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Abenomics: Preliminary Analysis and Outlook

ABSTRACT In early 2013, Japan enacted a monetary regime change. The Bank of Japan set a 2 percent inflation target and specified concrete actions to achieve this goal by 2015. In 2013, Shinzo Abe’s government supported this change with fiscal policy and planned structural reforms. Together with the Bank of Japan’s aggressive monetary easing, this policy package is known as “Abenomics.” We show that Abenomics ended deflation in 2013 and raised long-run inflation expectations. Our estimates suggest that Abenomics also raised 2013 output growth by 0.9 to 1.8 percentage points. Monetary policy alone accounted for up to a percentage point of growth, largely through positive effects on consumption. In both the medium and the long run, Abenomics will likely continue to be stimulative. However, the size of this effect, while highly uncertain, thus far appears likely to fall short of Japan’s large output gap. In part this is because the Bank of Japan’s 2 percent inflation target is not yet fully credible. We conclude by outlining a way to interpret future data releases in light of our results.

A great monetary experiment is taking place in Japan today. In early 2013, the Bank of Japan announced a monetary policy regime change. Along with this monetary expansion, the government is enacting complementary fiscal policy and structural reforms. The hope is to end two decades of stagnation and deflation. In this paper, we provide a preliminary evaluation of these policies.

That Japan needs some new policies is clear. The Japanese economy has stagnated since 1992. Between 1993 and 2012, real GDP growth averaged

just 0.8 percent.¹ Prices have fallen most years since 1998. Economists have blamed Japanese policymakers for an insufficiently aggressive response to these trends.² But they do so no longer. Shinzo Abe became prime minister on December 26, 2012. A member of the Liberal Democratic Party, Abe campaigned on a platform of radical action to end economic stagnation. His economic program (dubbed “Abenomics”) consists of monetary expansion, fiscal stimulus, and structural reforms. In a reference to a Japanese legend, these three components are referred to as the “three arrows” (Eichengreen 2013).

The first arrow is a monetary policy regime change. Beginning in November 2012, then-candidate Abe argued that the Bank of Japan should increase its inflation target and engage in “unlimited easing.” After his election on December 16, Abe threatened to revise the law granting the Bank of Japan independence if it did not agree to a higher inflation target.³ The Bank of Japan acceded to Abe’s demand, announcing a 2 percent inflation target at its meeting on January 22, 2013. While hardly extreme, 2 percent inflation would be the highest year-on-year inflation rate in Japan since 1991. In what we show was a more significant announcement, on April 4, 2013, the new Bank of Japan governor, Haruhiko Kuroda, promised to reach this target in two years through open-ended asset purchases and a doubling of the monetary base (Bank of Japan 2013b).

The second arrow is fiscal policy. In February 2013, the Diet passed a 2 percent of GDP “supplementary budget” (Ito 2013), although the actual stimulus being carried out is much smaller than this headline number suggests.⁴ Our preferred measure of stimulus size compares the cyclically adjusted primary budget balance forecast by the IMF before Abe’s fiscal measures were announced with that forecast in late 2013. Doing so suggests

1. Online appendix C describes our data sources. Note that throughout the paper we use the latest data published as of April 1, 2014. Thus, for instance, GDP data are from the March 2014 release. (Online appendixes for all papers in this volume may be found at the *Brookings Papers* webpage, www.brookings.edu/bpea, under “Past Editions.”)

2. See Bernanke (2000) and Ito and Mishkin (2006) among many others.

3. On “unlimited easing,” see “LDP Leader Abe: BOJ Must Ease until Inflation Hits 3 Percent” (*Reuters*, November 7, 2012) and “Abe Calls for ‘Unlimited Easing’ from BOJ” (*Financial Times*, November 15, 2012); on Abe’s threat, see “Japan’s Abe Heaps Pressure on BOJ to Set 2 Percent Inflation Target” (*Reuters*, December 22, 2012).

4. Throughout the 1990s, actual fiscal stimulus also usually fell short of headline numbers (Posen, 1998).

that the actual stimulus in 2013 was one percent of GDP.⁵ This stimulus has been dwarfed by tax increases. Consumption taxes rose from 5 to 8 percent in April 2014, and they will rise by an additional 2 percentage points in October 2015 (Ito, 2013). Thus, the IMF projects that the cyclically adjusted primary budget deficit will fall from 8.5 percent of potential GDP in 2013 to 6.0 percent in 2014 and then to 4.8 percent in 2015. Since the consumption tax was passed long before Abe took office—it passed the lower house of the Diet on June 26, 2012—we treat it as separate from Abenomics. Unless otherwise noted, the effects of Abenomics that we report do not include the contractionary effects of the consumption tax increase. But our estimates suggest that the negative effects of the consumption tax increases are insufficiently large to change our qualitative conclusions.

The third arrow consists of structural reforms to increase Japan's potential GDP growth. To date, the proposed reforms are mostly vague, but they include relaxations of labor market rigidities, less protection for farmers, and utility deregulation.⁶ These reforms may be made more credible by the Japanese government's part in the Trans-Pacific Partnership, which suggests a willingness to take on special interests.⁷

For substantive and pragmatic reasons, we focus primarily on the first arrow of Abenomics, the monetary policy regime change. Monetary policy is Abenomics' most clearly defined element, and it is also its newest and most radical element. Abe's government is not the first in Japan to try fiscal stimulus or fiscal consolidation,⁸ nor is it the first to push for structural reforms.⁹

By contrast, the Bank of Japan's current policies are a clear break from previous attempts at unconventional monetary policy. Japan's monetary policy is also likely to be the element of Abenomics of most interest to other

5. Abe's fiscal expansion was originally conceived of as a one-time program, but in October 2013 the Abe government announced another one percent of GDP supplementary budget to offset adverse effects from medium-run fiscal consolidation. (See "Abenomics One Year On" [*Financial Times*, October 27, 2013] and "Japan's Abenomics: Time to Take Stock" [iMFdirect, October 21, 2013].) As with the previous expansionary measures, we suspect that the headline number is an overestimate of the actual spending that will occur.

6. "Once More with Feeling," *Economist*, May 18, 2013.

7. See Deardorff (2013) and "Abe Should Aim His Third Arrow at Japan's Farmers," *Financial Times*, June 12, 2013.

8. Posen (1998) and Kuttner and Posen (2001) analyze Japanese fiscal policy in the 1990s.

9. Hoshi and Kashyap (2011) discuss reforms made under the Koizumi administration.

countries. There are many recent examples of fiscal stimulus programs and attempts at structural reform, but monetary policy regime changes are less common and less well understood.

We begin our analysis in section I by considering Japan's recent macro history and the size of its current output gap. For monetary policy to be an effective stimulus, there must be substantial unused resources in the economy. Using three different approaches, we find that the current output gap is quite large, in the range of 4.5 to 10 percent. Thus it can at least be hoped that demand-side policies will have large effects.

In section II, we consider Abenomics' effects in 2013. We start by examining the financial market response. Over the year, the yen fell 21 percent against the dollar, and the Nikkei 225 stock market index rose 57 percent. Measured by inflation swaps and surveys of professional forecasters, long-run inflation expectations in early 2014 were between 1.0 and 1.4 percent. Combined with a small decline in nominal interest rates, this means 10-year real interest rates have fallen by roughly a percentage point. Actual inflation also responded as hoped. The 12-month change in the CPI rose from negative 0.1 percent in December 2012 to positive 1.6 percent in December 2013. Much of this increase was driven by the effects of the weaker yen on imported energy and food prices, but even the CPI excluding food and energy rose over the year.

Growth was also decent. Measured year-over-year, 2013 output growth was 1.5 percent, which was 0.9 percentage points better than professional forecasters had expected in December 2012, before Abe took office. Statistical (VAR) forecast counterfactuals imply that Abenomics might have had even larger effects on 2013 growth, on the order of 1.1 to 1.8 percentage points.

That Abenomics contributed to a good year in 2013 is clear. Less clear is how much of that growth was driven by expansionary monetary policy, as opposed to one-off fiscal stimulus. A clue comes from the behavior of consumption. As we discuss in section II.F, both the time path and composition of consumption strongly suggest that expansionary monetary policy accounts for a significant part of 2013 consumption growth, perhaps contributing as much as a percentage point to overall GDP growth.

In both the medium and the long run, Abenomics—and Japan's new monetary policy in particular—is likely to continue to pass a cost-benefit test. The costs are likely to be small: the long-run inflation target is moderate, and by paying interest on reserves the Bank of Japan would be able to contain future inflation even with its expanded balance sheet. Further, so long as the current cooperation with the government is maintained, any losses on the

Bank of Japan's portfolio are unlikely to restrict its future policy choices.¹⁰ By contrast, the benefits both to output and to the government budget are potentially large. But, as of yet, it appears unlikely that Abenomics will fully close the output gap.

In section III, we look to four sources of evidence on the future effects of Abenomics: (i) forecasts from professional forecasters; (ii) the stock market; (iii) the analogy to the United States in 1933; and (iv) new and old Keynesian models. Professional forecasts suggest that Abenomics has raised both the level and the growth rate of GDP. But the forecast gains are modest relative to the output gap. Excluding negative effects from the consumption tax increase, by 2022 GDP is forecast to be 3.1 percent above the without-Abenomics baseline.¹¹ Our reliance here on forecasts, as in our discussion of Abenomics' 2013 effects, may make some readers uneasy. Professional forecasters have no particular knowledge of the effects of a monetary regime change, and both professional and statistical forecasts come with large standard errors. We therefore consider a range of other evidence to determine if we should discount these forecasts. For instance, the stock market's 2013 boom might seem to forecast larger gains. But a Campbell-Shiller decomposition shows that historically, the stock market has been a poor predictor of dividend growth and thus is likely to be an even worse predictor of GDP growth. Also initially suggesting optimism is the success of Franklin Roosevelt's monetary regime change in the spring of 1933, which is often pointed to as an example of the large potential effects of a monetary regime shift. So far, however, the effects of Abenomics have been an order of magnitude smaller.

Finally, a natural approach is to combine a financial market measure of the real interest rate change with a model-based estimate of the effect of the real interest rate on output. Using a conventionally calibrated new Keynesian model, this approach suggests that by now (April 2014) Japan's output ought to have risen 5 to 10 percent. Again, though, this prediction is at odds with Japan's more modest experience in 2013. Overall, we read the evidence from the stock market, from history, and from Keynesian models

10. See Hall and Reis (2013) for a discussion of these central bank solvency concerns. As discussed in section III.F, this issue suggests that implementing Abenomics could be difficult in countries where there is less cooperation between the government and the central bank.

11. Taking account of the consumption tax increase would not qualitatively change this conclusion. In section III.E, we show that forecast revisions imply that the consumption tax will subtract 0.5 percentage point from growth in 2014 and just 0.1 percentage point from growth in 2015.

as insufficiently convincing to discount the more moderate effects implied by professional forecasts.

An important caveat to all of our analysis in this paper is that we treat Abenomics *as is*. That is, we take as given the effect of Abe's policies on expected inflation and expected future output. This means we are analyzing a policy that has a stated goal of 2 percent inflation but has not yet convinced the public that the goal will be achieved. Market- and survey-based inflation forecasts suggest that the 2 percent inflation target is not (yet) credible, presumably because there is some probability that Abe or the Bank of Japan will change course. Therefore, we are measuring the effects of a 2 percent inflation target multiplied by the probability that the target is achieved. We argue in section IV that the Bank of Japan's credibility problems are likely a product of its past actions and the interaction of Japan's demographics and non-inflation-indexed pensions.

The Bank of Japan's current lack of credibility means that if it does succeed in raising inflation expectations to 2 percent, output effects are likely to be larger than current indicators suggest. Holding nominal rates fixed, full credibility would lead to another 0.7-percentage-point decline in the real interest rate. We would therefore expect another short-run boost to GDP commensurate with our estimate of the monetary policy contribution to 2013 GDP growth. In the medium run, the gains are likely to be even larger. But with current data it is difficult to produce an estimate of this effect. For instance, long-run forecast revisions do not allow us to distinguish monetary effects from structural reform expectations. Despite this, in section V we offer a brief road map for interpreting future data releases and forecast revisions. We provide guidance to help distinguish between the effects of the monetary and structural reform channels going forward.

I. A Brief History

I.A. The Broad Context

In the 1980s, Japan's economy was the envy of other nations. GDP had been growing rapidly for decades, the stock and property markets were booming, and Japanese production techniques were widely regarded as superior.¹² This all changed in the 1990s. From December 1989 to August 1992, the Nikkei 225 fell almost 60 percent. Land prices in six large Japanese cities fell by 50 percent from 1991 to 1996 and continued to decline

12. For background on the Japanese economy before 1990, see Ito (1992).

Table 1. Macro Summary Statistics, Japan and United States, 1974–2012^a

<i>Period</i>	<i>Real GDP growth (percent change)</i>		<i>Unemployment rate</i>	<i>CPI inflation</i>	<i>Money market interest rate</i>	
	1974–1992 average	4.0	2.3		4.8	6.8
1993–2007 average	1.1	4.1		0.1	0.6	
2008–12 average	–0.2	4.6		–0.2	0.2	

<i>Period</i>	<i>Real GDP growth per person (ages 15–64)</i>		<i>Multifactor productivity (percent change)</i>		<i>Employment/population (ages 15–64)</i>	
	<i>Japan</i>	<i>U.S.</i>	<i>Japan</i>	<i>U.S.</i>	<i>Japan</i>	<i>U.S.</i>
1974–1992 average	3.1	1.5	—	—	67.4	68.1
1993–2007 average	1.4	1.9	0.9	1.2	69.3	72.5
2008–12 average	0.4	0.2	0.3 ^b	0.8 ^b	70.8	67.8

Source: See online appendix C.

a. All figures are percentages except where indicated otherwise.

b. 2008–11 average.

thereafter. The fallout from the bursting of these asset bubbles dragged down the economy. Economists have often criticized the Bank of Japan for not responding more quickly to these asset price declines and the resulting economic slowdown. By 1996, the Bank of Japan found itself effectively stuck at the zero lower bound on nominal interest rates. Thus the Japanese experience in the 1990s bears remarkable similarities to the period since 2008 in the United States and Europe. The upper panel of table 1 summarizes this story.¹³

After growing rapidly until 1991, annual Japanese real GDP growth slowed to roughly one percent. Inflation fell to near zero, with prices falling most years after 1998. Nominal interest rates fell more than inflation. To U.S. observers, the Japanese unemployment rate remained puzzlingly low. Its peak during the 2008–09 recession was 5.5 percent. But this reflects particular Japanese labor market institutions. Many Japanese workers have de facto lifetime tenure in their jobs (Kato 2001). Thus when output falls, they remain employed.

Japan's economy was hard hit by the 2008 recession. From its peak in the first quarter of 2008 to its trough in the first quarter of 2009, output

13. This table is a deliberate updating of Krugman (1998), table 4.

fell 9.2 percent. Since then, recovery has been incomplete. GDP in the last quarter of 2013 was still below that in the first quarter of 2008. In part this is because a nascent recovery in 2010 was reversed in 2011: GDP growth swung from +4.7 percent in 2010 to -0.5 percent in 2011. A major culprit was the devastating March 11, 2011, Tohoku earthquake and tsunami. This disaster killed almost 20,000 people and destroyed 275,000 homes (Schnell and Weinstein 2012).

Poor headline GDP numbers also reflect Japan's low birth rate. The Japanese National Institute of Population and Social Security Research projects that the Japanese population peaked in 2010 and has since begun declining.¹⁴ As a result, GDP per capita growth now exceeds GDP growth. Furthermore, as Japan's population has aged, the growth rate of the working age population has generally been below that of the population as a whole. The number of people ages 15 to 64 peaked in 1995 at 87 million; by 2010 their number was only 81 million. Given these demographic trends, it is unreasonable to expect Japanese GDP growth to match that in countries with growing populations, like the United States.

A crude way to correct for the growth consequences of Japan's demographics is to measure the growth of GDP per person ages 15 to 64. Columns 1 and 2 of the lower panel in table 1 do this for Japan and the United States since 1974. With this adjustment, the Japanese growth slowdown is less pronounced. And the Japanese economy's performance relative to the United States' is better than some popular accounts would suggest. This is not to say that Japan did well. From 1992 to 2007, GDP per working-age person grew 0.5 percentage points more slowly in Japan than in the United States. A comparison of multifactor productivity has similar implications: from 1992 to 2007 multifactor productivity grew 0.3 percentage points more slowly in Japan. Thus, as of 2012, Japan's PPP-adjusted real GDP per person ages 15 to 64 was only 71 percent of that in the United States. Columns 5 and 6 of the lower panel in table 1 show that the employment-to-population ratio for people ages 15 to 64 was lower in Japan than in the United States before the 2008 recession. But during the recession, this ratio fell sharply in the United States while remaining fairly stable in Japan. As of 2012, therefore, a greater proportion of the working age population was employed in Japan.

Slow growth, an enormous natural disaster, and a shrinking population are not the only headwinds facing the Japanese economy. Japan also has a

14. See "Population Statistics of Japan 2012" on the institute's website at <http://www.ipss.go.jp/p-info/e/psj2012/PSJ2012.asp>.

large sovereign debt burden. The gross debt-to-GDP ratio rose from 66 percent in 1991 to 244 percent today. Net debt in 2013 was only somewhat less staggering, at 140 percent of GDP. This debt burden has thus far coexisted with extraordinarily low nominal and real interest rates. As of March 31, 2014, the nominal interest rate on 10-year Japanese government bonds was 0.6 percent, while expected 10-year inflation (from inflation swaps) was 1.3 percent. Yet some economists, such as Takeo Hoshi and Takatoshi Ito (2012) fear that Japan is close to the point at which investors will no longer tolerate an increasing debt-to-GDP ratio. This debt burden adds to the sense of many that the past 20 years were two “lost decades.”

1.B. The Output Gap

Japan’s two-decade stagnation was likely a product of both demand- and supply-side problems. A clear separation is difficult. Financial sector problems, for instance, affect both investment demand and firm marginal costs. But some decomposition is important; if Japan’s problems were entirely the result of changes to potential output, then a monetary regime change could have little real effect. In order to know what a demand-side policy can achieve, we need to know the size of Japan’s output gap.

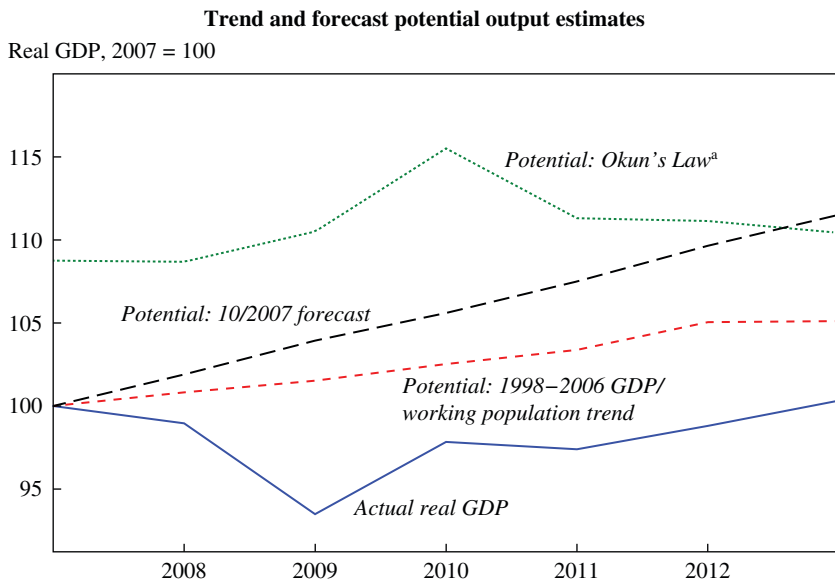
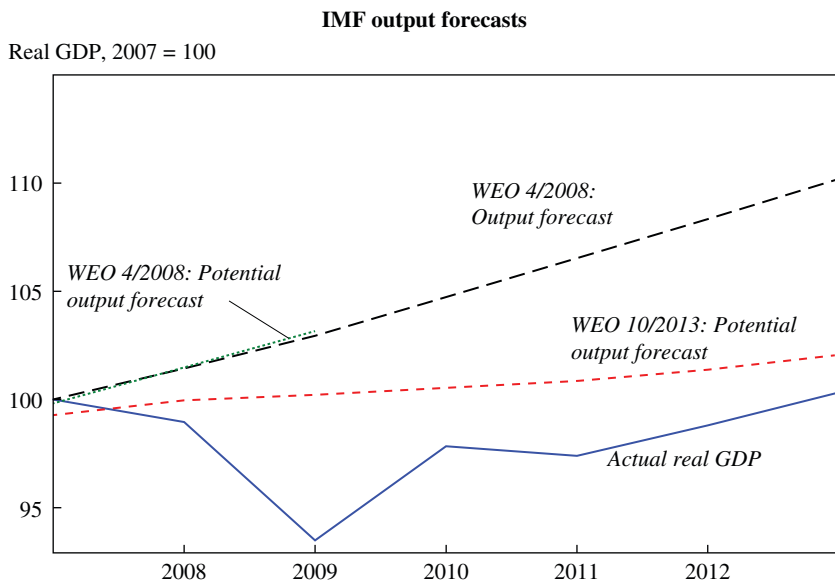
Official estimates of Japan’s output gap are small. In its October 2013 *World Economic Outlook*, the IMF estimated that Japan’s 2013 output gap would be –0.9 percent, while the OECD, in its November 2013 *Economic Outlook*, estimated it would be positive 1.1 percent. These two measures suggest that there is little role for demand-side policy in Japan: neither fiscal stimulus nor lower real interest rates will raise output if supply constraints are binding. In this case, the only arrow of Abenomics that matters is the third.

However, the IMF and OECD measures almost certainly have difficulty with Japan’s two-decade stagnation. Prolonged slumps can mean that conventional estimates of potential output—those, for instance, that use a Hodrick-Prescott filter—interpret the slowdown in actual growth to have been primarily a slowdown in potential output growth (Krugman 1998). While the IMF currently uses a production function approach, not a Hodrick-Prescott filter, to measure Japanese potential output, its methods suffer from a similar problem: the IMF’s potential output measure closely tracks forecast and actual output (figure 1, top panel).¹⁵ Between 2008 and 2013,

15. The IMF publishes a forecast for actual GDP and the output gap as a percent of potential in the *World Economic Outlook*. We computed the implied level of potential output

as $Y_{potential} = \frac{Y_{actual}}{1 + gap}$.

Figure 1. Actual and Potential Output, Japan, 2007–13



a. Krugman, 1998.

the IMF's estimate of 2009 potential output growth fell from 1.7 percent to 0.3 percent.

A large part of this revision to potential output likely comes from lower investment.¹⁶ A smaller capital stock certainly diminishes the level of output achievable at a given point in time, but over several years investment shortfalls can be made up. So it is not obvious how much a period of lower investment should affect one's view of what a demand-side policy can achieve in the medium run. A historical example may clarify. Investment was low in the United States throughout the 1930s. But in part because of stimulative monetary policy after 1933 and stimulative fiscal policy during World War II, the Great Depression does not appear to have lowered potential or actual U.S. output in 1950.

Hysteresis effects in the labor market, such as high long-term unemployment and early retirement, may also lower potential output. But it also seems likely that a prolonged boom could reverse many of these effects. Laurence Ball (2009) finds that large demand expansions are associated with declines in the natural rate of unemployment and, by implication, increases in potential output.

For the purpose of evaluating the potential effects of a prolonged demand-side policy, we believe the correct measure of potential output is conditioned on resources having been close to fully employed for some time. This is unlike the IMF, which measures potential output conditional on all resources being employed at their current capacity. Thus we do not believe that the IMF measure—an output gap of -0.9 percent—is a good indicator of what sustained expansionary monetary policy should aim for in Japan. We suspect that if Japanese output growth is high for several years, the IMF estimate of potential output will rise. Those who disagree with this assessment might find the official, small measures of Japan's output gap to be unproblematic. In that case, they might expect little from monetary policy other than price effects. Presumably, like us, Japanese officials do not hold this view; if they did, it is unclear why they would have gone to the effort of staging a monetary regime shift.

We are not the first to struggle with estimating Japan's output gap. Paul Krugman (1998) also argued that official estimates of Japan's output gap were too small. Instead of relying on official figures, he combines an estimate of Japan's natural rate of unemployment with an estimate of the Okun's law coefficient in Japan. Krugman estimates Japan's natural rate

16. Lower investment explains most of the downward revision to the Congressional Budget Office's estimates of potential output in the United States (Jacobson and Occhino 2013).

of unemployment as 2.5 percent, which was Japan's average unemployment rate in the decade from 1982 through 1991. Again using data from the 1980s, Krugman argues that Japan's Okun's law coefficient is roughly six. These two estimates, combined with Japan's 2013 unemployment rate (4.0 percent), suggest that the output gap in 2013 was roughly 9 percent [$= 6 \times (4 - 2.5)$].

Of course, the unemployment rate in the 1980s may no longer be a good indicator of Japan's natural rate of unemployment. Even ignoring hysteresis effects, demographic changes, for instance, have likely changed the natural rate.¹⁷ Another approach to estimating potential output is to assume that output continues to grow at its pre-depression trend. This is the approach taken by Christina Romer (1999) for the Great Depression. We use Japan's trend growth rate of output per working-age person from 1998 to 2006 to obtain a measure of Japan's current output gap; 1998 and 2006 are sensible start and end dates since the unemployment rate was the same in both of these years. Normalizing the trend by the working-age population incorporates Japan's changing demographics since the 1990s. Figure 1 (bottom panel) shows this trend along with actual output. We assume that output was at potential in 2007. This suggests a 2013 output gap of 4.6 percent. However, many observers would argue that output in 2007 was below potential. Okun's law implies that the 2007 output gap was in fact 8 percent (same panel). Thus our trend-based measure is biased toward underestimating Japan's current output gap. Bias in the other direction comes from the effects on potential output of the 2008 recession and the 2011 tsunami. As discussed above, it is not obvious that a potential output measure that responds strongly to recessions is correct for our purposes. But the 2011 tsunami raises separate issues. This disaster not only caused enormous physical destruction, it also led to the shutdown of all of Japan's nuclear power plants. That in turn raised energy prices, with economy-wide negative effects on aggregate supply (Schnell and Weinstein 2012). Unfortunately, quantifying the effect on potential output is difficult. A hint

17. Unfortunately, recent data are not well suited to estimating Japan's natural rate: Japan's inflation rate over the past several years has been negative but not falling. This has unclear implications for the natural rate. For instance, Ball (2006) and Blanchard (2000) suggest that the Phillips curve relationship in Japan may be between the level of inflation and slack rather than the more conventional relationship between changes in the inflation rate and slack. The challenges to estimating the natural rate of unemployment in Japan now are similar to those that plague any such calculation for the United States in the 1930s. Just as in Japan now, low output and employment in the 1930s coexisted in the United States with increases in the inflation rate (Romer 1999).

that it was small comes from the IMF's October 2013 *World Economic Outlook*, which shows no slowdown in potential output growth between 2010 and 2011.

A final way to measure the output gap is to see what professional forecasters in 2007 expected long-run growth to be. Absent any large and expected demand-side policies, these forecasts are likely to measure observers' best guess of trend growth. Like the previous measure, this ignores any effects of the 2008 recession or the 2011 tsunami on potential output, but it may also suffer from an opposite bias, since forecasters may not have believed that the economy would return to potential in 2013. In any case, this forecast is also shown in figure 1 (bottom panel). It suggests a 2013 gap of 10 percent, similar to the gap found using the Okun's law method.

In summary, these three measures suggest a large output gap in Japan, in the range of 4.5 to 10 percent.

II. 2013 Impact

In this section, we examine the effect of Abenomics on the Japanese economy in 2013. First, we consider how financial markets reacted. We focus on interest rates and the exchange rate. Since models suggest that Abenomics will work primarily by lowering the real interest rate¹⁸ and to a lesser extent by weakening the yen, these are relevant intermediate indicators of success. We next examine how actual inflation and output growth have responded.

II.A. Financial Markets

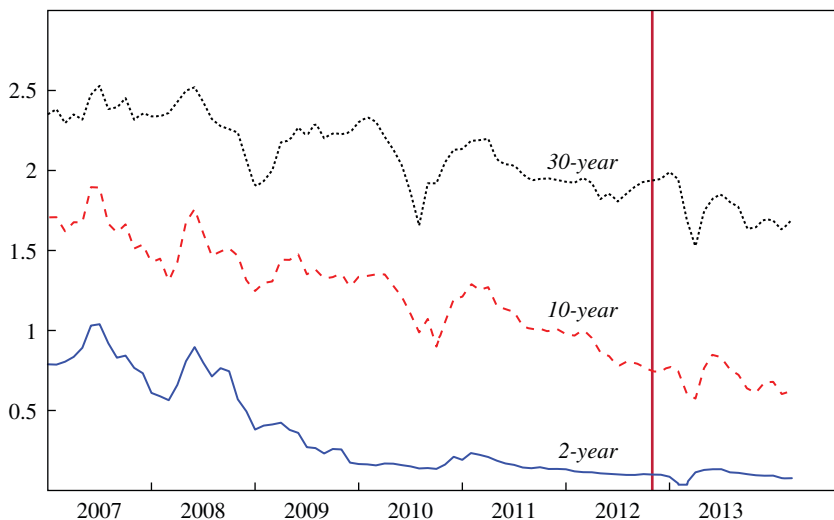
Figure 2 shows nominal interest rates in Japan since 2007. Two-year government bond yields were near zero before Abe took office, and they have changed little since. By contrast, both 10-year and 30-year government bond yields have fallen. As of March 31, 2014, the yield on 10-year Japanese government bonds was 0.64 percent, 21 basis points below the average yield in 2012. Thus, any expectations of inflation induced by the Bank of Japan have not led to higher nominal interest rates, even over quite long horizons.

Given small changes in nominal interest rates, expected inflation has been the primary determinant of movements in real interest rates. Unfortunately, there is no ideal measure of Japanese expected inflation. The market for inflation-linked Japanese government bonds is too thin for these prices to

18. This is the main channel emphasized in old and new Keynesian models (Romer 2012; Woodford 2003).

Figure 2. Nominal Bond Yields, Japan, 2007–14

Nominal yields in percent



Source: See online appendix C.

Note: The Abenomics period begins November 2012, indicated by the vertical line.

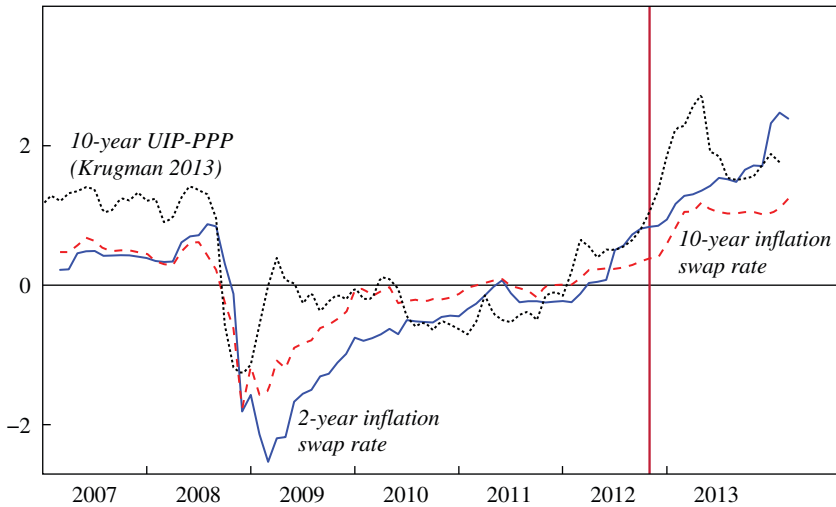
be reliable (Mandel and Barnes 2013). As a market measure of Japanese inflation expectations, we instead use inflation swap rates. These are also not ideal, since they are illiquid and they incorporate potentially time-varying risk premia (Mandel and Barnes 2013). But we are reassured by the similarity of this measure of inflation expectations with that derived from surveys of professional forecasters. In October 2012, the Consensus Economics survey of professional forecasters showed average annual expected inflation in 2013 and 2014 to be 0.65 percent. In the same month, the yield on 2-year inflation swaps averaged 0.8 percent. A year later, in October 2013, 2-year inflation expectations from Consensus Economics had risen to 1.8 percent, while the yield on 2-year inflation swaps had risen to 1.7 percent.¹⁹

An alternative approach to measuring Japanese inflation expectations, suggested by Krugman (2013) (following Mandel and Barnes 2013), is to use uncovered real interest rate parity and the purchasing power parity (PPP)

19. At longer horizons, there is a larger difference between the level of inflation expectations from Consensus Economics and that from inflation swaps. But the changes have been similar.

Figure 3. Market Inflation Forecasts, Japan, 2007–14

Expected inflation (risk-neutral), percent



Source: See online appendix C.

Note: The Abenomics period begins November 2012, indicated by the vertical line.

condition to estimate Japanese inflation expectations using U.S. inflation-linked bonds (TIPS).²⁰ This calculation requires taking a stand on when the yen-dollar real exchange rate was consistent with purchasing power parity. We follow Krugman (2013) in assuming the equilibrium exchange rate was that in January 2010. Uncertainty about this leads to uncertainty about the level of expected inflation, but we are primarily interested in the change after Abenomics began.

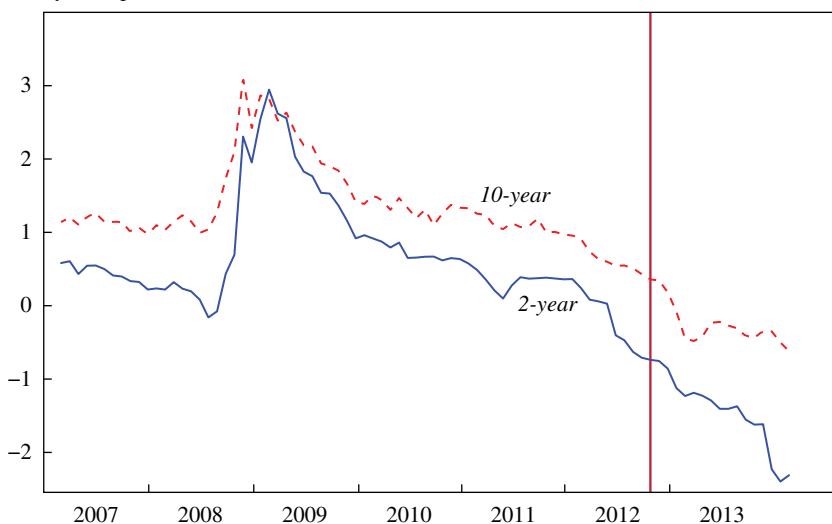
Figure 3 shows the behavior of inflation swaps and this alternative measure of inflation expectations. All measures of inflation expectations were rising before Abenomics and rose rapidly in the first half of 2013.

20. Uncovered real interest rate parity implies that $r_{japan} = r_{us} + \% \Delta e$, where r is the real interest rate, e is the real exchange rate, the price of U.S. goods in terms of Japanese goods, and $\% \Delta e$ is the depreciation required for purchasing power parity to hold. Expressing the real interest rate as the difference between the nominal interest rate (i) and expected inflation, this implies that $\pi_{japan}^e = i_{japan} - i_{us} + \pi_{us}^e - \% \Delta e$.

Following Krugman (2013) we assume that the real exchange rate will take 10 years to get back to its January 2010 value. We calculate the real exchange rate as EP^*/P where E is the yen-dollar exchange rate, P^* is the seasonally adjusted U.S. CPI, and P is the seasonally adjusted Japanese CPI.

Figure 4. Real Bond Yields, Japan, 2007–14

Real yields, percent

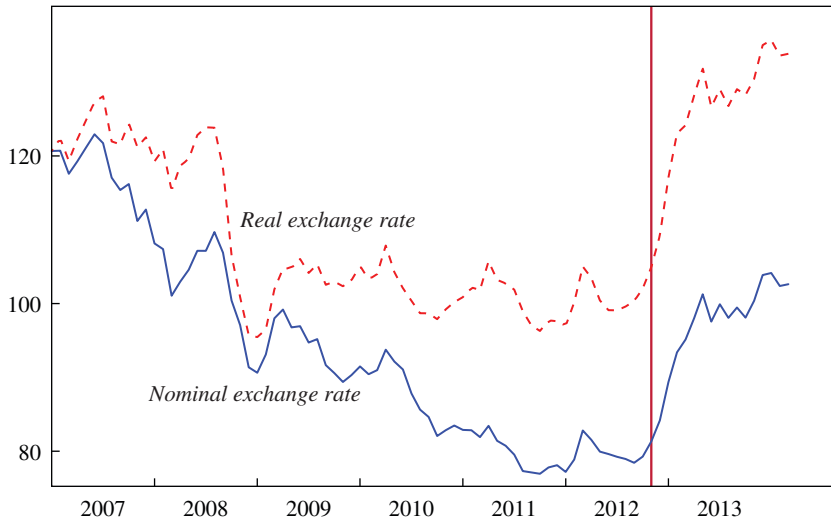


Source: See online appendix C.

Notes: Real bond yields are calculated as the difference between nominal bond yields and inflation swap rates. The Abenomics period begins November 2012, indicated by the vertical line.

Between October 2012 and April 2013, 10-year inflation swap rates rose from 0.3 percent to 1.1 percent. The interest rate parity measure of inflation expectations rose somewhat more. In October 2012 it was 0.8 percent; in January 2014, it was 1.9 percent. Since, as we describe below, long-run inflation expectations of professional forecasters are well below 2 percent, the interest rate parity measure—1.9 percent—may overestimate the level of expected inflation. But we see it as confirming the basic insight from our other measures: that Abenomics raised long-term inflation expectations in Japan by roughly one percentage point.

The combination of steady or falling nominal interest rates and rising inflation expectations has meant a precipitous decline in real interest rates (figure 4). We measure the real interest rate as the difference between the nominal government bond yield and the inflation swap yield. Between October 2012 and March 2014, the 2-year real interest rate fell 1.6 percentage points, and the 10-year real interest rate fell 1.1 percentage points. The larger decline in the 2-year real interest rate was in part driven by the upcoming consumption tax increases, which increased expected inflation.

Figure 5. Exchange Rates, 2007–14^aExchange rates^b

Source: See online appendix C.

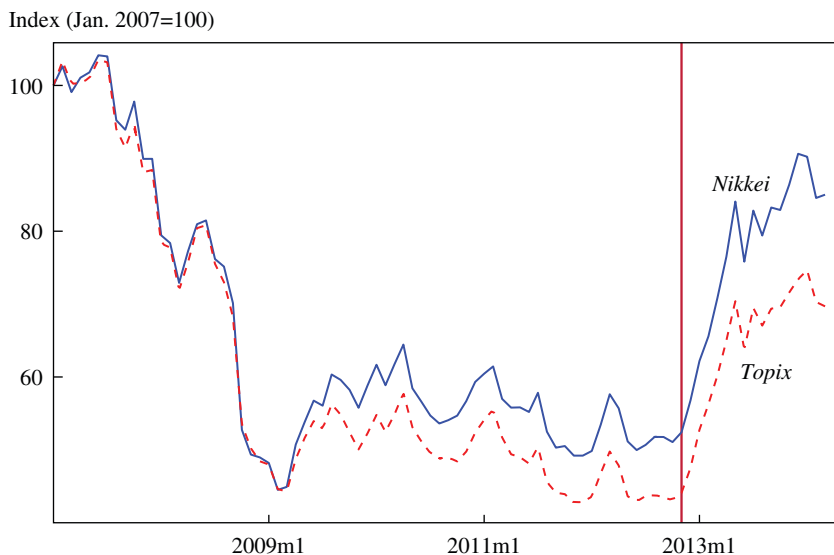
a. The Abenomics period begins November 2012, indicated by the vertical line.

b. Real rate indexed to equal nominal Yen/\$ in Jan. 2007.

The Bank of Japan's higher inflation target is likely to affect the economy primarily through its effect on real interest rates. But an important secondary channel is the exchange rate. Figure 5 shows the behavior of the yen-dollar exchange rate since 2007. After averaging 79 yen per dollar in the first 10 months of 2012, the yen weakened rapidly, reaching 103 yen per dollar in May 2013. Prices changed little over this short period in Japan or its major trading partners, so the Bank for International Settlements' broad effective real exchange rate index moved essentially one-for-one with the nominal rate.

Abenomics also had dramatic effects on the stock market. Figure 6 shows the Nikkei 225 and the broader Topix index. Between October 2012 and May 2013, the Nikkei rose 65 percent and the Topix rose 63 percent. Higher asset prices are one channel through which Abenomics may help the Japanese economy. Most obviously, higher stock prices lead to more consumption and investment. Some observers have interpreted the stock price increase as an implicit forecast of Abenomics' large long-run effects. We consider this argument in section III.B.

We would like to know how much these changes reflect the effects of Abenomics and monetary policy in particular. One source of evidence is

Figure 6. The Japanese Stock Market, 2007–14

Source: See online appendix C.

Note: The Abenomics period begins November 2012, indicated by the vertical line.

announcement effects: if the Bank of Japan’s newfound resolve to raise inflation drove the 2013 movements of interest rates, exchange rates, and the stock market, we should see large immediate reactions when the Bank of Japan announced its new policies.

Table 2 shows the change in several financial market indicators in a 24-hour window around dates of news about the Bank of Japan’s new monetary policy.²¹ On the first date, November 15, 2012, then-candidate Abe argued that the Bank of Japan should conduct “unlimited easing.”²² There was little change in nominal bond yields or inflation swap rates, but the yen weakened by more than one percent and stock prices rose more than two percent. On the second date, January 22, 2013, the Bank of Japan committed itself to a 2 percent inflation target (Bank of Japan 2013a). Since Abe had already called on the Bank of Japan to raise its inflation target, this announcement added little new information. And despite Abe’s

21. Note that though inflation swap yields are shown in the table, their general lack of liquidity makes nonresponses difficult to interpret. Inflation swap yields often only change once every few days.

22. “Abe Calls for Unlimited Easing from BoJ,” *Financial Times*, November 15, 2012.

Table 2. Changes in Financial Market Indicators in Response to 2012–13 Announcements, Japan^a

Date	Japanese government bond yields (basis-point change)			Inflation swaps (basis-point change)		Yen/\$ exchange rate (% change)	TOPIX index (% change)
	2-year	10-year	30-year	2-year	10-year		
Nov. 15, 2012 ^b	-0.5	-0.9	2.8	0.5	0.0	1.15	2.09
Jan. 22, 2013 ^c	-0.1	-0.8	-0.1	-0.7	3.2	-0.99	-0.44
Feb. 5, 2013 ^d	-1.2	-2.9	-2.2	5.3	15.9	1.36	1.37
Apr. 4, 2013 ^e	0.3	-11.4	-21.7	0.0	0.0	3.55	2.70

a. One-day changes following announcements or events on a given date.

b. On November 15, 2012, then-candidate Shinzo Abe called for “unlimited” easing.

c. On January 22, 2013, the Bank of Japan announced its 2% inflation target.

d. On February 5, 2013, the governor of the Bank of Japan, Masaaki Shirakawa, announced his resignation (we use a 2-day change since it is unclear whether markets had already closed).

e. On April 4, 2013, the Bank of Japan announced its new quantitative and qualitative monetary easing policy.

support of the Bank of Japan’s new target, there was a widespread view that it lacked credibility. The *Wall Street Journal* quoted the economist Joseph Gagnon as saying, “It’s meaningless. . . . The Bank of Japan is very good at telling politicians it’s going to do a lot, and then doing nothing.”²³ Consistent with this interpretation, the yen strengthened and the Topix stock market index fell nearly half a percent. Yields on government bonds and inflation swaps were essentially unchanged.

The third date is February 5, 2013, when the Bank of Japan’s governor, Masaaki Shirakawa, announced that he would resign early. This was interpreted as evidence that the Bank of Japan would soon be led by someone more sympathetic to bold monetary actions.²⁴ Government bond yields fell, inflation swap yields rose, the yen weakened, and stock prices rose.²⁵

The Bank of Japan finally specified actions to reach its 2 percent inflation target on April 4, 2013, the last date in table 2. These actions were dubbed “quantitative and qualitative monetary easing” (QQME). They included a commitment to double the monetary base and the Bank of Japan’s holdings of Japanese government bonds in two years. The statement quite deliberately emphasized the newness of the policies; it referred to a “new phase of monetary easing in terms of quantity and quality” (Bank of Japan 2013b).

23. “Doubt Greets Bank of Japan’s Easing Shift,” *Wall Street Journal*, January 22, 2013.

24. “BOJ’s Shirakawa to Step Down Early,” *Financial Times*, February 5, 2013.

25. It is unclear whether this announcement came while markets were still open, so we use a two-day window.

Reacting to the April 4 announcement, markets were jubilant. Ten-year government bond yields fell 11 basis points, and 30-year yields fell 22 basis points. This was the largest one-day decline in the 30-year yield in almost a decade.²⁶ Inflation swap yields were unchanged that day, presumably reflecting a lack of trading volume. But in their next quote, both the 2-year and the 10-year inflation swap yields rose by 4 basis points. The April 4 announcement also had sizable effects on the yen and the stock market. The 3.6 percent decline in the yen's value against the dollar was the fourth largest one-day depreciation since 1978. Thus a comparison of the January 22 and April 4 announcements strongly suggests that the mere announcement of an inflation target had much smaller effects than the announcement of actions which could make the target credible.²⁷ In any case, the announcement effects suggest that monetary policy was an important driver of financial market behavior in 2013.

II.B. Inflation

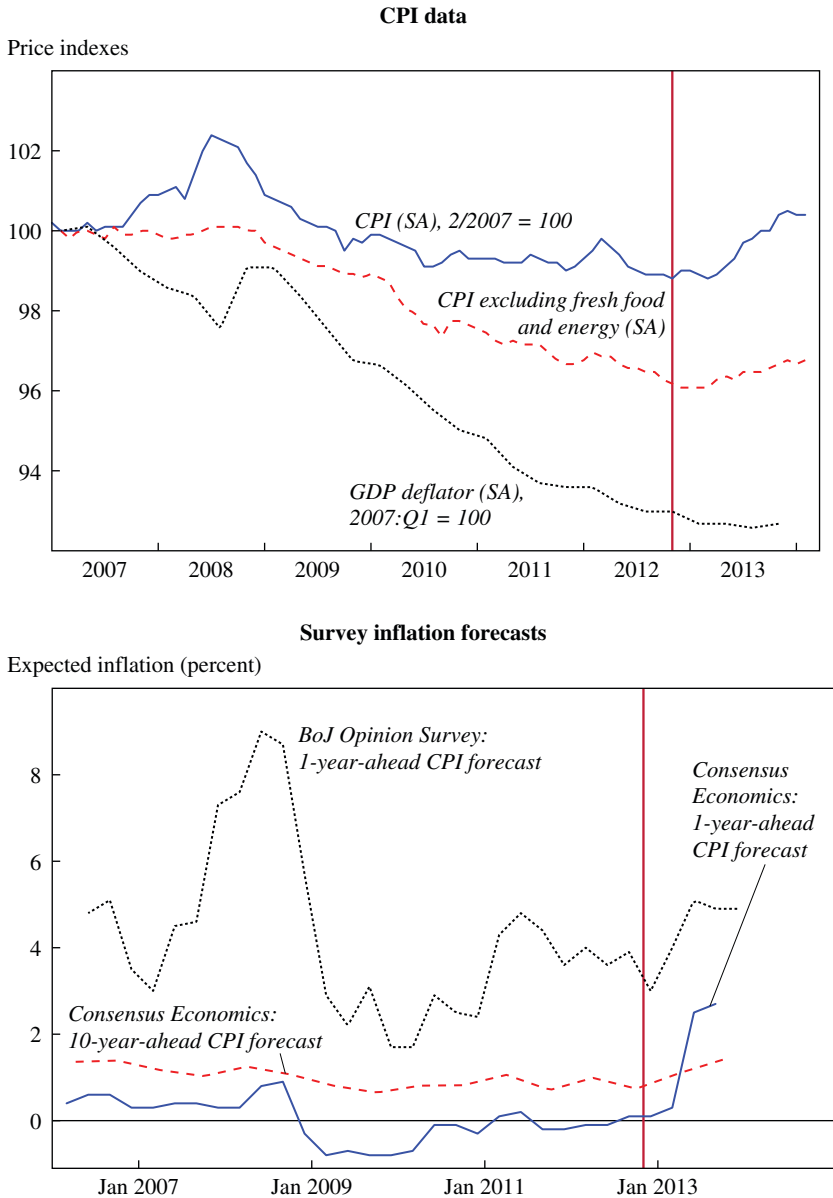
We now turn to an examination of actual inflation in 2013. Figure 7 (top panel) shows three measures of Japanese inflation: the CPI, the CPI excluding fresh food and energy, and the GDP deflator. The overall CPI has risen since March 2013. The 12-month percent change from December 2012 to December 2013 was 1.6 percent. This was the highest inflation rate in Japan since the 2008 energy price shock. Year-over-year CPI inflation was 0.4 percent, 0.6 percentage points above the December 2012 Consensus Forecast. Thus Abenomics ended deflation in 2013. But a concern is that much of this inflation may have been driven by a weaker yen and hence may not continue.

Energy and fresh food prices are especially sensitive to the yen's value. The so-called core CPI strips out both these categories. Figure 7 shows that this measure of the CPI has also risen since March 2013, but by much less. In the 12 months from December 2012 to December 2013, it rose 0.7 percent. A final measure of inflation, which has the advantage of excluding all imports, is the GDP deflator. After years of steady decline, the GDP deflator was flat through most of 2013 (figure 7). In part this was because over the four quarters of 2013, the deflator for exports rose almost 10 percent.

26. Based on an analysis of forward rate movements on April 4, Rogers, Scotti, and Wright (2014) argue that most of this movement in bond yields was due to the effect of this announcement on term premia.

27. See Kuttner and Posen (2001) for a discussion of the effects of earlier Bank of Japan announcements. For more discussion of the effects of Abenomics announcements, see Ueda (2013).

Figure 7. Actual and Expected Inflation, Japan, 2007–14



Source: See online appendix C.

Note: The Abenomics period begins November 2012, indicated by the vertical line.

Notably, both the CPI and GDP deflator rose more in 2013 than they did from early 2005 to early 2007, a period when the yen depreciated by nearly 20 percent. The comparison is imperfect, because the 2013 depreciation was more rapid, but this still suggests that Abenomics' effect on prices goes beyond pass-through. Further, a yen depreciation will exert only a temporary effect on CPI inflation as relative prices adjust. So the rise in long-run CPI inflation expectations suggests that more persistent (domestic) factors are at play. To the extent that these inflation expectations prove accurate, therefore, we also expect the GDP deflator to rise going forward.

Positive inflation is not yet firmly established, however. In January 2014, both the overall CPI and the CPI excluding food and energy fell. Consistent positive inflation likely requires increases in nominal wages. Here the news is somewhat encouraging. Including bonuses, nominal hourly earnings rose 0.4 percent from December 2012 through December 2013.²⁸ Many workers' wages are set in annual spring negotiations between unions and employers, and as this paper was being finalized, these negotiations were ending. Early reports suggest that many firms have agreed to small nominal wage increases. Toyota, for instance, agreed to raise wages by 0.8 percent.²⁹ Nevertheless, while any nominal wage increases are encouraging, so far these have been insufficient to prevent inflation from eroding real wages. The extent to which firms grant workers wage increases depends in large part on their inflation expectations. We consider two proxies for firm inflation expectations in Japan: (i) the expectations of professional forecasters and (ii) the expectations of households. The inflation expectations of professional forecasters are likely to be a good proxy for the inflation expectations of large multinational firms. Such firms have the resources either to employ forecasters themselves or to seek outside professional opinions.³⁰ By contrast, Coibion and Gorodnichenko (2013) argue that household inflation expectations are a good proxy for smaller firms' expectations.

Figure 7 (bottom panel) shows one-year-ahead and 10-year ahead inflation expectations of professional forecasters from Consensus Economics, as well as one-year-ahead household inflation expectations from the Bank

28. Total cash earnings rose 0.5 percent while hours rose 0.1 percent.

29. See "For First Time in Years, a Raise for Many Japanese Workers," *New York Times*, March 12, 2014. Olivei and Tenreyro (2010) discuss how synchronized wage setting affects monetary policy effectiveness in Japan.

30. As noted above, the changes in market inflation expectations from inflation swaps and inflation expectations by professional forecasters have been very similar.

of Japan opinion survey.³¹ A surprising feature of these data is the level of inflation forecast by Japanese households. Respondents to the opinion survey generally forecast more than 4 percent inflation over the next year. Households also often say that inflation over the past year exceeded 4 percent, even though Japan has not experienced 4 percent year-on-year inflation since 1981. For our purposes, however, what matters most is the change in these expectations.

Both household and professional inflation expectations have risen since late 2012 (figure 7, bottom panel). The one-year inflation forecast from professional forecasters rose particularly quickly in early 2013, but this likely reflects the April 2014 consumption tax hike. Respondents to the Bank of Japan opinion survey were instructed to ignore the consumption tax increase in forming their inflation expectations, but professional forecasters received no such instruction.³²

While the change in inflation expectations is encouraging, the level of inflation forecast by professional forecasters, like inflation swap rates, suggests that the Bank of Japan's target is not (yet) fully credible. As of October 2013, professional forecasters expected 1.4 percent annual inflation over the next 10 years. (As of March 2014, 10-year inflation swap yields are 1.2 percent, figure 3.) This implies that the output effects we discuss below are the effects of an imperfectly credible monetary policy change.

II.C. Comparison to Quantitative Easing

We have argued that Japan's recent monetary policy announcements and actions had large effects on financial markets and both actual and expected inflation. These effects are strikingly different from those of the Bank of Japan's 2001 to 2006 experiment with quantitative easing. What is the Bank of Japan doing now that it did not do in 2001? On March 19, 2001, the Bank of Japan announced its quantitative easing policy. The announcement had three key features (Ugai 2007): (i) the Bank of Japan would no longer target an interest rate, but would instead target the excess reserves of commercial

31. The Bank of Japan opinion survey is a poll of approximately 4,000 randomly sampled individuals above age 20. Individuals are sent a questionnaire in the mail, and the response rate, though variable, tends to be around 55 percent. See Bank of Japan Opinion Survey https://www.boj.or.jp/en/research/o_survey/index.htm/.

32. To get a better sense of how Abenomics changed the inflation expectations of professional forecasters, one can look at inflation expectations in October 2012 and October 2013. Since the consumption tax increase was passed in June 2012, the difference between the earlier and later forecasts provides an estimate of the effect of Abe's new policies on inflation expectations. This measure of inflation expectations rose at all time horizons.

banks held at the Bank of Japan—the Bank’s so-called current account balance; (ii) quantitative easing would be explicitly state-dependent and would continue until deflation ended; and (iii) the Bank of Japan would purchase long-term government bonds.

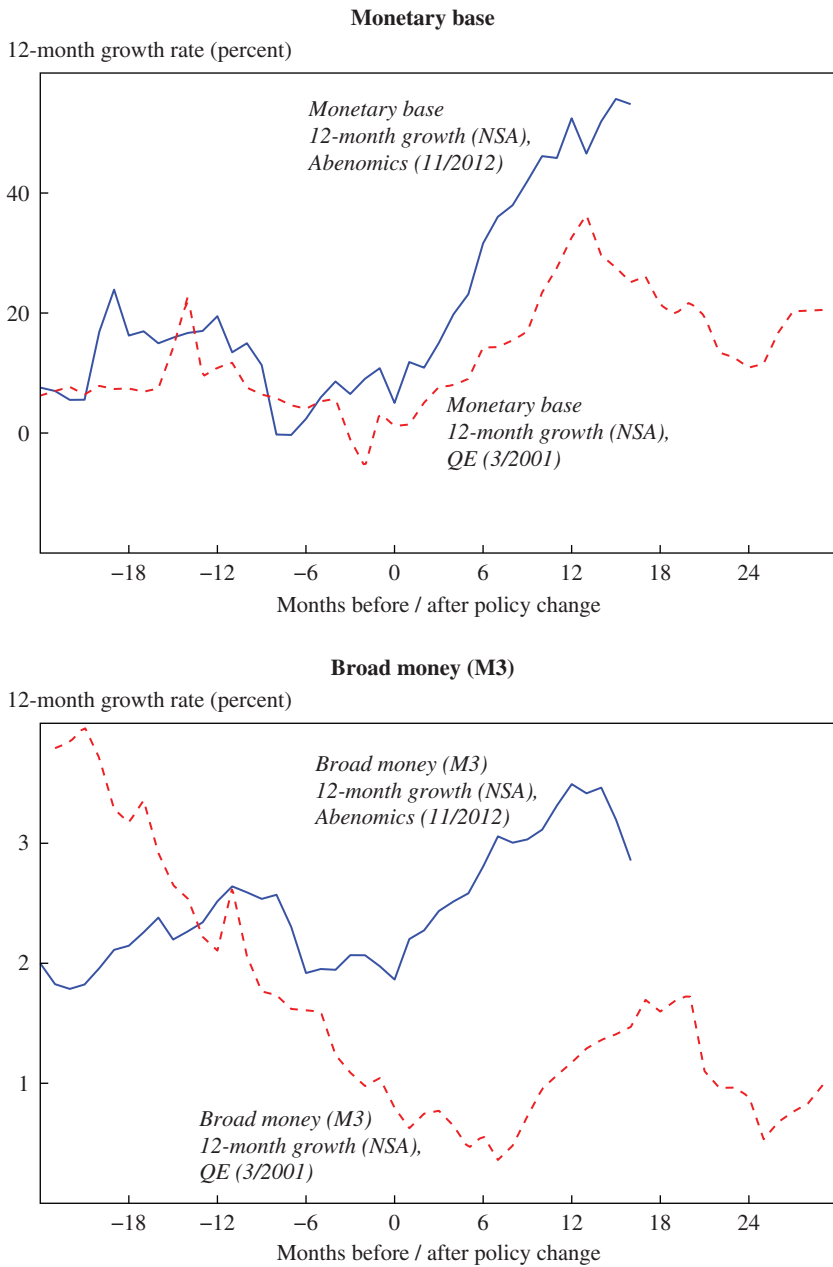
The effects of this policy are clearly visible in figure 8 (top panel), which shows a rapid increase in monetary base growth after March 2001. Despite this massive increase in liquidity provision, broad money growth was only slightly positive (figure 8, bottom panel). Moreover, in the year following March 2001, professional forecasters’ inflation expectations fell and the real exchange rate depreciated only slightly. The real effects of quantitative easing ultimately appear to have been small (Ugai 2007). Krugman (1998, 2000) and Gauti Eggertsson and Michael Woodford (2003) argue that this is exactly what one would expect of a policy that merely temporarily increases monetary aggregates without changing expectations about inflation or future nominal rates. For quantitative easing to be effective it must either lower nominal interest rates or raise expected inflation, or both. In general, this means it must be expected to persist even after the economy exits the zero lower bound. By contrast, if quantitative easing is expected to be temporary, then it will likely have little or no effect on expected future real interest rates and the broad money supply; consumers will simply substitute cash for deposits while banks hold excess reserves.

This last possibility appears to be what happened in the early 2000s. Quantitative easing was indeed temporary. In early 2006 the Bank of Japan mopped up most excess reserves (see Blinder 2010, figure 8); later that year it raised the uncollateralized call rate to 0.25 percent. Year-over-year from 2005 to 2006, the monetary base fell 13 percent.

Figure 8 shows that Abenomics is different. The monetary base has grown more, but the most striking difference is in the behavior of the broad money supply, which has grown much more rapidly than during the early 2000s (bottom panel). This is exactly what one would expect from a more credible monetary policy change. If, unlike in 2001, people now expect lower future real interest rates, the resulting increase in credit demand will also lead to money creation in the banking system.

Thus the increase in the broad money supply. Even after a recent slowdown, the 12-month growth rate of broad money is now (as of March 2014) at its highest level since 1999. Taken together, figure 8 is a striking confirmation of model-based predictions. Exactly as predicted by Krugman (1998) and Eggertsson and Woodford (2003), a credible commitment to future expansion is having effects that temporary changes in the monetary base did not.

Figure 8. Money Growth, Japan, during Quantitative Easing (QE) and Abenomics



Source: See online appendix C.

Note: Month 0 is March 2001 for quantitative easing and November 2012 for Abenomics.

II.D. Output

Ending deflation and increasing inflation expectations are intermediate goals. The ultimate target of Japan's new monetary policy is higher output. Here we document the turnaround of Japanese output in 2013. We then turn to the harder task of determining what part of recent Japanese growth is due to Abenomics and to its monetary policy in particular.

Figure 9 (top panel) shows quarterly GDP growth at an annual rate in Japan since 2007. Performance was notably better in 2013 than it was at the end of 2012. Whereas quarter-on-quarter growth was negative in the second and third quarters of 2012, output grew during each quarter of 2013, and particularly so in the first half of the year. Fourth quarter over fourth quarter, the Japanese economy grew 2.6 percent in 2013; year-on-year it grew 1.5 percent.

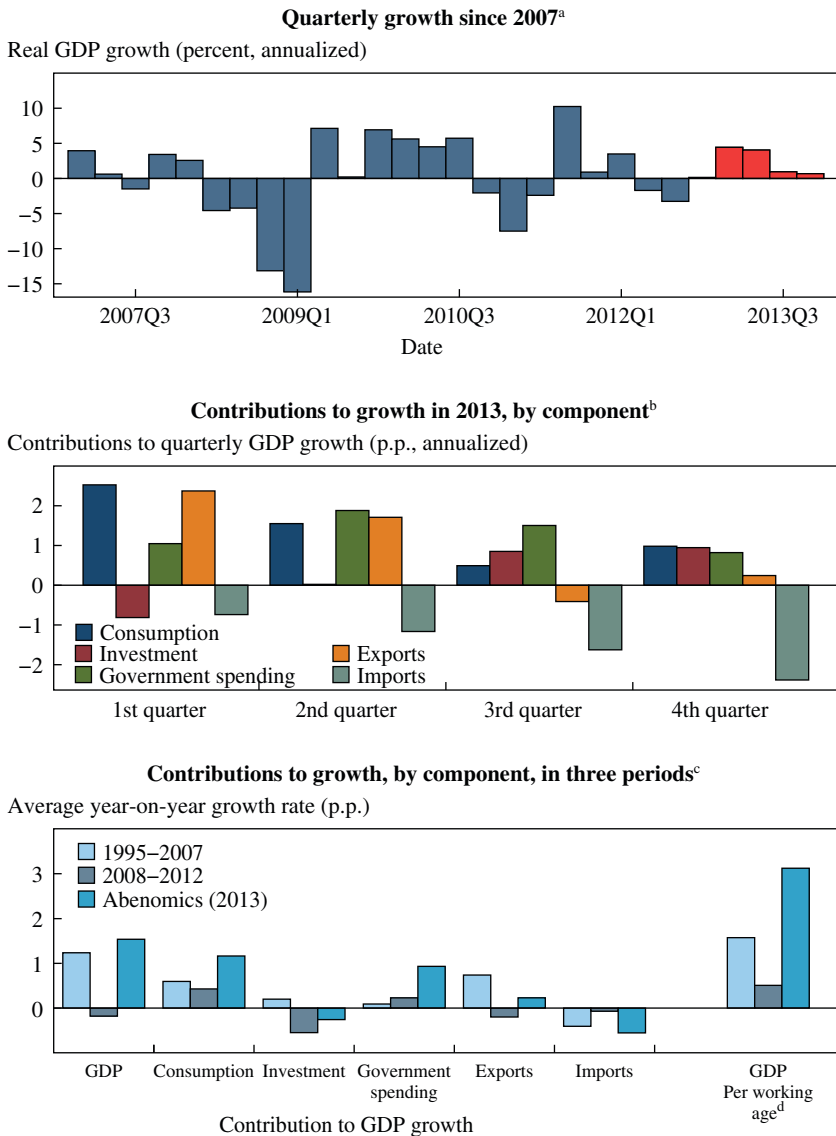
However, the trend is negative: since the first quarter of 2013, growth has declined each quarter. The principal problem was net exports. Figure 9 (middle panel) shows that the contribution of exports to real GDP growth fell from 2.4 percentage points (at an annual rate) in the first quarter of 2013 to 0.2 percentage points in the final quarter of the year. At the same time, the contribution of imports fell from -0.7 percentage points to -2.4 percentage points. Put differently, had the contribution of net exports been the same in the fourth quarter as it was in the first, annualized fourth quarter growth would have been 4.6 percent rather than 0.7 percent. We will return to the puzzling behavior of net exports below.

Figure 9 (lower two panels) provides a different way of seeing recent performance. It plots average annual GDP growth as well as the contributions of major components in 2013. For comparison, we also show average growth rates for two subsamples: the lost decades excluding the 2008 recession (1995–2007)³³ and the 2008 recession and recovery (2008–12). 2013 growth has been strong relative to these prior periods.

As we noted in section I, when making historical (and international) comparisons it is important to adjust for Japan's changing demographics. The right-most bars in figure 9 (lower panel) show growth rates of output per person ages 15 to 64. Since the 15-to-64-year-old population has been shrinking since 1995, this adjustment raises all growth rates. However, population decline has been particularly rapid since 2006, so this adjustment makes performance under Abenomics look more impressive: 2013 growth

33. We start this comparison in 1995, since official national accounts data for the level of GDP become available in 1994.

Figure 9. GDP Growth Components and Contributions, Japan, before and after Abenomics



Source: See online appendix C.

a. The top panel shows annualized quarter-on-quarter GDP growth since 2007. Quarters since Abenomics began are lightly shaded.

b. The middle panel shows contributions to GDP growth by component for each quarter during 2013.

c. The lower panel provides a comparison of contributions to GDP by component during Abenomics (2012–13), the lost decade excluding the Great Recession (1994–2007), and the Great Recession (2007–12). Contributions are calculated as in Japan’s national accounts.

d. In the lower panel, the right-most bars display working-age adjusted GDP growth.

per working-age person was 3.1 percent, compared to 1.6 percent from 1995 to 2007 and 0.4 percent from 2008 to 2012.

Output growth in 2013 is almost entirely accounted for by consumption, which contributed 1.2 percentage points, and government spending, which contributed 0.9 percentage points. Residential investment added another 0.3 percentage points. Nonresidential investment, the change in inventories, and net exports subtracted a total of 0.8 percentage points from growth.

II.E. Forecasts

Without a counterfactual, it is difficult to say how much of 2013 growth was due to Abenomics. We need to know what output would have been without Abenomics to know the policies' effect. As an estimate of this counterfactual, we first look to forecasts from Consensus Economics made in late 2012, before Abe's policies were fully known.

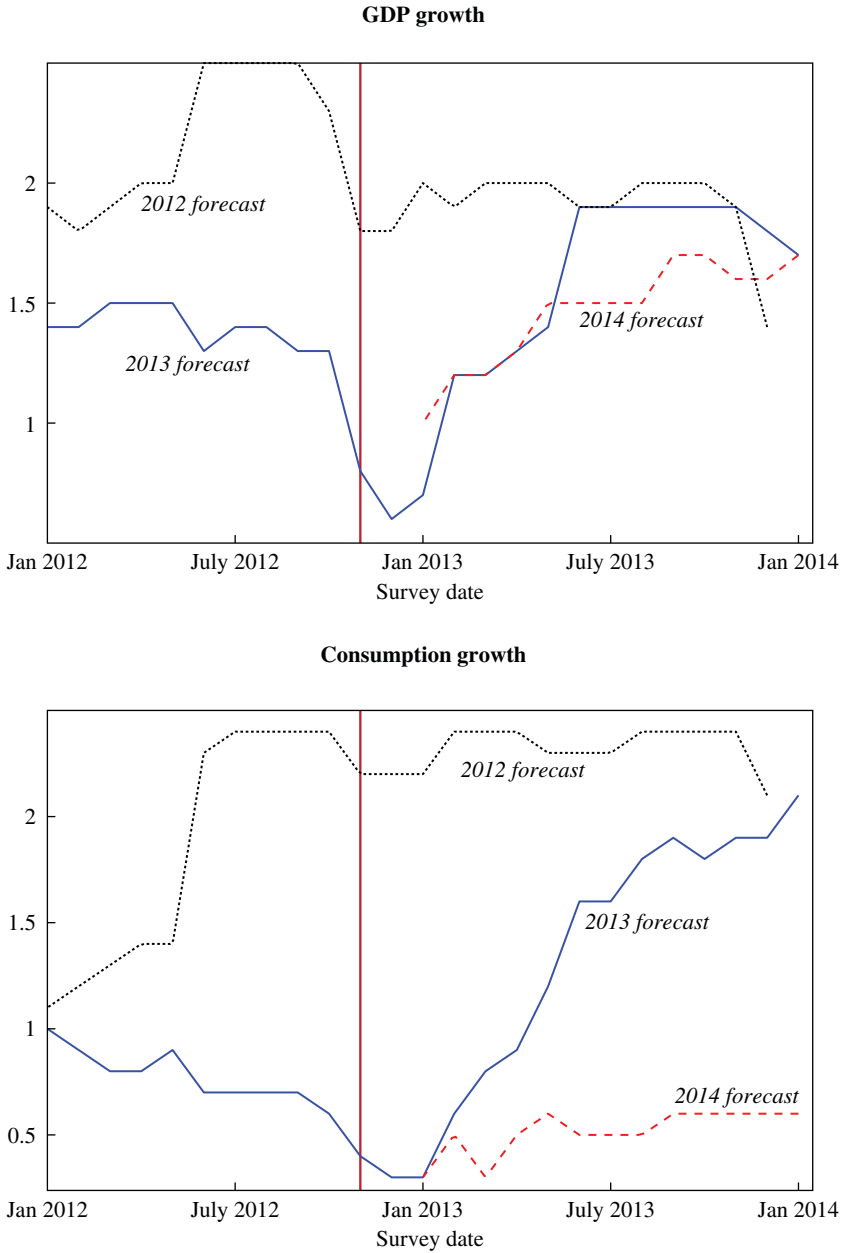
What complicates our analysis is that news of the 2012 recession arrived almost simultaneously with Abe's first policy speeches. The first news of an actual contraction came on November 12, 2012, when preliminary GDP data showed that output had declined in the third quarter of 2012 at a 3.5 percent annual rate.³⁴ This news came just days before Abe's "unlimited easing" speech on November 15.

Forecasters interpreted bad news about growth in 2012 to also be bad news about growth in 2013. The GDP growth forecast for 2013 was revised down from 1.3 percent in October 2012 to 0.8 percent in November 2012. This is shown in figure 10, where we plot the evolution of consensus forecasts for GDP and consumption by survey date. Even in November the depth of the 2012 recession was not fully appreciated. On November 28, data for October retail sales showed a larger than predicted 1.2 percent decline.³⁵ While the 2012 growth forecast in figure 10 (top panel) did not decline in December, this reflects single-digit rounding error in the mean forecast. The unrounded 2012 mean growth forecast fell from 1.84 percent in November to 1.80 in December. Forecasters read this as a negative signal for future growth: the 2013 growth forecast deteriorated from 0.8 percent in November 2012 to 0.6 percent in December. Since so much was already

34. See "Quarterly Estimates of GDP: July-September 2012 (The First Preliminary)" from the Department of National Accounts, available at http://www.esri.cao.go.jp/jp/sna/data/data_list/sokuhou/files/2012/qe123/pdf/jikei_1.pdf.

35. "Japan's Retail Sales Fall in October as Car Sales Drop," *Bloomberg News*, November 29, 2012.

Figure 10. GDP and Consumption Growth Forecasts, 2012–14^a



Source: Consensus Economics.

a. The Abenomics period begins November 2012, indicated by the vertical line.

Table 3. 2013 Year-on-Year Growth Forecasts from Autoregressive Models

Year-on-year growth, in percent

Lags (=p) ^a	Autoregressive (p) ^b		Vector autoregressive (p) ^c	
	Final release data ^d	Forecast data ^d	Final release data ^d	Forecast data ^d
1	-0.09	-0.16	-0.25	-0.05
2	0.02	-0.06	-0.11	-0.17
3	0.06	-0.04	0.43	0.38
4	0.06	-0.25	0.38	0.11

a. Column 1 shows the number of autoregressive lags.

b. Columns 2 and 3 show forecasts from autoregressive models of GDP growth estimated from 1996Q1 to 2012Q4.

c. Columns 4 and 5 display forecasts from vector-autoregressive models of GDP growth, GDP deflator growth, and changes in the 10-year bond yield estimated from 1996Q1 to 2012Q4.

d. Columns 2 and 4 use actual data, whereas columns 3 and 5 use the data available to professional forecasters in December 2012 (except for the GDP deflator, which comes from the February 2013 GDP release—see the text).

known about actual 2012 GDP at this time, it is unsurprising that 2013 forecasts moved more than 2012 forecasts did.

Thus it is not obvious which forecasts provide the best counterfactual. Forecasts made in early fall 2012, before Abe announced his policies, suffer from mistaken optimism about growth in 2013. This means they are an overoptimistic counterfactual. By contrast, later forecasts, in December 2012, more accurately reflect the 2012 recession's effect on the 2013 growth outlook, but they were made when then-candidate Abe was widely expected to win the election and after some of Abe's initial economic policy announcements. In particular, by December 2012, Abe had forcefully called for more expansionary monetary policy. To the extent that these announcements themselves had a positive effect on the December Consensus forecasts, using the December forecasts as a counterfactual will underestimate the effect of Abenomics.

Evidence that the December forecasts do include some positive announcement effects comes from out-of-sample statistical forecasts. In table 3 we tabulate 2013 (year-on-year) growth forecasts from autoregressive and vector-autoregressive (VAR) models estimated with data through the fourth quarter of 2012. Columns 2 and 3 report the forecasts from an autoregressive model of quarterly GDP growth. These two columns differ in that column 2 estimates the model based on final data releases, whereas column 3 estimates the model based on the data available to professional forecasters in December 2012. Columns 4 and 5 conduct the same exercise using a VAR with quarterly GDP growth, GDP deflator growth, and changes

in the 10-year bond yield.³⁶ We estimate all models with one to four lags (AIC and BIC criteria consistently favor one lag) starting in 1996 when the zero lower bound began to bind.

The consistent result is that 2013 growth is forecast to be lower than thought by professional forecasters in December 2012. This is true even when one uses the data available to forecasters at the time (columns 3 and 5). This suggests that professional forecasts include positive expectations about the effects of Abenomics.³⁷ While the standard errors for the VAR forecasts are large (as they are for the Consensus forecasts),³⁸ we are encouraged that the forecasts do better in 2012 than in 2013. Estimating the models through 2011 and forecasting 2012 growth yields estimates ranging from 1.46 percent to 2.31 percent; actual GDP growth was 1.45 percent.

The VAR and forecast-based counterfactuals imply that Abenomics raised 2013 growth by roughly a percentage point. Actual year-over-year growth was 1.5 percent compared to the 0.6 percent forecast by Consensus Economics in December 2012. This implies a 0.9-percentage-point effect of Abenomics on growth. As we argued above, we believe this estimate is conservative. For instance, our most pessimistic VAR forecast suggests that 2013 growth would have been -0.25 percent. That would imply a much larger 1.75-percentage-point contribution to 2013 growth from Abenomics. Further confirming that Abenomics added at least a percentage point to growth is an estimate from the IMF. In October 2013, the IMF argued that the entire package of policies would add 1.3 percentage points to 2013 growth (International Monetary Fund [2013c], p. 49). The IMF did not describe how it obtained this estimate, which might be out of date as of this

36. In table 3, columns 3 and 5 use data from the GDP release on December 10, 2012. This release had no data for the fourth quarter of 2012. For this quarter, we use the Consensus Economics forecast for GDP. Consensus Economics does not forecast the GDP deflator, so for this variable we use the value from the February 14, 2013, GDP release.

37. Some of this difference could also be due to expected intertemporal substitution in advance of the April 2014 consumption tax increase. In fact, as we discuss below, the evidence suggests that the consumption tax increase explains relatively little of 2013 growth.

38. Since the R^2 of these regressions are small, the conditional variance (squared standard error) of our forecasts is only slightly below the unconditional variance of output growth. From 1996 to 2012 output growth had an unconditional variance of 0.000529, or a standard deviation of 2.3 percent. However, this sample includes the Asian financial crisis, the Great Recession, and the 2011 Japanese earthquake. Conditional on not observing similar events in 2013, our estimate for the range of plausible 2013 growth rates should be smaller. For example, excluding these events and their recoveries (1997–98, 2008–11) from the sample yields a standard deviation of 0.9 percent. Conditional on not observing these large shocks, our estimated effects—0.9 percent to 1.8 percent—range from one to two (conditional) standard deviations of output growth.

writing (in early 2014). Still, we are encouraged by the fact that it is close to our figures.

Figure 10 shows that the primary improvement in output relative to the December 2012 forecast was in consumption. The December 2012 Consensus forecast was for 0.3 percent consumption growth; in fact—as indicated by the rapid improvement in the forecast over 2013—consumption grew 1.9 percent. This difference alone accounts for a percentage point of output growth. While not provided by Consensus Economics, a comparison to the OECD Economic Outlook forecast suggests that government consumption growth exceeded expectations due to Abe’s fiscal stimulus. At the same time, business investment (not shown) underperformed relative to expectations. The December 2012 forecast was for 0.4 percent growth; actual growth was -1.6 percent. This underperformance is mysterious, since one would expect stimulative monetary policy to have large effects on business investment. In our view, the most likely explanation is that forecasters were simply overoptimistic in December 2012³⁹ or already incorporated positive announcement effects from Abenomics (or both).

II.F. Which Arrow?

While a conservative read of the evidence suggests that Abenomics increased 2013 output by one percent, it is less clear whether this should be ascribed to the monetary, fiscal, or structural arrow. In our view there are at least two compelling reasons to believe that the third arrow has not yet been a major contributor. First, there has been little if any structural reform passed, let alone implemented. Thus the third arrow would have to work through anticipation effects, but it is not clear what consumers and firms anticipate. Second, the improvement in growth and growth forecasts has coincided with a rise in prices and inflation expectations (figure 7). If anticipation of structural reforms were the dominant driver of real effects, we should observe falling prices and inflation forecasts.

We therefore focus on disentangling the first and second arrows: how much of Abenomics’ boost to 2013 growth was due to monetary policy and how much to fiscal policy? This question is as challenging as it is important. Fiscal policy was first discussed in December 2012 and was

39. For instance, if low 2012 growth reduced firm cash flows and these are needed to finance investment because of credit frictions (Fazzari, Hubbard, and Petersen 1988), then continuous downward revisions in the 2012 output forecast could trigger downward revisions in the 2013 investment forecast.

formally announced in January 2013,⁴⁰ the same month that the Bank of Japan announced its two percent inflation target. Thus it is difficult to use timing to separate the effects of the two policies. Instead, we focus on movements in different components of GDP.

To have any hope of disentangling the effects of these two policies, we need to say something about the size of Abe's fiscal stimulus. We compare the late 2013 IMF estimate of the cyclically adjusted primary budget balance to the IMF forecast before Abe's fiscal stimulus was revealed. In October 2012, the IMF forecast that Japan's cyclically adjusted primary budget deficit as a share of potential GDP would be 7.5 percent (International Monetary Fund 2012). In October 2013, the IMF estimated it would be 8.5 percent (International Monetary Fund 2013b). This implies an unexpected fiscal stimulus equal to 1.0 percent of GDP in 2013.⁴¹

A case can be made, therefore, that there is little growth for monetary policy to explain in 2013. Suppose that Abenomics as a whole added one percentage point to 2013 output growth. If there was one percent of GDP worth of fiscal stimulus, a multiplier of one would explain all of this excess growth. Nonetheless, the behavior of consumption in 2013 strongly suggests that monetary policy also contributed to growth.

Recall that 2013 consumption growth exceeded forecasts by 1.6 percentage points, enough to contribute an entire percentage point to output growth. Consumption's strength is difficult to explain by fiscal policy. Unlike the U.S. stimulus in 2009 and 2010 (the American Recovery and Reinvestment Act), little, if any, of Abe's stimulus consisted of transfer payments or lower taxes for households.⁴² So there was no direct mechanism through which a larger budget deficit translated into higher consumption.

Evidence that the second arrow is not solely responsible for strong 2013 consumption growth comes from the time-series pattern of consumption and government spending in figure 9 (middle panel). Across quarters in 2013,

40. See "Japan Machine Orders Rise as Abe Vows Stimulus," *South China Morning Post*, December 12, 2012; and "Japan's Abe Unveils 10.3 Trillion Yen Fiscal Stimulus: Economy," *Bloomberg News*, January 11, 2013.

41. See also International Monetary Fund (2013a), p. 1. To be precise, this is 1.0 percent of potential GDP. But since the IMF believes that actual Japanese GDP is close to potential, the difference is small.

42. Forty-eight percent of Abe's supplementary budget was public investment, 32 percent was private investment subsidies, and 14 percent was transfers to local governments. The remaining seven percent was medical and educational spending. (These figures are based on Abe's supplementary budget released in January 2013. See <http://www.mof.go.jp/english/budget/budget/fy2012/e20130204a.pdf>.)

there is a slight negative correlation between consumption growth and government spending growth. If government spending were raising private consumption through an old Keynesian multiplier effect, one would expect to see the opposite pattern.⁴³

In addition to evidence against fiscal stimulus explaining consumption growth, there is evidence for monetary policy explaining this growth. Consider the spending patterns documented in Japan's Family Income and Expenditure Survey. Among so-called "worker households," households with a member employed, real disposable income fell 1.3 percent between 2012 and 2013. This fits with the more rapid increase in prices than in wages documented in section II.B and with the lack of any substantial new government transfer payments. At the same time as incomes fell, real consumption expenditures rose 0.9 percent, exactly as one would expect if a lower real interest rate were inducing households to spend sooner rather than later. Furthermore, from 2012 to 2013, the value of new loans taken rose 9 percent.

The composition of consumer spending also suggests a role for monetary policy. Among worker households, the largest positive contribution to consumer spending was in the transportation category, especially spending on private vehicles. A similar pattern is visible in the aggregate national accounts data. Consumption spending on durable goods rose 15.7 percent from the fourth quarter of 2012 to the fourth quarter of 2013.

Along with consumer durables, residential investment is likely to be one of the components of GDP most responsive to the real interest rate (Bernanke and Gertler 1995). Here too one sees large effects. Fourth quarter over fourth quarter, real residential investment grew 10.4 percent. This is particularly remarkable given that Japan's declining population presumably reduces demand for new housing.

Some of the increase in durables purchases and private residential investment may be driven by the consumption tax increase. In April 2014, Japan's consumption tax rose from 5 to 8 percent. The consumption tax increase is a large part of why short-term real interest rates were lower than long-term real interest rates in 2013 (figure 4). It applies to houses as well consumption goods, so its effects are also likely to show up in residential investment. Furthermore, a similar consumption tax increase

43. Government spending could raise consumption through intertemporal substitution by raising marginal production costs and inflation expectations and thus lowering real interest rates. However, evidence from Wieland (2014) and Dupor and Li (2013) suggests that this mechanism is unlikely to be quantitatively important.

occurred in April 1997, and it appears to have pulled forward durables purchases.⁴⁴ We doubt, however, that the tax increase is a major contributor to the increase in household spending in 2013. Most obviously, it has been expected since 2012, yet forecasters in December 2012 did not expect significant consumption growth in 2013. Therefore it seems implausible that the consumption tax increase can explain why year-over-year consumption growth exceeded December 2012 forecasts by 1.6 percentage points. Furthermore, consumption growth was particularly strong in the first two quarters of 2013 (figure 9, middle panel), but intertemporal substitution in advance of the tax increase ought to have had larger effects later in the year.

That we do not see such effects at the end of 2013 does not imply a lack of any intertemporal substitution. Rather, it appears likely that the consumption tax mostly boosted consumption in the first quarter of 2014, thus not affecting our estimates of Abenomics' contribution to 2013 growth. The December 2013 Consensus Economics forecast was for consumption to grow at an annual rate of 6 percent in the first quarter of 2014. In our view, it is more plausible that the consumption tax increase explains some part of 2013 residential investment growth than that it explains much of 2013 consumption growth. But even here, there is a strong hint that monetary policy mattered: from December 2012 to June 2013, the percent of borrowers choosing fixed rather than variable-rate mortgages increased by almost 10 percentage points.⁴⁵

Overall, we believe there are plausible reasons to attribute much of the increase in consumption to monetary policy. If we simply assign all of the consumption increase relative to the forecast counterfactual to the monetary arrow, then Japan's new monetary policy raised 2013 output growth by roughly a percentage point. This might be an overestimate, insofar as some excess consumption growth came from other causes and was spent on imports. But it might also be an underestimate, insofar as it ignores the likely small but positive effects of monetary policy on residential investment and net exports.

Consider, therefore, one percentage point as our estimate of the contribution of monetary policy to 2013 growth. Together with a fiscal stimulus of one percent of GDP and a multiplier of one, this would imply a total

44. Fourth quarter over fourth quarter, in 1996 real GDP rose 3.4 percent, consumer durables rose 12.0 percent, and residential investment rose 17.4 percent.

45. See "Japan Condo Sales Flying High on Abenomics," *Wall Street Journal*, September 19, 2013.

Abenomics effect of two percentage points.⁴⁶ That is much larger than the 0.9 percentage point difference between actual growth and the Consensus Economics forecast in December 2012. But, as we noted above, this is a conservative counterfactual. If instead we use the most pessimistic forecast from the statistical models in table 3—which is -0.25 percent—then Abenomics raised GDP growth by 1.75 percentage points, very close to the above calculation.

In short, while one can make a case that monetary policy added little to 2013 growth, one can also argue that it added roughly a percentage point to GDP. This large confidence interval reflects the difficulty of disentangling simultaneous monetary and fiscal changes. Nevertheless, we find the evidence in favor of some positive effects of monetary policy to be compelling.

II.G. Discussion

The above analysis implies that the effects of Japan's new monetary policy in 2013 were modest relative to the output gap. An important reason why the effects were not larger is the behavior of net exports. Despite the 20 percent depreciation of the yen in spring 2013, real net exports deteriorated over the year (figure 9, middle panel). Of course, that *nominal* net exports fell is unsurprising. Whether a currency depreciation raises nominal net exports depends on the Marshall-Lerner condition. Assuming that net exports are initially zero, the sum of import and export elasticities must exceed one in order for depreciation to raise nominal net exports. This condition is unlikely to be satisfied immediately, but is generally assumed to hold in the long run. Initially there is little response of quantities, so price effects dominate and the trade balance deteriorates. But long-run elasticities are larger, so eventually quantities adjust and nominal net exports rise above their pre-depreciation value. This is the so-called J-curve (Magee 1973; Bahmani-Oskooee and Ratha 2004). Japan is still on the downward slope. Nominal net exports fell from -2.4 percent of GDP in the first quarter of 2013 to -3.7 percent of GDP in the fourth quarter of 2013.

In the real national accounts data, separate price deflators are used for each component of real GDP, including imports. So the price effects that have driven down Japan's nominal trade balance are taken out. Yen depreciation cannot explain why real net exports have subtracted from Japanese

46. Auerbach and Gorodnichenko (2014) provide estimates of the government spending multiplier in Japan. Their estimates suggest large uncertainty about its current value.

real GDP growth in 2013—quite the opposite. As long as the elasticities of export and import volumes with respect to the real exchange rate are positive, a real depreciation should lead to some increase in export volumes and some decrease in import volumes.

In fact, year-over-year in 2013, export volumes (real exports) rose only 1.6 percent while import volumes rose 3.4 percent. Part of the explanation is that Japanese trade quantities appear to be quite inelastic with respect to yen movements. Japanese exports are overwhelmingly manufactures. In 2013, 73 percent of goods exports were in the categories of “manufactured goods,” “machinery,” “electrical machinery,” and “transport equipment” (such as motor vehicles). These are sectors in which so-called pricing to market is likely. Exporters of manufactures are likely to set prices in foreign currency. These prices will be set for a variety of competitive reasons (such as to maintain market share) and will thus be relatively unresponsive to short-run changes in the yen’s value.⁴⁷ An older literature suggests that such pricing to market is more prevalent among Japanese exporters than it is among other countries’ exporters (Dominguez 1999; Gagnon and Knetter 1995).

Consider one of Japan’s largest exports: automobiles. Gagnon and Knetter (1995, table 6) find that between 1978 and 1983, when the real value of the yen fell 39 percent against the dollar, the real retail price of a Honda Civic fell only 7 percent. Casual observation suggests a similar phenomenon is occurring today; Japanese cars sold in the United States are not 25 percent cheaper now than they were in 2012. Such pricing to market can explain why Japanese exports have not risen more. The number of Japanese cars exported, for instance, rose only 1.3 percent between December 2012 and December 2013.

Short-run elasticities may even be smaller for imports. Hooper, Johnson, and Marquez (2000) estimate that the short-run elasticity of Japanese imports with respect to the exchange rate is only -0.1 . This estimate is based on historical data, but it is unlikely that recent changes have improved matters. In 2013, fossil fuels accounted for 34 percent of Japan’s imports, equivalent to 5.7 percent of Japanese GDP. By contrast, in 2004, energy imports were only 2 percent of GDP. The change has been driven by the rise in the world price of oil and the 2011 tsunami. Prior to the tsunami, Japan produced roughly a quarter of its electricity from nuclear power. All

47. There is a large literature on pricing to market. See Krugman (1987) and Atkeson and Burstein (2008).

nuclear reactors are now shut down, with fossil fuel imports substituted. Unfortunately for the trade balance, demand for imports—including fossil fuels—is quite inelastic. From December 2012 to December 2013, for instance, the quantity of oil imported rose 0.2 percent despite a 19 percent increase in the yen price of oil.

Aside from net exports, the effects of a weaker yen on real GDP are ambiguous. On the one hand, as documented in section II.B, a weaker yen is a major reason why deflation ended in 2013. By raising actual inflation, yen weakness likely contributed to higher expected inflation and thus to lower real interest rates. On the other hand, a weaker currency has direct negative effects on aggregate demand. More resources spent on imported goods mean fewer resources spent on domestic goods.

Therefore, currency depreciations appear to be a less effective short-run tool to jump-start an economy at the zero lower bound than originally anticipated, at least in Japan.⁴⁸ If the yen's current level proves persistent, however, it is likely that firms and consumers will change their behavior in ways that significantly lower imports and raise exports. As long as yen weakness persists, it is reasonable to expect net exports to contribute to medium-run growth.

III. Medium-Run to Long-Run Outlook

In the previous section we discussed the behavior of Japanese output and inflation in 2013, and we argued that Abenomics as a whole likely added between 0.9 and 1.8 percentage points to 2013 growth, with strong, though circumstantial, evidence that monetary policy explains part of this gain. But proponents of Abenomics hope for more than one good year. Presumably, the ultimate goal is to close Japan's output gap.

There are two distinct questions here. First, does Abenomics generally, and the monetary policy regime change in particular, pass a cost-benefit test? Do the expected benefits, even if small, exceed the costs? To that our answer is a likely *yes*. The second question is whether Japan's monetary policy is likely to have large output effects, perhaps large enough to close the large (and, as we shall see, possibly growing) output gap of 4.5 to 10 percent that we found in section I. To that, our answer is that it is too soon to tell, but as of yet there is little evidence of effects this large.

48. For instance, McCallum (2000) and Svensson (2003) argue for currency depreciations to jump-start an economy at the zero lower bound, along with other measures such as price-level targeting.

We look at four sources of evidence on the medium- to long-run effects of Abenomics: professional forecasts, the stock market, a comparison with Franklin Roosevelt's regime change, and Keynesian models. Unfortunately, each of these sources of evidence has problems, and they do not paint a consistent picture. In particular, current data and professional forecasts are inconsistent with the larger effects suggested by the analogy to the United States in 1933 and by new Keynesian models.

It is worth emphasizing again that we take Abenomics' effect on inflation expectations as given. Inflation expectations have not (yet) risen to 2 percent (see section II). As we discuss further in section IV, if Japan's new inflation target becomes more credible, its positive effects will likely be larger.

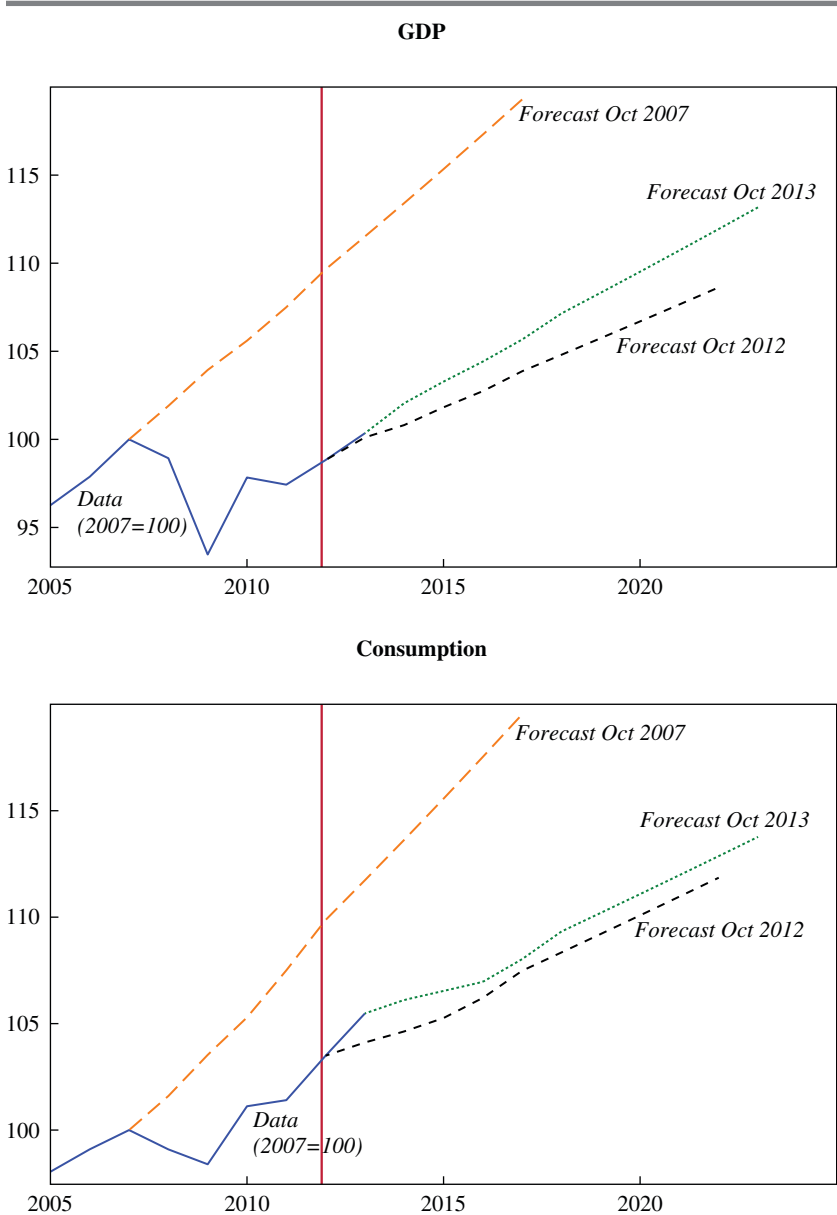
III.A. Forecasts

We first consider an obvious source: professional forecasts. In particular, we examine long-run forecasts from Consensus Economics. Figure 11 (top panel) shows that between October 2012 and October 2013, professional forecasters not only raised their level forecasts for GDP, they also raised their long-run growth forecast from 0.9 percent to 1.1 percent. Output in 2022 is predicted to be 3.1 percent above the pre-Abenomics forecast. Importantly, in October 2012, Japan had already legislated the 2014 and 2015 consumption tax increases, so the forecast change from October 2012 to October 2013 measures only the effects of Abe's new policies.

Whether this forecast revision is good or bad news depends on one's perspective. It suggests a greater than 3 percent output gain in perpetuity. That is a large gain for any economic policy, particularly one with few obvious costs. On the other hand, these forecasts suggest little prospect of closing Japan's output gap. As a benchmark, we plot forecasts made in late 2007. In section I.B we argued that this provides a reasonable measure of the output gap. With this metric, output was 10 percent below its potential in 2012. As of late 2012, this gap was projected to grow to 13 percent in 2017. While Abenomics is projected to raise long-run growth, current forecasts still show this gap widening to 11 percent in 2017. Put differently, forecasters do not expect Abenomics to close the gap with their 2007 view of Japanese economic prospects. If one had hoped that Japan's monetary regime change would eliminate Japan's demand-side problems, this is disappointing news.⁴⁹

49. Similar implications obtain from the Okun's law calculation of the output gap discussed in section I.B. As of October 2013, the IMF forecasts that Japanese unemployment will be above 4.2 percent through 2018 (the end of the forecast horizon), implying a persistent 10 percent output gap (International Monetary Fund 2013c).

Figure 11. Actual and Forecast Output and Consumption, 2005–23^a



Source: Consensus Economics.

a. The Abenomics period begins in 2012, indicated by the vertical line.

The forecasts for consumption (figure 11, bottom panel), nonresidential investment (not shown in figure 11), and industrial production (also not shown) have similar implications. A one-percent-level gain is projected for consumption, but that is not large enough to close the gap with the late 2007 projection. Consumption is forecast to grow less than output, presumably because forecasters expect a weaker yen to raise real net exports. Business investment in 2012 is more than 20 percent below the 2007 projection, and while Abenomics has led to upward forecast revisions, the change is too small to close this gap.

The forecast revisions we document here appear to be consistent with those of the general public, whose output expectations we can examine by looking at individuals' responses in the Bank of Japan opinion survey and firms' responses in the Tankan business survey.⁵⁰ Respondents to the Bank of Japan survey were pessimistic both before and after Abenomics. Before Abenomics, in September 2012, only 5.3 percent of these respondents expected their income to rise over the next year, and 45.8 percent expected it to fall. After Abenomics, in December 2013, 8.1 of respondents expected their income to rise, and 37.8 percent expected it to fall, indicating improvement. However, since 80.9 percent of respondents in December 2013 also expected prices to go up (either slightly or substantially), at least 72.8 percent of the polled population expected their real income to fall. (By comparison, in the United States, only 47 percent of respondents to the August 2013 Michigan consumer survey expected their real income to fall over the next year.)

In the December 2013 Tankan survey, we examine whether firms describe business conditions as favorable or unfavorable, and whether firms say there is excess demand or excess supply for products and services. For the first time since the financial crisis, net favorability ratings were now positive, matching their early-2007 level. But unsurprisingly, the December 2013 figures are some distance away from the very positive levels of the late 1980s. Responses to the excess supply question show that in 2013, instances of excess supply fell and those of excess demand rose. On net, excess supply still exceeds excess demand, but on this question responses have improved over their early 2007 levels.

These three sources of forecasts suggest cautious optimism. But so far there have been no signals of a dramatic break with the growth rates of the 1990s and 2000s. Of course, a limitation of this evidence is that it is

50. The Tankan survey polls a sample of 10,000 private enterprises with more than ¥20 million in capital for quantitative and qualitative data.

difficult to know what part of Abenomics is driving forecast revisions. Upward revisions could reflect forecasters' belief that growth-enhancing structural reforms will take place. Or perhaps forecasters think that monetary policy will increase growth, even in the long run. The fact that long-run inflation forecasts have risen certainly points to an important role for monetary policy, since structural reforms would presumably lower expected future prices. But we cannot rule out the possibility that the real side is (in the long run) primarily determined by structural reforms while the nominal side is primarily determined by monetary policy.

Even as an indicator of the effects of Abenomics as a whole, these forecasts are not definitive. Economic forecasters have no crystal ball, and their past experience could be a misleading guide to the effects of a large-scale policy change. Previous work has shown that forecasters may be slow in updating to news (Coibion and Gorodnichenko 2012). In online appendix A, tables 5 and 6, we show that short- and long-run professional forecast revisions have historically been reasonable in the sense that they have been unbiased. In other words, when GDP growth forecasts are revised from 0.5 percent to 1 percent, our best guess is that actual GDP growth will be 1 percent. This makes us sufficiently confident to present the forecast data here, but it does not establish that the forecasts will be good guides to Japan's future.

III.B. Stock Market

The small changes in forecasts of professionals and households may seem surprising given Japan's dramatic stock market boom. Between October 2012 and December 2013, the Nikkei 225 rose by 77 percent and the broader Topix index by 70 percent. Does this not suggest that Abenomics will have much larger real effects than professional forecasts imply? To answer that question, we investigate how well stock prices forecast dividend growth. To provide intuition for our exercise, we use the Gordon growth formula: when dividends D grow at a constant rate g and are discounted at a constant rate r , then the stock price is given by

$$(1) \quad P = \frac{D}{r - g}.$$

Thus, stock prices should be proportional to dividends, holding r and g constant.

In 2013, stock prices rose much faster than dividends. The MSCI Japan index, which has a long history of dividend data, rose by 76.9 percent from

October 2012 to December 2013, but nominal net dividends only rose by 9.1 percent since the third quarter of 2012. This suggests that either r has fallen or g has risen. But only an increase in growth rates would imply large real output effects. If discount rates (r) fall, for instance because investors become less risk averse or become irrationally exuberant, then stock prices might not forecast real growth.⁵¹

One should keep in mind the limits of this exercise: the stock market, at best, forecasts dividend growth and not necessarily GDP growth. These series differ notably: dividends are much more volatile than GDP. Since 1980 the standard deviation of annual dividend growth (22.3 percent) is nine times that of GDP growth (2.5 percent). For example, in 2009 real GDP fell by 5.5 percent while dividends declined by 36.2 percent. The overall correlation between year-on-year GDP growth and dividend growth is quite low—only 0.14 since 1980. Thus, to the extent that the stock market is a poor forecaster of dividend growth, it is likely an even worse forecaster of GDP growth.

We follow John Campbell and Robert Shiller (1988) to determine how well the stock market has historically forecast dividend growth in Japan.⁵² We define the (ex-post) discount rate R_{t+1} as the value that makes current prices equal to discounted future prices plus dividends, $P_t \equiv \frac{P_{t+1} + D_{t+1}}{R_{t+1}}$. This implies that the discount rate is identical to the ex-post return. Log-linearizing this equation and solving forward for h periods yields the Campbell-Shiller decomposition

$$(2) \quad d_t - p_t = \sum_{j=0}^{h-1} \rho^j r_{t+j+1} - \sum_{j=0}^{h-1} \rho^j \Delta d_{t+j+1} + \rho^h (d_{t+h} - p_{t+h}).$$

Here $d_t - p_t$ is the log dividend-price ratio, r_{t+j+1} are future log discount rates, Δd_{t+j+1} is log dividend growth, and $\rho = \frac{1}{1 + \exp\{\overline{d - p}\}} < 1$ is a constant.

For large h , and in the absence of bubbles, the last term will be close to zero. Thus, as a matter of accounting, low dividend-price ratios must be followed by either lower future discount rates (that is, lower future returns) or higher

51. Note that our use of the term “discount rates” encompasses both rational and behavioral elements, as in Cochrane (2011). It should thus be thought of as a residual: any price movements we cannot explain with dividend levels or dividend growth will necessarily show up in discount rates.

52. The first study we are aware of that tests for predictability of returns using the dividend-price ratio in Japan is Campbell and Hamao (1992).

Table 4. Campbell-Shiller Decomposition^a

	<i>h</i> = 10 years		<i>h</i> = 15 years		<i>h</i> = 20 years	
	b_r^h	b_d^h	b_r^h	b_d^h	b_r^h	b_d^h
Net returns ^b	0.97** (0.17)	0.03 (0.16)	1.23** (0.10)	0.08 (0.09)	1.13** (0.10)	-0.03 (0.05)
Gross returns ^c	0.95** (0.16)	0.07 (0.12)	1.19** (0.11)	0.13* (0.06)	1.10** (0.10)	0.04 (0.04)
<i>N</i>	133	133	113	113	93	93

a. b_r^h is the slope estimate of a regression of future realized returns, $\sum_{j=0}^{h-1} \rho^j r_{t+j+1}$, on the log dividend-price ratio $d_t - p_t$. b_d^h is the slope estimate of a regression of future realized dividend growth, $\sum_{j=0}^{h-1} \rho^j \Delta d_{t+j+1}$, on the log dividend-price ratio $d_t - p_t$. $\rho = 0.9874$, based on a historical mean of the dividend-price ratio. Newey-West standard errors are in parentheses (bandwidth = *h*). Statistical significance at the *5 percent and **1 percent levels.

b. The “net returns” row shows results for dividends net of taxes.

c. The “gross returns” row shows results for gross dividends.

dividend growth. One can determine the importance of each component with the regressions,

$$(3) \quad \sum_{j=0}^{h-1} \rho^j r_{t+j+1} = a_r^h + b_r^h (d_t - p_t) + \varepsilon_{r,t}^h \text{ and}$$

$$(4) \quad \sum_{j=0}^{h-1} \rho^j \Delta d_{t+j+1} = a_d^h + b_d^h (d_t - p_t) + \varepsilon_{d,t}^h.$$

These regressions answer the following question: Given that stock prices have risen faster than dividends in 2013, should we expect higher growth (higher *g* in equation 1) or lower discount rates in the future (lower *r* in equation 1)? In other words, we are asking how well the stock market has historically forecast growth. Note that for large enough *h* (and absent bubbles), we should find that $b_r^h - b_d^h = 1$. Further, the size of the coefficients determines the relative importance of discount rates versus dividend growth: If $b_r^h \approx 1$ then the dividend-price ratio forecasts discount rates (returns); if $b_d^h \approx -1$ then the dividend-price ratio forecasts future dividend growth. In their seminal work, Campbell and Shiller (1988) show that in the United States, the dividend-price ratio almost exclusively forecasts discount rates and not dividend growth, that is, $b_r^h \approx 1$ and $b_d^h \approx 0$.

Table 4 tabulates the coefficients b_r^h and b_d^h at horizons of 10, 15, and 20 years for gross and net returns. Like Campbell and Shiller (1988), we find that the dividend-price ratio strongly forecasts discount rates (returns),

with $b_r^h \approx 1$. By contrast, estimates of b_d^h are always close to zero and typically insignificant. If anything, the positive estimates of b_d^h imply that high prices relative to dividends forecast *lower* future dividend growth. What does this mean? If $b_d^h = 0$, then prices have historically reverted to a level consistent with dividends. Since dividends rose by approximately 9.1 percent in 2013, our best (long-run) forecast for future prices is that they will fall until they are 9.1 percent above those in November 2012. Thus, this exercise suggests caution in interpreting high stock prices (relative to dividends) as an implicit forecast of future dividend growth, even leaving aside the issues of linking dividend growth to GDP growth.

The stock market, at least unconditionally, gives no reason to expect future rapid growth in Japan. It is more likely that Japan will see falling stock prices than higher dividend growth—or so the history suggests. To argue that the recent behavior of the stock market forecasts future growth, one needs to argue that this robust historical relationship does not hold today.

III.C. The Roosevelt Analogy

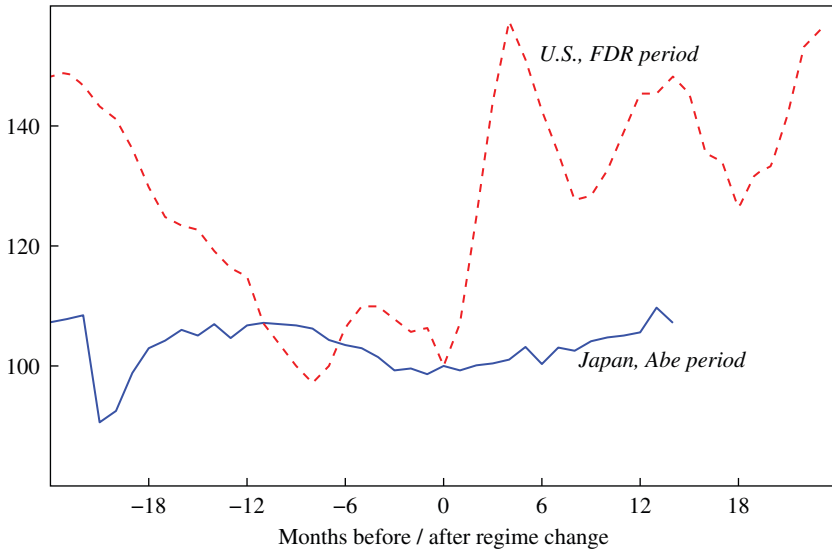
Given the uncertainty of predictions from professional forecasts and the stock market, it is natural to turn to history as a guide to the prospects for Japan's monetary regime change. The analogy most often discussed is to Franklin Roosevelt's monetary policy regime change in spring 1933. This is far from the only possible analogy: for instance, one might fruitfully compare current Japanese policies to disinflation efforts in the United States and Europe in the early 1980s and to other countries' efforts to reflate in the 1930s. But given its prominence, we focus on the analogy to the United States in 1933.

The U.S. recovery after Roosevelt's first inauguration in March 1933 is widely interpreted as evidence for the effectiveness of monetary policy regime changes—with direct implications for Japan (Temin and Wigmore 1990; Eggertsson 2008; Romer 2013).⁵³ And it is not only outside observers who have found the 1933 analogy useful. In a speech on December 25, 2013, the Bank of Japan's governor, Haruhiko Kuroda, argued that the U.S. economy's response to Roosevelt's actions shows that monetary policy can quickly raise inflation expectations (Kuroda 2013). We now explore the extent to which this comparison is warranted: Does 1933 indeed have lessons for Japan today?

53. Also see the op-ed by Barry Eichengreen, "Giving Abe's Policy a Chance," in *Caixin Online* February 18, 2013, <http://english.caixin.com/2013-02-18/100491854.html?p2>.

Figure 12. Industrial Production in the U.S. (1931–35) and Japan (2010–14)

Industrial production (SA)



Source: See online appendix C.

Notes: Industrial production in the U.S. after Franklin Roosevelt (FDR) took office in March 1933 and in Japan after Shinzo Abe took office in December 2012. Industrial production is indexed to be 100 in the month that each leader took office.

Two obvious similarities have motivated comparisons. First, the United States in 1933, like Japan in 2012, was suffering from deflation and a large output gap, and its monetary policy was similarly constrained by the zero lower bound. Second, Franklin Roosevelt, like Shinzo Abe, attempted a monetary policy regime change. The American president combined actions and words to convince the public that deflation would be replaced by moderate inflation. Of course, the scale of the economic problems that confronted each leader was quite different. Roosevelt's inauguration followed three years of continuous large declines in output and prices. In 1932 alone, real GDP in the United States fell 13 percent, and the CPI fell 10 percent. By contrast, over a period of 14 years in Japan, from 1998 to 2012, the cumulative decline in the CPI was 4 percent.

Figure 12 shows the path of industrial production before and after Roosevelt and Abe took office. It makes clear why the Roosevelt example inspires optimism about Abenomics. In the four months following Roosevelt's inauguration, seasonally adjusted industrial production rose 57 percent. This initial expansion persisted: real GDP growth from 1934

through 1936 averaged 11 percent per year. Many economists have argued that this growth was primarily explained by the effects of Roosevelt's monetary policy on inflation and output expectations (Temin and Wigmore 1990; Romer 1992; Eggertsson 2008).

The lesson usually drawn from this episode is that regime changes can have large, sustained effects on output. This suggests that Japan's new monetary policy could have large output effects. But it also raises a puzzle: Why did Roosevelt's actions have large, immediate effects in a way that Abe's policies have not?

One answer is that Roosevelt's policy change was much larger. In online appendix B, we provide a detailed comparison of the change in the real interest rate in Japan now with that in the United States between 1932 and 1934. Using inflation swaps as a measure of expected inflation, *ex ante* 10-year real interest rates fell 1.1 percentage points between October 2012 and March 2014 in Japan, whereas real interest rates fell by 2 to 4 percentage points between 1932 and 1934 in the United States.

This exercise suggests that the change in the real interest rate in the United States in 1933 was between two and four times as large as that in Japan in 2013. Therefore, all else equal, one might expect the effects of Abenomics to be only a quarter to one half as large as those of Roosevelt's actions. But this only resolves part of the puzzle. Abenomics has achieved far less than half or even a quarter of U.S. growth after 1933. The optimistic view is that this puzzle will be resolved by future rapid growth in Japan; perhaps the difference between Japan now and the United States in 1933 is simply in the lags with which a monetary regime change affects the economy. We are more inclined toward the pessimistic view, that 2013 data reflect fundamental differences between the current situation in Japan and the situation in the United States in 1933.

III.D. Keynesian Models

Like historical episodes, models are a natural place to turn for evidence on the effects of a new macro policy. In particular, since financial markets allow us to precisely measure the effect of Abenomics on the real interest rate, we can combine this measure with a model-implied estimate of the effect on output of a change in the real interest rate.

We first use the baseline new Keynesian model from Michael Woodford (2003, ch. 4). It consists of an Euler equation, a new Keynesian Phillips curve, and an interest-rate rule. It implies the conventional IS relationship

$$(5) \quad \hat{y}_t = -\sigma E_t \sum_{s=0}^{\infty} r_{t+s} + \hat{y}_{\infty},$$

where \hat{y}_t is the deviation of output from steady-state, r_{t+s} is the ex-ante one-year real interest rate from $t + s$ to $t + s + 1$, and σ is the intertemporal elasticity of substitution. In this model, the (peak) change in output from reducing the annualized 10-year real rate by r is $\frac{dY}{dr} = -10\sigma$. Since typical calibrations (such as those in Eggertsson and Woodford 2003; Christiano, Eichenbaum, and Evans 2005; and Smets and Wouters 2007) set σ between 0.5 and 1, the 1.1 percentage point decline in the 10-year real interest rate⁵⁴ should raise output by 5.5 to 11 percent. There are no sources of persistence in this model, so the output effect should be immediate.

As a second example, consider the model of Frank Smets and Rafael Wouters (2007). This is a medium-scale new Keynesian model that incorporates, among other features, capital, habits, sticky wages, price- and wage-indexation, and interest-rate smoothing. We take the estimated parameters in Smets and Wouters (2007) as given and conduct the following experiment. First, we subject the model to a discount factor shock such that the zero lower bound binds for eight quarters—the maximum duration for which a unique equilibrium exists in the model. Next we add a one-standard-deviation monetary policy shock and calculate the difference in outcomes, with and without the monetary shock. We are particularly interested in two numbers: the change in 10-year real interest rates, dr , and the maximum change in output due to the monetary shock, dY . We then calculate the peak interest-rate semi-elasticity of output, $\frac{dY}{dr}$. The result is -7.0 after 5 quarters. Based on the 1.1-percentage-point decline in the 10-year real interest rate, this model predicts an increase in output of $7.0 \times 1.1 = 7.7$ percent after 5 quarters.

Unlike in the baseline new Keynesian model, the effects of a real interest-rate change in the Smets-Wouters model are not immediate, although they happen more quickly than is consistent with Japanese data. Most of the decline in Japanese real interest rates had occurred by late spring 2013, but output does not look as if it will be 6 or 7 percent higher in summer 2014. Thus, conventionally calibrated new Keynesian models suggest much larger—or at least faster—gains than are currently apparent in the data or in professional forecasts.

54. This is the decline in figure 4 between October 2012 and March 2014. Most of this decline in the real interest rate occurred in the first half of 2013; between October 2012 and May 2013 the real interest rate fell 0.9 percentage point.

Like the new Keynesian IS curve, an old Keynesian IS curve suggests large effects of a change in the real interest rate. But since (some) old Keynesian models are purely backward looking, they can do a better job of matching an initially small output gain in 2013. Consider the old Keynesian IS curve suggested by Ball (1999): $y_t = \lambda y_{t-1} - r_{t-1}$, where y_t is the natural log of output in year t . Ball (1999) calibrates λ to be 0.8.⁵⁵ Assuming the reduction in 10-year bond yields is spread out equally over time, this implies an output gain of 4.9 percent after 10 years.⁵⁶ Because the IS curve is purely backward looking, the dynamics are slow. Output gains in the first year after the real interest rate change are only equal to the change in the real interest rate. Thus, this model fits with positive but small output gains from monetary policy in 2013, and it suggests that the gains from monetary policy will be more visible in 2014.

While old and new Keynesian models disagree about the speed of adjustment to a monetary regime shift, they both suggest that the medium-run effects of monetary policy are larger than professional forecasts imply. Furthermore, throughout this analysis we have assumed that the monetary regime shift will remain imperfectly credible and thus will only lower future real interest rates by 1.1 percentage points. Assuming that the policy becomes more credible over time would imply even larger effects. In short, Keynesian models imply large real effects from the first arrow of Abenomics. That we do not (yet) observe such rapid growth suggests three possibilities. A first possibility is (i) that (unobserved) negative shocks have been reducing Japanese growth; such shocks would, however, need to be as large as the 2008 financial crisis to depress growth from the 6 to 7 percent implied by the model to the 1.5 percent we observe in the data. In our view, more plausible candidates are (ii) that real-world dynamics are primarily backward-looking (as in old Keynesian models), or (iii) that these models overestimate the effect of monetary policy.

III.E. The Consumption Tax Increases

We have focused on monetary policy, since it is the most radical element of Abenomics. But it is also worthwhile to compare the future effects of Japan's expansionary monetary policy with those of the consumption tax increases. As discussed in section II, fiscal policy has become contractionary

55. Ball (2006) argues that λ is 0.6 in Japan. For comparison with the new Keynesian models calibrated with U.S. data, we use λ equal to 0.8.

56. The effect in year t is given by $y_t = ([1 - 0.8]^t / [1 - 0.8]) \times 1.1$ for t less than or equal to 10.

due to the sales tax increase in April 2014 (from 5 to 8 percent) and the second increase scheduled for October 2015 (from 8 to 10 percent). Here we confine ourselves to an examination of how these legislated tax increases affect long-run forecasts.⁵⁷

The original tax bill was passed on June 26, 2012. We compare long-term forecasts for 2014 and 2015 made in April 2012 and October 2012. The 2014 growth forecasts were revised downward by 0.5 percentage point and the 2015 forecasts by 0.1 percentage point. This may be an upper bound on the negative effects of the consumption tax increase. From April 2012 to October 2012, growth forecasts for all years were generally revised downward by 0.1 to 0.2 percentage point, suggesting that during these six months other bad news was revealed. This forecast-based estimate of the consumption taxes' effect can be compared to model-based estimates from the IMF, which imply a 1.0 percent cumulative contraction.⁵⁸ The forecast revisions after the consumption tax increase were much smaller than the revisions made after Abe's new policies were revealed, even if we focus solely on the years 2014 and 2015. As discussed above, and as shown in figure 11, between October 2012 and October 2013, forecasters revised up their estimate of 2014 growth by one percentage point and their estimate of 2015 growth by 0.2 percentage point.

It is a matter of semantics whether one regards the consumption tax increases as part of Abenomics. They are not new policies. But Abe adopted them, and they are often considered an integral part of his "second arrow." What our discussion suggests is that even taking account of these tax increases, Abenomics will likely have net positive effects on output.

III.F. Discussion

The preceding pages may appear needlessly complicated: Why not simply look to a model or to forecasters for insight into Japan's future prospects? Our discussion of several sources has been deliberate, however. We do not believe that any single source is a reliable guide. Here we return to the two motivating questions of this section: (i) Will Abenomics' future benefits exceed the costs? and (ii) Will Abenomics close Japan's output gap?

We start with the second question. In section I.B, we estimated the 2013 output gap in Japan to be 4.5 to 10 percent. It appears unlikely that

57. Of course, just as with monetary policy, one could explore other sources of evidence on the effects of the consumption tax increases.

58. Kang, Keen, and Pradhan (2011) show that a VAT increase of 1 percent of GDP reduces GDP by 0.4 percent in the IMF's GIMF model for Japan (their figure 4). We combine this with the estimated budget impact of the consumption tax increase of 2.5 percent of GDP to obtain the 1.0 percent figure in the text.

Abenomics will close a gap this large; current professional forecasts suggest the gap will actually widen. The historical behavior of the Japanese stock market suggests that lower stock prices are more likely to be in Japan's future than higher profits and dividends. And since both the 1933 analogy and new Keynesian models have difficulty explaining Japan's slow growth in 2013, this suggests that these two sources may be poor guides to the future. Of course, our conclusion that Abenomics is unlikely to close Japan's output gap is enormously uncertain. Professional forecasters could be wrong. Japan's economy may simply be responding more slowly than the U.S. economy did in 1933 or new Keynesian models predict. Or perhaps very large negative shocks depressed the Japanese economy in 2013, and the large gains suggested by history and by new Keynesian models will become visible in 2014.

To the first question, we have both a more certain and a more positive answer: the benefits of Japan's new monetary policy, and of Abenomics as a whole, appear almost certain to exceed the costs. In part, this is because all the data point to at least some positive output effect. But even if monetary policy has no effect on output, the real interest rate decline is good for Japan's fiscal situation. Here we perform an illustrative calculation that compares the effects of a change in the real interest rate with the effects of other policies on Japan's budget outlook.

We take 2013 net debt of 140 percent of GDP from the IMF's October 2013 *World Economic Outlook* and the following values from Takero Doi, Takeo Hoshi, and Tatsuyoshi Okimoto (2011): tax rates and social security contributions are 30 percent of GDP, general government expenditure (including social security benefits) are 39 percent of GDP, and annual real GDP growth is 1 percent. We further assume that the real interest rate on debt for the next 10 years is initially 0.43 percent per year—the yield on 10-year government bonds minus the 10-year inflation swap rate in October 2012. We then compare the evolution of debt over the next 10 years with and without Abe's fiscal and monetary policy. Abenomics' impact consists of raising expenditures temporarily by 1 percent of GDP in year one and by 0.5 percent in year two, raising tax income permanently by 1.5 percent of GDP in year two and another 1 percent in year three, and lowering the real interest rate on debt by 1.1 percentage points per year.⁵⁹ We make the

59. We implicitly assume that the government refinances all debt into 10-year bond yields. In practice, since most of the decline in real interest rates comes from a rise in expected inflation (which does not require refinancing to affect real debt levels), this assumption is not particularly important.

conservative assumption that any future deficits must be financed with debt carrying the old 0.4 percent real interest rate.

In the baseline scenario, without Abenomics, net debt rises to 220 percent of GDP after 10 years. With Abenomics, net debt rises to 185.3 percent. Thus Abenomics has shaved 34.8 percentage points off the future debt burden. Most of the decline is accounted for by the consumption tax increase (21 percentage points), although the fall in real interest rates is a nontrivial second factor (14.2 percentage points).⁶⁰ The temporary stimulus packages, on the other hand, play only a very small role over the 10-year horizon. Note that to ensure that this simulation is a conservative one, we exclude any effects of Abenomics on real GDP. If Abenomics does increase real GDP, it will further reduce the debt-to-GDP ratio. This effect would come both through a larger denominator and through the effect of higher tax revenue on the numerator.

In short, Abenomics has improved the fiscal outlook through both the tax hikes and the monetary arrow. If improving the fiscal outlook is a good thing in and of itself, then Abenomics, and more expansionary monetary policy in particular, looks like good policy, even if one believes output effects will be small or nonexistent.

Against the benefits of Japan's new monetary policy, one must tally the costs. To our mind, these are likely to be small. One might think that the most obvious cost is higher inflation. This is not necessarily true. The costs of higher price dispersion and deviations from the Friedman rule need to be balanced against the benefit of higher steady-state nominal interest rates, which allow the economy to avoid the zero lower bound. Olivier Coibion, Yuriy Gorodnichenko, and Johannes Wieland (2012) suggest that in an economy like Japan's, the optimal inflation rate is more likely to be 2 percent than it is to be zero percent.⁶¹

Another possible concern is that higher inflation will at some point drive down nominal bond prices through the Fisher effect. Relative to a baseline without Abenomics, this would have no adverse effects on the government budget (unless real interest rates rose with nominal interest rates). But it might cause problems for the banking sector, which holds

60. Joseph Gagnon has also made the point that declining real interest rates have large fiscal benefits for Japan. See his RealTime Economic Issues Watch blog entry, "Saving Abenomics: No Time for Cold Feet on QE," dated June 14, 2013, at <http://blogs.piie.com/realtime/?p=3624>.

61. Ball (2013) argues for even higher inflation targets.

large amounts of government debt on its balance sheet (Hoshi 2013). As of early 2014, this scenario is entirely speculative. Abenomics has thus far driven up the price of government bonds, improving the position of banks that hold these bonds.

One might wonder how the Bank of Japan will eventually normalize monetary policy after expanding its balance sheet to an unprecedented size. In principle, the Bank of Japan should be able to contain any inflationary pressures by paying interest on the (now expanded) excess reserves (Hall and Reis 2013). By raising interest rates, however, it would suffer losses on its portfolio of long-run government bonds. As emphasized by Ben Bernanke (2000, 2003), such losses need not be of any economic consequence. Whether a central bank transfers resources to the government or vice versa ought to be irrelevant for macroeconomic policy. But in practice, the distinction between positive and negative transfers may be politically important, with required positive transfers to the central bank endangering central bank independence (Hall and Reis 2013). Given the already close cooperation between the Bank of Japan and Abe's government, we doubt that such transfers would lead to large changes in the Bank of Japan's policy. Furthermore, as detailed by Bernanke (2003), the Japanese Ministry of Finance and the Bank of Japan could agree to an interest rate swap that would nearly eliminate the Bank of Japan's balance sheet risk. Thus we see little reason for this concern to have much influence on Japanese policy. Central bank solvency concerns could be more important in other countries, where unconventional expansionary monetary policy might not be endorsed by the government as a whole.

Another common worry is that unconventional monetary policy will lead financial institutions to "reach for yield," by taking on more risk than is optimal for the financial system as a whole. This has been more often discussed in the United States context than in the Japanese context, but it is a risk of any policy that pushes down safe real interest rates, as Abenomics has done. Gabriel Chodorow-Reich (2014) shows that unconventional monetary policy also affects financial institutions through other channels, some of which are likely to reduce vulnerability to shocks. Both in theory and (at least in the United States) in practice, it is very unclear that the "reach for yield" effect dominates.

Overall, we see the evidence as strongly in favor of positive net benefits from Abenomics, whether considered as an entire policy package or as monetary policy alone. This is the more remarkable since we have not considered the third arrow—structural reforms. Abe's structural reforms are as yet imprecisely specified, so we have left a detailed treatment of them to

future work. But the right reforms could undoubtedly raise potential and actual GDP.⁶²

IV. Credibility

We have thus far treated the effects of Abenomics on inflation expectations as a given. We have evaluated a policy that has not yet convinced markets or professional forecasters that the 2 percent target will be reached. Even the Japanese government appears to be of two minds about the credibility of this target: in December 2013, Takahiro Mitani, the head of the semi-autonomous Japanese Government Pension Investment Fund, said that he expects CPI inflation to remain between 0.1 and 1 percent.⁶³

This raises two questions. First, why has the Bank of Japan been unable to make its target fully credible? Second, is there a way the Bank of Japan could make its target more credible?

We start with the first question. The Bank of Japan's lack of credibility is in some ways odd. Two percent inflation is not high by international standards. And in standard new Keynesian models, if an inflation target is optimal, then it is also a feasible (time-consistent) policy for a central bank that cannot commit to future actions (Woodford 2003, ch. 7). These points of reference suggest that the Bank of Japan ought to be able to raise inflation expectations to 2 percent or more.

Despite this, there are two good reasons to doubt the Bank of Japan's commitment. First, the Bank of Japan now has a record of announcing that it will achieve higher inflation and failing to do so. In February 1999, it began its "zero interest rate policy." It emphasized that it would maintain this policy "until deflation concerns subside" (quoted in Ito and Mishkin 2006, p. 145). In fact, it raised the interest rate to 0.25 percent in August 2000, a year in which the price level fell 0.7 percent (Ito and Mishkin 2006). Likewise, when the Bank of Japan began its quantitative easing program in March 2001, it said it would continue the policy until CPI inflation, excluding fresh food, was positive. In this case, it followed the letter of its commitment, ending the policy in March 2006 after several months of

62. Perhaps most obviously, women's labor force participation in Japan lags behind their participation in the U.S. The "activity rate" for women ages 15 to 64 (number of women employed plus unemployed divided by the female population) was 65 percent in Japan in the third quarter of 2013, as compared with 67.2 percent in the United States. Some of Abe's proposals, such as more funding for childcare, could help eliminate this gap.

63. "World's Biggest Pension Fund Sees Japan Fail on 2% Inflation," *Bloomberg News*, December 4, 2013.

positive inflation (Ugai 2007). But prices quickly began falling again: in the 12 months from March 2006 to March 2007, the CPI (excluding fresh food) fell 0.3 percent.

Demographics and the structure of Japan's pension system compound this credibility problem. Japan's large retired population has benefited from deflation. In theory, Japanese pensions are indexed to CPI inflation. But in practice, when CPI inflation has been negative, this indexation has been incomplete or has occurred only with a long lag.⁶⁴ Furthermore, the Japanese population holds over half its financial wealth in bank deposits and currency (compared to 13 percent in the United States).⁶⁵ Inflation imposes losses for which (at the very least) those who are retired cannot be compensated with labor market improvements.

The combination of benefits to the retired population and this group's outsized political power leads Robert Feldman and others (2010) to argue that Japan "made a social decision to entrench deflation" (p. 3) in the 2000s. Regardless of whether one entirely agrees, the presence of a large constituency that benefits from deflation naturally leads to questions about the government's commitment to 2 percent inflation. There is at least a hint of evidence that forecasters fear that Japan's next government might be less committed to this target. After the Liberal Democratic party, led by Abe, won seats in the House of Councillors on July 21, 2013, both 5- and 10-year inflation swap rates rose, albeit only slightly.

Much of this discussion suggests that credibility is outside the control of the Bank of Japan: it cannot change Japan's demography or its pension system. This implies that for the Bank of Japan to merely announce a different target would have little effect. For instance, while there are well-known advantages to a credible price-level target (Eggertsson and Woodford 2003), it is unclear why a price-level target would be any more credible than Japan's current inflation target, and by extension, whether Japan would see large benefits from adopting it. By contrast, further actions by the Bank of Japan could help to make the current 2 percent inflation target more credible. One lesson from the financial market response to monetary announcements (section II.A) is that for the Bank of Japan, actions speak louder than words. No doubt in part because it had not lived up to past commitments, when it merely committed to higher inflation, as

64. See Hosen (2010) and Ministry of Finance slides, p. 27 (http://www.mof.go.jp/english/public_relations/presentation/pre201310.pdf). Incidentally, this lack of indexation is another reason why inflation might improve Japan's fiscal situation.

65. Bank of Japan (2014), p. 2.

it did in January 2013, this had a much smaller effect on markets than its announcement of asset purchases (“Quantitative and Qualitative Monetary Easing”) had in April. Further large-scale asset purchases, therefore, could be beneficial.

If the Bank of Japan does manage to convince the public of its 2 percent inflation target, this will likely further stimulate the economy. By raising current long-term inflation expectations from 1.3 percent to 2 percent, long-term real interest rates would decline a further 0.7 percentage point. A linear model suggests this would increase the effects of the policy by more than 50 percent. As an illustrative calculation of the long-run effects of full credibility, consider professional forecasts of output in 2022. Abenomics (excluding the consumption tax increases) led this forecast to be revised upward by 3.1 percent (section III.A). If this is entirely a monetary policy effect, then full credibility could leave 2022 output roughly 5 percent above its no-Abenomics baseline. Although illustrative, this is likely an overestimate of what full credibility would achieve. The currently observed 3.1 percent upward forecast revision may reflect expectations of structural reforms, not only monetary policy effects. Still, this calculation shows that making the 2 percent inflation target credible could have large benefits and ought to be a high priority for the Japanese government.

V. Conclusion and Outlook

We have provided a preliminary evaluation of Abenomics and Japan’s monetary regime change in particular. Our analysis suggests that Abenomics as a whole raised 2013 GDP growth by 0.9 to 1.8 percentage points, with monetary policy accounting for up to one percentage point of this gain. This suggests large net welfare gains from Abenomics. But there is as yet little evidence that the policy will close Japan’s output gap, which we estimate to be 4.5 to 10 percent in 2013 (section I.B). For instance, professional forecasts suggest an output gain from Abenomics of 3.1 percent by 2022, excluding the consumption tax increases. Since the output gap implied by professional forecasts was projected to widen to 13 percent in 2017 absent Abenomics, this gain is far from enough to close the gap. Of course, future performance is highly uncertain, and it is quite possible that Abenomics may exceed (or underperform) our expectations and those of professional forecasters. We therefore conclude with a brief discussion of what future data releases would point to larger effects of Abenomics.

In part, the modest effects of Abenomics relative to the output gap reflect the imperfect credibility of the policy. Expected inflation is therefore a

crucial indicator. If our analysis is correct, future upward movements in inflation expectations—whether measured by inflation swaps or by surveys of professional forecasters—will be accompanied both by higher actual growth and by higher expectations of future growth. Concretely, as of January 2014, the Consensus forecasts for 2014 growth and 2015 growth are 1.7 and 1.2 percent, respectively. If inflation expectations rise, we expect the Japanese economy to beat these forecasts, perhaps significantly.

Sustained monetary stimulus likely depends on the outcome of future wage negotiations. Assuming that the marginal propensity to consume out of profits is low, real consumption cannot grow indefinitely if CPI inflation continues to outstrip money wage growth. Quite simply, this would violate individual budget constraints. Furthermore, a 2 percent inflation target may not be politically sustainable if, in addition to lowering retirement incomes, inflation lowers the incomes of working Japanese.

In the short run, the contractionary effects of fiscal policy are also an important unknown. With the consumption tax implemented in April 2014, there will be uneven growth: in the December 2013 quarterly consensus forecasts, output was expected to grow at an annualized rate of 4.9 percent in the first quarter and -4.7 percent in the second quarter. If the Japanese economy can exceed these forecasts and resume growth in the second half of 2014, this would be very good news for Abenomics. It would mean avoiding a repeat of the 1997 recession, which some have attributed to the 1997 consumption tax hike.

Perhaps the largest long-run unknown about Abenomics is the third arrow, structural reforms. No one yet knows what reforms will be enacted or what the effect of these reforms will be. If this arrow is to have large effects, we would expect to see them first in rising forecasts of real future growth and lower inflation expectations. If inflation expectations fall at the same time as growth forecasts rise, this would suggest that forecasters expect positive future supply shocks.

Developments in Japan should be of wide interest to macroeconomists. The outcome of Abenomics will determine whether Japan experiences another lost decade or resumes healthy growth. Abenomics' success may also influence policy in Europe and the United States. As this paper was being prepared for publication in April 2014, both the Federal Reserve and the European Central Bank were up against the zero lower bound, with inflation near one percent on both sides of the Atlantic. Thus far, neither the Federal Reserve nor the European Central Bank has considered a radical regime shift. If Abenomics succeeds, that may change.

ACKNOWLEDGMENTS We are grateful for extensive comments from the editors, from our discussants, Ben Bernanke and Paul Krugman, and from the participants in the spring 2014 Brookings Panel on Economic Activity. We have also benefited from conversations and assistance from Steven Braun, Gabriel Chodorow-Reich, Catherine Hausman, David Hausman, Koichiro Ito, Stefan Nagel, and Mu-Jeung Yang, as well as from comments from seminar participants at the University of California, San Diego. We thank Walid Badawi, Matthew Haarer, and Ben Meiselman for superb research assistance, and the International Policy Center at the Ford School of Public Policy for financial support. We have no relevant material or financial interests to declare regarding the content of this paper.

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Comments and Discussion

COMMENT BY

BEN BERNANKE The rational expectations revolution of the 1970s taught us that (i) private-sector expectations of how government policies will evolve are critical for determining economic outcomes and (ii) the formation of private-sector expectations in turn depends on the nature of the policy “regime,” the set of rules that govern policy responses to economic conditions. If these two premises are correct, then policymakers can effect fundamental change in the dynamics of an economy only by achieving a credible change in the policy regime. The theoretical arguments for this proposition are compelling, but empirical verification is hampered by the fact that, apart from episodes of fiscal and currency reform used to end bouts of hyperinflation in some emerging-market economies, postwar examples of credible regime changes in macroeconomic policy are rare. That is why the ongoing policy experiment in Japan, which is as close to a credible regime change as we have seen in a modern industrial economy in many years, is so interesting.

Why is Abenomics, as the new set of policies has been called, arguably a credible regime change, especially in the area of monetary policy, on which the authors of this paper, Joshua Hausman and Johannes Wieland, appropriately focus?

First, the introduction of Abenomics was not a decision made by the central bank alone. Instead, like Franklin D. Roosevelt’s canonical regime change in 1933 in the United States, it reflected a commitment by the government as a whole, applied to a range of policies, including fiscal and structural as well as monetary policies. The fact that the package included strategic changes in both monetary and nonmonetary policies likely helped to increase the public’s conviction that the government intended a structural break.

Second, the government did not simply announce a regime change in monetary policy, but took concrete steps to make the change credible. In particular, the government made clear that failure to act would have consequences for the central bank—most importantly, the possible loss of its cherished independence. Moreover, in a variant of Kenneth Rogoff’s hawkish central banker model, the government replaced a governor of the central bank who had expressed reservations about the efficacy of further monetary expansion with a governor who publicly embraced more aggressive policies.

Finally, like the Fed under Paul Volcker in 1979, which announced the adoption of money-growth targeting, the Bank of Japan itself modified its policy framework to signal a regime change. Specifically, it adopted an explicit inflation target of 2 percent, it repudiated earlier rhetoric about inflation not being a monetary phenomenon in Japan, and it essentially promised to do what it takes, in terms of asset purchases and possibly other measures, to hit its inflation target.

So the policy experiment in Japan could be very important indeed, both for economists’ understanding of how macroeconomic policies work as well as for the future of that country. In their paper, Hausman and Wieland have done a nice job evaluating the early effects of Abenomics, although (as the authors concede in the title of their paper), at this stage of the experiment any assessment must be preliminary. They try a variety of approaches and diagnostics, which together give a good sense of how Abenomics is working thus far, but only time will tell how effective the program has been.

I have a few comments on the analysis presented in the paper, and then conclude with an observation about the broader lessons of Abenomics, at least thus far.

First, the new monetary policy of “quantitative and qualitative easing” is the most concrete example so far of fundamental policy change in Japan, but the paper does not give us much information about the details of this new policy. I would have liked to have seen more discussion of the program’s implementation and rationale. How did the economists at the Bank of Japan determine which assets to buy, how much to buy, and how quickly? Importantly, through what mechanism or mechanisms does the central bank expect its purchases to affect financial conditions and the economy? Understanding the anticipated channels of effect might sharpen the tests of whether the policy is working as expected. For example, do Bank of Japan officials expect purchases to lower longer-term rates by reducing term premiums, or are they looking to purchase as a form of commitment to extended easing (a signaling effect)? If the former, did they consider

buying private instruments like corporate bonds as well as government debt? (They did engage in some credit programs.) If the latter, how did they think about the link between the quantity of purchases and private-sector expectations?

Responding to the earlier programs by the Fed and the Bank of England, a large recent literature on central-bank asset purchases has tried to quantify the effects of these purchases on financial markets and the economy and to determine the channels of those effects (for example, the portfolio-balance effect versus signaling effects). Do the early effects of the Bank of Japan's purchases on asset markets throw any light on the debates in that literature or help us to sharpen our estimates of the effects of asset purchases? Future work should look more carefully at the transmission mechanisms in Japan.

Second, the paper contains a nice discussion of the problems of measuring potential output in Japan today. I do not think a precise estimate of potential output is essential for considering the short-run effects of Abenomics, since expansionary monetary policy is both justified by the need to hit the inflation target and likely to produce at least transitory increases in output, even if output is currently close to potential. (There would be no output effect only if output were close to potential *and* the short-run aggregate supply curve were vertical at full employment, which seems unlikely.) But, of course, in the medium term we need estimates of potential output to judge how much monetary expansion is needed and how well it is working. A key question—relevant to the United States and other industrial countries as well as Japan—is whether the crisis has had permanent level or growth rate effects on potential output. The authors are right to point out that, in answering that question, we should recognize that aggregate demand and aggregate supply are not perfectly separable. In particular, long periods of underutilization can affect the supplies of capital and labor at a point in time, which may result in misleading answers from conventional approaches to measuring potential output, such as statistical filtering and production function estimation. The endogeneity of aggregate supply is, of course, a possible reason for policy to be more aggressive early in an expansion than it otherwise would be.

Third, as I have noted, at this early stage it is difficult to determine whether Abenomics in general (or the Bank of Japan's policy in particular) has had much effect on output or prices. That is not surprising, given the lags with which the economy normally responds to changes in monetary policy or financial conditions. But the logic of regime change says that the realized effects on the economy should lag changes in private-sector *expectations*, which could adjust relatively quickly if the regime change is

credible. The authors use the projections of professional forecasters to establish counterfactuals against which to compare realized outcomes, but I regard forecasters' reported views as more useful for assessing whether, following the attempt at regime change, expectations are adjusting in the predicted directions. Notably, if Abenomics is working, we should be seeing expectations of faster future growth (which in turn will stimulate higher levels of activity today, according to the theory) as well as expectations of higher inflation. The evidence from professional forecasts is directionally consistent with both of these predictions, although the magnitudes are modest. Changes in asset prices are also directionally consistent with these predictions, although asset prices are only noisy measures of expectations, as the authors discuss.

I do see one potential problem in interpreting the evidence that inflation expectations have risen in Japan. For data reasons, the paper focuses on expectations of CPI inflation, and the authors calculate real interest rates as the difference between nominal interest rates and expected CPI inflation. However, the theory says that the real interest rate that matters for investment and hiring should be defined in terms of inflation in the prices of the goods and services that people *produce*, not the goods and services that they consume. So the measure that is really needed is the expectation of inflation in the GDP deflator or something similar. The distinction is relevant, because much of the rise in Japanese inflation appears to be coming from the depreciation of the yen, which is an adverse shift in the terms of trade (that is, it makes imports more expensive). Since the CPI includes import prices and the GDP deflator does not, the CPI has been rising notably more than the GDP deflator. If the same relationship is true of expectations of the two measures of inflation, it would cast some doubt on the effectiveness of the Bank of Japan's policy.

Here is a related question: The authors speculate that yen depreciation has not had much effect on Japanese exports to date because Japanese exporters are "pricing to market." For example, it appears that the dollar price of Toyotas in the United States has not fallen much, despite the sharp drop in the yen. But if that is true, then the yen price of exported Toyotas should be rising significantly, which in principle should be reflected in the Japanese GDP deflator, unless all the profits from depreciation are going to American middlemen. Is that happening? If not, why not? In any case, it would be interesting to know where the increased profits from Japanese exports are going; for example, if they are being paid out as dividends to the domestic owners of exporting firms, they might be reflected in higher income and consumption at home even if growth in exports is constrained

by pricing-to-market strategies. These issues seem like technicalities, but I suspect that they may be important for understanding whether Japanese monetary policy is likely to be effective.

I will conclude by briefly considering the implications of the early experience of Abenomics for other countries, including the United States. Some economists have argued that, as a way of speeding growth and reducing the costs of the zero lower bound on interest rates, advanced economies might consider raising their official inflation targets, with the goal of achieving permanently higher inflation expectations on the part of the public. Whether achieving permanently higher inflation expectations would increase growth in the near term is an intensely debated question, which I will not get into here. There is also the question of how difficult it would be to re-anchor inflation expectations, once dislodged, at a higher level. Putting those issues aside, however, a point that I take away from this paper is that raising inflation expectations in a controlled and predictable way is not so easy in practice.

Why do I make that inference? As I foreshadowed at the beginning, for a number of reasons the Bank of Japan's ongoing commitment to raise inflation expectations should be exceptionally credible. First, as I noted earlier, the attempt to increase inflation is fully supported by the government, not only by the central bank. Second, the Bank of Japan's target of 2 percent inflation is an international norm, one that the central bank should be comfortable with even in the longer term; concerns that the Bank of Japan will renege on its commitment at a later date should therefore be limited. Third, the depreciation of Japan's exchange rate, a possible source of friction with trading partners, seems so far to have been accepted with only modest blowback. Fourth, reflecting its support of the central bank's policies, the Japanese government has not expressed concerns about possible fiscal consequences of those policies. Fifth, the Bank of Japan's commitment to its policies might be less credible if there were evidence that those policies were creating important ancillary costs; but, so far, important costs have not appeared.

In short, there seems little reason for observers to doubt that the Bank of Japan will follow through on its promises to hit its newly minted inflation target. Nevertheless, inflation expectations in Japan (especially when measured in terms of producer rather than consumer prices) appear to have moved up only modestly thus far. The apparent stickiness of inflation expectations suggests that those expectations may be formed by some type of adaptive learning rather than being fully rational, in the sense that economists use the word. It will be instructive to see whether the Bank of

Japan's inflation target becomes more credible as time passes and the central bank persists in its policies.

Let me close by commending the authors for producing an interesting paper about a very interesting and important economic experiment.

COMMENT BY

PAUL KRUGMAN On the eve of the global financial crisis, there were two kinds of macroeconomists—and for once I do not mean saltwater versus freshwater. Instead, I mean there were those who had been paying attention to Japan and those who had not. When the crisis struck, in effect we all turned Japanese, with interest rates hitting the zero lower bound and economies remaining depressed for a very long time. Those who had been tracking Japan by and large had a better experience trying to make sense of what was happening than those who had not.

But now, even as the rest of us are becoming ever more Japanese, the Japanese themselves are trying to move in the opposite direction. Abenomics is the most dramatic macroeconomic policy experiment of recent years. It is too early to make a full assessment, but a progress report is urgently needed, and the paper by Joshua Hausman and Johannes Wieland has done that. This is an extremely valuable paper, essential reading for anyone trying to keep up with Japanese events and policy. I would like to raise two issues.

First, there is the question of the size of the output gap, which has become a puzzle all across the advanced world. Projections based on precrisis trends suggest a huge gap, but the official estimates from the IMF and others are that the gap is not very big at all; moreover, this disconnect between projection and official estimate applies not just to Japan but to other countries, including the United States. Hausman and Wieland go through the various Japan estimates and make the case for a relatively large gap.

Why is it so hard to reach agreement on this? The answer is that conventional approaches to estimating the output gap rely, explicitly or implicitly, on an “accelerationist” model of inflation, according to which inflation would not only be low but be continuously falling if the economy were operating far below potential. Some estimates of the output gap use this approach explicitly, in effect inverting the Phillips curve to estimate the gap. Filter-type estimates use it implicitly, because an accelerationist model implies that unless there has been a collapse in the inflation rate, over any extended period the output gap will average zero. And production-function approaches do the same thing, because they essentially assume that historical rates of labor input have been normal on average.

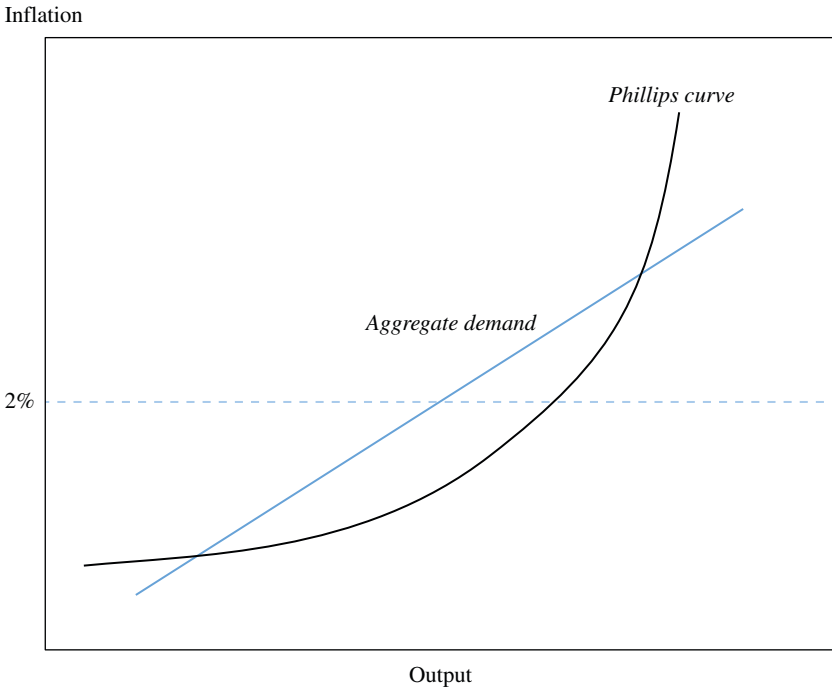
The trouble is, we have good reason to believe that accelerationist models break down at very low inflation, that even a persistently depressed economy settles down to a stable, small positive or negative inflation rate rather than going into accelerating deflation. This may be partly due to downward nominal wage rigidity, and perhaps also to other forms of money illusion. In any case, it causes big problems with the standard methods for estimating the output gap: all of these methods will tend to find little if any output gap in a persistently depressed economy.

So I am with Hausman and Wieland on the proposition that Japan has more slack than the standard estimates say; but there may be no way to test that proposition other than by generating a boom and seeing how far it goes.

This brings me to the question of whether Abenomics is adequate to the task. So far, as the authors show, the policy has been surprisingly successful at raising expected inflation, which in turn has both helped boost consumption and depreciated the yen, which should improve net exports over time. But is it enough? I have a big worry here, which I have tried to convey at various times over the year but may have a better way to express now. Here it is: I worry that the inflation target of 2 percent is too low and will turn into a self-denying prophecy.

If you look at the extensive theoretical literature on the zero lower bound since Japan became a source of concern in the 1990s, you find that just about all of it treats liquidity-trap conditions as the result of a temporary shock. Something—most obviously, a burst bubble or deleveraging after a credit boom—leads to a period of very low demand, so low that even zero interest rates aren't enough to restore full employment. Eventually, however, the shock will end. So the way out is to convince the public that there has been a regime change, that the central bank will maintain expansionary monetary policy even after the economy recovers, in order to generate high demand and some inflation.

But if we are talking about Japan, exactly when do we imagine that this period of high demand, when the zero lower bound is no longer binding, is going to begin? Even in the United States, we are talking seriously about secular stagnation, which means that it could be a very long time before “normal” monetary policy resumes. Now, even in this case you can get traction if you can credibly promise higher inflation, which reduces real interest rates. But what does it take to credibly promise inflation? It has to involve a strong element of self-fulfilling prophecy: people have to *believe* in higher inflation, which produces an economic boom, which yields the promised inflation. A necessary (though not sufficient) condition for this to work is that the promised inflation be high enough that it will indeed

Figure 1. A Timidity Trap?

produce an economic boom if people believe the promise will be kept. If it is not high enough, then the actual rate of inflation will fall short of the promise even if people do believe in the promise, which means that they will stop believing after a while, and the whole effort will fail.

My figure 1 offers a way to illustrate this problem, which I have come to think of as the “timidity trap.” Of the two curves shown, one is a hypothetical, but I think realistic, non-accelerationist Phillips curve, in which the rate of inflation depends on output and the relationship gets steep at high levels of utilization. The other is an aggregate demand curve that depends positively on expected inflation, because this reduces real interest rates at the zero lower bound. I have drawn the graph so that if the central bank announces a 2 percent inflation target, the actual rate of inflation will fall short of 2 percent, even if everyone believes the bank’s promise—which they will not do for very long, in any case.

So you see my worry. Suppose that the economy really needs a 4 percent inflation target, but the central bank says, “That seems kind of radical, so

let's be more cautious and only target 2 percent." This sounds prudent, but it may actually guarantee failure. As you might imagine, this concern ties in with the uncertain size of Japan's output gap. If Japan's economy really is fairly close to full capacity, a 2 percent inflation target might be enough. But if it is not, Abenomics will fail because although it is bold, it is not bold enough.

GENERAL DISCUSSION Joseph Gagnon opened the discussion by stating that he liked this paper. He took issue with an assumption that he felt Paul Krugman had made in his comment, namely, that the Bank of Japan's policy actions worked entirely through the expectations channel. On the contrary, he noted that the Bank of Japan started buying longer-term assets, which was a different approach from the one the central bank had taken in its previous attempts at quantitative easing, buying only short-term assets.

Disagreeing with the paper's concern that Japan's weak net exports were an indication that the policy might not be working as well as hoped, Gagnon thought that this might be the first time Japan has experienced a consumption-led recovery. Since quantitative easing affects domestic consumption without engaging in currency manipulation or exchange rate-oriented policies, he argued, the policy would not harm the global economy, so the lack of growth in net exports was a good thing. Gagnon also pointed out that if the Bank of Japan could increase inflation expectations by 2 percentage points without raising long-term bond yields, that would reduce Japan's fiscal deficit by 3 percentage points, enough to change its fiscal outlook. He added that, in his view, the IMF, the OECD, and the Bank of Japan all were too pessimistic about the prospects quantitative easing has for assisting fiscal policy.

Jonathan Wright commented on the mechanism that causes quantitative easing (QE) to work. He observed that the QE announcements in Japan had caused sharp declines in the 10- or 20-year forward rates, and thought that this implied that QE worked through the risk-premium channel and not through a signaling channel. If the mechanism worked instead through an expectations channel, then the 10- to 20-year forward rates should be going up and not down because of higher inflation expectations.

Kathryn Dominguez found it remarkable that a 25 percent decline in the exchange rate appeared to have so little effect on Japan's economy. She also noted that the consumption tax was particularly important, given that a consumption tax is thought to have been one of the major impediments to

Japan's previous quantitative easing attempt, as Paul Krugman had pointed out in a paper many years ago.

Donald Kohn was interested in the channels of the policy. He wondered whether there was a wealth effect, and suggested that the authors should explain the channels that they thought the policy would work through. He was not surprised that inflation expectations did not change suddenly. Making an analogy to Paul Volcker's disinflation policies, he pointed out that it took many years for inflation expectations to change in the United States under Volcker's central bank leadership, even though it was clear how to reduce inflation by increasing interest rates. By contrast, he said, the Bank of Japan was trying to increase inflation while interest rates were already at the zero lower bound, a circumstance where it is not clear what actually works to increase inflation. In sum, he found it unsurprising that the inflation target was not fully credible.

Frederic Mishkin was also skeptical as to whether inflation targets are fully credible. He noted that inflation expectations change very slowly. In his view, changing expectations takes time, and central banks have to earn the credibility to achieve it. As far as the cost of inflation targeting is concerned, he said that a 2 percent target forced by the government is not a cost for an economy experiencing deflation, though it may have come at a cost to the Bank of Japan's independence. He asked what would happen if the Bank of Japan were successful in meeting the government's inflation target? Would it then find itself repeatedly compromised by commands from the central government?

William Brainard was not surprised that inflation expectations have not increased. Although financial markets pay great attention to what the central bank promises to do in the future, firms that produce or sell goods and services do not—they change prices when their actual circumstances change. He noted the work by Truman Bewley, who had interviewed over 500 firms about their pricing behavior and found none that said they paid attention to the Fed's policy announcements.

Chris Faulkner-MacDonagh remarked that his experience as a market participant made him question the validity of several of the authors' measures of improved confidence and higher inflation expectations. In his view, external investors had been the primary drivers of the recovery in equity prices. He also noted that there was no good domestic measure of inflation expectations, since the inflation swap market was illiquid and also dominated by foreigners. Others have tried to estimate expectations, but the only work he found compelling was a recent Bank of Japan working paper. He would be interested in seeing if the authors could provide other perspectives.

Jay Shambaugh thought the paper was useful as a first draft of economic history. He cautioned that if the expert participants in this Brookings Panel were unable to agree on the effects that the regime change might have, then it would be unrealistic to expect market participants to be able to set expectations correctly. He did note that when Japanese government bond yields increased slightly even the Bank of Japan did not know whether to call that a good thing. Shambaugh believed the value-added tax was going to be problematic, not *only* because it would trigger a fiscal contraction but because it would make the inflation data difficult to read and market expectations would then have to be reset on inflation. Lastly, he asked why the Government of Japan did not start increasing every price it controls by 2 percent. Government wages and government prices, at least, could be increased by 2 percent to demonstrate the commitment to the inflation target.

Athanasios Orphanides asked the authors to comment more specifically on Japan's debt situation. The structural adjustment agreed to by the government and the Bank of Japan could lead to an improvement in the debt situation, as Gagnon suggested, but Orphanides did not think that should be considered the baseline scenario. Instead, he thought that the baseline scenario could be an upward price adjustment that had distributional consequences for current holders of debt—wealth would be transferred from the older generation to the younger.

Randall Kroszner agreed with the authors that the history of FDR's New Deal was an appropriate analogy to Japan's consumption tax. During the New Deal, he said, the U.S. government provided a substantial fiscal stimulus in the form of veterans' bonuses, which continued until late 1936, when both the federal government and the Federal Reserve enacted contractionary policies. Then in 1937 social security contributions were first collected. Kroszner thought these details formed an interesting analogy with the consumption tax in Japan, and he suggested that extending the authors' analysis past 1936 to 1937 and 1938 might provide some insight into what is coming next for Japan.

However, Robert Gordon cautioned the authors regarding the FDR analogy. He reminded everyone that there had been a substantial regime change in 1933, when the economy went from 10,000 failed banks to a stunning array of new policies—everything from leaving the gold standard to creating federal deposit insurance. Gordon noted that in the 1930s the level of output was related to the price level and not to the rate of inflation. Given that there were so many differences, he said, the New Deal could not serve well as an analogy to Abenomics.

The Phillips curve was alive and well in the United States, Gordon added. It operated with very long lags, but once it was adjusted for the long-term unemployed—as discussed in the paper by Alan Krueger and coauthors at this Brookings panel—it explained inflation in the United States quite well. Returning to the topic of Japan, Gordon thought a discussion was missing of the supply-side factors in the context of potential output. Since total output is equal to productivity per worker-hour times the number of workers and the number of hours, if potential output had in fact dropped by 10 percent in Japan, one of the components of that identity must have changed. The paper, he felt, was missing an appropriate discussion of productivity.

Paul Krugman turned to the subject of the trade balance. He said that the expected impact of expansionary monetary policy on the trade balance is ambiguous. On the one hand, it makes the economy more internationally competitive, but it also raises domestic demand. In Krugman's reading of the literature on expansionary policy, the findings are ambiguous and the various estimates of its impact may be a wash. Krugman also noted that pricing to market has always been a problem. He reminded everyone that while small countries generally denominate in someone else's currency, and large countries denominate in their own currency, Japan has nevertheless always denominated in U.S. dollars. Thus one would not expect a lot of pass-through to export prices. But since exporting from Japan has become much more profitable, he added, one should expect a rise in net exports within the next few years.

David Romer commented on Ben Bernanke's remarks as a discussant. He was surprised to hear Bernanke show so much skepticism about whether Abenomics passed the cost-benefit test.

In response, Ben Bernanke said that, in fact, he thought Abenomics did pass the cost-benefit analysis, but he was skeptical about the authors' conclusion that the regime change had literally *no* costs. In the United States, clearly there was some cost to QE.

In response to all these comments, Joshua Hausman first agreed with Bernanke that the costs of Abenomics were not literally zero. For one thing, there were distributional costs. He also agreed with Bernanke's observation that the standard errors on the VAR estimates were quite large. But Hausman said they confirmed the evidence from professional forecasters, which gave them some additional weight. Replying to the discussion regarding the composition of consumption, he noted that consumption growth was highest in the first half of 2013. If the consumption tax were going to cause intertemporal transfers of consumption, that effect should have *increased* in the second half of 2013 as the tax's implementation approached. Hausman

added that the plan to institute a consumption tax had been known since 2012, but forecasters did not expect this to trigger high consumption growth in early 2013.

Hausman agreed with several calls for follow-up studies. He agreed with Krugman's comment on the potential for a "timidity trap," and he agreed with Kohn that the wealth effect deserved to be studied while noting that the authors had limited space. In response to the questions about inflation expectations, he observed that while the level of expectations is hard to measure, all measures show an increase in expected inflation in 2013. Lastly, Hausman said he and coauthor Johannes Wieland had done some illustrative debt simulations and found that while Abenomics is helping, the current government debt load is still unsustainable.

Wieland defended the measure of inflation expectations used in the study, noting that the yen depreciation would have a level effect on the CPI but should not drive a wedge between the long-run inflation rates of the GDP deflator and the CPI. As far as the measure of stock market risk premiums, he said that in the study he and Hausman had tried alternative measures, including a Gordon growth formula, but the results did not change much. Wieland also defended their reliance on professional forecasters, whose work they used as a baseline and with whom they did not find much evidence to disagree.