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Structural Change in Current Account and Real Exchange Rate Dynamics: Evidence from the G7 Countries*

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Abstract

Lee and Chinn (2006) and Chinn and Lee (2009) decomposed current account and real exchange rate into temporary and permanent shocks and argued that a temporary shock creates the combination of a current account surplus (deficit) and real exchange rate depreciation (appreciation). This paper extends their framework by examining a possible structural break in current account and real exchange rate dynamics. Using G7 country data for 1980–2007, we find structural changes in two-variable dynamics for all G7 countries during the 1990s. Temporary shocks have not been the main source of fluctuation in the current account since the 1990s. Our empirical results imply that the conventional mechanism has played a limited role in explaining the dynamics of the two variables.

Keywords: Current account, Real exchange rate, Structural change, Global imbalances

JEL Classification: F31, F41

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1 Introduction

The extent of the exchange rate adjustments that would be generated during adjustment of the current account has been widely debated as an important topic in the discussion of large global current account imbalances.[1] Obstfeld and Rogoff (2007) argued that the consistent level of the real exchange rate for balancing the US current account differed from its actual level by about 12% to more than 30% given the estimations of that time.[2] Chinn and Lee (2009), who divided the current account into components attributable to temporary and permanent shocks, estimated that the level of real exchange rate that balanced the deficit component caused by temporary shock was at a depreciated level of nearly 20% compared to its actual level of 2006–2007. We examine the extent of stability in the relation between the current account and the real exchange rate underlying such discussions.

A particularly important motivation to examine the stability of the relation between the current account and the real exchange rate is that many empirical studies have shown declines of exchange rate pass-through worldwide.[3] Chinn and Lee (2009) compared the sample period up to 2001 (4th quarter) with that up to 2007 (1st quarter) in the US and reported that the size of the impulse response of the current account attributable to temporary shocks had decreased by half. Chinn and Lee (2009) argued that it is likely that the relation between the real exchange rate and the current account has changed, and suggested that the decline in the

[1] An enormous amount of literature exists related to the issue of global imbalances. See, for example, Obstfeld and Rogoff (2009).

[2] For the estimation, Obstfeld and Rogoff (2007) assumed that the pass-through of exchange rate was perfect. In the latter part of their paper, however, they described the estimate of Campa and Goldberg (2002) that the pass-through of the exchange rate to import prices in the US after one year was less than 50%, and argued that, if such were the case, then the size of the adjustment of the exchange rate for balancing the current account would double.

[3] See Ihrig, Marazzi, and Rothenburg (2006) for an explanation of the decline of the exchange rate pass-through into import prices of the seven developed nations (G7) in the 1990s. See Campa and Goldberg (2002, 2005) for an explanation of the decline of pass-through in OECD countries. See Marazzi and Sheets (2007) and Otani, Shiratsuka, and Shirota (2003, 2005) for an explanation of the declines of pass-through in the US and Japan, respectively. See Frankel, Parsley, and Wei (2005) for an explanation of the decline of pass-through in developing nations.

pass-through of the exchange rate contributes to this change.

Lee and Chinn (2006) and Chinn and Lee (2009) provide a useful framework for understanding the current account and real exchange rate dynamics. They apply the approach proposed by Blanchard and Quah (1989) to the open economy model.[4] Specifically, they impose a long-run restriction in a bivariate vector autoregressive (VAR) model consisting of the current account and the real exchange rate.[5] According to Lee and Chinn (2006), it is possible to analyze empirical results from the viewpoint of the recent open macroeconomic models, where prices are rigid in the short run but flexible in the long run. Particularly, Lee and Chinn (2006) argued that if we interpret temporary shocks as (expansive) monetary shocks, temporary shocks depreciate the real exchange rate and improve the current account, which is consistent with the implications of recent open macroeconomic models. They also found that, whereas the temporary shocks are the main source of fluctuations in the current account in G7 countries excluding the US, permanent shocks are the main source of fluctuations in the real exchange rate. Chinn and Lee (2009) applied the same method to the US, Japan, and the EU and decomposed the current account and the real exchange rate into respective components attributable to temporary and permanent shocks. They estimated that, in the case of the current account of the US, the portion that diverged from the permanent component was about 2% of GDP during 2006–2007. Based on that estimation, as argued earlier, they argued that if the divergent component is resolved, the consistent level of the real exchange rate would be a depreciated level by nearly 20% compared with its actual level at that time.

The objective of our study is to complement the discussion of the current account and the real exchange rate, which is an important topic related to global imbalances. It is likely that the relation of the two variables has been changing mainly because of declines of the exchange rate pass-through in many countries. This paper incorporates this possible structural change in the framework proposed

[4]Blanchard and Quah (1989) adopted the approach of identifying the structural shock based on the long-run neutrality of money.

[5]Prasad (1999) and Giuliodori (2004) added another endogenous variable and conducted their analysis based on the trivariable VAR model.

by Lee and Chinn (2006) and Chinn and Lee (2009). Our empirical results show a structural change in the impact of the temporary and permanent shocks on both variables for all countries during the 1990s. With regard to the current account and the real exchange rate dynamics, a temporary shock causes the combination of the real exchange rate depreciation (appreciation) and the current account surplus (deficit) underlying the theoretical models in open macroeconomics, as shown by Lee and Chinn (2006). Reports in the literature emphasize the importance of the role of the temporary shock for current account fluctuations (e.g., Giuliodori 2004). However, we find that temporary shocks have not been the main source of fluctuation in the current account after the 1990s in five of the seven countries investigated here, if we consider the structural changes. Ignoring structural changes, we would infer incorrectly that temporary shocks have been the main source of fluctuations in the current account through the entire sample period in six of the seven countries. This fact implies that we must be more careful in discussing the role of the exchange rate for adjusting the current account based on the combination of the current account surplus (deficit) and real exchange rate depreciation (appreciation).

The remainder of the paper is organized as follows. In Section 2, we first explain the benchmark VAR model for identifying temporary and permanent shocks from the dynamics of the current account and the real exchange rate. Next, we conduct a stability test to examine statistically whether a structural change occurs in the dynamic relation of the current account and the real exchange rate. We analyze each of the two divided sample periods based on the result of the stability test. We conclude our explanation of these analyses in Section 3.

2 Econometric Analysis

2.1 Identification of temporary and permanent shocks

We use the same method as that employed by Lee and Chinn (2006) and Chinn and Lee (2009) to identify the structural shocks. We first provide a brief explanation of how Lee and Chinn (2006) and Chinn and Lee (2009) identify the structural shocks from the bivariate VAR model of the current account (ca_t) and the firstdifferentiated real exchange rate (Δq_t).[6] Their identification method applies the approach proposed by Blanchard and Quah (1989) to the open economy model.

The reduced-form bivariate VAR model of the current account (ca_t) and the first-differenced real exchange rate (Δq_t) can be expressed as follows:

$$\begin{bmatrix} ca_t \\ \Delta\, q_t \end{bmatrix} = \bar{A} + A(L) \begin{bmatrix} ca_t \\ \Delta\, q_t \end{bmatrix} + e_t, \tag{1}$$

where $\bar{A}$ is the constant vector; $A_{ij}(L) = \sum_{k=1}^{p} a_{ij}(k)L^k$; $a_{ij}(k)(i,j = 1,2,\ k = 1,\cdots,p)$ is the coefficient; p is the number of lags; L is the lag operator; and $e_t = [e_t^{ca}\ e_t^{q}]'$ are the reduced-form error terms (innovation) with mean zero and variance–covariance matrix Σ_e.

Following Lee and Chinn (2006) and Chinn and Lee (2009), we express the current account (ca_t) and the first-differenced real exchange rate (Δq_t) in terms of the two structural shocks of temporary and permanent shocks. These two shocks can be expressed as a linear combination of the reduced-form error terms e_t^{ca} and e_t^{q}. Then, we can set up the following moving average (MA) representation of the structural model:

$$\begin{bmatrix} ca_t \\ \Delta\, q_t \end{bmatrix} = \bar{D} + \begin{bmatrix} D_{11}(L) & D_{12}(L) \\ D_{21}(L) & D_{22}(L) \end{bmatrix} \epsilon_t, \tag{2}$$

where $\bar{D}$ is a constant vector; $D_{ij}(L) = \sum_{k=1}^{p} d_{ij}(k)L^k$; $d_{ij}(k)\ (i,j = 1,2,\ k = 1,\cdots,p)$ denotes the coefficient; $\epsilon_t = [\epsilon_t^T\ \epsilon_t^P]'$; ϵ_t^T is the temporary shock; and ϵ_t^P is the permanent shock. The structural shock vector ϵ_t satisfies the general assumption that $E(\epsilon_t) = 0$, $E(\epsilon_t \epsilon_t') = I$, and $E(\epsilon_t \epsilon_s') = 0$, where $t \neq s$. Lee and Chinn (2006) and Chinn and Lee (2009) introduce the long-run restriction that temporary shocks ϵ_t^T have short-run effects on the real exchange rate q_t, but these effects disappear over time. This long-run restriction implies that:

$$D_{21}(1) = 0. \tag{3}$$

The use of the restriction (3) just identifies our structural model.

[6] See Hamilton (1994) for a detailed explanation of the identification method of the structural shock by the VAR model.

The framework proposed by Lee and Chinn (2006) and Chinn and Lee (2009) uses an extremely simple system of the bivariate model. Therefore, it can limit the assumption and arbitrariness imposed on an estimated model to a minimum.[7] In addition, the method has the advantage of not necessitating the imposition of an arbitrary limitation on the relation between the real exchange rate and the current account at concurrent time points (e.g., at concurrent time points, the real exchange rate affects the current account, but the current account does not affect the real exchange rate, and vice versa).[8]

We conduct these analyses based on quarterly data for 1980Q4–2007Q4. We choose the sample period to 2007 to avoid the influences of the financial crises from 2008. We use the data of the current account and the real exchange rate from *International Financial Statistics*. For the estimation procedure, we use the ratio of the current account to GDP and the logarithm of the CPI-based real effective exchange rate (*rec* series). Following Lee and Chinn (2006) and Chinn and Lee (2009), the lag length is set to two quarters in the estimation of the reduced-form model (1).

2.2 Testing for structural stability

We incorporate a possible structural break in the framework proposed by Lee and Chinn (2006) and Chinn and Lee (2009). Specifically, we apply the stability test recently proposed by Qu and Perron (2007) to explore the possibility of the struc-

[7]When long-run restrictions are used for identification of the VAR model, some inferences for the impulse responses and the forecast error variance decompositions can have a significance level greater than or equal to the maximum power, as Faust and Leeper (1997) point out. To avoid this problem, we specifically examine the point estimates of the impulse responses and the variance decompositions. This problem does not arise in the test for the structural stability that is described later because it is based on the reduced-form VAR model.

[8]Aside from the method described above, other ways exist of identifying structural shocks by the VAR model. To identify these structural shocks, Backus (1998) imposed a restriction on the temporary relation at concurrent time points and analyzed the impact of the exchange rate and the relative price shocks on imports and exports. In contrast, our study aims to analyze mainly the impact of permanent and (in particular) temporary variable factors on the current account and their structural changes.

tural change of our reduced-form VAR model (1) in G7.[9] Qu and Perron (2007) proposed a method of testing whether a structural change has occurred in the system regression model including the VAR model when the break point is unknown.[10] In this subsection, we test the null hypothesis that all the parameters included in the VAR model do not change over the entire period against the alternative hypothesis that there was structural change in the parameters at a point that is unknown beforehand.

Expanding the reduced-form model (1), we obtain the following model that allows the possibility of structural change at an unknown break point BP.

$$\begin{bmatrix} ca_t \\ \Delta\, q_t \end{bmatrix} = \bar{A} + A(L) \begin{bmatrix} ca_t \\ \Delta\, q_t \end{bmatrix} + \bar{\Gamma} h_t(BP) + \Gamma(L) \begin{bmatrix} ca_t \\ \Delta\, q_t \end{bmatrix} h_t(BP) + \eta_t. \tag{4}$$

Therein, $\bar{\Gamma}$ represents a constant, $\Gamma(L)$ is the coefficient matrix, $h_t(BP)$ signifies a dummy variable that takes 0 if $t \leq BP$ and 1 if $t > BP$, and η_t is an error term vector where it takes the variance–covariance matrix $\Sigma_{\eta 1}$ if $t \leq BP$ and $\Sigma_{\eta 2}$ if $t > BP$. From this, Qu and Perron (2007) proposed the following statistic.

$$SupLR = \sup_{\lambda_1 \in \Lambda} LR(T_1) = LR(\hat{T}_1), \tag{5}$$

where

$$LR(T_1) = T \log |\Sigma_e| - \{T_1 \log |\Sigma_{\eta 1}| + (T - T_1) \log |\Sigma_{\eta 2}|\}. \tag{6}$$

In those equations, T stands for the total number of samples, and $T_1 = \lambda_1 T$ denotes the number of samples from the initial point to break point BP. Λ denotes a

[9] To the best of our knowledge at this writing, Bai, Lumsdaine, and Stock (1998) is the first paper which considers the inference for the estimate of a single break date in the system regression model. Although the tests proposed by Bai, Lumsdaine, and Stock (1998) and Qu and Perron (2007) are asymptotically justified, Bernard, Idoudi, Khalaf, and Yelou (2007) argue that the asymptotic tests in the system regression model suffer from severe over-rejection due to the size distortions in case that the sample size is not large (e.g., $T < 100$) and the dimension of the system is high.

[10] Qu and Perron (2007) proposed a method of identifying structural changes at more than two points. For details, see Qu and Perron (2007). We might have the problem of small sample size within a regime in our analysis if we consider the structural changes at more than two points. We therefore only test the possibility of structural change at one point.

candidate group of λ_1 that indicates the ratio of the samples from the initial point to the break point BP to the total. $\hat{T}_1$ is the estimated value of the number of samples from the initial point to the break point BP, which is obtainable as T_1 that maximizes $LR(T_1)$. Qu and Perron (2007) derive the distribution of the statistic $SupLR$ in equation (5). Our test in this section is based on this distribution. To ensure sufficient samples before and after the structural change, we include at least 40 quarters in each subperiod.[11]

Table 1 shows the results of the stability test. The results of statistic $SupLR$ in Table 1 suggest the existence of a structural change during 1991-1997 in all G7 countries, although the period of structural change differs slightly among countries. For example, for Japan, our results suggest a structural change in 1995Q2 based on point estimates, and between 1994Q1 and 1996Q4 based on a 90% confidence interval.

Table 1: Results of the stability test.

Country	$SupLR$	Estimated point of structural change	90% confidence interval
US	30.318^{*}	1995Q2	[1994Q3, 1996Q2]
Canada	$25.877^{\dagger}$	1991Q2	[1989Q3, 1993Q1]
France	32.163^{**}	1991Q2	[1990Q4, 1993Q2]
Germany	39.092^{**}	1997Q4	[1994Q4, 1999Q4]
Italy	51.206^{**}	1992Q3	[1991Q3, 1994Q1]
Japan	32.703^{**}	1995Q2	[1994Q1, 1996Q4]
UK	45.317^{**}	1996Q4	[1995Q3, 1997Q2]

Note: Critical values are, respectively, 23.506, 26.149, and 31.889 for significance levels of 10%, 5%, and 1%.

[11] The distribution derived by Qu and Perron (2007) depends on the size of Λ. Here, based on the critical values for the distribution, we test and derive a confidence interval for the point of structural change.

2.3 Structural change in the effect of the temporary shocks

Following Lee and Chinn (2006) and Chinn and Lee (2009), we respectively estimate the effects of the temporary and permanent shocks on the current account and the real exchange rate. However, in contrast with Lee and Chinn (2006) and Chinn and Lee (2009), we attempt to explore the implications of the structural breaks in the current account and the real exchange rate dynamics. We focus our analysis mainly on temporary shocks because the temporary shock causes dynamics corresponding to the oft-described expenditure-switching effect on the current account of exchange rate changes, which underlies the discussion of the role of exchange rate in the adjustment of the current account in international macroeconomics.

Hereinafter, we divide the sample based on the point of structural change estimated in the previous section, and analyze the effects of temporary and permanent shocks on the current account and the real exchange rate. Figures 1 and 2 respectively present the impulse responses on the current account (to GDP ratio) and the real exchange rate to a temporary or a permanent shock in the first half and second half of the sample period. From left to the right, the four columns respectively show the response of the current account to a temporary shock (CA/GDP: temp), the response of the current account to a permanent shock (CA/GDP: perm), the response of the exchange rate to a temporary shock (ER: temp), and the response of the exchange rate to a permanent shock (ER: perm). The solid line shows the estimated impulse response. We use the accumulated impulse response for the real exchange rate, which indicates the level of the real exchange rate. The dotted line shows a 90% confidence interval obtained using a bootstrap of 1000 replications.

In Figure 1, we can confirm that the responses observed in the first-half sample period are almost identical to those reported by Lee and Chinn (2006) and Chinn and Lee (2009). The temporary shock tends to engender a combination of real exchange rate depreciation and current account surplus, whereas a permanent shock tends to engender a combination of real exchange rate appreciation and current account surplus.[12] As argued by Lee and Chinn (2006) and Chinn and Lee (2009), it is

[12]We do not mean to say that this is true for all countries. See Lee and Chinn (2006) for additional discussion related to this point.

noteworthy that the combination of real exchange rate depreciation (appreciation) and current account surplus (deficit) caused by the temporary shock is broadly consistent with predictions of conventional models in international macroeconomics. The permanent shock causes formation of the opposite combination.[13]

The results obtained from the former sample period should not be surprising because the former sample period and the data sample used by Lee and Chinn (2006) largely overlap. However, we detect a change in the estimated effect of a temporary shock on the current account between Figures 1 and 2.[14] Particularly we can see an evident change in Japan. Although the response of the current account to a temporary shock in the first half is the same as that reported by Lee and Chinn (2006), the response in the second half is smaller than that in the first half and also becomes insignificant, even though the sign of the impulse response is positive. We can see a decline in the size of the responses in the US, Canada, and the UK as well.

Our finding, that the structural change occurred in the 1990s, is consistent with ample empirical evidence of a downward trend in the pass-through of exchange rates in the 1990s in many countries, which has been discussed vigorously in recent years. It weakens the expenditure-switching effect of exchange rate on the current account if the exchange rate pass-through declines. Therefore, the decline of the exchange rate pass-through might reduce the size of the response of the current account to a temporary shock.[15] However, we do not argue that the downward trend of the

[13]Lee and Chinn (2006) and Chinn and Lee (2009) explain temporary and permanent shocks as shocks of the following types. When we interpret temporary shocks as monetary shocks, the result from the impulse response function is consistent with conventional models of the open economy. In other words, an (expansive) monetary shock induces a temporary depreciation of the real exchange rate (Fig. 1, third column) and a concurrent improvement in the current account (Fig. 1, first column). Lee and Chinn (2006) and Chinn and Lee (2009) interpret permanent shocks as a preference shock in favor of home exports, which induces permanent appreciation of the real exchange rate (Fig. 1, fourth column) and surplus in the current account (Fig. 1, second column).

[14]Although we have identified structural changes in the impacts of temporary and permanent shocks on the current account and the real exchange rate in all the G7 countries, we focus the impulse response of the temporary shock on the current account in Figures 1 and 2.

[15]Ihrig, Marazzi, and Rothenburg (2006) find that all the G-7 countries experience a numerical decline in the responsiveness of import prices to exchange-rate movements, and that for nearly half of these countries, the decline in the 1990s is statistically significant. Marazzi and Sheets

pass-through is the only reason for the structural changes. The identification of the causes of the structural change is beyond the scope of our analysis.

We next assess the relative contributions of temporary and permanent components for the current account and the real exchange rate dynamics. Specifically, given the temporary and permanent shocks identified in our VAR model, we decompose the forecast error variances of the current account (to GDP) and the real exchange rate into the variances of the temporary and the permanent shocks, and estimate the contribution (%) of each of the shocks to the forecast errors of the current account and the real exchange rate.[16]

Table 2 presents results of the (20-quarter ahead) forecast error variance decomposition for the two subperiods before and after the structural point detected in each country. In the former subsample, as shown by Lee and Chinn (2006), we can confirm that the temporary shocks tend to be the dominant factor for the current account whereas the permanent shocks tend to be the dominant factor for the real exchange rate. However, it seems difficult to argue that this is the case if we consider structural changes. Comparing the cases before and after structural change, we can say that after the structural change, permanent shocks seem to have played a larger role in the movement of the current account, whereas temporary shocks seem to have played a larger role in the movement of the real exchange rate. In Table 2, particularly for Canada, France, Germany, and Japan, it is apparent that

(2007) report a sustained decline in the exchange rate pass-through to U.S. import prices during the 1990s. Campa and Goldberg (2002) estimate the exchange rate pass-through to import prices for 25 OECD member countries, and show that the exchange rate pass-through to import prices tends to decline in the 1990s. Otani, Shiratsuka, and Shirota (2003) show that the exchange rate pass-through to import prices in Japan declined in the 1990s. Frankel, Parsley, and Wei (2005) argue that pass-through of exchange rate changes has historically been much higher in developing countries than in industrial countries, but the former also declined considerably during the 1990s.

[16]Decomposition of the forecast error variance is to decompose the average squared error of the forecast error of s period forecasts of the respective variables into their variances because of the respective shocks. The average squared error of the infinite period forecast error of the respective variables ($s \to \infty$) is known to converge to the (unconditional) variances of the respective variables. By increasing s in the decomposition of the forecast error variance sufficiently, we can therefore decompose the variances of the respective variables into those caused by the respective shocks. See Hamilton (1994) for details.

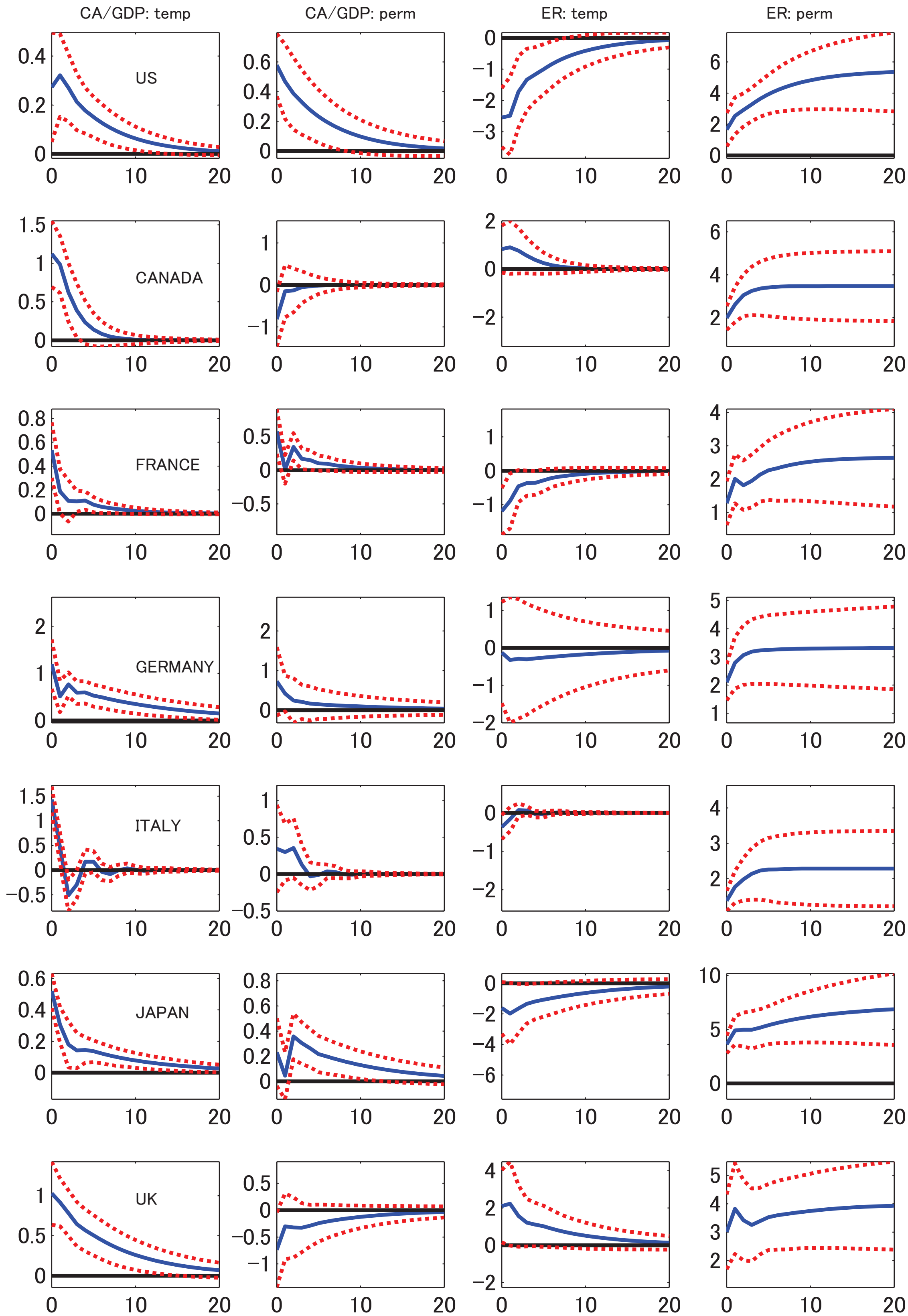

Figure 1: Impulse responses: pre-break period (1980Q4 – US 1995Q2, Canada 1991Q2, France 1991Q2, Germany 1997Q4, Italy 1992Q3, Japan 1995Q2, and UK 1996Q4).

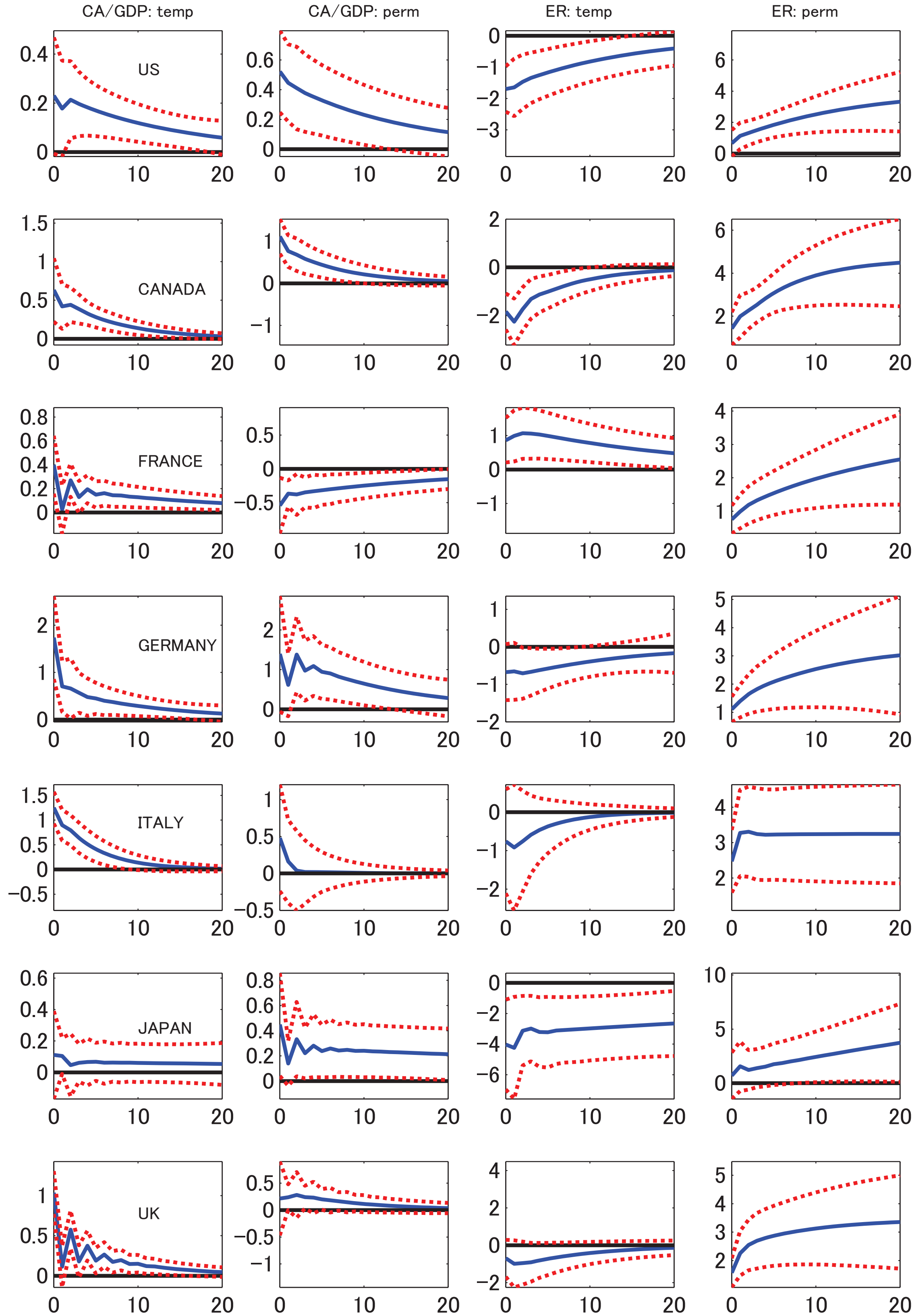

Figure 2: Impulse responses: post-break period (US 1995Q3, Canada 1991Q2, France 1991Q3, Germany 1998Q1, Italy 1992Q4, Japan 1995Q3, UK 1997Q1 – 2007Q4).

the percentages of the current account explained by permanent shocks have largely increased in the latter subsample. The percentages of the exchange rate explained by temporary shocks are found to have increased after the structural change in these countries as well.

Table 2: Variance decomposition of the current account (to GDP ratio) and the real exchange rate (20 quarters ahead).

		Current account (GDP ratio)		Real exchange rate	
Country	Sample period	temporary	permanent	temporary	permanent
US	80Q4–95Q2	27.403%	72.597%	63.596%	36.404%
	95Q3–07Q4	19.449%	80.551%	76.021%	23.979%
Canada	80Q4–91Q2	80.261%	19.739%	15.085%	84.915%
	91Q3–07Q4	26.799%	73.201%	59.321%	40.679%
France	80Q4–91Q2	40.938%	59.062%	43.131%	56.869%
	91Q3–07Q4	23.668%	76.332%	50.294%	49.706%
Germany	80Q4–97Q4	82.717%	17.283%	1.190%	98.810%
	98Q1–07Q4	31.901%	68.099%	24.225%	75.775%
Italy	80Q4–92Q3	88.397%	11.603%	10.471%	89.529%
	92Q4–07Q4	94.098%	5.902%	9.320%	90.680%
Japan	80Q4–95Q2	47.384%	52.616%	16.753%	83.247%
	95Q3–07Q4	6.268%	93.732%	91.202%	8.798%
UK	80Q4–96Q4	78.673%	21.327%	33.763%	66.237%
	97Q1–07Q4	79.327%	20.673%	16.682%	83.318%

Another useful means to assess the relative contributions of temporary and permanent components of the current account and the real exchange rate dynamics is to investigate the extent to which past movements in the current account and the real exchange rate resulted from temporary or permanent shocks. Specifically, we use the historical decomposition technique to decompose the historical value of the current account (to GDP ratio) and the real exchange rate into the accumulated effects of current and past temporary or permanent shocks. The left-side panels of Figure 3 show the time-series of the current account to GDP ratio explained by temporary and permanent shocks, whereas the left-side panels of Figure 4 show the time-series of the real exchange rate explained by temporary and permanent shocks. The components explained by the temporary shocks are denoted by $*$, whereas those explained by the permanent shocks are denoted by $+$. The solid line represents the overall movements of the estimated current account to GDP ratio and the real exchange rate.[17]

Particularly as shown in the left-side panels of Figure 3, it is apparent that the persistent deficit or surplus of the current account after the structural change is attributed largely to permanent shocks in the countries described earlier (Canada, France, Germany, and Japan). In addition, as shown in the left panels of Figure 4, it is apparent that a larger part of the real exchange rate movements after the structural change are explainable by temporary shocks in Canada, France and Japan.[18]

Finally, it is noted that if we ignore the possibility of structural change in the current account and the real exchange rate dynamics, we might misinterpret the relation between the two variables in the discussion of global imbalances. To elucidate this point, we compare the relative contributions of temporary and permanent components of the current account and the real exchange rate dynamics estimated under the assumption that there is no structural change with those estimated when we allow for the possibility of the structural change, as argued above.

Table 3 presents results of the forecast error variance decomposition for the entire period obtained without considering structural changes. By comparing Table 3 with Table 2, we note that, if we did not consider structural change, we would incorrectly conclude that the temporary shocks are the dominant factor for the current account whereas the permanent shocks are the dominant factor for the real exchange rate

[17]The graph shows deviations of the values from the mean estimated using the VAR model.

[18]We can also see these results as a structural break in the univariate time-series properties of the individual variables because each variable is characterized by temporary and permanent shocks. Indeed, for example, we find that the persistence of the current account, as measured by the AR(1) coefficient for the series, has increased in the latter subsample (US, Canada, France, Italy, and Japan). We would like to thank an anonymous referee for the suggestion to emphasize this result.

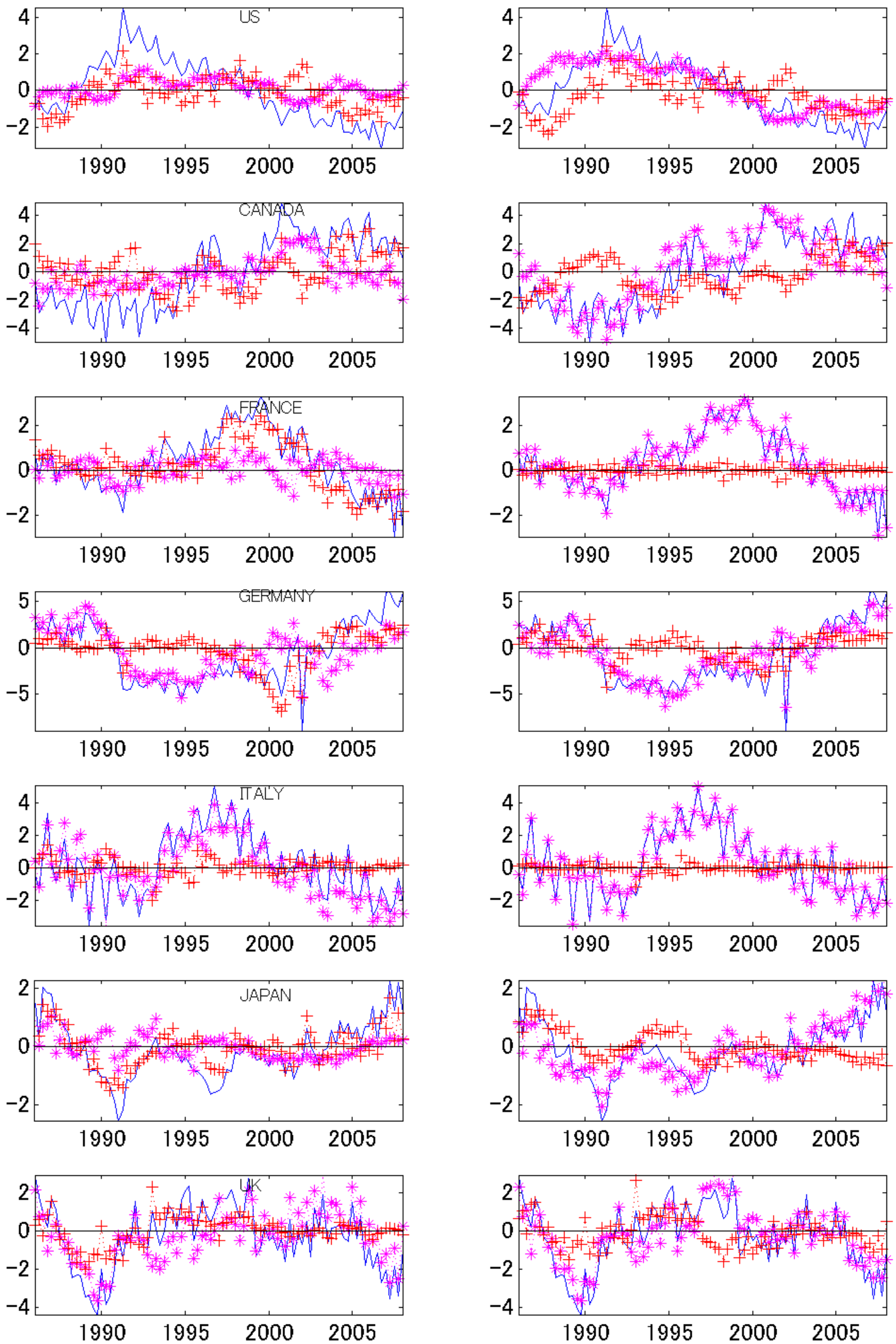

Figure 3: Historical decomposition of current account (to GDP ratio).

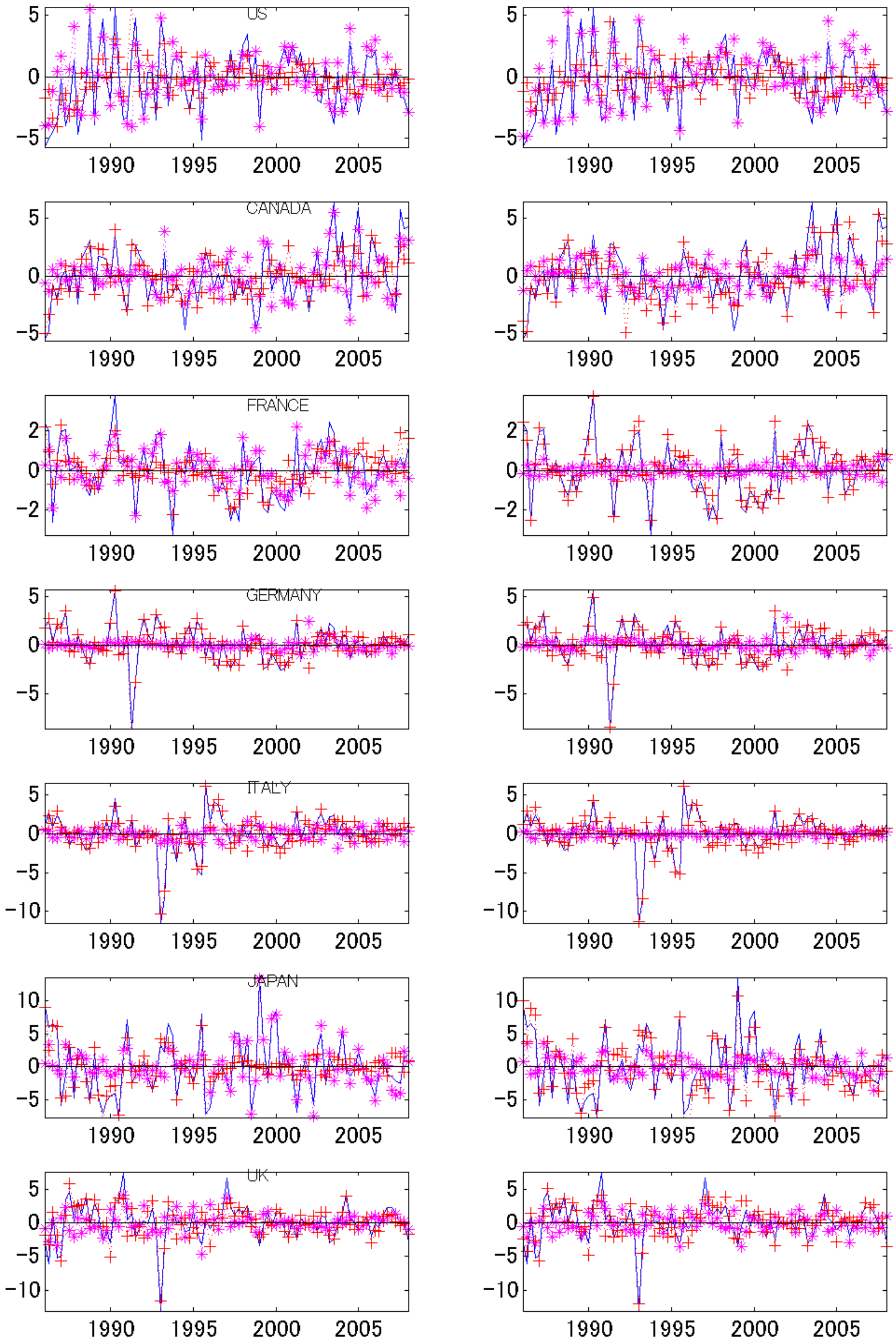

Figure 4: Historical decomposition of the real exchange rate change

through the entire period, except for the US. In addition, the right-side panels of Figures 3 and 4 show time-series of the current account to GDP ratio and the real exchange rate explained by temporary and permanent shocks, but in the cases for which we do not consider structural changes. Comparison of both panels of Figure 3 reveals that if we did not consider structural change, we would incorrectly infer that the persistent deficit or surplus of the current account after the 1990s is still attributed largely to temporary shocks in the countries described earlier (Canada, France, Germany, and Japan). In addition, by comparing both panels of Figure 4, we notice that if we did not consider structural change, we would incorrectly infer that a larger part of the real exchange rate movements after the 1990s are still explainable by permanent shocks in Canada, France, and Japan.

Table 3: Variance decomposition of the current account (to GDP ratio) and the real exchange rate (20 quarters ahead): No structural change case.

	Current account (GDP ratio)		Real exchange rate	
Country	temporary	permanent	temporary	permanent
US	32.053%	67.947%	75.779%	24.221%
Canada	76.101%	23.899%	21.083%	78.917%
France	97.937%	2.063%	3.375%	96.625%
Germany	67.027%	32.973%	8.166%	91.834%
Italy	98.828%	1.172%	2.428%	97.572%
Japan	75.444%	24.556%	13.231%	86.769%
UK	83.058%	16.942%	23.751%	76.249%

3 Concluding Remarks

This paper presented empirical evidence suggesting a structural shift in the current account and the real exchange rate dynamics in G7 countries. First, we statistically examined the possibility that structural change occurred in the dynamic relation between the two variables. Results showed ample evidence that structural change occurred in the 1990s in all G7 countries. Although identification of the causes of the structural change is beyond the scope of our analysis, we identified the 1990s as the time during which structural change occurred, which is consistent with the empirical evidence of a downward trend in the pass-through of exchange rates in many countries. Structural change might be related to the decline of the exchange rate pass-through, which was observed in many countries and which has been discussed vigorously in recent years.

Next, we used the long-run restricted structural VAR model proposed by Lee and Chinn (2006) and Chinn and Lee (2009) to compare the effects of temporary and permanent shocks on the real exchange rate and the current account between two subsamples separated by the estimated break point. The literature tends to emphasize the importance of the role of the temporary shock for current account fluctuations. A temporary shock generates a combination of a current account surplus (deficit) and real exchange rate depreciation (appreciation) through expenditure-switching effects. Many studies therefore estimate a consistent size of exchange rate depreciation to adjust the current account deficit, especially after global imbalances became an important topic. However, our analysis results show that the role of temporary shocks in generating current account movements has become limited after the 1990s. Especially, if we ignored structural changes, we would infer incorrectly that the persistent deficit or surplus of the current account is attributed largely to temporary shocks in most of the countries investigated here. Our empirical results imply that the conventional mechanism has played a more limited role in explaining the actual dynamic relation between the current account and the exchange rate after the 1990s.

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