Fiscal Policies of Korea through the Global Financial Crisis[*]

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This paper examines the expansionary fiscal policies taken in Korea during the recent Global Financial Crisis (GFC) and evaluates their effectiveness in the recovery process.   In light of the historical trend of fiscal consolidation, the fiscal stimulus package during the GFC is unprecedented both in terms of timing and magnitude. The existing literature has split decisions on the efficacy of fiscal policies in Korea. In contrast, this paper, adopting three different empirical strategies, reports evidences, though limited, that the massive fiscal expansion during the GFC sustained the Korean economy after the currency depreciation has lost its influence on trade balance.

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1. INTRODUCTION

The aftermath of the U.S. subprime mortgage crisis in 2007 pervaded the globe so fast, plunging the global financial system almost into chaos. Most economies, consequently, have experienced devastating panic due to following recessions and rising unemployment, though in different degrees. In response, governments around the world, rather competitively or in a coordinated way, have announced and launched massive fiscal stimulus packages as well as monetary easing with an aim to put their economies back on track. Like other countries, Korea also aggressively implemented several fiscal stimulus packages after the Global Financial Crisis (GFC).

This paper is purposed to examine whether these unusual expansionary fiscal policy measures contributed to the quick recovery from the GFC. However, few studies have assessed the effectiveness of fiscal policy during the GFC. Furthermore, among the very few, most being model-based, agree that those bold fiscal policy measures have helped the Korean economy to return to normalcy. Eskesen (2009) shows using the GIMF model (Global Integrated Monetary and Fiscal Model) that the expansionary fiscal policy brought about additional economic growth of 1.0-1.5%p in Korea in 2009. Based on the simulation of a simultaneous equation model, S.-T. Kim (2012) also estimates that the growth rate enhancement effect of the expansionary fiscal policy was 0.3-0.5%p in 2008 and 1.1-1.9%p in 2009.[1] Such a model-based evaluation, however, tends to show what we believe rather than what we see in that transmission mechanism of fiscal policy is already fixed in the economic model. Thus, this paper takes a purely empirical approach in order to examine how fiscal policy measures[2] implemented during the

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[1] There are recent studies that evaluate how much fiscal policy contributed to real GDP growth during the GFC in U.S. and Euro area. Cogan *et al.* (2010) investigate the effectiveness of ARRA (American Recovery and Reinvestment Act) following Smet and Wouter (2007) and show that additional real GDP growth attributable to ARRA is about 0.6-0.7%p in 2009. Coenen *et al.* (2012) extend the European Central Bank's New Area-Wide Model and estimate that discretionary fiscal measures have increased real GDP growth during the GFC by up to 1.6%p.

[2] Fiscal expansion is so exceptional from a long history of fiscal conservatism in Korea (Koh, 2002).

GFC have helped the Korean economy achieve the faster-than-expected recovery.

So far, on the efficacy of fiscal policies in Korea, several empirical literatures provide conflicting views.[3]   Depending on estimation techniques and data sets used, they sustain or refute the effectiveness of fiscal policies work in Korea.   W. Kim (2006), adopting the Blanchard and Perotti (2002) framework, shows that both structural shock of tax cut and fiscal expenditure contribute to alleviating business fluctuations and claim that tax cut is a more effective counter-cyclical measure than fiscal expenditure.   In contrast, S.-S. Kim (2007) and Hur (2007) report that the efficacy of fiscal policy is not statistically significant.   Compared with W. Kim (2006), they modify Blanchard and Perotti (2002) by adopting different sets of variables and identification strategies.   S.-S. Kim (2007) adds inflation and interest rate variables in the original setup of Blanchard and Perotti (2002).   Hur (2007) supports the insignificant effectiveness of fiscal policy by levying a new shock identification strategy of "Expenditure-Within-Revenue".   However, all the empirical literatures including the above do not focus on the GFC period.

To our best knowledge, our paper is the first attempt to assess empirically the effectiveness of fiscal policies in Korea during the GFC.   In details, it employs the following three empirical strategies.   First, we directly regress real GDP and output gap[4] respectively on widely used indicators of fiscal stance.   The empirical results show that real GDP growth increases when the fiscal stance is expansionary, and vice versa. More importantly, the size of coefficient is larger when including the GFC periods, which implies the expansionary fiscal stance during the GFC was quite effective and pervasive for the Korean economy to rebound from the recession.   Similar results are found even when output gap is used instead of real GDP growth.

Second, in order to assess the robustness of the above single equation approach, we construct bivariate VAR with *FIS* and real GDP growth (output

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[3] Refer to Hur (2007) and S.-T. Kim (2012) for Korean literature on these issues.

[4] For notational consistency, output gap is defined as follows: output gap = actual output – potential output.

gap) and identify structural shocks using Choleski-decomposition.   The impulse response analysis confirms that the fiscal stimulus package has helped the Korean economy to recover faster-than-expected.

Third, this paper adopts an estimation strategy by Hur *et al.* (2010). Based on a country panel data set, they calculate a hypothetical growth path which would have been possible if it had not been for fiscal stimuli after the GFC.   Then, they compare it with the realized growth rate and run regressions in order to see how much the fiscal stimuli during the GFC explain the difference.   One of their major findings is that fiscal stimuli in Asian countries are significantly effective in boosting their economies after the crisis.   Hur *et al.* (2010) classify Korea as an Asian country and include it in the estimation.   Our paper varies from theirs by examining how the regression result changes by locating Korea in the category of non-Asian countries.   By doing so, we could provide evidence, though indirect, as to how effective the fiscal stimulus packages were in Korea after the GFC.

The paper is organized as follows.   Section 2 compares fiscal positions before and after the GFC.   The size of fiscal stimulus packages announced by Korean government includes a portion contributed by the working of automatic stabilizer.   Identifying that the true fiscal stimulus packages are discretionary, we measure the size of fiscal stimulus packages by various methods and discuss whether the estimated size of fiscal stimulus packages is unprecedented.   Section 3 evaluates whether the fiscal stimulus packages were effective in boosting the Korean economy after the GFC.   Section 4 summarizes major findings and discusses their implications.

2. ASSESSMENT OF FISCAL POSITION: BEFORE AND AFTER THE GFC

Like other Asian countries, Korean economy was distant from the center of the GFC.   Thus, the need for injection of liquidity into the economy was not imminent.   Instead usual combination of fiscal expansion and monetary

easing was executed in response to the crisis.[5]   Since the purpose of this paper is to evaluate the efficacy of fiscal policy through the GFC, we hereafter focus on fiscal stimulus package.   Based on the consolidated government budget data, this section measures the timing and the magnitude of fiscal expansion after the GFC.

2.1. Size and Composition of Fiscal Stimulus

The size of fiscal stimulus package in 2008-2010 is estimated to be at about 59.8 trillion won (5.1% of GDP in 2010) according to the official report from the Ministry of Strategy and Finance (MOSF).   It combines spending expansions (30.5 trillion won) and tax cuts including tax exemptions and reductions (29.3 trillion won).   Table 1 exhibits chronologically major fiscal stimulus measures announced by the government since September 2008 in chronological order.

These estimates of fiscal stimulus package in 2008-2010 are somewhat larger than those of Eskesen (2009), who claims that expenditure and revenue measures during the GFC in Korea would amount to 2.6% and 1.0% of GDP respectively in 2009.   Furthermore, Eskesen (2009) predicts that additional revenue measures would be taken in the volume of 1.2% per GDP.   Putting these figures altogether and converting the sum to a nominal value, it would amount to 48 trillion won, which is smaller than our own estimate of 59.8 trillion won.   Such discrepancy could be attributed to the different timing of measurement and the different sources of data.

On the other hand, in terms of composition, these two estimates indicate unanimously that the fiscal stimulus package is concentrated more on specific areas, such as tax cut, SOC building and supports for SMEs and the self-employed.[6]   These budget items are known to have bigger or more persistent multiplier effects according to the existing literature.   S.-S. Kim (1997) reports that the government investment tends to boost private economic

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[5] Park *et al*. (2011) assess that massive and responsive monetary easing and expansionary fiscal policy contributed to the quick recovery of emerging Asian economies from the GFC.

[6] For details, compare table 1 with Eskesen (2009).

Table1   Major Fiscal Stimulus Measures after the GFC

Major Fiscal Stimulus Measures	Amount (tril. won)
Supplementary Budget of 2008 (September 2008)	4.6
· Spending on infrastructure of the local government	1.0
· Support for stabilization of utility bills	1.3
· Support for farmers, fishermen and small- and mid-sized merchants	0.6
· Mandatory expenditures	0.7
· Investment in resource development funds and others	1.0
Tax Reform of 2008 (December 2008)	−29.6
· Tax cut in 2008~2010	−29.6
Revised Budget of 2009 (December 2008)	10.7
· Support for local SMEs, small business owners, farmers and fishermen	3.4
· Increase of Social Overhead Capital (SOC) projects	4.6
· Support for welfare of low-income earners	1.0
· Measures to address youth unemployment	0.3
· Financial support for local government and others	1.4
Supplementary Budget of 2009 (April 2009)	28.4
· Support for welfare of low-income earners	4.2
· Job retention and creation	3.5
· Support for small size companies, exporters, and the self-employed	4.5
· Investment in research and development	2.3
· Spending on local government and others	2.7
· Coverage of loss on revenues	11.2
Tax Reform of 2009 (December 2009)	8.3
· Revenue increase from the termination of tax exemption and reduction in 2010	8.3

Sources: (1) MOSF, Various Press Releases.   (2) MOSF (Nov. 2008), Comprehensive Policy
            Measures to Overcome the Ongoing Economic Difficulties, Monthly Economic
            Bulletin.   (3) Cho and Kim (2011).

activities whereas the government consumption is likely to crowd out them.
Also, W. Kim (2006) and Hur (2007) claim that tax cut tends to have more

persistent and boosting effect than spending increase. Summing up, it is inferred that tax benefits and subsidies on corporate investments and on the purchase of durable goods are likely to have persistent and positive effects on an economy. Therefore, the composition of fiscal stimulus package of Korea is considered appropriate for boosting the economy.

2.2. Size of "Discretionary" Fiscal Stimulus

Fiscal policy could influence the dynamics of an economy through automatic stabilizer as well as a discretionary measure. Thus, we need to remove a portion contributed by automatic stabilizer from that by discretionary policy. Though conceptually clear, it is quite intriguing to decompose changes in fiscal variables into the two parts empirically. Thus, here we use the following two approaches.

The first one is to observe Fiscal Impulse (*FI*) and *FIS* (Fiscal Stance) indicators, which are commonly used as proxies for "discretionary" fiscal policies. These measures, widely used for its simplicity, are calculated by the IMF method (refer to Heller *et al.*, 1986 and Lee, 2006). To begin with, find a reference point of time, at which real GDP is closest to potential GDP or GDP gap is almost zero. At the point of time, the ratios of government revenue to GDP and expenditure to GDP are denoted as $t_0 \equiv T_0 / y_0$ and $g_0 \equiv G_0 / y_0$ respectively. Then, we define the cyclically neutral balance by $B_n \equiv t_0 y - g_0 y^*$, where y is a real GDP and y^* is potential GDP. Such a definition of the cyclically neutral balance is based on a notion that fiscal stance neither expansionary nor contractionary when revenue grows at the speed of real GDP while expenditure at the speed of potential GDP. Thus, by taking the difference between the cyclically neutral balance (B_n) and the current fiscal balance (B), we obtain a measure of fiscal stance called *FIS* in abbreviation.

$$FIS \equiv B_n - B.$$

Notably, *FIS* compares the current fiscal stance with that of the reference point. Thus, the negative (positive) sign of *FIS* implies that the current fiscal stance is contractionary (expansionary) compared with the reference point of time 0.

In different occasions, however, it would be more useful to hold a measure comparing the current fiscal stance with that of the previous period.   For the purpose, Fiscal Impulse (*FI*) indicator is devised to be change in the ratio of *FIS* to potential GDP.   Of course, the sign of *FI* is interpreted in a similar way to that of *FIS* but it indicates the change of fiscal stance from the previous period.

$$FI \equiv \Delta(FIS / y^{*}).$$

Using the Korean data, we calculate *FIS* and *FI*, and compare them with the deviation of real GDP from the long-run trend as shown in figure 1.   The potential GDP used here is seasonally adjusted and HP-filtered.   The figure 1 is drawn with the consolidated fiscal data since 2000.[7]   It shows that *FIS* and especially *FI* increased sharply during the first half of 2009 in response to the negative real GDP deviation following the GFC.   Such an aggressive fiscal reaction had not been observed before then.   Of course, even before the GFC, it is known that fiscal policy of Korea responds (slightly) in a counter-cyclical way.[8]   In terms of both magnitude and responsiveness, however, the fiscal stimulus package executed after the GFC is somewhat unprecedented in the fiscal history of Korea with an exception of the 1997 currency crisis.[9]   These above two measures of fiscal stance unanimously

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[7] We consider the sample period after the Asian Financial Crisis to reflect the possibility of a structural change in Korean economy.

[8] For example, Lee (2006) measures how responsive the Korean fiscal framework to a business cycle.   He, using a longer series of the central budget data (the fiscal data available in Monthly Statistical Bulletin published by Bank of Korea), calculates *FI* and *FIS*, regresses them on the past GDP gaps, and reports that overall fiscal policy, especially expenditure side, properly responded to economic conditions.   On the other hand, based on the observations that average *FIs* do not show the significant difference between expansionary and recessionary periods, he doubts whether the fiscal policy timing has been proper.

[9] In the 1997 currency crisis, financial institutions including several major domestic banks

**Figure 1 Fiscal Stance (*FIS*), Fiscal Impulse (*FI*),
and Real GDP Deviation**
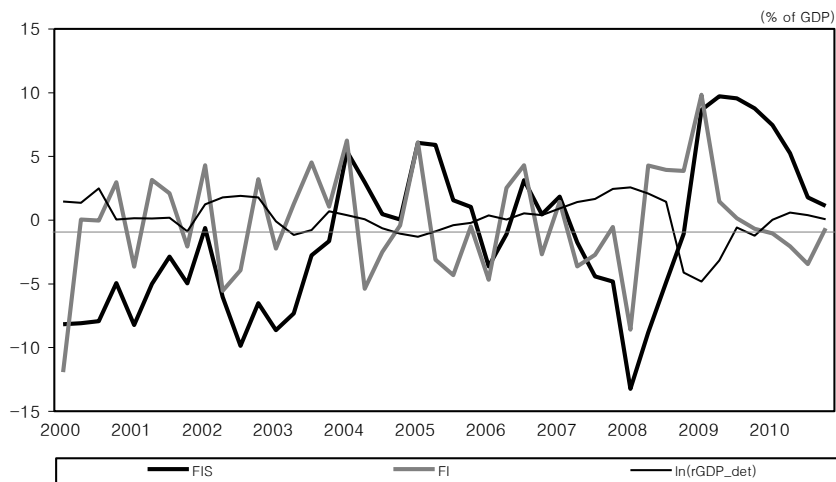
Notes: 1) Authors' own calculation.   2) ln(rGDP_det)=ln(real GDP)-ln(real GDP[*]).   3) Real
GDP[*] is seasonally adjusted and HP-filtered.

confirm that fiscal stimulus package of Korea is concentrated in the first half
of 2009.   The actual fiscal execution rate also supports the findings from *FI*
and *FIS*.   The fiscal execution rate was 62.8% in the first half of 2009,
which is about 8%p greater than in normal period.   The reason that it is so
high despite of a supplementary budget in April, 2009, is because of the
front-loading of budget of 2009.

Next, we check the reliability of *FI* and *FIS* by comparing them with
another measure for discretionary fiscal policy.   For the purpose, a three-
variable Structural VAR (SVAR) is estimated in order to extract orthogonal
shocks, which, in turn, are identified to be discretionary portions.
Following Blanchard and Perotti (2002), adopted are three shock
identification strategies,[10] especially the last of which is based on the

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were directly hit and most of fiscal resources flew into the restructuring or the resolution
process of those distressed ones.   In contrast, this time was different and most of fiscal
stimulus package was allocated to sustain domestic demand.

[10] For the details on other identification strategies mentioned briefly here, refer to Hur (2007).

institutional information of Korea.

The three key variables are real GDP (Y_t), government expenditure (G_t), and tax revenue (T_t).   All of them which are seasonally adjusted are the log-value after being divided by population size and detrended by HP-filter.   A reason for detrending all the variables is because we would like to focus on business cycles rather than long-term non-stationary movements. Then, a SVAR system of X_t is represented as:

$$X_t = A(L)X_{t-1} + U_t, \quad X_t \equiv \begin{pmatrix} T_t \\ G_t \\ Y_t \end{pmatrix}, \quad U_t \equiv \begin{pmatrix} t_t \\ g_t \\ y_t \end{pmatrix}.$$

The above SVAR system is not complete in that detailed assumptions on the disturbance term U_t are needed for further specifications.

The first identification strategy is simple Cholesky Decomposition, which restricts U_t in the following way.

$$\begin{pmatrix} t_t \\ g_t \\ y_t \end{pmatrix} \equiv \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix} \begin{pmatrix} t_t \\ g_t \\ y_t \end{pmatrix} + \begin{pmatrix} 1 & 0 & 0 \\ b_1 & 1 & 0 \\ c_1 & c_2 & 1 \end{pmatrix} \begin{pmatrix} e_t^t \\ e_t^g \\ e_t^y \end{pmatrix}.$$

Second, as a typical example of institutional identification strategies, we adopt Blanchard and Perotti (2002), whose shock identification is represented as

$$\begin{pmatrix} t_t \\ g_t \\ y_t \end{pmatrix} \equiv \begin{pmatrix} 0 & 0 & \alpha_3 \\ 0 & 0 & \beta_3 \\ \gamma_1 & \gamma_2 & 0 \end{pmatrix} \begin{pmatrix} t_t \\ g_t \\ y_t \end{pmatrix} + \begin{pmatrix} 1 & a_2 & 0 \\ b_1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} e_t^t \\ e_t^g \\ e_t^y \end{pmatrix}.$$

The third identification strategy borrows the restrictions on β_1 and $\beta_3 (= 0)$ from the budget data in addition to α_3, based on common

perception that the government of Korea has kept the principle of "Expenditure within Revenue" since 1980s (Koh, 2002).[11]   Due to the long tradition of fiscal consolidation or maintaining the balanced budget, the level of expenditure still tends to be determined within the revenue forecasts. Exploiting such a tendency of fiscal conservatism, we assign a restriction on β_1 by running a regression of expenditure increment on tax revenue increase.   Compared with the other identification strategies, this highlights the contemporaneous relation in the disturbance term U_t.

$$\begin{pmatrix} t_t \\ g_t \\ y_t \end{pmatrix} \equiv \begin{pmatrix} 0 & \alpha_2 & \alpha_3 \\ \beta_1 & 0 & \beta_3 \\ \gamma_1 & \gamma_2 & 0 \end{pmatrix} \begin{pmatrix} t_t \\ g_t \\ y_t \end{pmatrix} + \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} e_t^t \\ e_t^g \\ e_t^y \end{pmatrix}.$$

Based on the estimates from the above SVARs,[12] we calculate orthogonal shocks in tax revenue and expenditure and define them to be the third measures for discretionary fiscal policies.   Table 2 reports how they are correlated with *FI* and *FIS*.

The upper part of table 2 shows that, regardless of identification strategies, *FIS* and *FI* tend to have positive correlation with contemporaneous discretionary expenditure change (e_t^g) and negative correlation with contemporaneous discretionary revenue change (e_t^t).   Especially, the correlations are statistically significant between *FI* and discretionary expenditure measures.   Furthermore, in the lower part of table 2, which identifies the discretionary fiscal stimulus to be $e_t \equiv e_t^g - e_t^t$,   the correlations of e_t with e_t^g and e_t^t become greater and more significant. According to the correlation patterns in table 2, there is not much difference among orthogonal shocks derived from the three identification strategies.

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[11] [Quoted from Koh (2002)] "One important principle in fiscal management was established in this period.   It was the principle of "Expenditure within Revenue," or the balanced budget principle.   While not formalized in a law or a regulation, it acted as self-discipline imposed on the budget authorities against imprudent management of the budget".

[12] This study uses the consolidated budget data instead of the fiscal data from BOK's Monthly Statistical Bulletin.   In this regard, this paper is differentiated from Hur (2007).

**Table 2   Correlations among the Measures of
Discretionary Fiscal Stimulus**

	Identification Strategy I		Identification Strategy II		Identification Strategy III (#)	
	Discret. Tax	Discret. Exp	Discret. Tax	Discret. Exp	Discret. Tax	Discret. Exp
FIS	−0.25	0.32+	−0.27	0.30	−0.25	0.30
FI	−0.08	0.43[**]	−0.11	0.42[***]	−0.08	0.42[***]

Discretionary Fiscal Stimulus	Identification Strategy I	Identification Strategy II	Identification Strategy III (#)
FIS	0.35+	0.33+	0.36[***]
FI	0.45[**]	0.44[**]	0.45[**]

Notes: 1) [*], [**], [***] and + is significant at the levels of 5%, 10%, 15% and lower than 1% respectively.   2) Identification Strategy 3(#) assumes the fiscal stance of "Expenditure within Revenue."

Summing up the results so far, we could recognize, regardless of measurement tools chosen, that fiscal stimulus package executed during the GFC is quite substantial and unusual.   Especially it is worth to note that this stimulus package is so exceptional, when considering the long tradition of fiscal conservatism in Korea.

3. EFFECTIVENESS OF FISCAL STIMULUS PACKAGES IN COMBATING AGAINST THE GFC

During a period between 2008 Q3 and 2010 Q4, some components of the national income contributed more to economic growth than the rest in the sequence of net export, consumption, and investment.   Right after the GFC, rapidly depreciating Korean won improved trade balance dramatically.   In the meantime, substantial investment from the government sector counteracted fallen private consumption and investment.

Figure 2   Growth Contribution and Rates by Components

(a) Growth Contributions
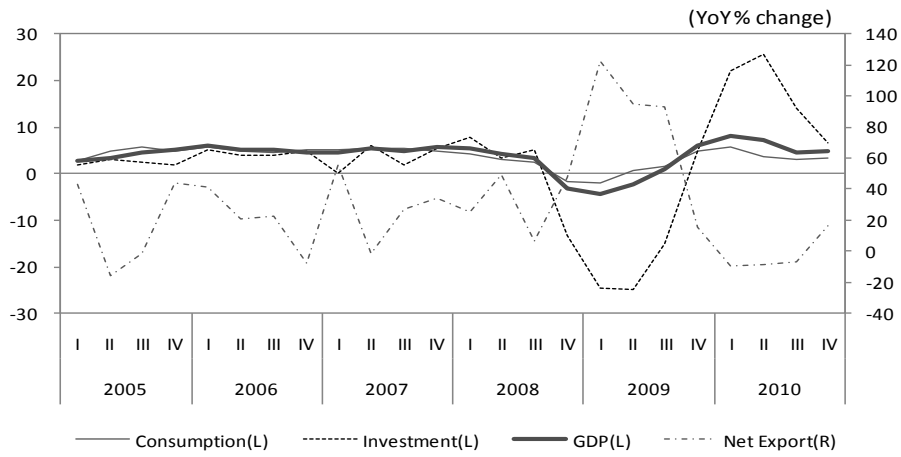
(b) Growth Rates
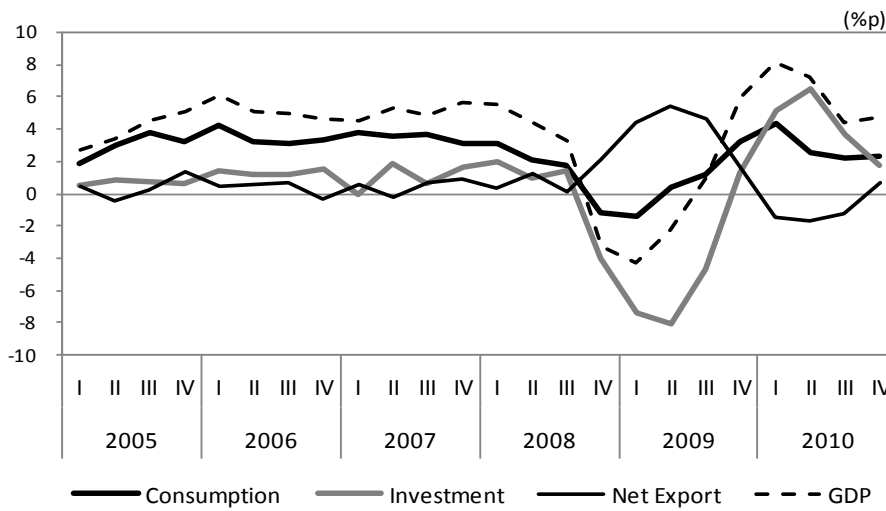
Source: Bank of Korea.

Since 2009 Q4, domestic consumption and investment, succeeding the net export, led the economic recovery of Korea.   This may be a sign of lagged

boosting effect from the fiscal stimulus package, considering that most of fiscal stimulus package were concentrated before 2009 Q4.

Aforementioned, the main purpose of the paper is not to assess the overall efficacy of fiscal policies in Korea for the last two to three decades. Instead, it aims to verify whether expansionary fiscal stance during the GFC have contributed to lift the Korean economy out of this one-time crisis. However, it is not a simple task to devise a direct empirical strategy for this issue. As alternatives, the paper adopts the following three approaches.

First, using *FIS* calculated above, we investigate how *FIS* affected the dynamics of real GDP growth and output gap, respectively. Thus, real GDP growth and output gap are respectively regressed by *FIS* and their lagged variables. For empirical investigation, we use a quarterly sample covering 2000 Q1 to 2010 Q4. Since our goal is to evaluate the efficacy of expansionary fiscal policy during the GFC, we compare how the size of coefficient of *FIS* is different according to whether or not the GFC period is included. As reported in table 3, real GDP growth positively responds to current period *FIS* even excluding the GFC periods. In other words, real GDP growth increases when the fiscal stance is expansionary, and vice versa. One thing that should be noted is that the size of coefficient is lager when including the GFC periods, which implies the expansionary fiscal stance during the GFC was quite effective for the Korean economy to rebound from the recession. This finding can be explained by timing and size of fiscal stimulus package. The government quickly switched fiscal stance right after the GFC by implementing supplementary budget, revising budget for 2009, and reforming tax system. Especially, tax reform in 2008 was an anticipated action for the Korean economy to rebound, though it was not intended. As a result, the government could allocate massive fiscal stimulus expenditure in the end of 2008 and the first half of 2009. The size of the package was also historically unprecedented. Its size measured in section 2 was about 5.1% of GDP (59.8 trillion won) greater than any other countries. According IMF's measure of the size of stimulus package in G-20 countries in table 5, it is confirmed that stimulus package of Korea was the largest

Table 3   Regression Results from GDP Growth

Dependent Variable: GDP Growth	2000.1/4-2010.4/4 (Including the GFC Period)			2000.1/4-2008.2/4 (Excluding the GFC Period)		
	(1)	(2)	(3)	(1)	(2)	(3)
Constant	0.010*** (0.002)	0.006*** (0.002)	0.007*** (0.002)	0.011*** (0.001)	0.008*** (0.002)	0.008*** (0.002)
FIS	0.863** (0.366)	0.870** (0.347)	0.838*** (0.206)	0.361*** (0.185)	0.412** (0.187)	0.429** (0.173)
FIS(−1)	−0.785 (0.206)	−0.972*** (0.226)	−0.743** (0.302)	−0.554 (0.183)	−0.639*** (0.187)	−0.736*** (0.216)
FIS(−2)			−0.274 (0.240)			0.132 (0.179)
GDP Growth(−1)		0.318*** (0.110)	0.235 (0.153)		0.231*** (0.111)	0.284* (0.165)
Adjusted R^2	0.289	0.365	0.370	0.244	0.282	0.270

Notes: 1) Standard errors are in parentheses.   2) ***, **, * indicate statistical significance at 1%, 5%, 10% levels, respectively.
Source: Author estimates.

Table 4   Regression Results from Output Gap

Dependent Variable	2000.1/4-2010.4/4 (Including the GFC Period)			2000.1/4-2008.2/4 (Excluding the GFC Period)		
	(1)	(2)	(3)	(1)	(2)	(3)
Constant	−0.002 (0.001)	−0.001 (0.001)	−0.001 (0.001)	−0.002 (0.002)	−0.001 (0.001)	−0.001 (0.001)
FIS	1.233*** (0.131)	1.165*** (0.106)	1.146*** (0.103)	1.036*** (0.133)	0.878*** (0.101)	0.879*** (0.103)
FIS(−1)	−0.148 (0.151)	−0.928*** (0.152)	−0.773*** (0.172)	−0.389 (0.151)	−0.948*** (0.113)	−0.931*** (0.144)
FIS(−2)			−0.192* (0.108)			−0.021 (0.105)
Output Gap(−1)		0.757*** (0.102)	0.728*** (0.101)		0.854*** (0.091)	0.846*** (0.101)
Adjusted R^2	0.652	0.858	0.866	0.454	0.857	0.864

Notes: 1) Standard errors are in parentheses.   2) ***, **, * indicate statistical significance at 1%, 5%, 10% level, respectively.
Source: Author estimates.

following Saudi Arabia and South Africa.[13]

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[13] The discrepancy between our estimate and IMF's is attributable to the difficulty in clearly

Table 5   The Size of Expansionary Fiscal Policy Implemented by the G-20 Members

(unit: % of GDP)

	2008	2009	2010
Argentina	0.0	1.5	0.0
Australia	1.2	2.5	2.1
Brazil	0.0	0.6	0.5
Canada	0.0	1.9	1.7
China	0.4	3.1	2.7
France	0.0	0.7	0.8
Germany	0.0	1.6	2.0
India	0.6	0.6	0.6
Indonesia	0.0	1.0	0.6
Italy	0.0	0.2	0.1
Japan	0.3	2.4	1.8
Korea	1.1	3.7	1.2
Mexico	0.0	1.5	0.0
Russia	0.0	4.1	1.3
Saudi Arabia	2.4	3.3	3.5
South Africa	2.3	3.0	2.1
Spain	1.9	2.3	0.0
Turkey	0.0	0.8	0.3
Britain	0.2	1.5	0.0
The U.S.	1.1	2.0	1.8
G-20 Members	0.6	2.0	1.5

Source: IMF (2009b).

Similar results are found when output gap is used instead of GDP growth.[14]   The greater coefficient of *FIS* is obtained when the GFC period is included.   This supports that the stimulus package during the GFC was quite effective compared with any other previous experiences of fiscal expansion.
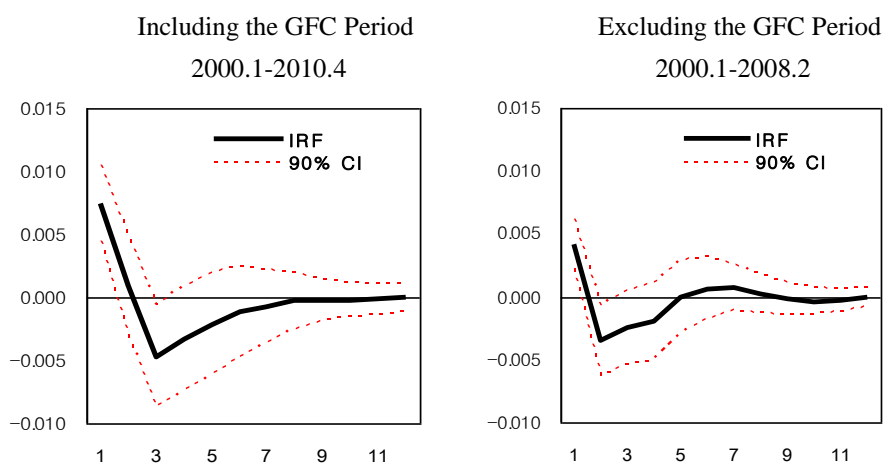
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differentiating between automatic stabilizer and discretionary spending.   In addition, size of each country's fiscal stimulus package defies an accurate estimation for various reasons. The execution period of the fiscal stimulus package varied from a country to another and in some cases the budget amount formulated before the crisis or the funds injected into the financial sector were included.   Nevertheless, the growth of government budget (estimated by the IMF) is based on the consistent standards and reflects each country's fiscal spending trends to an extent.

[14] Output gap here is measured by Blanchard and Quah (1989).   The empirical results are qualitatively similar even when output gap is measured by HP filtering.
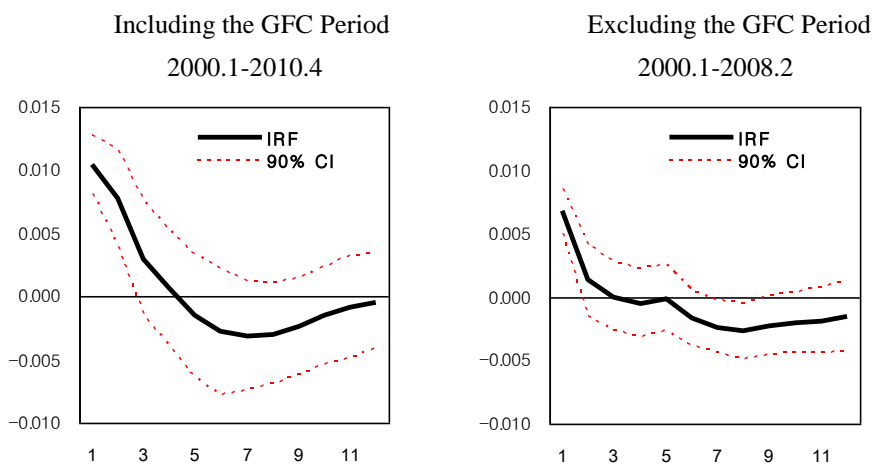
Second, in order to assess the robustness of the above findings, we construct bivariate VAR with *FIS* and real GDP growth (output gap) and identify structural shocks using Choleski-decomposition.   Figure 3 describes

Figure 3   Impulse Response Analysis

(a) Response of Real GDP Growth to Fiscal Shock

Source: Authors' estimates.

the main results from the bivariate VAR in forms of impulse responses. The results consistently confirm the positive responses of the real GDP growth and the output gap to unexpected change in the fiscal stance. Furthermore, these patterns are intensified when the GFC period is included in the sample, indicating that the expansionary fiscal policies have helped the Korean economy to recover from the downward pressure earlier than expected during the GFC.

On the other hand, it should be noted that anticipated and unanticipated changes in fiscal policy are not distinguished in our VAR setup. As highlighted at the recent debate between Gali *et al.* (2007) and Ramey (2011),[15] a VAR approach is based on the implemented fiscal records and ignores that fiscal shocks are usually anticipated prior to actual implementation in forms of government announcements or media reports on the fiscal procedures.[16] Such announcement effects may influence our empirical results. However, we reason that this effect is quite marginal during the GFC on the following grounds. First, the time interval between announcement and implementation stages during the GFC period is much shorter than Ramey (2011)'s estimate for the US economy (3-7 quarters). Second, most of budgetary expansions during the GFC are centered around a short period between 2008 3Q and 2009 2Q.

Third, we employ the methodology of Hur, Jha, Park, and Qusing (2010). Hur *et al.* (2010) design an empirical framework to evaluate the effectiveness of countercyclical fiscal policy in Asian countries during the GFC. The empirical framework consists of two stages. The first stage is to estimate a Panel Vector Auto-Regression (PVAR) model using historical data up to 2008 Q3 and to generate dynamic GDP forecasts of each sample country

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[15] We thank an anonymous referee for bring up this issue.

[16] Gali *et al.* (2007) show the effectiveness of fiscal policy by replicating Blanchard and Perotti (2002) and Fatas and Mihov (2001), and provide New Keynesian Model allowing the presence of rule-of-thumb consumers with sticky prices to account for the positive effects of government spending. While, Ramey (2011) argue that a standard VAR ignores the timing of the fiscal news. Comparing results from the standard VAR and the narrative approach of Ramey and Shapiro (1998), Ramey reasons that a key difference lies in the identification of timing.

during the global crisis from 2008 Q4 to 2009 Q2.   The choice of 2008 Q3 as the breakpoint coincides with the bankruptcy of Lehman Brothers in September 2008 which triggered the global financial crisis.

The second stage involves a cross-country regression with the gap between actual GDP and forecasted GDP on a number of explanatory variables.   The gap is to measure how much the real GDP would deviate from the actual value if there had not been a fiscal stimulus package.   Among the various explanatory variables, of particular interest are the interaction terms between fiscal variables and dummy for developing Asia that capture impact of fiscal policy for the developing Asian countries.

In this paper, we give variations to Hur *et al*. (2010) on the following two points.   First, the data set is extended to 2009 Q4.   With the extended data set, we expect the contributions of fiscal stimulus packages to be evaluated at full-length.   Second, the second stage cross-country regressions are estimated separately by classifying Korea in different country groups.

Table 6 reports the results of cross-country regressions on the gap between actual output and dynamic output forecasts for the crisis period generated by 4-variable PVAR models.[17)]   Here Korea is treated as an Asian country in equation (1)-(3) while as a non-Asian country in equation (4)-(6).

For both cases, the fiscal policies in developing Asia countries are likely to be more effective than the rest of the world as was confirmed in Hur *et al*. (2010).   More interestingly, when Korea is treated as non-Asia country, the magnitude and significance of interaction term between fiscal policy and Asia dummy become much weaker.   This result, consistent with those of table 3 and table 4, implies Korea's fiscal stimulus package was quite effective and had an important role for Korea's rapid recovery.   Overall, these empirical results provide limited support to the claim that countercyclical fiscal policy boosted aggregate demand and output in Korea at least during the GFC.

[17)] The four variables include the GDP, the tax revenue and the government expenditure of Korea and the global GDP.

**Table 6   Regression Results From De-Trended
4-Variable PVAR (-2009 Q3)**

	Korea in Asian Group			Korea in Non-Asian Group		
	(1)	(2)	(3)	(4)	(5)	(6)
$\ln GDP_{it-1}^{det*}$	0.437^{***}	0.418^{***}	0.444^{***}	0.467^{***}	0.451^{***}	0.478^{***}
	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
$\ln global\_GDP_{it}^{det}$	-0.005^*	-0.005^*	-0.004^*	-0.004	-0.005^*	-0.004
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
$\ln REV_{it-1}^{det*}$	0.032	0.033	0.031	-0.003	0.015	0.014
	(0.04)	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)
$\ln EXP_{it-1}^{det*}$	-0.122^{**}	-0.122^{**}	-0.122^{**}	-0.079	-0.098^*	-0.099^*
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
$TS\_1yr_{it-1}^{diff}$	-0.580		-0.550	-0.577		-0.632
	(0.36)		(0.38)	(0.38)		(0.39)
$TS\_3yr_{it-1}^{diff}$		-0.495			-0.564	
		(0.38)			(0.38)	
$POLICY_{it-1}^{diff}$	-0.890^*	-0.898^*	-0.908^*	-0.951^{**}	-1.033^{**}	-1.045^{**}
	(0.46)	(0.48)	(0.47)	(0.47)	(0.48)	(0.47)
$\ln REER_{it-1}^{det*}$	0.039	0.025	0.038	0.030	0.030	0.044
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
$ASIA_i * \ln REV_{it-1}^{det}$	-0.127^{**}	-0.131^*	-0.119^*	-0.080	-0.108	-0.097
	(0.06)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
$ASIA_i * \ln EXP_{it-1}^{det}$	0.157^{**}	0.170^{**}	0.168^{**}	0.126^*	0.139^*	0.139^*
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
$open_{i,t-1} * \ln REV_{it-1}^{det}$	0.005	0.005	0.005	0.002	0.004	0.004
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$open_{i,t-1} * \ln EXP_{it-1}^{det}$	-0.003	-0.003	-0.003	-0.002	-0.003	-0.002
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$FS_i * \ln REV_{it-1}^{det}$		-0.135	-0.214		-0.739	-0.769
		(0.53)	(0.54)		(0.49)	(0.49)
$FS_i * \ln EXP_{it-1}^{det}$		-0.405	-0.385		0.350	0.367
		(0.58)	(0.58)		(0.56)	(0.56)
Constant	-0.02^{**}	-0.02^*	-0.02^{**}	-0.026^{**}	-0.023^*	-0.024^{**}
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	76	76	76	76	76	76
R-squared	0.421	0.426	0.429	0.392	0.412	0.416

Notes: 1) Standard errors in parentheses.   2) ***, **, * indicate statistical significance at 1%, 5%, 10%, respectively.

4. CONCLUDING REMARKS

Like other economies in the world, Korean economy has suffered from the tremor of the GFC. In response to a severe recession following the GFC, Korea government executed unprecedented fiscal stimulus package along with monetary easing. This study evaluates the efficacy of expansionary fiscal policies taken in Korea during the recent GFC.   For this purpose, we first estimate the size of the fiscal stimulus package based on the official report from MOSF.   The aggregate size of expansionary fiscal policy is estimated at about 59.8 trillion won (30.5 trillion won in spending and 29.3 trillion won of tax cut), which accounts for 5.1% of GDP in 2010.   Its size was not only historically unprecedented, but also quite greater than any other countries.   According to IMF's estimates for the fiscal stimulus packages in G-20 countries, it is confirmed that the stimulus package of Korea was the largest following Saudi Arabia and South Africa.

For the evaluation of the efficacy of the stimulus package during the GFC, we first regress real GDP and output gap respectively on *FIS* and its lagged values.   The empirical results show that real GDP growth (the output gap) increases when the fiscal stance is expansionary, and vice versa. More importantly, the size of coefficient is larger when including the GFC periods, which implies the expansionary fiscal stance during the GFC was quite effective in inducing the Korean economy to rebound from the recession. Similar results are obtained also from a bivariate VAR analysis.

Other supportive evidence is found from cross-country regressions following Hur *et al*. (2010).   Depending on which group Korea is assigned to Asian or non-Asian country group, the magnitude and significance of interaction term between fiscal policy and Asia dummy differ.   Especially, those estimates become much smaller when Korea is treated as non-Asia country.   Though indirectly, these empirical findings unanimously support that Korea's fiscal stimulus package was quite effective and had an important role for Korea's rapid recovery from the GFC.

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