworth, "The Financial Stability Case for a Nominal GDP Target," *Cato Journal* 39, no. 2 (2019): 419–47.

43. See Atif Mian and Amir Sufi, "The Great Recession: Lessons from Microeconomic Data," *American Economic Review* 100, no. 2 (May 2010): 51–56; Atif Mian, Kamalesh Rao, and Amir Sufi, "Household Balance Sheets, Consumption, and the Economic Slump," *Quarterly Journal of Economics* 128, no. 4 (November 2013): 1687–726; and Atif Mian and Amir Sufi, "What Explains the 2007–2009 Drop in Employment?," *Econometrica* 82, no. 6 (November 2014): 2197–223.

44. Bernanke, Gertler, and Gilchrist argue that these spillover effects ultimately proved more damaging than the deterioration in household cash flow and household balance sheets. (See Bernanke, "The Real Effects of the Financial Crisis," and Gertler and Gilchrist, "What Happened: Financial Factors in the Great Recession.")

45. Representative studies include Eggertsson and Woodford, "The Zero Bound on Interest Rates and Optimal Monetary Policy"; Andrew Levin et al., "Limitations on the Effectiveness of Forward Guidance at the Zero Lower Bound," *International Journal of Central Banking* 6, no. 1 (2010): 143–89; and Roberto M. Billi, "A Note on Nominal GDP Targeting and the Zero Lower Bound," *Macroeconomic Dynamics* 21 (2017): 2138–57.

46. Woodford, "Methods of Policy Accommodation at the Interest Rate Lower Bound."

47. In our earlier automobile analogy, straight-ahead driving (strict price stability) is fine whenever road imperfections are small, but disastrous on occasions when a large pothole looms. Alternatively, proximity to a hospital is inconsequential for most people most of the time, but critical when a medical emergency arises.