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Liquidity Traps, Policy Rules for Inflation Targeting, and Eurosystem Monetary-Policy Strategy

Lars E.O. Svensson*

The field of monetary policy continuously provides new challenges for economic research. For instance, the experience of Japan since the early 1990s has generated new work on how to avoid and escape from a liquidity trap. The rapid spread of inflation targeting during the 1990s has stimulated new studies of how to understand and further improve this monetary policy regime. The ever-present uncertainty in practical monetary policymaking provides a constant demand for new ideas about conducting monetary policy under uncertainty. And, the controversial choice of a monetary policy strategy for the euro area has encouraged further research on monetary indicators and monetary targeting. These are all areas of focus in my own research over the last few years.¹

Escaping from a Liquidity Trap: The Foolproof Way

Japan's decade-long experience of deflation and a "liquidity trap" has stimulated research on how to escape from such a trap. In a liquidity trap, the central bank's "instrument rate" — a short nominal interest rate, such as the federal funds rate in the United States — is zero and the zero lower bound is binding, in the sense that deflation and/or recession calls for a more expansionary policy and a lower real interest rate.

As several authors have pointed out, an open economy such as Japan's has access to a very effective stimulative measure — namely, a currency depreci-

ation — if it wants to avoid a deflationary spiral. From that insight, I have constructed a specific proposal for a foolproof way to escape from a liquidity trap.² Although this proposal was directed initially to the Bank of Japan (BOJ) and the Ministry of Finance of Japan (MOF) — because the MOF is formally in charge of exchange rate policy in Japan — the foolproof way provides a method for any sufficiently open economy to escape from a liquidity trap, if it so desires.³

The idea is to announce and implement 1) an upward-sloping target path for the price level; 2) a depreciation and a temporary peg of the currency; and 3) the future abandonment of the peg in favor of inflation targeting when the price-level target path has been reached. The price-level target path provides the best nominal anchor and insurance against run-away inflation. It also provides an exit strategy for the temporary peg. The target path begins somewhere above the current price level; that difference is the "price gap." In Japan, several years of zero or negative inflation (that is, deflation) have resulted in a price level below previous expectations, increasing the real value of debt and contributing to deteriorating balance sheets for firms and banks. For Japan, the price gap may be 10-20 percent or more. The upward slope corresponds to a small positive long-run inflation target, say, 2 percent/year.

How to achieve this price-level target? This is the role of the depreciation and the temporary peg of the currency. Both are technically feasible. If the peg would fail, then the currency would appreciate back to where it was, making it a good investment. Initially, before the peg's credibility has been established, there will therefore be excess demand for the currency. This is fulfilled easily, though, because the central bank can print unlimited

amounts of the currency and sell them for foreign exchange. Indeed, there is a big difference between defending a fixed exchange rate for a strong currency under appreciation pressure (when foreign exchange reserves rise) and for a weak currency under depreciation pressure (when foreign exchange reserves fall). Thus, the peg can be maintained, and after a day or perhaps a few days, the peg's credibility will have been established.

Further, in order to be effective, the initial depreciation of the currency needs to be so large that it results in a real depreciation relative to any conceivable long-run equilibrium real exchange rate. For Japan, this may require a peg at 140 or 150 yen to the dollar, or even more. Then the future will inevitably bring a real appreciation. Thus, the market and the general public must expect a real appreciation in the future. But with an exchange rate peg, the real appreciation can only occur with a rise in the domestic price level. Hence, by pure logic, once the credibility of the exchange rate peg has been established, the market and the general public must expect future inflation in the country. In that way, gloomy deflation expectations will be replaced by optimistic inflation expectations.

Next, the expected future real appreciation of the currency will induce a desirable fall in the long real interest rate. Indeed, equilibrium on the international capital market requires that the expected real return on investment in the country and the rest of the world (including expected real exchange rate movements) move approximately parallel. This fall in the long real rate in the country also can be seen as the result of the increased inflation expectations noted earlier.

All this will jump-start the economy and increase output and the price level. First, the real depreciation will

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stimulate export and import-competing sectors. Second, the lower long real interest rate will stimulate domestic consumption and investment. Aggregate demand and output will rise. Third, the real depreciation, the increased aggregate demand, and the increased inflation expectations will all contribute to inflation and an increasing price level. The price level will approach the price-level target path from below. When the price-level target has been reached, the peg is abandoned and the currency floated. By adopting explicit inflation targeting, the central bank can then pursue a policy consistent with the initial price-level target path.

Japan has the option to follow this foolproof way unilaterally, without cooperation from countries in the region or the United States. The objections to a real depreciation of the yen that have been voiced by other countries in the region and by some U.S. officials appear to be mistaken. Any expansion in Japan requires a lower real interest rate, and a real depreciation is the unavoidable mirror image of a lower real interest rate. A real depreciation means that Japanese exporters get a short-term competitive edge, but growth in Japan and increased aggregate demand will increase Japan's imports from the rest of the world. Importantly, a real depreciation has both a substitution and an income effect on the trade balance. These effects are of opposite signs. While the real depreciation will tend to increase Japan's trade surplus, the income effect — caused by increased output, employment, and income in Japan — will tend to reduce the trade surplus, because of Japan's increased imports. Therefore, the net effect on the trade balance is probably quite small. The foolproof way is therefore not a beggar-thy-neighbor policy, except possibly in the very short run. In the medium and long run, the region, the United States, and the world will by all likelihood gain substantially from an expansion in Japan. In particular, if the rest of the world is sluggish, Japan is arguably needed even more as an engine of growth and trade.

Other proposals for recovery of Japan have focused on introducing inflation targeting and/or depreciating

the yen by foreign-exchange interventions.⁴ The foolproof way is fully consistent with these proposals, but it provides better benchmarks, in the form of a peg for the yen, a price-level target path, and an exit strategy for the peg. The peg also provides an arena where the BOJ and the MOF can quickly demonstrate their resolve to end stagnation and deflation and thereby gain credibility.

Needless to say, the foolproof way is not a substitute but rather a complement to the structural reforms and cleanup of the financial sector in Japan that many observers have recommended. Arguably, such reforms are easier to undertake in a growing rather than a stagnating economy. The foolproof way implies that the BOJ and the MOF, if they so desire, can liberate Japan from its liquidity trap and replace stagnation and deflation by growth and low inflation. The foolproof way can jump-start Japan out of recession/depression and deflation. The foolproof way can help any sufficiently open economy to escape from a liquidity trap. It belongs among the contingency plans that prudent central banks may want to prepare for the worst-case scenario of falling into a liquidity trap and risking a spiral of deflation and depression.

Monetary Policy Rules for Inflation Targeting: Targeting Rules Rather than Instrument Rules

Much recent work on monetary policy rules, for example in a conference volume edited by John Taylor,⁵ focuses on a rather narrow interpretation of a monetary policy rule — an “instrument rule” — which expresses the central bank's instrument rate as a function of economic variables observed by the central bank. Knut Wicksell, Dale Henderson and Warwick McKibbin, Allan Meltzer, and Bennett McCallum have all suggested various instrument rules (the latter two for the monetary base rather than the instrument rate), but the best known and most studied instrument rule is the “Taylor rule” created by Taylor him-

self, where the instrument rate is a linear function of the gap between inflation and an inflation target and the gap between actual output and potential output, or the output gap. In the theoretical and empirical work on monetary policy, central banks are very often modeled as mechanically following a Taylor rule.

However, no central bank has committed itself to an instrument rule such as the Taylor rule. Instead, central banks have developed elaborate procedures for decisionmaking whereby huge amounts of data are collected, processed, and analyzed. Because of the lags in the effects of monetary-policy actions on inflation and output, the decision procedures in the more advanced central banks focus on projections of future inflation and output gaps. The instrument rate is set so that these projections are consistent with the banks' objectives, or what can be called “forecast targeting.” This means that all information that is relevant for the projections, including substantial amounts of judgment, ends up affecting the instrument setting, rather than just information on current inflation and the output gap. Subsamples for the Federal Reserve System's periods during which a Taylor-type rule fits best still leave at least one third of the variance of interest-rate changes unexplained.⁶ Indeed, any realistic model of the economy requires more variables than just inflation and the output gap to describe the state of the economy, making Taylor-type rules less than optimal. Furthermore, any simple rule mentioned by central banks seems to refer to conditions for the target variables, such as inflation and the output gap, rather than to a formula for the instrument rates. Thus, the Bank of England and the Swedish Riksbank have referred to a rule that “inflation projections about two years ahead should approximately equal the inflation target.”

One view, promoted by Taylor, is that simple instrument rules, such as the Taylor rule, should not be followed mechanically but rather be used as a “guideline,” from which deviations may occur because of some “specific factor.”⁷ I find this view too vague to be operational, since it does not pro-

vide any precise criterion for when deviations from the simple rule are motivated and when they are not.

Thus, there appears to be a substantial gap between the research on instrument rules and the practice of monetary policy. In a series of papers, including one I coauthored with Glenn Rudebusch and another coauthored with Michael Woodford, I discuss and propose a way to bridge that gap.⁸ I have argued that, both from a descriptive and a prescriptive perspective, in order to be useful for discussing real-world monetary policy the concept of monetary-policy rules has to be broadened and defined as “a prescribed guide for monetary-policy conduct,” thus including “targeting rules” as well as “instrument rules.”⁹

A “general” targeting rule specifies the objectives to be achieved, for instance by listing the target variables, the targets (target levels) for those variables, and the (explicit or implicit) loss function to be minimized. A “specific” targeting rule specifies conditions for the target variables (or forecasts of the target variables) — the rule of thumb of the Bank of England and the Riksbank are examples. Specifying monetary policy in terms of targeting rules has a number of advantages. It allows for using all relevant information, in particular, for allowing the use of judgment; is more robust to both disturbances and model variation than instrument rules; and likely leads to better monetary-policy outcomes than instrument rules. Presumably, these advantages provide one explanation for why real-world monetary policy and monetary-policy reform have shunned commitment to instrument rules.

Monetary policy by the world’s more advanced central banks these days is at least as optimizing and forward-looking as the behavior of the most rational private agents. I therefore find it strange that a large part of the literature on monetary policy still prefers to represent central-bank behavior with the help of mechanical instrument rules. The concept of general and specific targeting rules is designed instead to provide a discussion of monetary policy that is fully consistent with the optimizing and forward-looking nature of modern mon-

etary policy. From this point of view, general targeting rules essentially specify operational objectives for monetary policy and specific targeting rules essentially specify operational optimal first-order conditions for monetary policy, in the same way that rational private agents these days are modeled in terms of optimal first-order conditions. In particular, an optimal targeting rule expresses the equality of the marginal rates of transformation and the marginal rates of substitution between the target variables in an operational way.

Transparency of Monetary Policy

In two papers with Jon Faust, I examine the role of transparency in monetary policy and the endogenous choice of transparency by central banks.¹⁰ Increased transparency makes the central bank’s reputation and credibility with the private sector more sensitive to its actions. This moderates the bank’s policy, and induces the bank to follow a policy closer to the socially optimal one. Full transparency of the central bank’s intentions is generally socially beneficial, but frequently not in the interest of the bank. When central banks can choose both the degree of control in monetary policy and the degree of transparency, a maximum feasible degree of control with a minimum degree of transparency is a possible outcome, we find. The Deutsche Bundesbank and the Federal Reserve System are, arguably, examples of this. One interpretation of these results is that society is better if it, rather than the central bank, decides on the level of transparency in monetary policy.

Monetary Policy under Uncertainty

In three papers with Michael Woodford, I have explored optimal monetary policy under the very realistic case of uncertainty about the state of the economy using models with forward-looking variables, such as asset prices.¹¹ We find a simple way to show that the classic so-called *certainty-equivalence* theorem in a linear model with

standard quadratic monetary-policy objectives also holds when there are forward-looking variables. This implies that the optimal monetary-policy response to the optimal estimate of the current uncertain state of the economy is the same as if that estimate were certain. Hence, the optimal response to the *optimal estimate* of the state of the economy is *independent* of the degree of uncertainty of the estimate. We also derive the optimal weights on observable indicators in estimating the underlying state of the economy. These weights depend on — and are generally decreasing in — the degree of uncertainty. Hence, the monetary-policy response to the *indicators* is *dependent* on the degree of uncertainty.

Under the assumption of symmetric information between the central bank and the private sector, we can demonstrate a *separation principle* according to which the optimal estimation of the underlying state of the economy is independent of the monetary policy pursued. Under asymmetric information, the separation principle does not hold, but we can still derive the conditions defining the optimal estimation procedure.

These findings have substantial implications for practical monetary policy. They imply that monetary policy best fulfills its objectives if it focuses on mean (that is, probability-weighted average) forecasts, even if these forecasts are highly uncertain. For instance, they imply that central banks best fulfill their objectives if they construct their best estimates of potential output and the output gap and respond to these estimates with the same force as if they were not uncertain. In particular, these findings run counter to the idea that central banks should more or less disregard uncertain estimates of the output gap.¹²

Eurosystem Monetary Policy Strategy and Monetary Targeting

The Eurosystem, consisting of the European Central Bank (ECB) and the twelve national central banks in the euro area, has chosen a heavily criticized “two pillar” monetary-policy

strategy with considerable emphasis on a money-growth indicator (consisting of the gap between M3 growth and a reference value, currently 4.5 percent/year). In two papers, I scrutinize the choice of strategy and conduct of monetary policy in the euro area.¹³ The emphasis on monetary indicators in general and the money-growth indicator in particular lacks both theoretical and empirical basis and the monetary-policy strategy appears less well designed and transparent than that of inflation-targeting central banks.¹⁴

In three papers, one coauthored with Glenn Rudebusch and another with Stefan Gerlach, I further explore the theoretical and empirical case for monetary targeting and monetary indicators.¹⁵ First, using an empirical model of the United States, Rudebusch and I show that monetary targeting would be a most inferior policy in the United States, resulting in much higher variability of both inflation and the output gap than does flexible inflation targeting. Since there are some economic similarities between the United States and the euro area — for instance, the size and the degree of openness — these results probably have some bearing on the euro area. Second, I show that the so-called P* model of inflation — emphasized by the Bundesbank and the ECB and often interpreted as supporting monetary targeting — in no way supports monetary targeting above inflation targeting, even if the model were completely right, counter to previous views. One reason is that the P* model puts emphasis on the *real money gap*, the gap between real money balances and long-run equilibrium real balances, as an indicator of future inflation rather than the Eurosystem's *nominal money-growth gap*. Third, Stefan Gerlach and I show that, even though the real money gap has predictive power for future inflation in euro area data, it does not perform better than the more conventional predictor, the output gap. The Eurosystem's money-growth gap is a much worse predictor of future inflation than either the real money gap or the output gap.

The findings in these papers are completely consistent with the fact that central banks other than the Eurosystem — including the Federal

Reserve System, the former monetary targeter Swiss National Bank, and inflation-targeting central banks — have reduced the emphasis on monetary indicators and/or abandoned monetary targeting.

¹ My research through the fall of 1997 was surveyed in "Monetary Policy and Inflation Targeting," NBER Reporter, Winter 1997/8, pp. 5-8.

² L. E. O. Svensson, "The Zero Bound in an Open-Economy: A Foolproof Way of Escaping from a Liquidity Trap," NBER Working Paper No. 7957, October 2000, and in Monetary and Economic Studies, Bank of Japan, 19 (S-1) (2001), pp. 277-312; "How Japan Can Recover," Financial Times, (Sept. 25, 2001); "Monetary Policy and Real Stabilization," in Rethinking Stabilization Policy, A Symposium Sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, Sept. 29-31, 2002, forthcoming.

³ See: www.princeton.edu/~svensson/japan/japan.htm for more details on Japan and the foolproof way.

⁴ B. S. Bernanke, "Japanese Monetary Policy: A Case of Self-Induced Paralysis?" in A. S. Posen and R. Mikitani, eds., Japan's Financial Crisis and Its Parallels to US Experience, Special Report 13, Institute for International Economics, Washington, DC, 2000, pp. 149-66; P. R. Krugman, "It's Baaack! Japan's Slump and the Return of the Liquidity Trap," Brookings Papers on Economic Activity, 2 (1998), pp. 137-187; A. S. Posen, Restoring Japan's Economic Growth, Institute for International Economics, Washington, DC, 1998; A. H. Meltzer, "Commentary: What More Can the Bank of Japan Do?" Monetary and Economic Studies, Bank of Japan, 17 (3) (1999), pp. 189-191; B. T. McCallum, "Theoretical Analysis Regarding a Zero Lower Bound on Nominal Interest Rates," Journal of Money Credit and Banking, 32 (2000), pp. 870-904.

⁵ J. B. Taylor, ed., Monetary Policy Rules, Chicago: University of Chicago Press, 1999.

⁶ See, for instance, J. P. Judd, and G. D. Rudebusch, "Taylor's Rule and the Fed: 1970-1997," Federal Reserve Bank of San Francisco Economic Review, (3) (1998), pp. 3-16.

⁷ J. B. Taylor, "Using Monetary Policy in Emerging Market Economies," in Stabilization and Monetary Policy: The

International Experience, Bank of Mexico, (2000), pp. 441-457.

⁸ L. E. O. Svensson, "Inflation Forecast Targeting: Implementing and Monitoring Inflation Targets," NBER Working Paper No. 5797, October 1997, and in European Economic Review, 41 (1997), pp. 1111-46; "Inflation Targeting as a Monetary Policy Rule," NBER Working Paper No. 6790, November 1998, and in Journal of Monetary Economics, 43 (1999), pp. 607-654; "What Is Wrong with Taylor Rules? Using Judgment in Monetary Policy through Targeting Rules," Journal of Economic Literature, forthcoming; "Requiem for Forecast-Based Instrument Rules," Princeton University working paper, 2001; G. D. Rudebusch, and L. E. Svensson "Policy Rules for Inflation Targeting," NBER Working Paper No. 6512, April 1998, and in J. B. Taylor, ed., Monetary Policy Rules; L. E. O. Svensson and M. Woodford, "Implementing Optimal Policy through Inflation-Forecast Targeting," forthcoming in an NBER Conference Volume.

⁹ C. A. Sims, "Macroeconomics and Reality," Econometrica, 48 (1980), pp. 1-48, and K. S. Rogoff, "The Optimal Degree of Commitment to an Intermediate Monetary Target," Quarterly Journal of Economics, 100 (1985), pp. 1169-90, provide early discussions of targeting rules.

¹⁰ J. Faust and L. E. O. Svensson, "Transparency and Credibility: Monetary Policy with Unobservable Goals," NBER Working Paper No. 6452, March 1998, and in International Economic Review, 42 (2001), pp. 369-97; "The Equilibrium Degree of Transparency and Control in Monetary Policy," NBER Working Paper No. 7152, June 1999, and in Journal of Money, Credit and Banking, 34 (2002), pp. 520-39.

¹¹ L. E. O. Svensson and M. Woodford, "Indicator Variables for Optimal Policy," NBER Working Paper No. 7953, October 2000, and in Journal of Monetary Economics, forthcoming; "Optimal Policy with Partial Information in a Forward-Looking Model: Certainty-Equivalence Redux," Princeton University working paper, 2002; "Indicator Variables for Optimal Policy under Asymmetric Information," NBER Working Paper No. 8255, April 2001, and in Journal of Economic Dynamics and Control, forthcoming.

¹² A. Orphanides, "The Quest for Prosperity without Inflation," Working Paper No. 15,

European Central Bank, 2000.

¹³ L. E. O. Svensson, "Monetary Policy Issues for the Eurosystem," NBER Working Paper No. 7177, June 1999, and in Carnegie-Rochester Conferences Series on Public Policy, 51-1 (1999), pp. 79-136; "The First Year of the Eurosystem: Inflation Targeting or Not?" NBER Working Paper No. 7598, August 2000, and in American Economic Review: Papers and Proceedings, 90 (May

2000), pp. 95-9.

¹⁴ I have been invited to submit regular Briefing Papers for the Committee on Economic and Monetary Affairs (ECON) of the European Parliament for its hearings with ECB officials. These are available on www.princeton.edu/~svensson.

¹⁵ L. E. O. Svensson, "Does the P* Model Provide Any Rationale for Monetary Targeting?" NBER Working Paper No. 7178, June 2000, and in German

Economic Review, 1 (February 2000), pp. 69-81; S. Gerlach, and L. E. O. Svensson, "Money and Inflation in the Euro Area: A Case for Monetary Indicators?" NBER Working Paper No. 8025, December 2000; G. D. Rudebusch, and L. E. O. Svensson, "Eurosystem Monetary Targeting: Lessons from U.S. Data," NBER Working Paper No. 7179, June 1999, and in European Economic Review, 46 (2002), pp. 417-42.

Technology and Inequality

Daron Acemoglu*

Many OECD economies have experienced sharp increases in wage and income inequality over the past several decades. In the United States, for example, the college premium — the wages of college graduates relative to the wages of high school graduates — increased by over 25 percent between 1979 and 1995. Overall earnings inequality also soared: in 1971, a worker at the 90th percentile of the wage distribution earned 266 percent more than a worker at the 10th percentile. By 1995 this number had risen to 366 percent.¹ Are new technologies — in particular, computers, computer-assisted machines and robotics, and advances in communication technology — responsible for these changes? More generally, what are the implications of technical change for the labor market?

Some economists now believe that, although other factors including the decline in the real value of the minimum wage, de-unionization, and globalization have played some role, the major driving force behind the changes in the U.S. wage structure is technology. This consensus is built on

the notion of technology-skill complementarity: technical change favors more skilled (educated) workers, replaces tasks previously performed by the unskilled, and increases the demand for skills. Consequently, many commentators see a direct causal relationship between technological changes and these radical shifts in the distribution of wages taking place in the U.S. economy.²

Although the consensus is now broad, the idea that technological advances favor more skilled workers is a 20th-century phenomenon. In 19th-century Britain, skilled artisans destroyed weaving, spinning, and threshing machines during the Luddite and Captain Swing riots, in the belief that the new machines would make their skills redundant. They were right: the artisan shop was replaced by the factory and later by interchangeable parts and the assembly line. Products previously manufactured by skilled artisans came to be produced in factories by workers with relatively few skills, and many previously complex tasks were simplified, reducing the demand for skilled workers.

A major 19th-century technological advance, interchangeable parts, in fact was designed to be "skill-replacing" (un-skill-biased). Eli Whitney, a pioneer of interchangeable parts, described the objective of this technology as: "to

substitute correct and effective operations of machinery for the skill of the artist which is acquired only by long practice and experience; a species of skill which is not possessed in this country to any considerable extent."³

There are also no compelling theoretical reasons to expect technological change always and everywhere to be skill-biased. On the contrary, if replacing skilled workers is more profitable, new technologies may attempt to replace skilled workers, just as interchangeable parts did. Even the most purportedly skill-biased technological advance, the microchip, can be used in scanners to complement unskilled work just as effectively as in personal computers to complement skilled workers.

Recent research takes these issues into consideration and analyzes the origins of skill bias and the conditions under which new technologies would be more or less skill biased. In this article, I survey some of this recent research, and how it might shed light on the recent increase in inequality. I also briefly discuss the links between technology and trade, technology and changes in the organization of production, the interaction between technical change and labor market institutions, and potential reasons for cross-country differences in inequality trends.

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