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Financial Linkages and Business Cycles of Japan:

An Analysis Using Financial Conditions Index

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【Abstract】This paper constructs a financial conditions index (FCI) for Japan, using vector autoregressions (VAR) and impulse responses functions, and then investigate the effect of financial shocks on business cycles of Japan. Based upon our estimation results, we found that, in addition to the trade channel, the financial linkage played a significant role in Japanese business downturn caused by the current global financial crisis, and that its effect has come mainly from fallen stock prices and exchange rate appreciation, but not from credit crunch or the financial accelerator mechanism as had been the case in the recession in the early 1990s.

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1. Introduction

The Japanese economy lost about 9 percent of real GDP during her 17 months of economic recession[1] since the U.S. subprime loan crisis in 2007. Dichotomizing channels of international business cycle transmission, Lane and Milesi-Ferretti (2010) argue that the crisis has been transmitted through a financial channel in the case of Europe and through a trade channel in Japan. Is this true that there is no transmission through the financial channel in the case of Japan?

As to international transmission of business cycles there have been a lot of arguments focusing on the trade channel. For instance, once popular decoupling hypothesis argues that the international transmission of U.S. recessions would be limited because of the declining exports to the U.S. market as a share of world trade. In the current crisis, however, the collapse of the U.S. subprime loan market hard hit U.S. investment banks, and the shock was transmitted to worldwide financial institutions that hold securitized financial products related to the subprime loans. As Krugman (2008) refers to International Financial Multiplier, the financial channel of international business cycle transmission has recently attracted more attention.

The purpose of the present paper is to clarify the relationship between financial conditions and real economy across business cycles in Japan since the 1980s, estimating Financial Condition Index (FCI, hereafter). Particularly, in view of increasing global financial integration, we focus on a financial linkage to see to what extent the current global financial turmoil affects Japanese financial conditions and then her real economy.

While FCI measures the effect of representative financial variables such as interest rates, stock prices and exchange rates on the real economy, the recent research on FCI includes a variable for credit markets in addition. Swinston (2008) and Beaton, Lalonde and Luu (2009) construct FCI on the United States, and Guichard, Haugh and Truner (2009) on the four economies as Euro area, Japan, the United States and the United Kingdom, using lending attitudes of financial institutions as a variable for credit markets. In constructing FCI for Japan, there are reasons to include a variable for credit market conditions.

For one thing, reviewing Japanese business cycles since the 1980s[2], it has been pointed out that, while large deteriorations in corporate stock as well as foreign exchange markets negatively affected

[1] Economic and Social Research Institute (ESRI) preliminarily reported on June 8, 2010, that the contraction phase (from peak to trough) is 17 months from October 2007 to March 2009.
[2] There are the recession by Yen appreciation in 1985, the bubble collapse of the stock price and real estate price in 1991, the sharp appreciation of Yen in 1995 and the decline of the stock price caused by the U.S. IT bubble collapse in 2001 etc.

the real economy, banks' nonperforming loans as well as resulting credit crunch, too, did so independently in her "lost decade."

For another, IMF (2008) reveals that, historically comparing between economic recessions with and without preceding financial conditions, the decline in GDP tends to be larger and the duration of recession to be longer in the former case, and that the difference tends to be larger particularly with deterioration in banking sector than those in securities and foreign exchange markets. As such, we can grasp the role of financial conditions more comprehensively by including a credit market variable into FCI. Accordingly, the present research constructs FCI covering some credit market variable as well as interest rates, asset prices and foreign exchange rates. With the FCI, we analyze the role of financial linkage across Japanese business cycles since the 1980s.

We can summarize our findings as follows: First, after the 1980s, financial shocks in the recession starting from 1991 were the largest in terms of its depth, duration and cumulative effects, and they, not the real factor, were a main cause of the recession. On the other hand, in the recession due to the global financial crisis in 2008, the negative effect of the real economic factor was indeed unprecedentedly large, but the financial shock was not only larger in depth than that in the case of 1991 recession, but also almost as large in size (or depth *and* duration).

Second, relative contributions of individual financial shocks are diverse across recessions. In particular, while stock prices, credit market conditions and foreign exchange rates gave negative impacts altogether in the 1991 recession, credit market conditions did *not* in the current crisis/ recession. Low leverage ratios of Japanese financial institutions and larger deterioration of corporate demand for external funds than tightening banks' lending stance appear to be among background factors for the above.

The structure of the paper is as follows: In Section 2, the procedure to construct FCI using a VAR model and the data to be used are explained. In Section 3, the VAR model is estimated and its impulse response function is discussed. Then, using these results, FCI is estimated. Based on the FCI, first, the impact of financial conditions on real GDP growth, and then that of individual financial variables constituting the FCI across Japanese business cycles are discussed. Section 4 concludes and summarizes the paper.

2. Methodology

2.1. Construction of FCI

In prior studies we can find four types of methods to construct FCI, using; 1) a large-scale macroeconometric model as in Guichard, Haugh and Truner (2009), 2) reduced-form aggregate-demand equations like IS and Phillips curves as in Goodhart and Hofmann(2001) and Gauthier, Graham and Liu (2004), 3) a principal component analysis as in Montagnoli and Napolitano (2001) and Hatzius, Hooper, Mishkin, Schoenholtz and Watson (2010), and 4) a VAR model as in Swiston (2008) and Beaton, Lalonde and Luu (2009)[3]. In this paper, we use the VAR method of type 4) to construct FCI.

An advantage of using the VAR method is that we can avoid an endogeneity problem. Since financial market and real economic variables are essentially endogenous, if we assume that the financial variables are exogenous in the estimation model for FCI, the estimators would be biased. With the VAR method treating all variables as endogenous, we can obtain exogenous financial shocks and avoid the endogeneity problems.

Another advantage the VAR method has is that, because the parameters of impulse responses are used as weights, we can analyze dynamic responses of real economy to financial shocks. The other methods use average values of financial effects on real economy as weights, so that we cannot trace their dynamic effects on real economy.

We follow a VAR method in Swiston (2008) to construct FCI in this paper. First, we estimate the VAR model with financial variables and real GDP and then calculate the structural shocks of financial variables and the parameters of impulse responses of real GDP. Second, FCI is constructed by combining the financial shocks and the parameters of the impulse responses as weights as follows:

$$FCI_t = \sum_{j=1}^{m}\left(\sum_{i=0}^{n} w_i^j u_{t-i}^j\right)$$

w_i^j is a parameter for an i quarters-lagged impulse response of real GDP growth rate to a shock of a financial variable j and u_{t-i}^j is a structural shock of a financial variable j. Namely, FCI_t is a combination of impulse response parameters multiplied by shocks across time lags. In this paper, assuming that financial shocks persist for two years (eight quarters), we set 8 lags for FCI.

2.2. Data

As for the data for FCI, we select representative indicators of financial conditions such as lending standards of banks, interest rates and asset prices. Specifically, financial variables for FCI are

[3] For more details in the advantages and disadvantages of each method, see Gauthier, Graham and Liu (2004).

selected in view of the availability of data, the being frequently used variables in prior studies and the statistical significance of the impulse responses of real GDP growth to their shocks.

For lending standards of banks that stand for loan-supply conditions in credit market, we use a survey, "Lending Attitude of Financial Institutions" in *TANKAN* of Bank of Japan (BOJ). Swiston (2008) uses a survey on financial institutions, but the *TANKAN* is on nonfinancial corporations. Although there is a survey on financial institutions that is "Lending Policies" in *Senior Loan Officer Opinion Survey on Bank Lending Practices at Large Japanese Banks* (SLOOS) of Bank of Japan, it covers the period only after 2000, which is too short to estimate FCI. Accordingly we use this *TANKAN* survey for lending standards. While the U.S. survey covers four types of lending, i.e. commercial and industrial loans, commercial real estate loans, residential mortgage loans and consumer credits, the *TANKAN* survey classifies loans by scale of firms (all, large, medium and small) and by industry (all, manufacturing, non-manufacturing and individual). We use loans on all firms and all industry.

As to lending standards of banks, the *TANKAN* survey has some advantages to the SLOOS in quality and characteristics of data. First, the *TANKAN* covers not only longer periods, but also larger samples in size than the SLOOS does. In fact, the former covers about 10000 nonfinancial firms, while the SLOOS covers only 50 banks. Thus the *TANKAN* appears more stable and reliable. Second, *TANKAN* data may reflect loan-demand conditions of firms because they evaluate banks' lending attitudes based on their own conditions about internal funds, running costs and investment opportunities. Thus, it appears that the *TANKAN*, capturing both loan-demand as well as loan-supply conditions, can more properly measure liquidity constraints of firms and supply-demand conditions of credit market.

As to interest rates for FCI, we include a short-term money market rate and a long-term government bond rate. As the short-term rate we use three-month "Tokyo Interbank Offered Rate (TIBOR)". We select TIBOR instead of an "Uncollateralized Call Rate" which is a policy rate of BOJ, because the former reflects expectations of interbank markets[4]. Since the uncollateralized call rate is not available before August 1985, we use the "Collateralized Call Rate" adjusted by spreads between uncollateralized and collateralized before August 1985 only for a sensitivity check. As the long-term interest rate we use a "Newly Issued Government Bonds Yield (10 Years)". Both the short-term and long-term interest rates are deflated by inflation in Consumer Price Index (CPI)[5].

[4] We use the call rate only for a robustness check.
[5] We also estimate FCI using "Interest Rate Spread" as a term premium instead of the long-term interest rate for a robustness check.

As to asset prices for FCI, finally, we use a stock price and a foreign exchange rate. As the stock price we use a "Tokyo Stock Price Index (TOPIX)" in Tokyo Stock Exchange (TSE) and as the exchange rate we use a "real effective exchange rate" downloaded from the BOJ website. The stock price is also deflated by inflation in CPI[6].

Prior FCI literature uses a residential price index such as "S&P Case-Shiller Home price indices" as asset prices. But a similar residential price data is not available in Japan. Likewise, "Land Price" of Ministry of Land, Infrastructure, Transportation and Tourism (MLITT) is annual data and "All Urban Land Price Index" of Real Estate Economic Institute is biannual data. Thus we simply do not use data on real estate prices in this paper. Also, although a market of real estate investment trust (REIT) started in the 2000s, the "Tokyo Stock Exchange REIT index" is available only after 2003, whose sample period is too short to use for our purpose.

Some FCI literature include other variables such as a Commercial Paper (CP) spread of nonfinancial corporations as default risk, a mortgage premium, a volatility of stock price, an investment grade bond yield, an investment grade and a high yield bond spread etc. The CP data, "Newly Issued Domestic Commercial Paper (3 months)" can be downloaded from the BOJ website, but it is available only after 1994. About mortgage premium, Japan Housing Finance Agency started issuing mortgage backed securities (MBS) in 2001, but their sample period is not long enough to estimate VAR. *Financial and Economic Statistics Monthly* of BOJ stopped publishing the data on bonds (investment grade and high yield) in 2004, and, although the bond data are maintained by Japan Securities Dealers Association, they are not available as time series data now. Thus we do not use these data[7].

The variables for real economy are real GDP and GDP deflator. Both are downloaded from the CAO website. Finally, this paper includes a crude oil price (West Texas Intermediate ($)) downloaded from *International Financial Statistics* of IMF in order to avoid the "price puzzle" pointed out by Sims (1980).

3. Estimation

3.1. VAR Model

[6] We estimate FCI using "Stock Yield" in TSE for a robustness check.
[7] About the CP spread, the investment grade bond yield and the bond spread, we estimate FCI respectively, though the sample periods are limited.

In this subsection, we estimate a VAR model with 8 variables (OP, REER, TIBOR, GB, TOPIX, LS, INFL, GDP) over the period from the first quarter of 1980 (1980Q1) to the fourth quarter of 2009 (2009Q4). OP stands for the crude oil price, REER for the real effective exchange rate of Yen, TIBOR for the real Tokyo Interbank Offered Rate (three-month), GB for the 10-years real government bond yield, TOPIX for the real equity return of Tokyo Stock Price Index and LS for the lending standards of banks. INFL stands for the log-difference of GDP deflator and GDP for the real GDP growth.

The structural shocks and the impulse responses of the financial variables are calculated using Cholesky decomposition, when the order of variables in VAR is important[8]. We place, first, the oil price as the most exogenous because it would be least affected by the financial conditions and business cycles in Japan. Then, since our goal is to examine the effects of the financial shocks on real GDP growth, the next are the financial variables and the last are the real economic variables, assuming that they are most endogenous. Among the financial variables, the first is REER because it is affected mostly by the international economic environment, and the next the short-term and long-term interest rates because they are significantly affected by the central bank―although they are not policy rates themselves. And then follow the stock price and the lending standards of banks which are affected by the domestic business cycles[9].

Most variables are in log-difference, but the interest rates are differenced and the lending standard of banks is in level due to stationarity. An AIC and a SBIC show that 1 lag is appropriate for the VAR model, but a likelihood ratio test shows that 2 lags are appropriate. In this paper, to capture the broad effects of financial shocks on the real economy, we adopt 2 lags[10]

Figure 1 shows the impulse responses of real GDP growth to the financial shocks. Central solid lines stand for dynamic responses of GDP growth and upper and lower dotted lines for confidence bands with 1 standard error, calculated by Monte Carlo Integration. The effects of the financial shocks on GDP growth are as follows. First, an appreciation shock of exchange rates (REER) decreases real GDP growth significantly, but the effect works only right after a shock and is not persistent. A

[8] As to the order of the variables, we check the robustness by estimating VAR with different orders. The replacement of the order in the VAR models hardly affects the results.
[9] There are structural VAR models with identifying restrictions as in Christiano, Eichenbaum and Evans (1999), Sims and Zha (1996) and Bernanke and Mihov (1999), usually used for monetary policy analysis. We do not adopt this approach because financial variables in this paper are more extensive than in these analyses, and then also, it is generally difficult to presume signs and effects of parameters on restrictions in advance.
[10] We check the robustness by estimating the VAR model with different lags. The results of the VAR model with 3 and 4 lags are hardly different from the results of the basic model.

upward shock of the short-term interest rate (TIBOR) decreases GDP growth significantly and is persistent, while that of the long-term interest rate (GB) promptly decreases GDP growth but is short-lived. A positive shock of the real equity return (TOPIX) immediately increases real GDP growth significantly, and the effect is persistent. Also, a positive shock in the lending standards of banks (LS) not only significantly increases GDP growth immediately, but also the effect is persistent.

Table 1 reports the results of a forecast error variance decomposition on real GDP growth over the whole sample period. The values show (average) relative contributions of the financial variables to forecast error variances of real GDP growth 8 quarters after a shock. First, a GDP's own shock accounts for about 64% of GDP growth variance and it is the largest. As for the financial variables, TOPIX and LS account for about 7% of GDP growth variance respectively, and REER, TIBOR and GB for about 4% each. This suggests that the effects of the stock price and the lending standards of banks were relatively stronger than those of the other financial variables over the period.

3.2. FCI and Business Cycles in Japan

Here, using the VAR results obtained in the previous subsection, we calculate FCI by combining the exogenous shocks of the financial variables with their impacts on real economy (real GDP growth rate)―the parameters of the impulse responses―as weights. Namely the FCI measures the total effect of exogenous financial shocks on real GDP growth.

Figure 2 shows the FCI calculated as above and real GDP growth. Both are expressed in four-quarter moving averages to be easily seen. Shadowed periods in the figure represent contraction phases (from peak to trough) of business cycles determined by Economic and Social Research Institute (ESRI). We investigate the effects of the FCI on the business cycles particularly focusing on contraction phases (recessions, hereafter). Since the values of the FCI measure the effects of the financial shocks on real GDP growth, their positive (negative) values mean that these shocks increased (decreased) real GDP growth.

In the recession started from 1985, the financial conditions that had increased real GDP growth by about 0.4% until then deteriorated to decrease the growth by about -0.3% from 1985. The cumulative effect over the recession was about -0.55% only and not so large, though.

In contrast, in the recession from 1991, the deterioration of the FCI from 1990Q3 preceded the decline of the real economy and had significant negative effects that peaked at -0.85% (1992Q3). In addition, the duration of the effects extended to 12 quarters, the longest since 1980, and accordingly the cumulative negative effect amounted to -6%.

In the recession from 1997, the financial conditions had negative effects from 1998Q1. While its duration was 10 quarters and the cumulative effect on GDP growth amounted to -2.95%, the decline of the real economy exceeded the financial deteriorations in the period. In the recession from 2001, the FCI turned negative from 2001Q2 and remained so even after the real economic recovery. Consequently the duration extended to 12 quarters, which was as long as that ofn the 1991 recession, thereby the cumulative effect amounting to -2.93%.

Finally, in the crisis of 2008, the financial conditions have had negative effects since 2008Q1. While the FCI did not become positive within our sample period, their cumulative effect amounted to -3.45% over 8 consecutive quarters.

We can summarize the above estimation results as follows. First, since 1980, the negative effects of financial shocks in the recession starting from 1991 were the largest in terms of its depth (impact size), duration and cumulative effects, and then financial factors were dominant for the recession. Comparing with these, the negative effects in the 1997 recession were half as large in terms of duration and cumulative effects, while the initial impact was almost comparable, and also the real economic factors overwhelmed the financial factors then. The 2001 recession was also led by the real factors and then, although the financial shocks continued to impact negatively until 2004, they were overwhelmed by the strong real economic recovery.

Second, indeed the negative effects of the real factors were unprecedented in the recession caused by the global financial crisis since 2008, but the negative financial shocks also took place almost simultaneously and it is not necessarily clear whether the real factors led the recession. The initial negative effects of the financial shocks were larger than those of the 1991 recession at least in depth and the cumulative impact were larger than that of the 1997 recession. Therefore, the role of the financial shocks was no small in the current recession, or rather it was almost comparable to that in the 1991 recession of financial bubble bursts.

3.3. Effects of Individual Financial Variables

In this subsection, in addition to the total effect of financial conditions on business cycles measured by the FCI, we examine relative contributions of individual financial variables across recessions. Figure 3 shows the individual effects of the financial shocks on real GDP growth using the VAR model for the FCI. These effects are expressed in four-quarter moving averages and shadowed periods in the figure represent contraction phases (from peak to trough) of business cycles determined by Economic and Social Research Institute (ESRI). In the following, we investigate the

cumulative effects of the individual financial shocks on real GDP growth within each recession. Table 2 shows the magnitudes of their negative effects in each recession. Bold types show the largest negative effect in the recession.

In the recession from 1985, REER and TIBOR had negative effects. Their cumulative effects on real GDP growth are -1.2% and -0.6%, respectively[11]. Despite these negative effects, the positive effects of the stock price and lending standard of banks offset those effects in this recession, and thus the values of FCI were close to zero.

In contrast, all the financial variables except TIBOR had negative effects on real GDP growth in the recession from 1991. The cumulative effect of the stock price, -2.2%, was the largest, and then follow those of the lending standards of banks, the exchange rate and the government bond rate. In the 1991 recession, the financial shocks were main factors of business contraction and their cumulative effects reduced real GDP growth by -4.33%.

In the recession from 1997, LS and TIBOR had negative effects. The lending standard shock reduced real GDP growth by -1.96% and was the largest. TIBOR also had a -0.56% negative effect and TOPIX followed. In the recession from 2001, although TOPIX and TIBOR had negative effects of -0.68% and -0.6% respectively, the total cumulative effect remained to be only -0.07% because the positive effects of the other variables offset.

Finally, in the recession from 2008, all the financial variables except LS had negative effects on real GDP growth. The cumulative effects of TOPIX, REER, GB and TIBOR were -1.21%, -0.86%, -0.61% and -0.07%, respectively. In particular, TOPIX, REER and GB deteriorated sharply as soon as the Japanese economy entered recession. The effect of the short-term rate was negative in the beginning, but it turned positive in the midst of the recession. Although the lending attitudes of banks in the "*TANKAN*" survey were generally tightened, the estimated effects of their exogenous shocks remained positive on real GDP growth as contrast with the 1991 recession.

Upon examining individual effects of financial shocks as above, we find that the channels through which these financial shocks affect GDP growth are not uniform across recessions. Throughout our sample period, either foreign exchange rates, stock prices or credit market variables (lending standards of banks) plays a leading role, but short term interest rates were also one of the main channels of transmission in the 1985, 1997 and 2001 recessions. In particular, in the 1991 recession

[11] On the other hand, GB, TOPIX and LS had positive effects in this recession, i.e. 0.3%, 0.75% and 0.65%, respectively.

led by the financial factors, stock prices, credit market and foreign exchange rates affected economic growth negatively altogether and in this order of importance. In contrast, however, in the case of the current global financial crisis, although our observation period is limited to until 2009Q4, stock prices, foreign exchange rates and long term interest rates were the transmission channels of negative impacts in this order of importance, but credit markets were not this time.

The above results give implications on whether and how the financial linkage works in the transmission of international business cycle in Japan in 2008. According to the models in Krugman (2008) and Devereux and Yetmen (2009), the deleveraging of highly-leveraged financial institutions generate a decline of asset prices as well as deterioration of their balance sheets, leading to a shrinkage of credit markets or credit crunch. In the case of Japan this time, however, while the decline in asset prices (stock prices) is witnessed, the effects of LS on growth remained positive mostly between 2005 and 2009, suggesting no credit crunch.

Why no credit crunch? One possibility is that the pre-crisis leverage level of Japanese financial institutions was not high. If we look at the balance sheets of Japanese banks since the latter half of the 1990s, loans and domestic equity holdings in their asset portfolios have decreased continuously. The shares of foreign equity holdings and financial derivatives have increased, but were small on one hand, and government bond holdings have increased by four times as large. That is, there was no increase in leverage in Japanese banks throughout the 2000s, thereby they did not get involved with the international trend of deleveraging. The other possibility is that because of severe collapse of real demand, corporate demand for investment finance declined larger than tightening of lending standards. Equipment investment of private corporate sector declined by 20 percent in a year from the peak of the former half of 2008. These abrupt drops of investment finance demand may be another reason why credit market conditions did not affect growth negatively.

4. Summary and Conclusion

In the literature on the international transmission of business cycles in the current global financial crisis, it has been often discussed that the linkage through trade channels played a more significant role than the financial linkage in the case of Japan. We wonder at the outset of this paper if this is really the case and, if not, how the financial linkage works.

In order to examine the role of the financial linkage in the business cycle transmission in the case of Japan, we have constructed an FCI by estimating a VAR model and analyzed the relationship between financial conditions and business cycles in Japan since the 1980s. Then we found: First,

since 1980, the negative effects of financial shocks in the recession starting from 1991were the largest in terms of its depth, duration and cumulative effects, and then financial factors were dominant for the recession. Comparing with these, the negative effects in the 1997 recession were half as large in terms of duration and cumulative effects, while the initial impact was almost comparable, and also the real economic factors overwhelmed the financial factors then.

Second, indeed the negative effects of the real factors were unprecedented in the recession caused by the global financial crisis since 2008, but the negative financial shocks also took place almost simultaneously and it is not necessarily clear whether only the real factors led the recession. The initial negative effects of the financial shocks were larger than those in the 1991 recession at least in depth, and the cumulative impacts were larger than in the 1997 recession. Therefore, the role of the financial shocks was no small in the current recession, or rather it was almost comparable to that in the 1991 recession of financial bubble bursts, contrary to the argument that the trade linkage is more important than the financial linkage in the international transmission of the global financial crisis in the case of Japan.

Third, upon further examining individual effects of financial shocks as above, we find that the channels through which these financial shocks affect GDP growth are not uniform across recessions. Throughout the period of our analysis, either foreign exchange rates, stock prices or credit market variables play a leading role. In particular, in the 1991 recession led by the financial factors, stock prices, credit market and foreign exchange rates altogether affected economic growth negatively. In contrast, in the case of the current global financial crisis, stock prices, foreign exchange rates and long term interest rates were the transmission channels of negative impacts in this order of importance, but credit markets were not this time. This is how the financial linkage works in the current crisis.

Why no credit crunch? One possiblity is that the pre-crisis level of leverage of Japanese financial institutions was not that high, thereby they did not get involved with international trend of deleveraging. The other possibility is that because of severe collapse of real demand, corporate demand for investment finance declined larger than tightening of lending standards, so that credit market conditions did not affect growth negatively.

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Table 1：Relative Contribution to Real GDP Growth Variance (%)

Variables	REER	TIBOR	GB	TOPIX	LS	GDP
Contribution	3.97	4.63	3.72	6.65	6.75	64.77

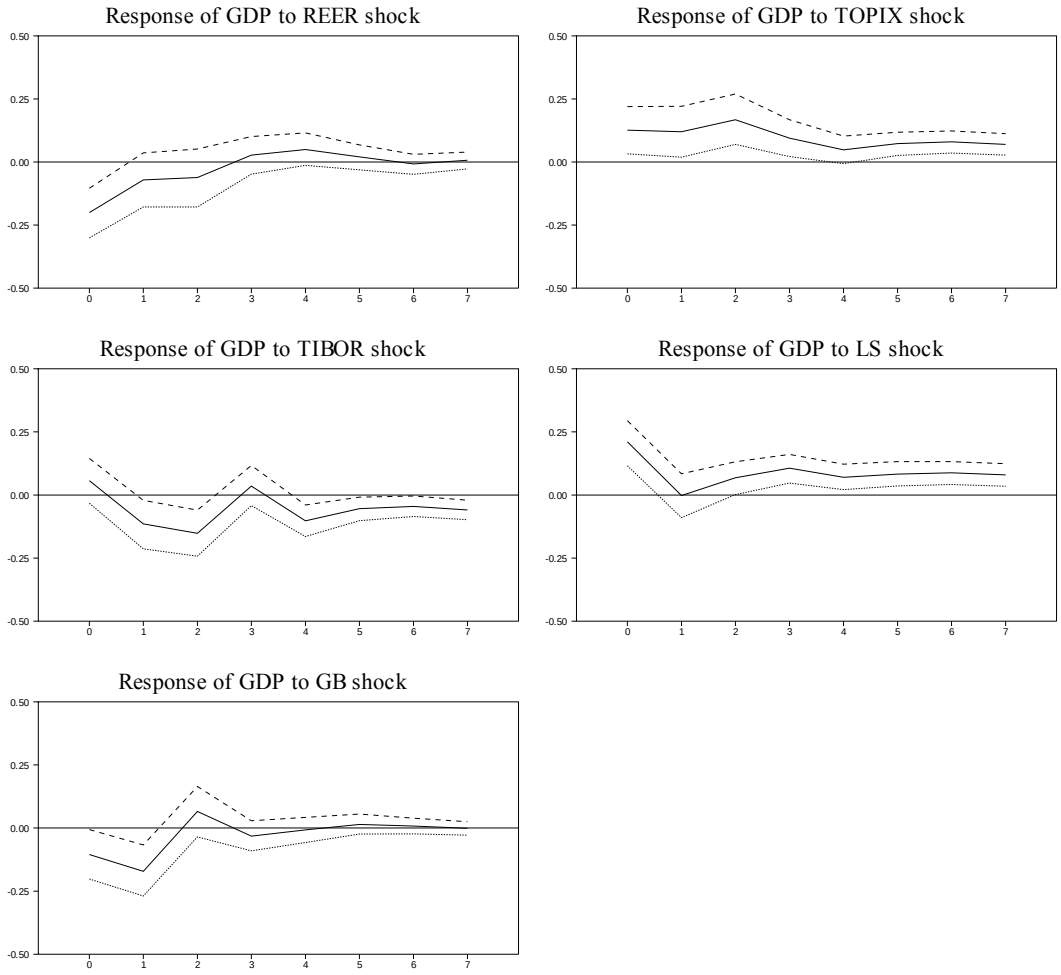
This table is the result of variance decomposition that shows relative contributions of financial and other shocks to real GDP growth variance. We show the values 8 quarters after a shock. REER stands for the real effective exchange rate of Yen, TIBOR for the real short-term interest rate (three-month), GB for the real long-term interest rate (10 years), TOPIX for the real equity return and LS for the lending standard of banks.

Table 2：Cumulative Effects of Individual Financial Shocks across Recessions (%)

Variables	REER	TIBOR	GB	TOPIX	LS
Recessions:					
1985-86	**-1.2%**	-0.6%			
1991-93	-0.96%		-0.41%	**-2.2%**	-1.43%
1997-99		-0.56%		-0.08%	**-1.96%**
2001-02		-0.6%		**-0.68%**	
2008-	-0.86%	-0.07%	-0.61%	**-1.21%**	

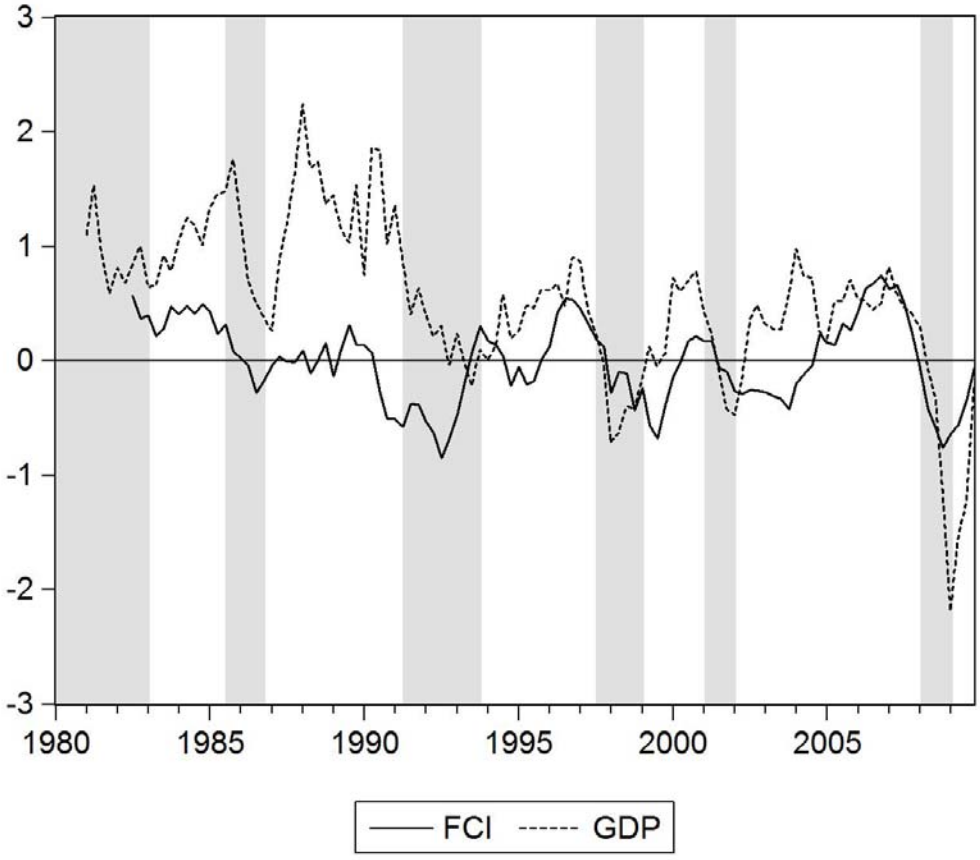
This table shows the effects of the financial shocks on real GDP growth in each recession. Bold types stand for the largest effect in the recession. REER stands for the real effective exchange rate of Yen, TIBOR for the real short-term interest rate (three-month), GB for the real long-term interest rate (10 years), TOPIX for the real equity return and LS for the lending standard of banks.

Figure 1：Impulse Responses of Real GDP Growth to the Financial Shocks



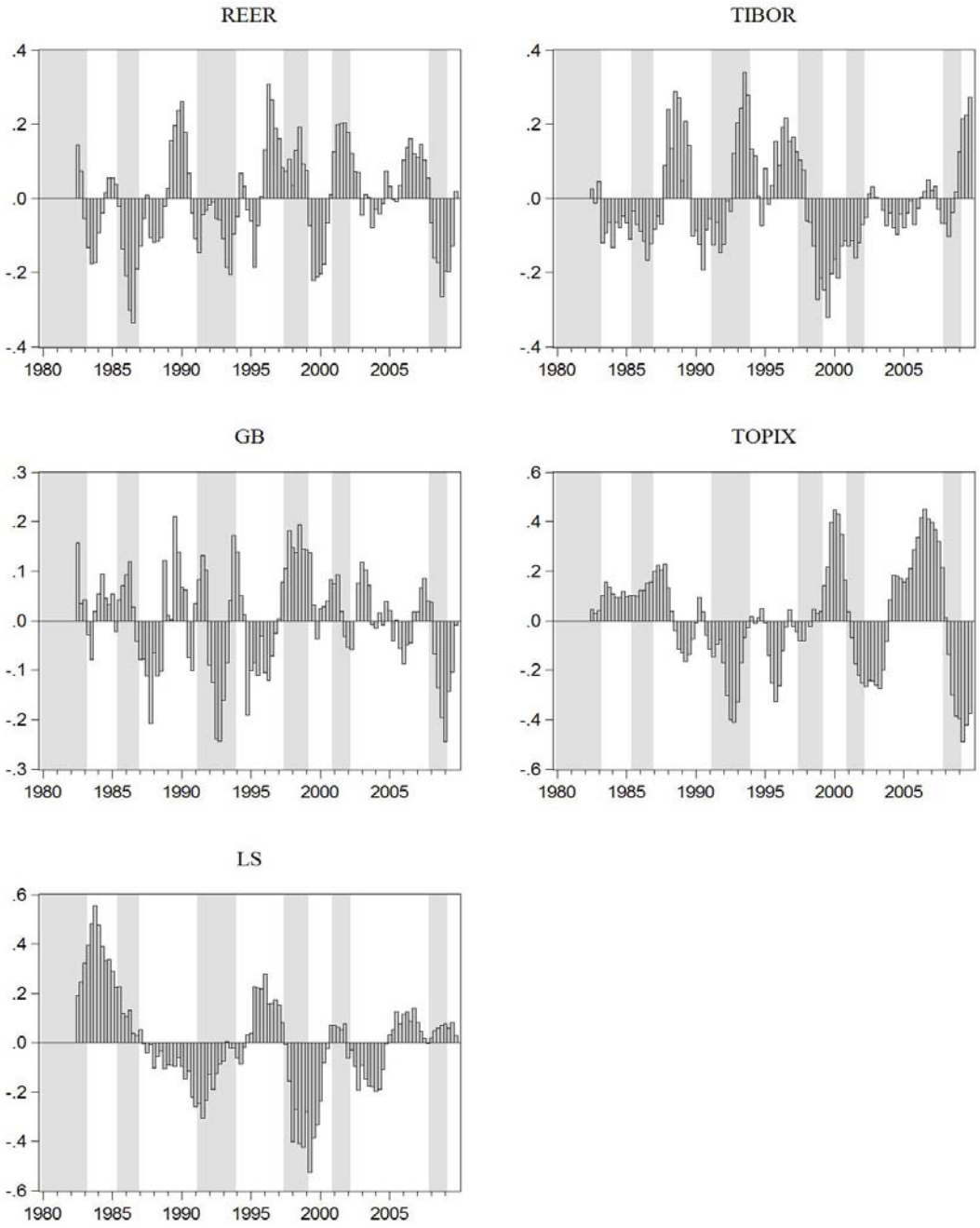
This figure shows the impulse responses of real GDP growth to the financial shocks. A solid line in the center is a point estimate of the impulse responses and top and bottom dotted lines are confidence bands with 1 standard error. REER is the real effective exchange rate of Yen, TIBOR is the real short-term interest rate (three-month), GB is the real long-term interest rate (10 years), TOPIX is the real equity return and LS is the lending standard of banks.

Figure 2：FCI and real GDP growth



This figure shows FCI (Financial Conditions Index) and real GDP growth, both in four-quarter moving averages. Shadowed periods in the figure represent contraction phases (from peak to trough) of business cycles determined by Economic and Social Research Institute (ESRI). The value of FCI is a magnitude of effect of the financial conditions on real GDP growth and the positive (negative) financial conditions increase (decrease) real GDP growth.

Figure 3：Effects of financial shocks on real GDP growth



This figure shows the effects of financial shocks on real GDP growth. All variables are in four-quarter moving averages. Shadowed periods in the figure represent contraction phases (from peak to trough) of business cycles determined by Economic and Social Research Institute (ESRI). The value of each shock is a magnitude of effects of the financial shocks on real GDP growth and a positive (negative) financial shock increases (decreases) real GDP growth. REER is the real effective exchange rate of Yen, TIBOR is the real short-term interest rate (three-month), GB is the real long-term interest rate (10 years), TOPIX is the real equity return and LS is the lending standard of bank.