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THE MORNING AFTER: EXPLAINING THE SLOWDOWN IN JAPANESE GROWTH IN THE 1990S

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ABSTRACT

This paper uses a VAR to investigate four possible explanations of the extended slump in Japanese economic activity over the 1990s: the absence of bold and consistent fiscal stimulus; the limited room for expansionary monetary policy due to a liquidity trap; overinvestment and debt overhang; and disruption of financial intermediation. The results indicate that all of these factors played a role, but that the major explanation is disruption in financial intermediation, largely operating through the impact of changes in domestic asset prices on bank lending.

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A. Introduction

What explains the Japanese economic slump of the 1990s? This question has gained increased importance with the economy's recent plunge economy into recession. Before the latest bout of weakness, many regarded the downturn in activity which followed the bursting of the asset price bubble in 1991 as following a normal cyclical pattern, although somewhat longer than usual due to the size of the asset deflation. In particular, the nascent signs of economic expansion through much of 1996 and early 1997 appeared to confirm that the economy was regaining its balance (albeit assisted by some demand shifting in anticipation of the consumption tax hike in April 1997), and could be expected to recover steadily over the next few years.

Rather than recovering, however, in 1997 the economy entered into its first recession since the early 1970s. Combined with the earlier weakness, this means that Japan has now been in a slump for almost eight years. Growth has averaged only ¾ percent per annum over this period, and the output gap is estimated to have moved from plus 4½ percentage points of potential output in late 1990 to minus 4½ percent by early 1998. This makes Japan's current situation the most serious economic slowdown experienced by any major industrial country since the early 1950s. Furthermore, this slump has occurred despite significant counter-cyclical policies, involving a considerable expansion in the fiscal deficit (largely through packages aimed at fiscal expansion) and reducing the overnight call rate to its effective floor in early 1999.

The proximate causes of the initial slowdown in output in the early 1990s are generally agreed. In mid-1989 the Bank of Japan started to raise interest rates so as to cool the asset price inflation which had started in the mid-1980s. The tightening of monetary policy pricked what was later identified as an asset price bubble, and stock and land prices started falling rapidly. Just as the run up of asset prices in the upswing of the bubble had encouraged domestic spending and driven the economy significantly above potential output, so the collapse of asset prices lowered domestic demand and output, and the economy grew at an annual rate of 1 percent or less through 1994.[2]

As the Japanese slowdown has turned from temporary slowdown to slump, however, its causes have come under further scrutiny, and a number of competing hypotheses have emerged. They fall into four main categories. The first is that the slump reflects *inadequate policy responses*, particularly as regards fiscal expansion (Posen, 1998). Although the Japanese government has unveiled a number of fiscal packages aimed at reviving the economy over the 1990s, the argument goes, most of these packages contained limited amounts of "real water" (i.e., measures which have a direct impact on activity). The main exception was the September 1995 stimulus package, to which the economy responded vigorously until the recovery was derailed by a switch to fiscal contraction in early 1997.

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[2]Useful analysis of the Japanese economy is contained in the EPA's annual Economic Surveys of Japan.

An alternative view, which focuses on monetary policy, holds that Japan is stuck in a *liquidity trap* (Krugman, 1998).[3] Consumption is historically low in Japan, creating a high structural saving rate, which was offset during the golden years by high investment. However, a slowdown in anticipated growth has led to a sufficiently large imbalance between saving and investment that the equilibrium real interest is now negative. The anti-inflationary reputation of the Bank of Japan is sufficiently strong that expectations of future inflation are low. As a result, despite record low nominal short- and long-term interest rates, the monetary authorities are unable to reduce the real interest rate sufficiently far to bring the economy back to full employment.

A third view holds that the slowdown reflects the *low rate of return to capital due to over investment* (Ando, 1998). Japan is in a vicious cycle, in which past over investment is reducing the rate of return on capital, which both lowers current investment and spurs saving, as consumers fail to achieve their desired level of asset accumulation. The usual wealth effects which cause cyclical downturns are being elongated by the inefficiency of the corporate sector, exacerbated by significant corporate debt overhang which further reduces the incentive to invest. In the absence of wealth-creating investment opportunities, the economy will remain depressed.[4] This explanation gives primacy to wealth effects (largely

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[3]See Keynes (1936) and Hicks (1937).

[4]Some have also pointed to demographic effects in this connection, with the aging population depressing investment more than saving.

through the stock market, as land prices have divergent effects on property owners and those with no land).

A final view holds that the slump reflects *problems with financial intermediation*. Banks play a much more important role in financial intermediation in Japan than in "Anglo-Saxon" financial systems such as the United States or United Kingdom,[5] and are the main providers of loans to small- and medium-sized enterprises (SMEs). During the asset price bubble, the banks lent large amounts of money to firms using land as collateral. With the steady fall in land prices since the bursting of the asset price bubble, many of these loans have stopped performing. The bubble in stock prices further exacerbated these effects by first boosting and then reducing bank capital.[6] Lax accounting rules and a permissive regulatory environment have allowed banks to survive, but with only limited ability to lend to companies due to the competing needs of writing-off bad loans and maintaining capital adequacy ratios.[7]

These explanations are not mutually exclusive. Indeed, it would be unlikely that a slowdown of the type being currently experienced in Japan had a single cause. However, each

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[5]See Borio (1995) for a cross country comparison of financial systems.

[6]Bank capital is susceptible to changes in stock prices because banks typically hold large amounts of stock in industrial companies. Kwon (1998) explores the relationship between monetary policy, land prices, bank lending and output using a VAR.

[7]See Ogawa et al (1994) and Ogawa and Suzuki (1998) for evidence on how land collateral has affected investment by Japanese firms, Ogawa and Kitisaka (1998) for a discussion of the determinants of bank lending, and Wescott (1995) for a discussion of the role of SMEs in the economy.

explanation points to a different set of variables—fiscal, monetary, stock prices and land prices plus bank loans—as the major factor explaining the current slump.[8]

This paper examines the reasons for the slowdown in activity in Japan empirically using a vector-autoregression (VARs) involving the main competing explanations: fiscal policy, monetary policy (including the exchange rate), domestic asset prices and lending to the private sector. A VAR approach was chosen for a number of reasons. It allows the variables underlying the alternative explanations to be incorporated into a single empirical approach. For example, their impacts on output can be compared using the relevant impulse response functions. In addition, estimating a system of equations allows interactions between different variables to be examined, in particular the relationship between domestic asset prices, lending, and output, as well as allowing changes in underlying behavior to be assessed through examination of the residuals from individual equations. Finally, the historical role of each variable can be examined using the decomposition of past movements in output implied by the VAR.

B. Past trends

Before discussing more formal analysis of the causes of the slowdown in Japan in the 1990s, it may be useful to look at the underlying data for output and for domestic demand and

[8]These explanations also correspond to the alternative explanations of the recovery by the U.S. from the 1930s depression. The fiscal explanation, for example, is favored by Gordon (1988), the liquidity trap by Romer (1992) while the role of financial intermediation is discussed in Bernanke (1983). For a comparison of the role of banks and monetary policy in the two periods, see Bordo, Ito and Iwaisako (1997).

its components over the period since 1980.[9] As can be seen in Chart 1, output has gone through a number of cycles over the last two decades, following a relatively stable growth path from 1980 through 1987, expanding rapidly through the next few years to 1991, and then stagnating from then through early 1995. This is followed by a very limited recovery through early 1997, and a renewed collapse in output which is still continuing.[10] The Chart also shows the Fund's estimate of potential output based upon a Cobb-Douglas production function and the resulting path for the gap. The path shows the cyclical path of the economy even more clearly, including the cyclical peaks in 1990/91 and 1997, and troughs in 1983, 1995, and the current downturn.

The advantage of correcting for potential output is that it provides a path for the cyclical element in output, which is primarily affected by short-term factors such as changes in aggregate demand. Given the prolonged stagnation of output in Japan, however, any estimate of the path of potential output is highly uncertain. In the analysis, the Fund's

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[9]The year 1980 was chosen as a start for the empirical analysis so as to ensure that there was a significant period before the bubble economy of the mid-1980s, so that the extended cycle in output since 1987 could be put in context. As discussed later in the text, extending the period back to 1973 (thereby extending the data back into the golden period of exceptionally vigorous Japanese economic growth, in which the underlying forces shaping the economy probably somewhat different than they were subsequently) has little impact on the results.

[10]The data for total domestic demand has a similar pattern, although the period before 1987 looks somewhat less buoyant.

estimate is used to deflate real series, but as the VAR is estimated in first difference form this has very limited effects on the results.[11]

The behavior of individual components of demand can also provide insight as to the sources of the recent slowdown in demand. Chart 2 graphs paths of private consumption, business investment, net exports, government consumption, government investment, and residential investment, measured as a ratio to output. If the downturn in output during the 1990s largely reflects consumption, then one would assume that it reflected wealth effects of some form, while weakness business investment would point more towards financial intermediation. To aid comparison, movements in the three major components of demand (private consumption, business investment, and net exports) are measured on the same scale.

Business investment is clearly the most cyclical element of demand since 1980, increasing markedly as a percentage of GDP over the bubble years compared to the period before or since. The underlying trend in investment is also significantly affected by movements in relative prices, with nominal spending staying fairly constant as a ratio to nominal GDP between the early 1980s and the later 1990s, but the corresponding ratio using real values has increased significantly, reflecting a decline in the relative price of investment goods (a reverse trend of this type holds for net exports).[12] By contrast, private consumption

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[11]Rerunning the VAR using logarithms of the real variables rather than ratios to potential output produced very similar results.

[12]Each component of demand is measured in three ways; nominal spending as a percentage of observed nominal GDP; real demand as a percentage of observed real GDP, which adjusts for changes in relative prices over time; and real demand as a percentage of potential output,

(continued...)

has been relatively stable as a ratio to GDP over the last two decades, fluctuating within a relatively narrow range between 57 and 61 percent of GDP. The alternative calculations illustrates this stability. Measured as a percentage of observed output, consumption is relatively low over the bubble years, while it is relatively high as a percentage of potential output, reflecting the fact that most of the variation is in the denominator rather than the numerator.

C. Econometric Analysis

This section reports the results from VARs using output, two fiscal variables (the structural general government deficit is divided into direct government spending and taxes net transfers[13]), two monetary variables (the real short-term interest rate and the real exchange rate), two domestic asset prices (real stock prices and real land prices), and financial intermediation. (Data sources are provided in the appendix.) Financial intermediation is measured as lending to the private sector by banks, public institutions, and capital markets. As private bank lending turns out to be the most important component, representing over 70 percent of all lending and dominating quarter-to-quarter changes, this series will be simply referred to as bank lending below.[14] Output and real bank lending were divided by potential

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[12](...continued)
which takes account of both relative prices and the cycle.

[13]The fiscal variables are adjusted for the cycle using the Fund's standard approach.

[14]As is discussed further below, the results are not sensitive to alternative measures of

(continued...)

output to eliminate the trends caused by expanding supply, and logarithms were taken of those variables with no clear unit of measurement (the real exchange rate, real stock prices, real land prices, and real lending). In addition to a constant term, the VARs also included two dummy variables aimed at capturing the short-term shifting of demand seen the quarter before and after the introduction of the consumption tax in 1989 and the consumption tax hike in April 1997, with each variable being designed so that the impact sums to zero over time.

The first stage in the analysis involved investigating the statistical properties of the underlying series. The output gap is shown in Chart 1, while those of the other explanatory variables are shown in Chart 3. Even though most of the series are adjusted by potential output, many still appear nonstationary, with no tendency to revert to an underlying mean value or trend. This even appears to be true of the output gap, despite the fact that output should at some point revert to its level of potential. This presumably reflects the depth of the current recession, which makes it appear that deviations from trend can be permanent.

Formal analysis confirms these visual impressions. Table 1 shows the results from running Dickey-Fuller tests on the various components of the VARs. Almost all of the variables, including the output gap, fail to accept stationarity (without the inclusion of a time trend). Even the two exceptions, bank lending and taxes net of transfers, fail the test when a time trend is included, spectacularly so in the case of real lending. When the variables are

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[14](...continued)
lending.

first differenced, however, the opposite result holds true, with almost all of the variables accepting stationarity.[15]

Accordingly, a VAR involving the first difference of the output gap, the other explanatory variables, a constant term, and dummy variables for the consumption tax changes of 1989 and 1997 was estimated from the first quarter of 1981 to the first quarter of 1998.[16] Two lags were used in the estimation as this was the lag length indicated by the Akaike Information Criterion. A Choleski decomposition was used to orthogonalize the underlying errors using the ordering: direct government spending; taxes net of transfers; the output gap; the real exchange rate; the real exchange rate; real stock prices; real land prices; and real bank lending. The ordering determines the level of exogeneity of the variables, with changes in government spending being assumed independent of all other explanatory variables, while current changes in bank lending are assumed to be affected by changes in all of the other explanatory variables. The ordering was chosen on the basis of the speed with which the variables respond to current events, with fiscal variables assumed to be the least responsive, followed by output, then monetary policy, asset prices, and bank lending.

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[15]It remains possible that there are cointegrating relationships between the levels of the variables. The Johansen (1991) procedure (which is not robust to small samples) indicated many cointegrating relationships, but none with particularly intuitive properties. When the VAR was estimated in levels terms, the estimated cointegrating relationships were generally unsatisfactory, and the impulse responses from this system exhibited considerable cycling and instability. Accordingly, it was decided to focus upon VARs using only first-differences, which has the additional advantage that the constant terms act as trends, making the estimation less dependent on the assumptions made about the path of potential output.

[16]The start date of 1981 reflects the need to accommodate transformations of the underlying data and lags in the VAR.

The estimated impulse responses for output, shown in Chart 4, are generally intuitive.[17] The top left panel of Chart 4a, for example, reports the impulse response of the level of output to a one standard deviation shock in direct government spending, together with the level response of direct government spending to its own shock (all of the variables are measured in such a manner that a change of 0.01 represents a 1 percent changes in the relevant variable[18]). An increase in direct government spending provides the expected temporary boost to the economy while an increase in taxes lowers activity. The dynamic multiplier for direct government spending, calculated using the ratio between the response of output and the response of government investment, indicates that in the short-term a ¥100 increase in government spending raises output by about ¥65.[19] The implied multiplier from a tax increase, which peaks at -0.2 (in absolute value) after two quarters, is again quite small.[20] In short, while fiscal policy is effective in stimulating output, the estimated impact is relatively muted.

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[17]Note that these responses refer to the level of output, etc. As the model was estimated in first differences, underlying disturbances can result in permanent changes in the underlying variables.

[18]This is achieved through measuring the variable in logarithms, as a ratio to potential output or, in the case of the real interest rate, by dividing the percentage value by 100.

[19]These estimates are significantly smaller than the multipliers produced from large models (the Fund, for example, uses a multiplier of 1–1.2 in its analysis, see Lipworth and Meredith, 1998).

[20]Bayoumi (1998) discussed various reasons how the implementation of fiscal stimulus may have muted its effects over the 1990s in more detail.

An increase in the real interest rate of 1 percentage point lowers output by about 0.6 percent. This is consistent with, although at the lower end of, the wide range of estimates from large models (see Krugman, 1998).[21] An increase in the real exchange rate also lowers output in the short-term, although the effect is quite small—a 10 percent increase in the real exchange rate lowering output by about 0.2 percent, reflecting the relatively closed nature of the Japanese economy. Output rises in response to an increase in the real price of land and, to a rather lesser extent, to increase in the price of stocks. Notably, it also rises quite significantly in response to an increase in bank lending, with a 3 percent increase in such lending leading to a 1 percent rise in output. The absolute size of the various impulse response functions is also illuminating, as they illustrate the impact of a "typical" disturbance in each variable on output. The largest response is associated with land prices, where a typical quarterly disturbance changes output by about 1 percent over time, compared to a value of 0.3 percent for real interest rates.

Chart 4b reports the standard errors around the responses of output (calculated using Monte Carlo methods using 500 replications), which indicate that the short-term responses are reasonably well identified. Over longer periods, however, the degree of precision deteriorates, reflecting the fact that because the underlying impulse responses are cumulated over time uncertainty is compounded.

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[21]When the real interest rate was divided into the nominal rate and inflation, it was found that each component was correctly signed and contributed about one-half to the estimated impact.

Tests indicate that the results are relatively invariant to alternative orderings of most of the variables. However, this is not the case for the relative position of land prices to stock prices or to bank lending, because of a significant colinearity between the residuals. If land prices are placed after the other two variables in the ordering, the estimated long-term impact on output becomes relatively similar across all three variables. The ordering chosen was the felt to be the most "reasonable," in that land prices are the least likely variable to be immediately affected by other developments. The nexus of domestic asset prices and bank lending is discussed further below.

To this point, the analysis has focused on the output responses implied by the system. It is also of interest to examine the most important interrelationships between the individual equations comprising the VAR, as these provide information as to the transmission mechanisms at work. These interrelationships can be analyzed through F-tests of the significance of each variable in each equation (i.e., Granger causality tests). The results from this exercise again accord with intuition. Output is most affected by past changes in real interest rates (note that the main impact of direct government spending is contemporaneous, as government consumption and investment feed through directly into GDP), and least affected by own shocks and real stock prices. Fiscal policy and the real interest rate are relatively independent of the other variables in the model, indicating that government policy decisions are made relatively autonomously, while the real exchange rate is also largely independent of the rest of the model.

By contrast, there are important interactions are between stock prices, land prices, and bank lending. As can be seen from the impulse responses in Chart 5, positive disturbances in any one of these variables produces increases in all of them. This mutually reinforcing interaction, which helps explain the asset bubble of the late 1980s, reflects, at least in part, the importance of domestic asset prices in the behavior of banks, with land being used as the most usual form of collateral, and share-holdings being an important source of bank capital.[22] In the 1990s, this process apparently went into reverse, hurting the economy through a reinforcing erosion of bank collateral, capital, and loans (called, by some of the more melodramatic commentators, the Japanese "death spiral").

The importance of these interactions can be examined by rerunning the VAR with one of the variables exogenized. This is done by excluding the chosen variable from the VAR, but including its first two lags as exogenous variables. The estimated equations for the remaining variables are identical to the main case, but any interactions involving the exogenized variable are no longer identified. When bank lending is exogenized in this manner, the impulse response of land price on output is lowered by almost 90 percent while the impulse response of stock prices falls by two thirds, implying that the vast majority of the estimated impact of asset prices on output comes through financial intermediation.[23] Exogenizing land

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[22]Kwon (1998), also using a VAR approach, finds that collateral effect increase the impact of monetary policy on the economy, but does not explore the wider set of interactions examined in this paper. Lincoln (1998) provides a detailed discussion of the Japanese system of financial intermediation.

[23]Reversing the ordering of land and stock prices in the VAR leads to a fall of about three-

(continued...)

prices and stock prices in a similar manner also produces significant, if somewhat less spectacular, reductions in the impulse responses of the remaining financial variables with respect to output. In short, there appears to be a close and highly interwoven interrelationship between domestic asset prices and bank lending, an interrelationship which helps to explain the size and longevity of the estimated effects of each of these variables on output.[24]

The cumulated residuals from each equation, shown in Chart 6, help to illustrate the direction of the underlying shocks (assuming the shocks are random, they should cumulate to random walks, which have apparent trends over time). In addition to illustrating policy changes (such as the spike in government spending after the September 1995 stimulus package was announced and the tightening of monetary policy in late 1989), the results also illustrate the rise and fall in domestic asset prices over the bubble and subsequent crash, the increase in bank lending in the early 1980s (a time of significant deregulation) and more recent weakness, and the large positive shocks to output in 1996, prior to the consumption tax hike.

The decomposition of past movements in output implied by the model are shown in Chart 7. Past changes in the output gap are divided into those parts explained by innovations in fiscal policy (the sum of direct government spending and taxes net of transfers), monetary

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[23](...continued)
quarters in both impulse responses. Changing the order of bank lending relative to the two asset prices had little impact on the results.

[24]As already noted, there is also a contemporaneous relationship, with the size of the impulse responses depending on the ordering of the variables.

policy (the sum of real interest rates and the real exchange rate), asset prices (the sum of land prices and share prices), bank lending, and exogenous disturbances (the sum of independent shocks to output, the dummy variables, and any effects due to unidentified disturbances prior to the estimation period).

The decomposition indicates that the most important factor explaining past movements in output is innovations in asset prices, accounting for most of the hump in the output gap over the bubble period and subsequent weakness. Changes in bank lending helps to explain the rise in output in the early- to mid-1980s and more recent weakness in activity, indicating that shocks to bank lending can also generate significant movements in output. Monetary policy was supportive though the bubble period, restrictive through much of the 1990s, and more recently again providing a significant boost to the economy. Fiscal policy provided a significant boost to the economy in the 1995 and early 1996, but this support was rapidly withdrawn in the later part of 1996. While exogenous factors play an important role in explaining quarter-to-quarter variation in output, they only matter for overall movements in output over the more recent period.

Chart 7b decomposes the aggregate fiscal, monetary, asset price and exogenous effects into their constituent parts (in the case of fiscal policy, for example, the effects of direct government spending and taxes net of transfers are distinguished). They indicate that the fiscal expansion of 1996 was largely fueled by direct government spending, reflecting the sharp increase and subsequent fall in government investment, changes in real interest rates have been the most important monetary policy effect, and that changes in land prices have

been generally more important than stock prices in explaining movements in output. Also note the significant role played by own shocks in the increase output in late 1996 and early 1997, presumably reflecting longer-term demand shifting from the consumption tax hike than that captured by the existing dummy variable, particularly in residential investment (Chart 2).

The historical decomposition also has implications for the differing explanations for the mini-revival of output in 1996. The results shown in Chart 7 indicate that fiscal policy and monetary policy both contributed, each providing a boost of about 1 percent to output. However, the underlying situation appears to have started worsening in late 1996 (in part due to a sharp fall in public investment), weakness which was obscured by demand shifting in anticipation of the consumption tax hike.

The importance of bank lending as a conduit for asset price effects is illustrated in Chart 8, which graphs the estimated impact of land prices and stock prices on output once bank lending has been exogenized as described earlier. In this experiment, asset prices produce very limited movements in output, indicating that the "pure" effects of changes in wealth are quite limited.[25] A comparison of Charts 7 and 8 vividly illustrates the central role played by financial intermediation in transmitting asset price shocks to the real economy.

To examine the robustness of the model, the VAR was reestimated under a number of alternative assumptions. The lag length of the VAR was extended from two lags to three lags, which produced very similar results (with more complex impulse responses). Next, the

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[25]When the ordering of land and stock prices in the VAR is reversed, the impact of stock prices increases, but still only accounts for a variation in the output gap of around 1 percentage point of GDP over the 1990s.

impact of changing the estimation period was examined, both by truncating the sample at the first quarter of 1996 to avoid the distortions associated with the consumption tax hike in 1997, and by extending the estimation period back to 1973. The VAR was rerun using nominal variables instead of their real equivalents, to examine whether nominal asset price changes produce a more significant impact on the model. Finally, experiments using different proxies for financial intermediation (restricting the variable to cover only bank lending or only lending to the corporate sector) were also conducted. None of these experiments changed the qualitative nature of the results.

In another type of experiment, additional variables were included in the estimation. First, the old-age dependency ratio was added to the VAR, in order to examine the role of demographic changes in explaining the bubble and subsequent slump. Demographic changes were found to increase output by about ½ percent over the 1980s and lower it by the same amount over the 1990s. At least some of this effect comes through asset prices, in that increases in the old-age dependency ratio were found to lower domestic stock and land prices, presumably reflecting the reduced demand for such assets from older individuals. The impact on the remainder of the model was minimal. Next, the capital stock was also added to the VAR, so as to see if a direct measure of overinvestment (the ratio of the capital stock to potential output) helps to explain past changes in output. This variable also had minimal effects either on output or the rest of the model. Finally, real narrow money (M1) was substituted for the real interest rate, to see if a different measure of monetary policy had a

significant effect on the results. The money supply provides a good substitute for the real interest rates within the estimation, but has very little impact on the other impulse responses.

An alternative way of examining the robustness of the results is to consider what happens when variables other than output are used in the VAR. In particular, if the conclusions from this analysis are valid, one would expect that same types of patterns found for output to be apparent in an analysis using the major components of aggregate demand. Accordingly, the VAR was reestimated three times, with output each time being replaced by a different major component of demand (private consumption, business fixed investment, and residential investment).[26]

The estimated impulse responses for each component of demand are shown in Chart 9. The impulse response functions for output from the various shocks appear generally sensible. Increases in government direct spending crowd out private consumption and business investment, but crowd in residential investment, which is what might be expected given the concentration in government investment projections on infrastructure projects of doubtful overall efficiency. Increases in taxes and interest rates lower all of the components of demand, again as might be expected, while the impact of the real exchange rate on domestic demand is small. Finally, increases in stock prices, land prices, and bank loans all raise demand.

The decomposition of historical movements in private consumption, business investment, and residential investment can be seen in Chart 10. The dominant factor

[26]Like output, these variables were normalized by dividing by potential output.

explaining movements in business investment and consumption has been asset prices while residential investment has been largely affected by bank loans, partly offset by expansionary fiscal policy, plausibly reflecting higher government investment (the panels are all produced on the same scale to aid comparisons across different components). Further analysis (not reported) indicates that land prices continue to be at least as important as share prices in explaining the behavior of output, and that bank lending remains an important channel for asset price movements. Hence, the analysis of the components of demand broadly confirms the conclusions of the original analysis.

D. Conclusions

This paper has examined the reasons for the marked slowing of growth in Japan in the 1990s in the context of a VAR analysis which includes the impact of fiscal policy, monetary policy, domestic asset prices, and bank loans. The results are used to attempt to differentiate between a number of alternative explanations of the current slump, including the absence of bold and consistent fiscal stimulus, the limited room for expansionary monetary policy due to a liquidity trap, asset deflation operating through the long-term problems caused by overinvestment, inadequate returns on saving and debt overhang, and disruption of financial intermediation.

The results indicate that all of these explanations have some validity. Fiscal policy has generated limited effect on output except in the wake of the September 1995 stimulus package, whose beneficial effects were rapidly reversed by an abrupt shift to fiscal

contraction. Expansionary monetary policy is also found to be effective in stimulating demand recently, but has presumably reached its practical limit given the low level of interest rates and deflationary pressures. Domestic asset price changes were an important factor behind the rise in the output gap over the bubble period and the subsequent decline. However, the important role assigned to land prices appears inconsistent with explanations which emphasize pure wealth effects as an explanation of the slump (changes in land prices have different effects on individuals depending on whether they own land or not), or with explanations which emphasize structural problems caused by declining rates of return on reproducible capital.

What the analysis reveals is the central role played by financial intermediation in magnifying the impact of asset prices on the economy. Increases in bank lending, operating both directly and through a self-reinforcing cycle with increases in land prices (the main source of collateral) and stock prices (an important component of bank capital), helps explain much of the expansion in the output gap in the mid- to late-1980s. The reverse process operated with equal force over the contraction, as undercapitalized banks responded to falling asset prices and other balance sheet pressures by restraining lending to maintain capital adequacy standards.

The importance of banks both in overall lending and, in particular, in providing capital to smaller companies, who have failed to provide their usual role in leading the economy out of recession, provides an obvious mechanism through which domestic asset prices and bank lending could have disrupted activity. The central role played by financial

intermediation in the slump also provides a compelling reason for the limited effectiveness of standard macroeconomic policies. If the corporate sector is limited in its ability to obtain funds, then this will blunt the impact of monetary policy (as such policy operates largely through the banking system) and of fiscal policy (as companies and individuals will be constrained in their ability to respond to government stimulus). Finally, it provides a ready explanation for the current recession. Already undercapitalized banks responded to prospect of tighter banking regulations in early 1998 (when "prompt corrective action" was introduced) by further cutting back on lending, exacerbating the weakness already generated by fiscal contraction and the Asia crisis, and sending the economy rapidly into the doldrums.

At the same time, the limitations of this exercise should be borne in mind. VAR analysis is a powerful tool, but it assumes that the underlying responses are linear and have not changed over time. Both assumptions could be questioned in the context of the type of slump currently being experienced in Japan. Individuals could react differently to events depending on the state of the macroeconomy, with behavior at the tip of a cyclical upturn being rather different from that at the bottom of a downturn. Similarly, the impact of financial sector deregulation since 1980 may have altered the relationship between the corporate sector and the banking system. More analysis, looking more deeply at the mechanisms through which the banking system might affect output would be needed to support the results from this paper. However, the fact that these results appear robust across a number of different specifications provides at least some evidence that banking system problems are indeed at the heart of the current weakness in activity.

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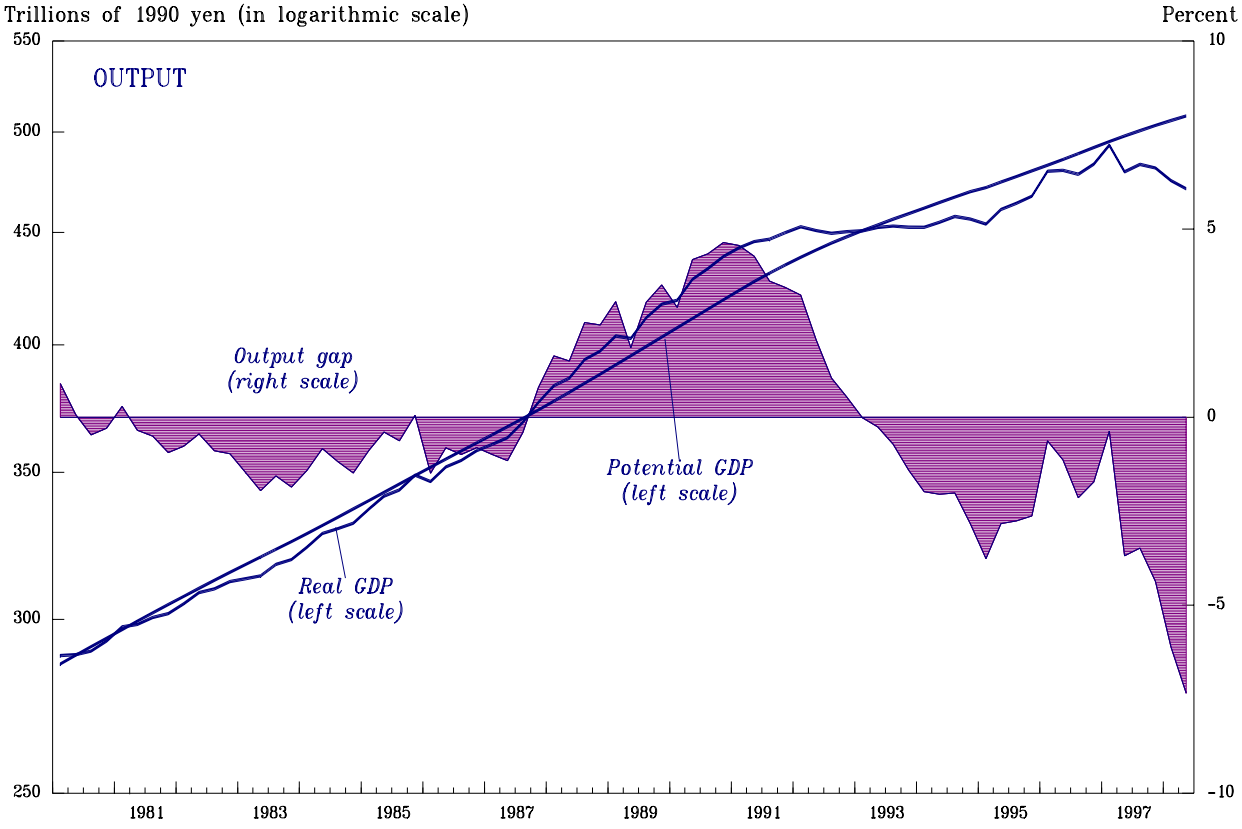
Table 1. Dickey-Fuller Tests Results

	Level		First difference	Second difference
	No trend	Trend		
Output	0.80	0.95	0.00	0.00
Direct government spending	0.25	0.76	0.00	0.00
Taxes net of transfers	0.03	0.11	0.00	0.00
Real interest rate	0.55	0.07	0.00	0.00
Real exchange rate	0.76	0.84	0.00	0.00
Real land prices	0.62	1.00	0.43	0.00
Real stock prices	0.51	0.96	0.00	0.00
Real bank lending	0.05	1.00	0.00	0.00
Memorandum items:				
Private consumption	0.38	0.63	0.00	0.00
Business investment	0.79	0.98	0.00	0.00
Residential investment	0.48	0.82	0.00	0.00

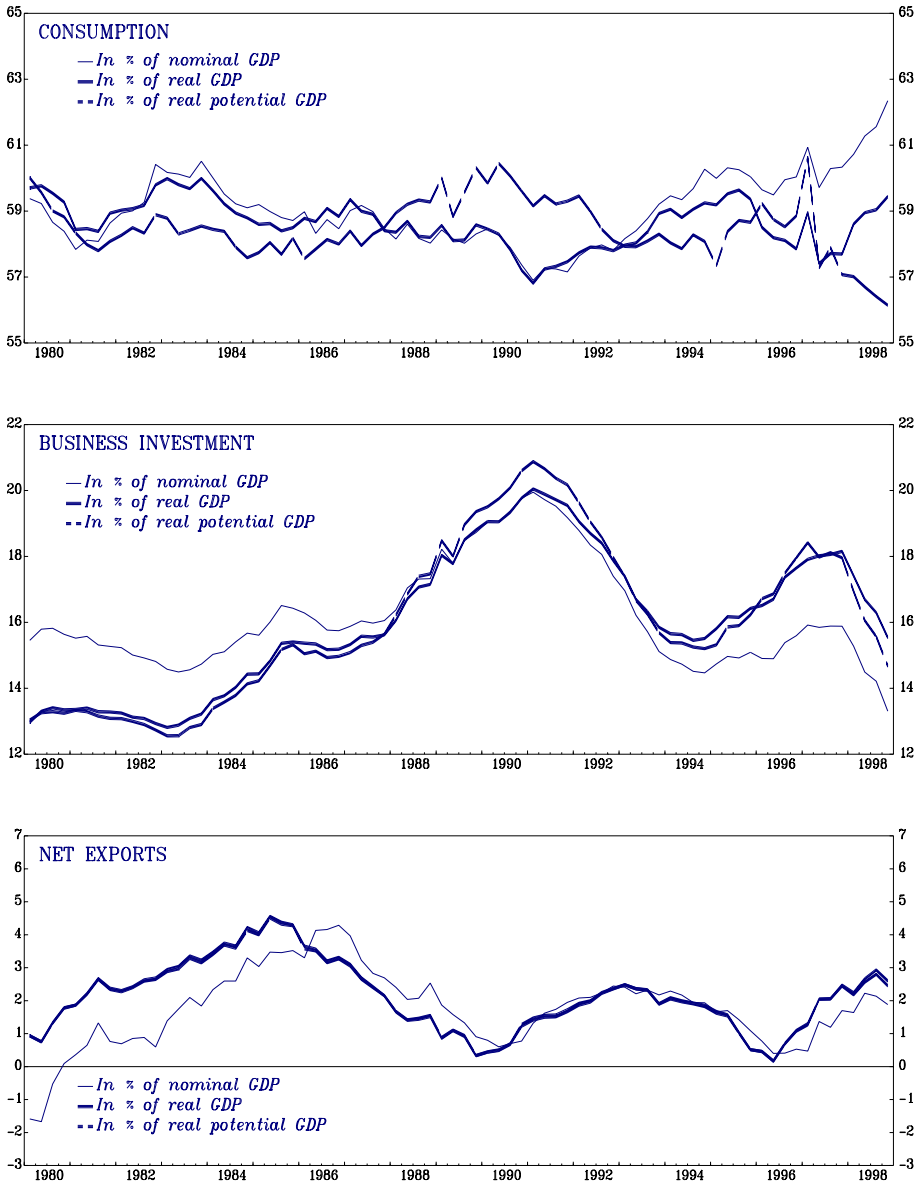
Source: Authors calculations.

CHART 1
JAPAN
OUTPUT AND DEMAND DEVELOPMENTS



Sources: Nikkei Telecom, WEFA, and staff estimates.

CHART 2a
JAPAN
MAJOR DEMAND COMPONENTS



Sources: Nikkei Telecom, WEFA, and staff estimates.

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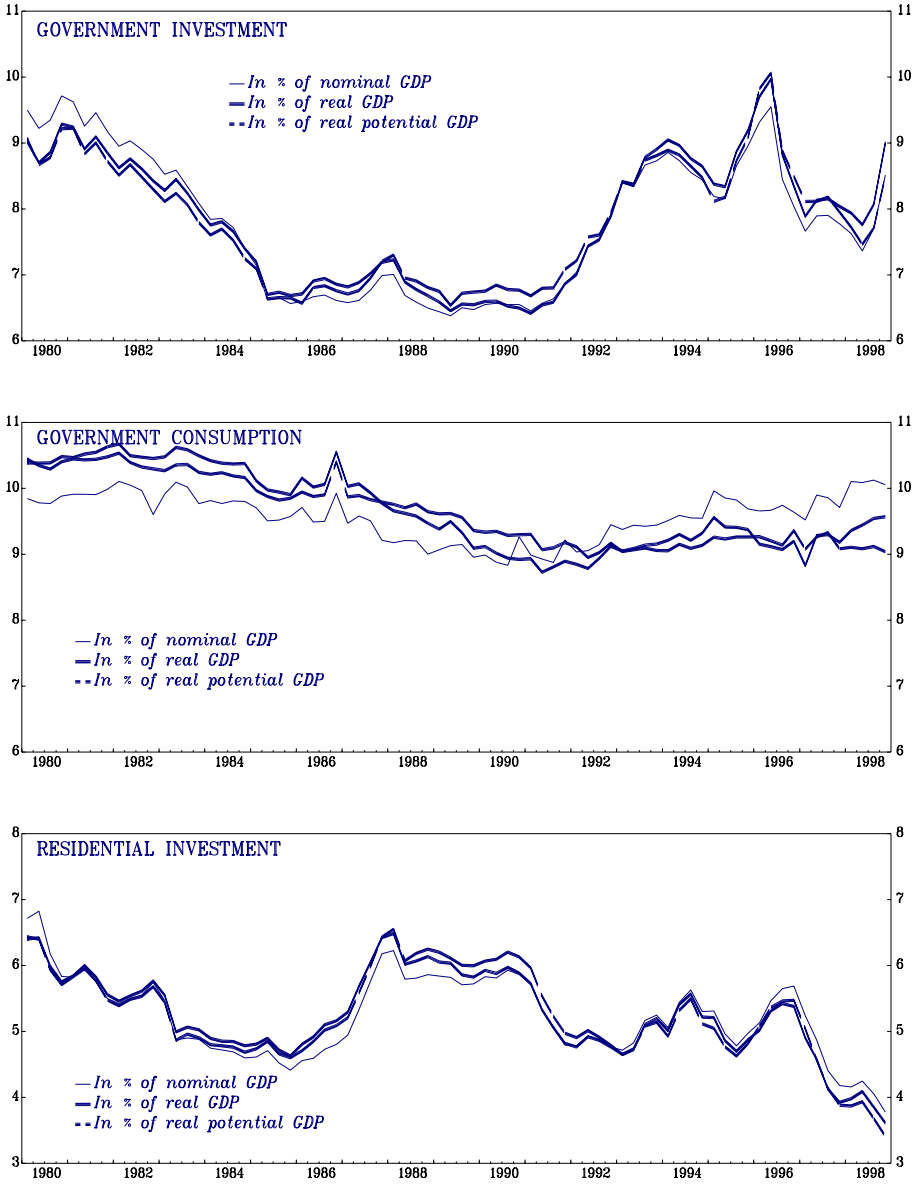
CHART 2b
JAPAN
MINOR DEMAND COMPONENTS



Sources: Nikkei Telecom, WEFA, and staff estimates.

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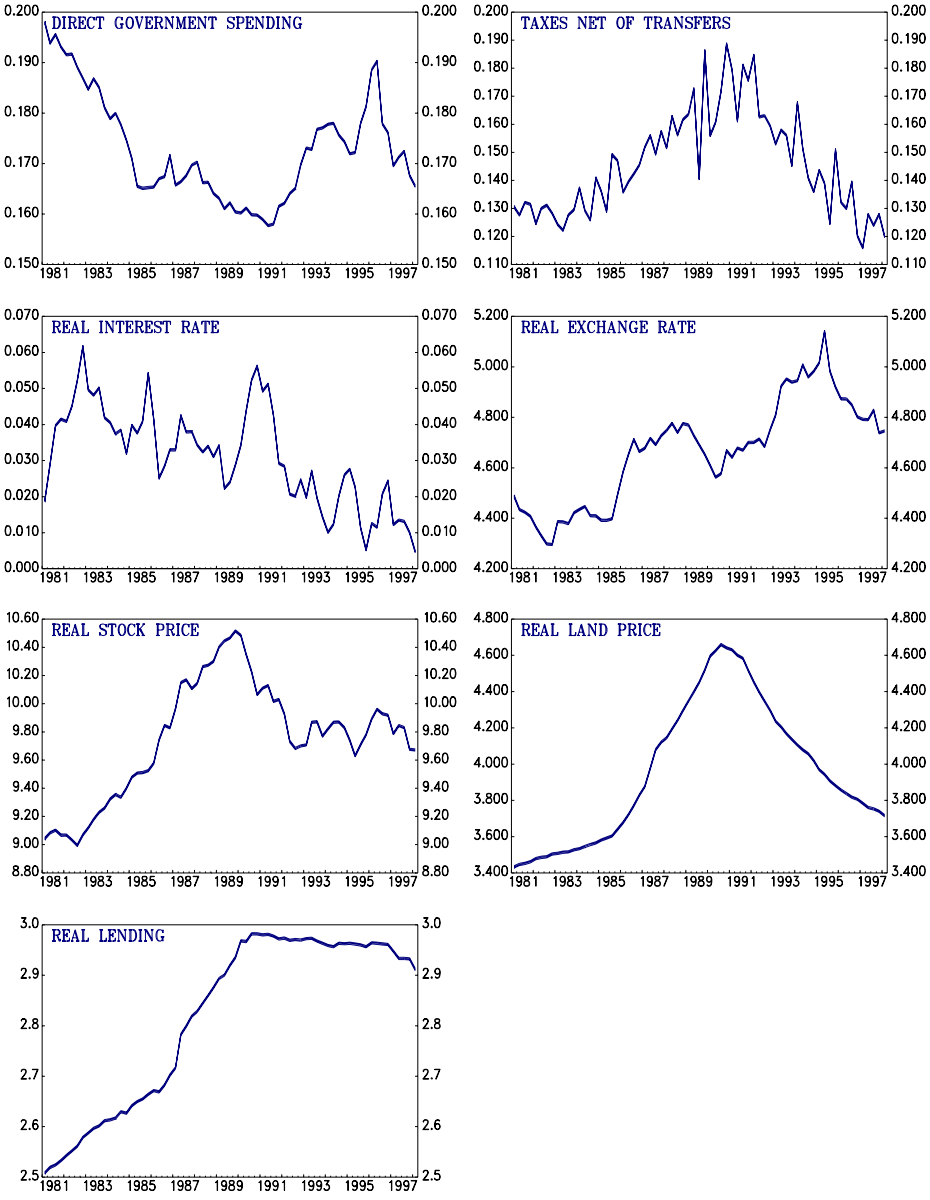
CHART 3
JAPAN
UNDERLYING VARIABLES



Sources: EPA and WEFA. See text for more details.

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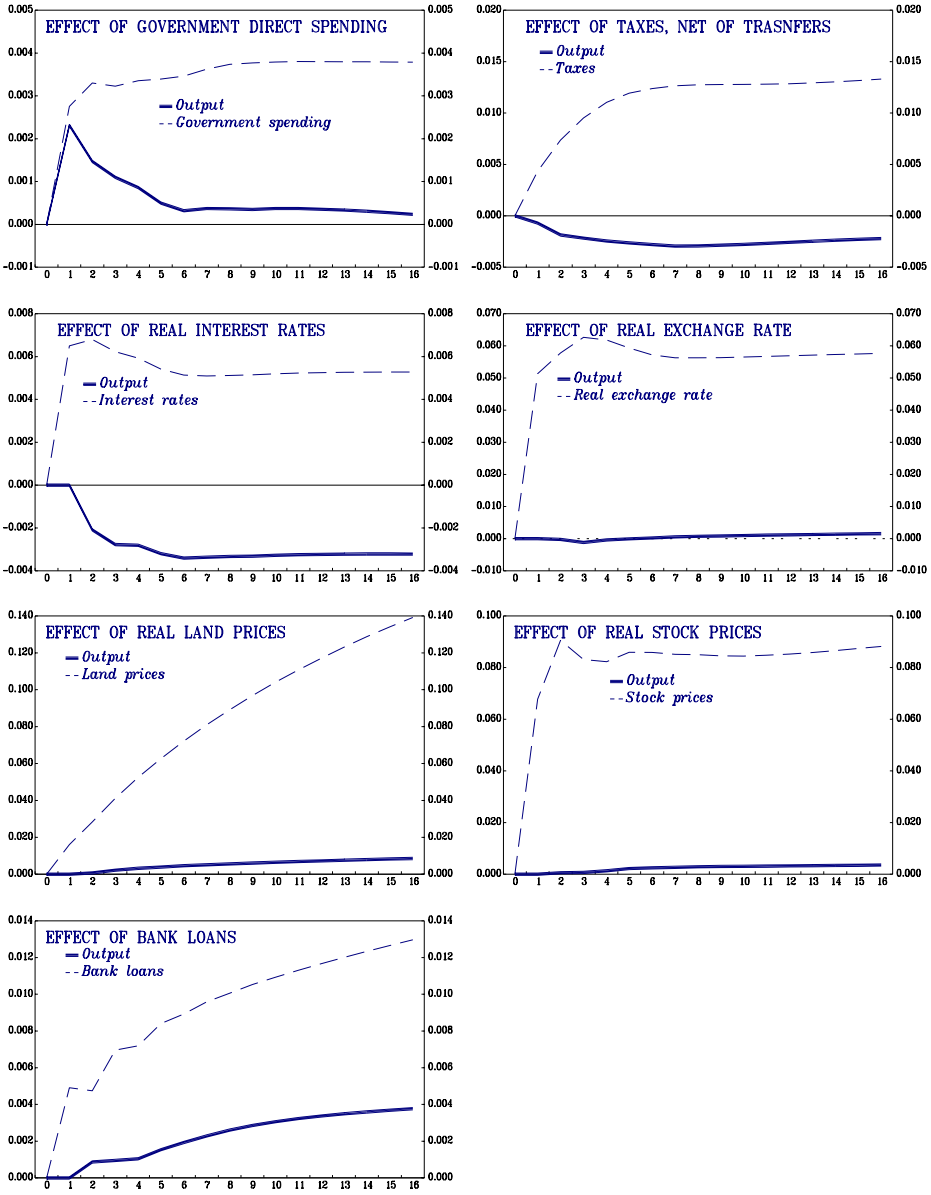
CHART 4a
JAPAN
IMPULSE RESPONSE FUNCTIONS



Source: Staff estimates.

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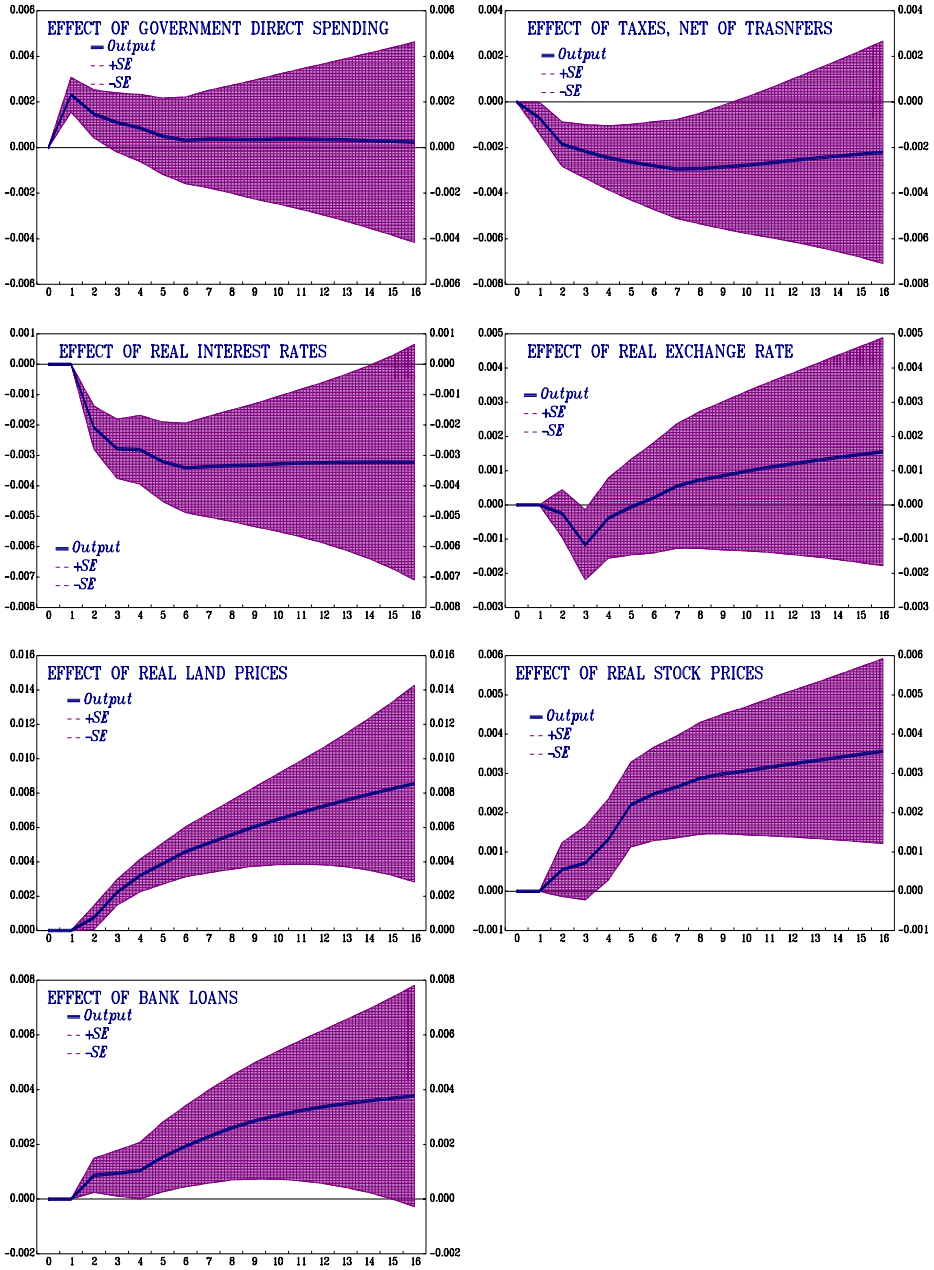
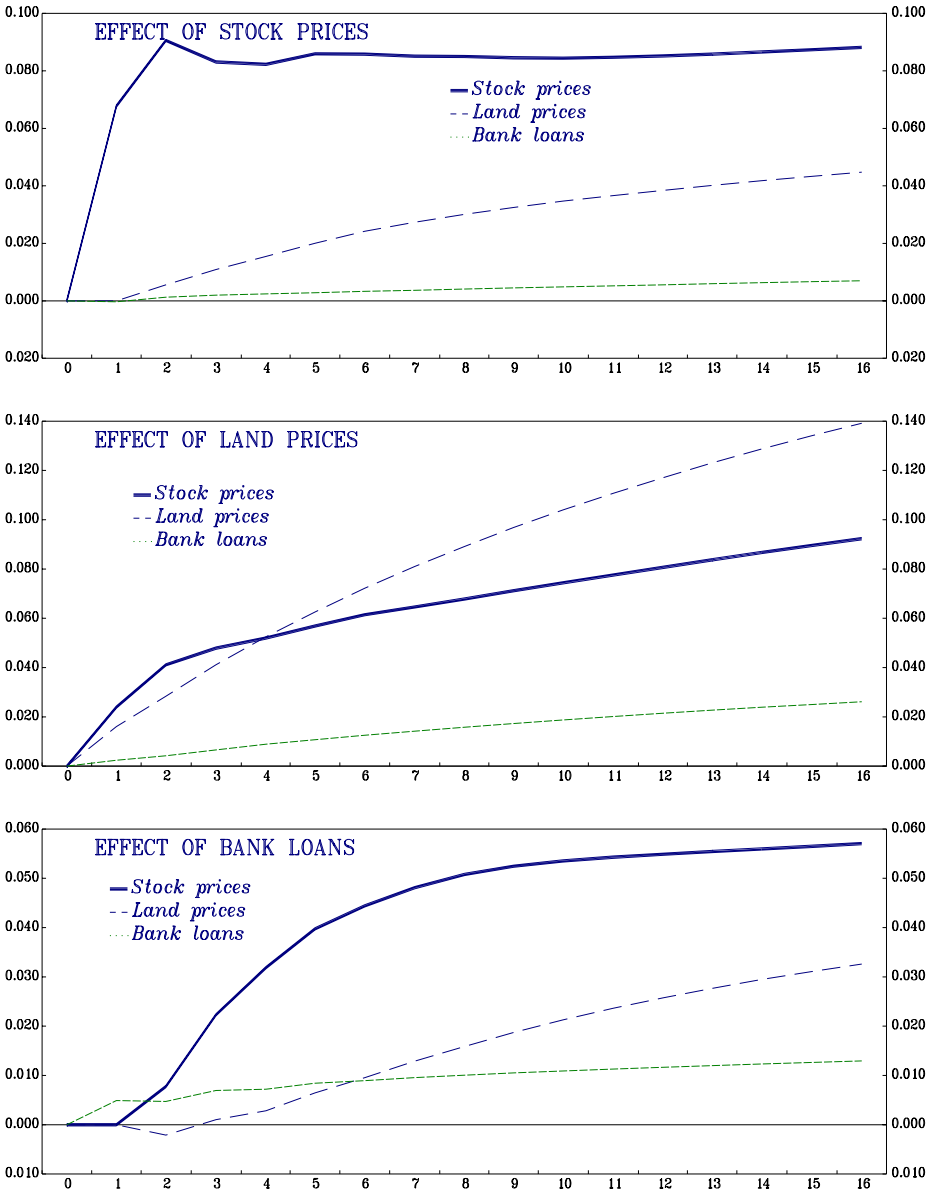
CHART 4b
JAPAN
IMPULSE RESPONSE FUNCTIONS - OUTPUT AND STANDARD ERRORS



Sources: Staff estimates.

q: data jpn tb vars hist_yyc.cmd

CHART 5
JAPAN
IMPULSE RESPONSE OF FINANCIAL VARIABLES



Sources: Staff estimates.

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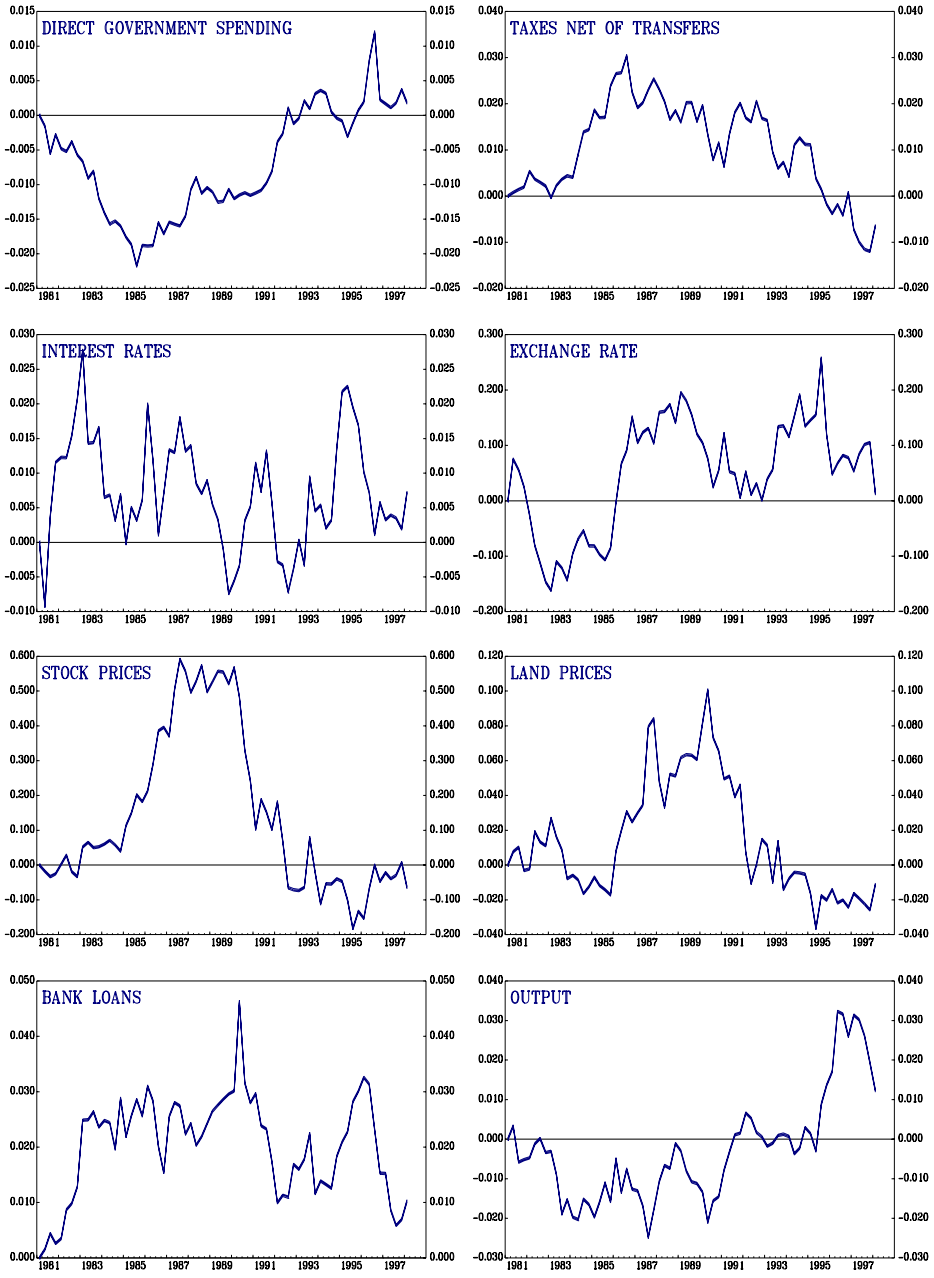
CHART 6
JAPAN
CUMULATIVE RESIDUALS



Source: Staff estimates.

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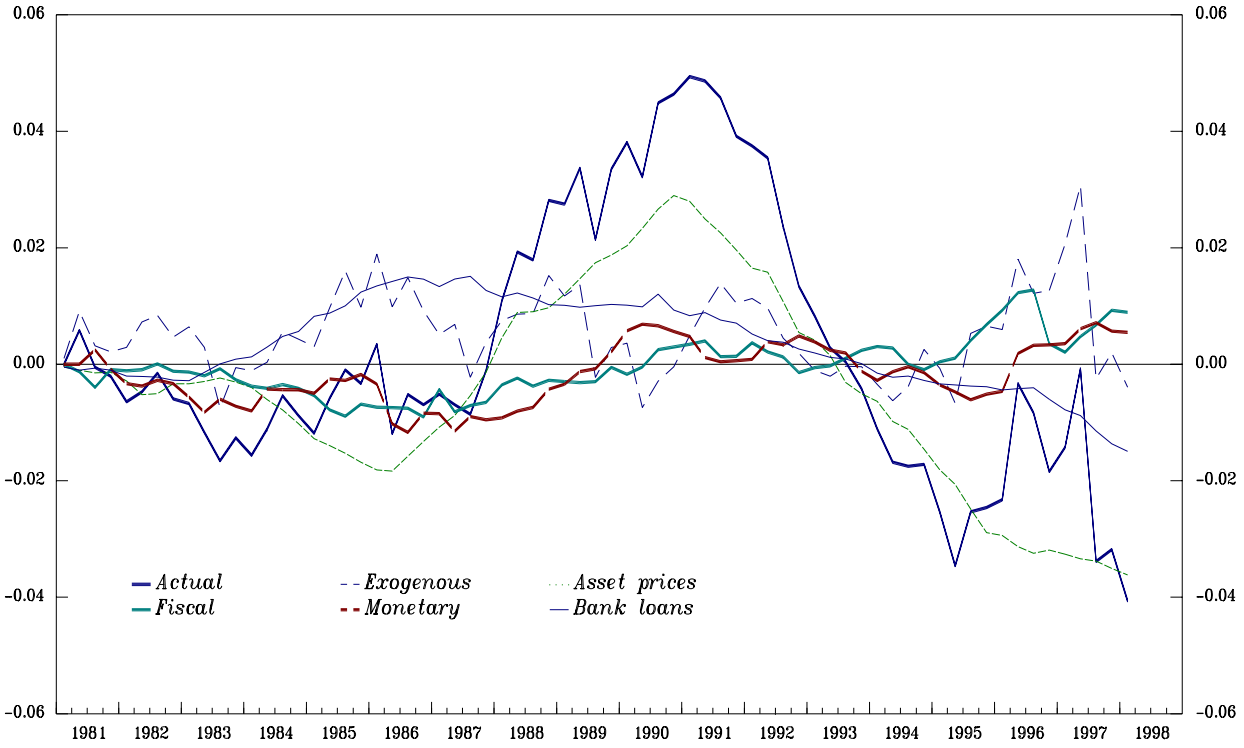
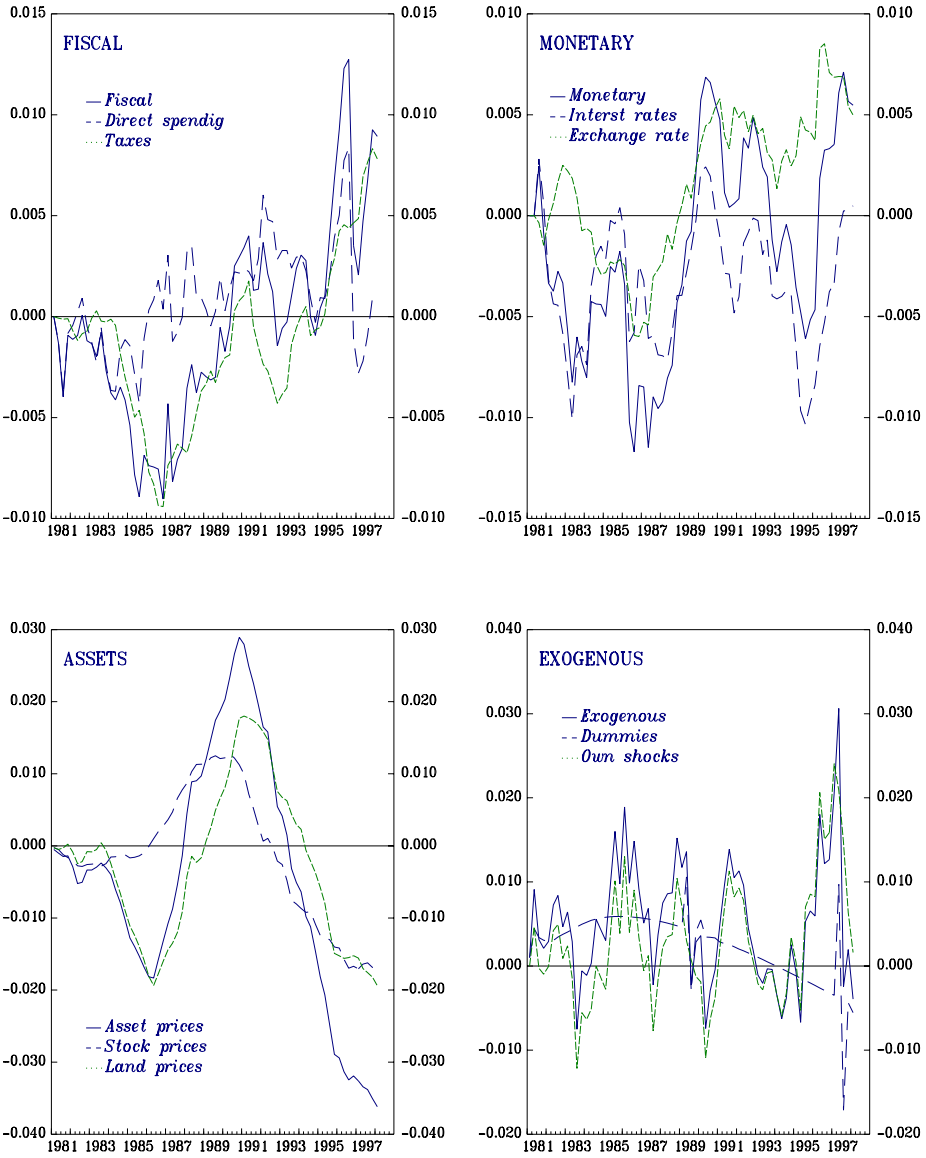
CHART 7a
JAPAN
DECOMPOSITION OF OUTPUT



Sources: Staff estimates.

q: data jpn tb vars hist_yyc.cmd

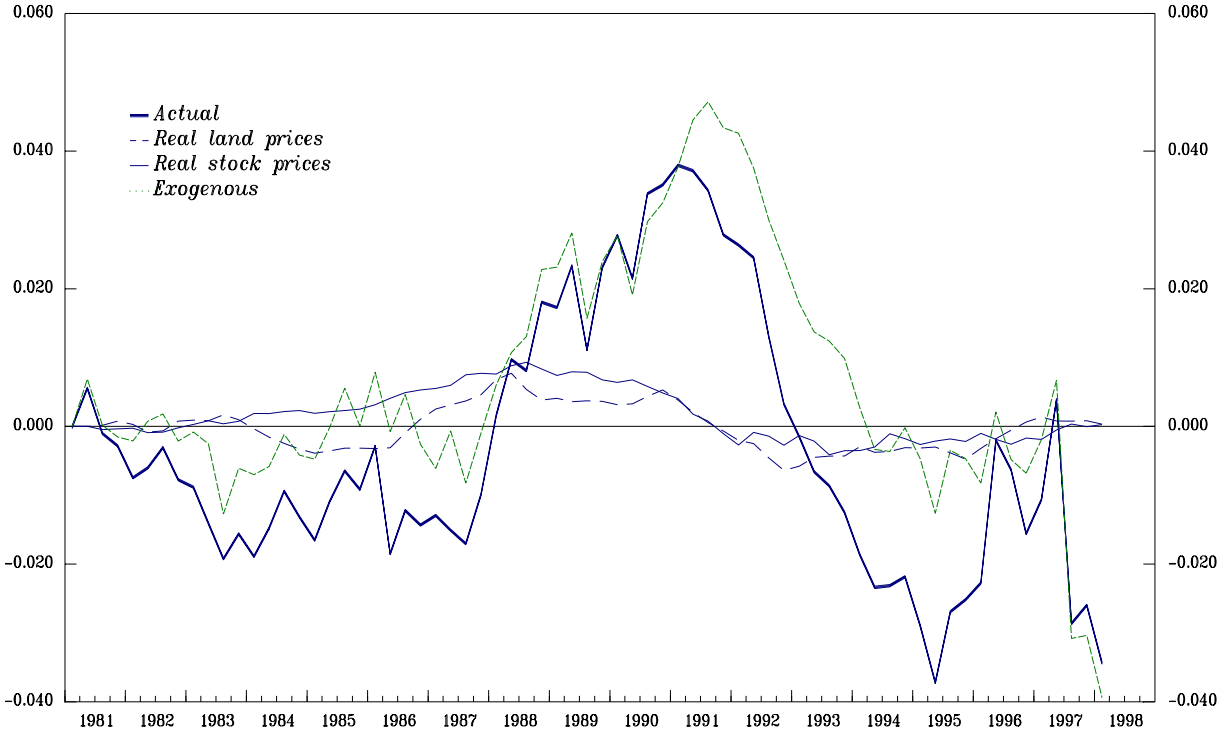
CHART 7b
JAPAN
DECOMPOSITION OF OUTPUT: DETAILED RESULTS



Sources: Staff estimates.

q: data jpn tb vars hist_yyc.cmd

CHART 8
JAPAN
DECOMPOSITION OF OUTPUT WITH LENDING EXOGENIZED



Sources: Staff estimates.

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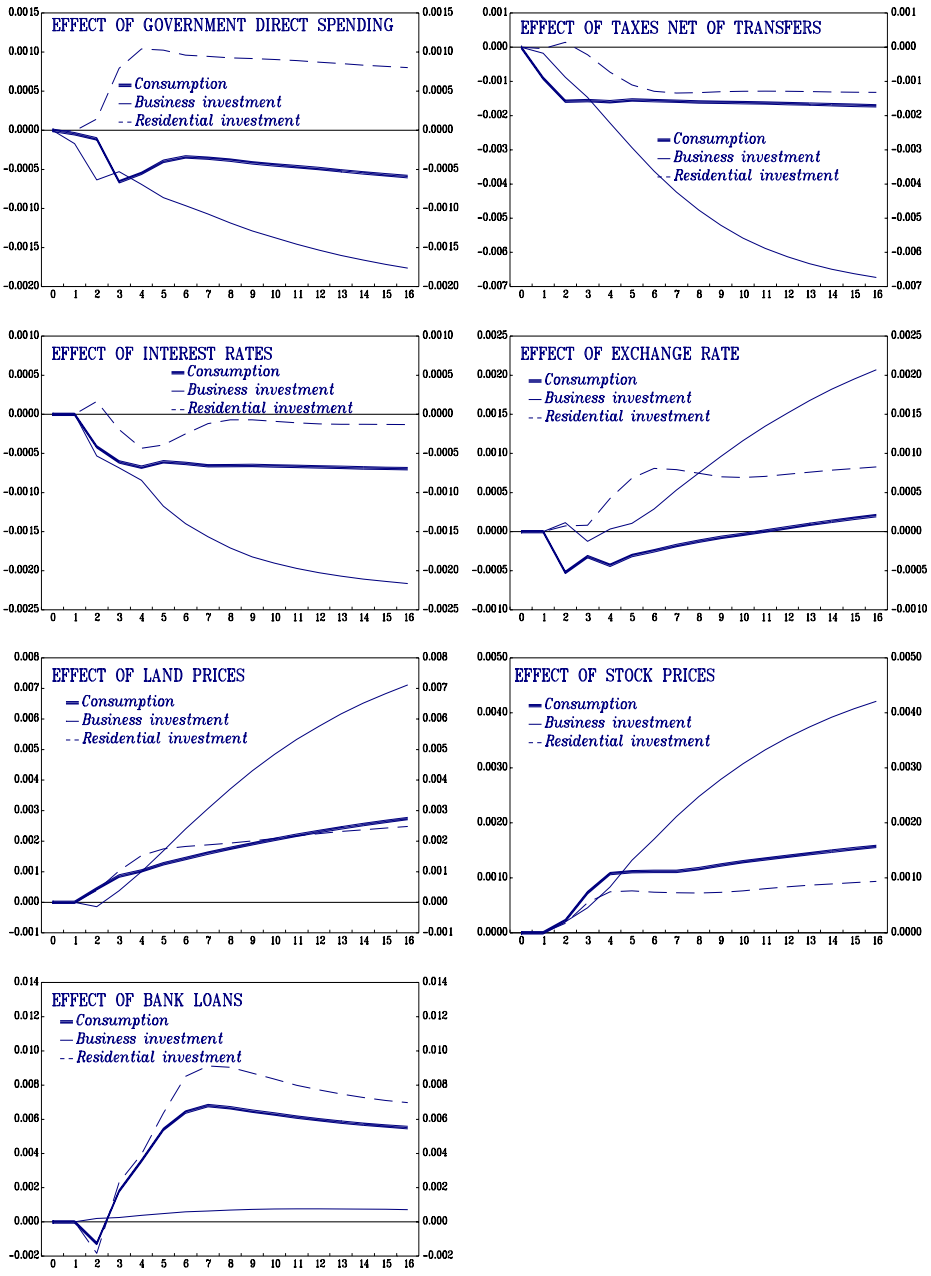
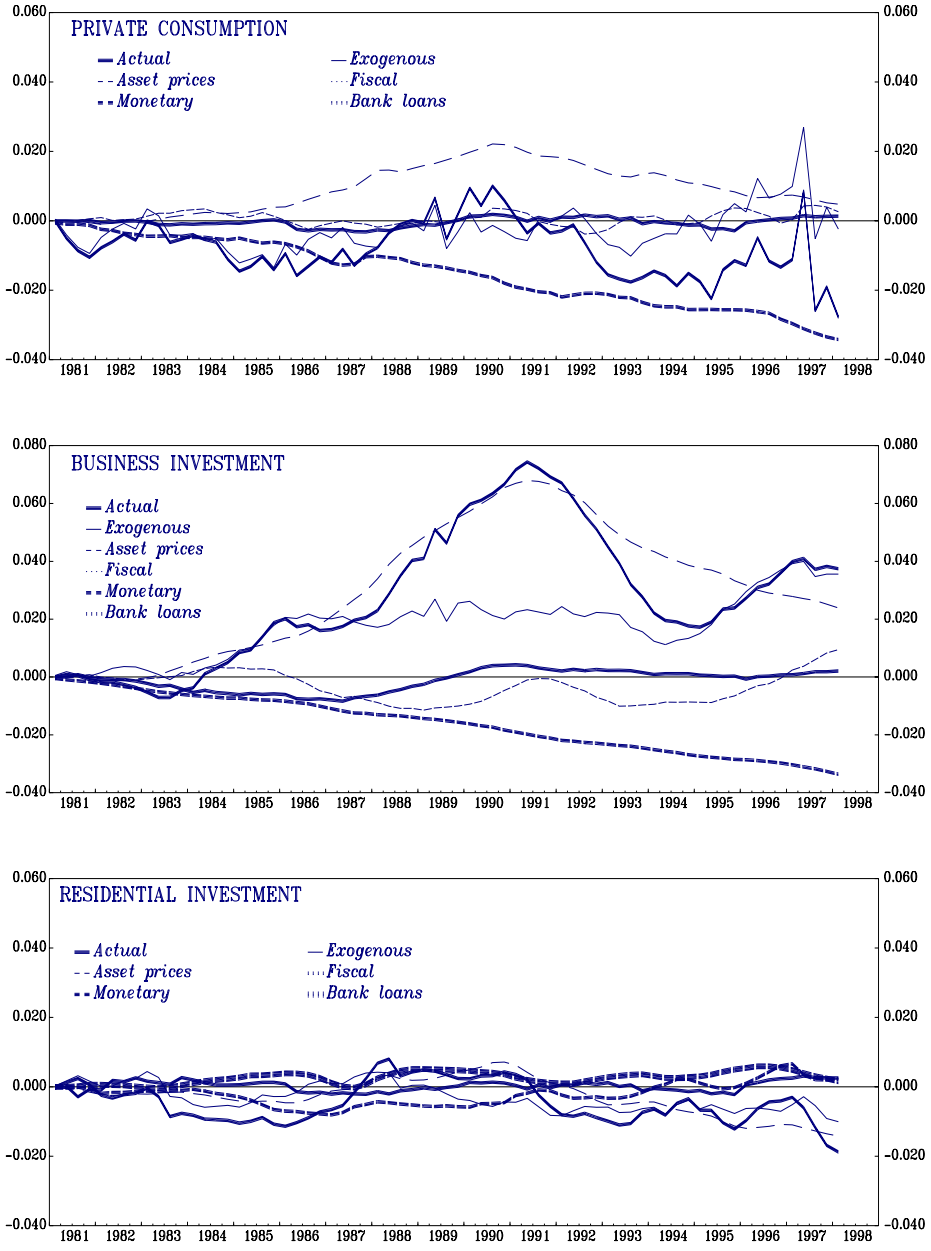
CHART 9
JAPAN
IMPULSE RESPONSES OF COMPONENTS OF DEMAND



Sources: Staff estimates.

q: data jpn tb vars dvar_com.cmd

CHART 10
JAPAN
DECOMPOSITION OF COMPONENTS OF DEMAND



Sources: Staff estimates.

q: data jpn tb vars hist_com.cmd

Appendix: Data Sources

The sources for the variables were as follows:

Output and Components of Demand. The National Income Accounts.

Direct Government Spending: The sum of real quarterly government consumption and public investment.

Taxes Net of Transfers: Nominal seasonally unadjusted quarterly general government deficit (defined from its components) less (unadjusted) direct government spending. As the series were not seasonally adjusted and tax policy normally occurs on an annual basis, the series used in the regressions was the four quarter moving average, first differences by subtracting the same value from the year before. Projected after 1997Q1 due to lack of data.

The Real Interest Rate: The 3-month gensaki rate less the inflation rate of the GDP deflator (adjusted for indirect tax changes) over the previous 4 quarters.

The Real Exchange Rate: The Fund's multilateral real exchange rate calculated using data on unit labor costs across developing countries.

Real Stock Prices. Monthly averages of the Nikkei 225 index, divided by the GDP deflator.

Real Land Prices: Semi annual data on the average value of land in the 6 major cities were interpolated, and divided by the GDP deflator.

Real Loans: The sum of liabilities of the corporate sector and borrowing by the private sector, as measured by the flow of funds accounts, divided by the GDP deflator.