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RECENT G3 CURRENT ACCOUNT IMBALANCES: HOW IMPORTANT ARE STRUCTURAL FACTORS?

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ABSTRACT

This paper implements a novel empirical approach for estimating the importance of structural factors in explaining the recent behavior of G3 current account positions. Following the contribution of Sims (1982), we employ a tractable econometric framework that can be used to answer the following basic question: assuming that there is a stable underlying structure that links the current account with other macroeconomic variables such as economic growth, world demand, and the real exchange rate, how important are the observed departures of these variables from their long run equilibrium levels in accounting for the observed adjustments in a country's current account? Our approach interprets the departure of the actual current account from this estimated structural component of the current account path as arising from a combination of cyclical and idiosyncratic factors. The cyclical influences on the current account are assumed to be captured by the deviations of the multilateral real exchange rate, home GDP growth, and global GDP growth from their respective long run averages.

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INTRODUCTION

This paper implements a novel empirical approach for estimating the importance of structural factors in explaining the recent behavior of G3 current account positions. Following the contribution of Sims (1982) and applications of the Sims approach presented in Clarida and Friedman (1984) and Clarida (1997), we employ a rigorous but tractable econometric framework that can be used to answer the following basic question: assuming that there is a stable underlying structure that links the current account with other macroeconomic variables such economic growth, world demand, and the real exchange rate, how important are the observed departures of these variables from their long run equilibrium levels in accounting for the observed adjustments in a country's current account? We identify the unobserved structural component of a country's observed current account path as the most likely path for the current account from some time t onward given history up through time t -1 and conditional on the restriction that

home and global GDP growth rates and the real exchange rate are all equal to their respective long run means. Our approach interprets the departure of the actual current account from this estimated structural component of the current account path as arising from a combination of cyclical and idiosyncratic factors. The cyclical influences on the current account are assumed to be captured by the deviations of the multilateral real exchange rate, home GDP growth, and global GDP growth from their respective long run averages.

Our estimates of an economy's structural current account adjustment path take full account of the endogeneity of the real exchange rate, home GDP growth, and global GDP growth because, as in Sims (1982), they are true conditional projections which satisfy the constraints that the multilateral real exchange rate, home GDP growth, and global GDP growth are equal to their respective long run averages during the adjustment process. An alternative strategy would be to assume that the real exchange rate, world growth, and perhaps even home GDP growth are exogenous with respect to the current account and then to "feed in" to the current account equation various scenarios about the time path of these variables during the adjustment process without allowing for "feedback" from the current account equation to the rest of the model. The Sims approach used in this paper allows for this feedback but requires only the estimates obtained from a multivariate tome series model, such as a VAR, to capture the relevant probability structure of the data on the current account, the real exchange rate, world growth, and home country growth.

There are a number of practical applications for which it is useful to have estimates of the structural component of a country's current account. We will mention two. In assessing the sustainability of a country's current account deficit, it is important to ascertain the extent to which deficits will need to be financed on an ongoing basis. Deficits which are high as a results of the asynchronization of a country's business cycle with that of its trading partners or a temporary overvaluation of its real exchange rate are presumably easier to finance than are deficits that would be present in the absence of cyclical ups and downs. As another example, medium term projections for a country's exchange rate often embody an implicit (sometimes explicit) assumption that such medium term adjustments in the exchange rate respond to the structural component of the current account deficit but not the cyclical component (see Krugman (1987) for a celebrated example).

The plan of the paper is as follows. In Section 2 we present the model and outline our approach for identification of structural shocks. In Section 3 we present and discuss the impulse dynamics of G3 current account responses to real exchange rate, world growth, and home country growth shocks. We also in this section interpret historical decompositions of recent G3 current account adjustments and discuss the role of growth and exchange rate shocks. In Section 4 we propose our definition of the structural component of a country's current account adjustment path and present our estimates of the structural components in recent G3 current accounts. Section 5 concludes.

2. THE MODEL

We consider a four equation quarterly macro model of the current account, home GDP growth, world (OECD) GDP growth, and the trade weighted real exchange rate. Let z_t denote the ratio of real net exports of goods and services to real GDP, g_t denote the rate of growth in home country GDP, g^*_t denote the rate of growth in world GDP, and q_t the log of a multilateral index of the real exchange rate. All data are from the OECD *Main Economic Indicators*. We use data on net exports instead of the current account data themselves for two reasons: they are available in real terms (and deflate exports and imports separately) and they are not subject to errors in measuring net interest income. Nonetheless, we will refer to z_t as the current account or the current account/GDP ratio. Letting $x_t = [g^*_t, g_t, z_t, q_t]'$ denote a four by one column vector of the system's variables, the system has a structural VAR (SVAR) representation of the form

$$Ax_t = Bx_{t-1} + e_t$$

where e_t is a four by 1 vector of mutually orthogonal and unit variance *structural* shocks to g^*_t, g_t, z_t, q_t respectively (the VAR(1) specification is without loss of generality). The assumption that $E\, e_t\, e_t' = I$ is not enough to identify A; additional restrictions on A (in this case six) are required.

As we will show, the restrictions implied by a lower triangular A matrix yield plausible current account dynamics in response to "structural" shocks to world growth, home growth, and the real exchange rate. These restrictions on A can be interpreted as follows. Within a calendar quarter, shocks to the real exchange rate are dominated by

shocks to the nominal exchange rate which responds to all available information. This implies that q_t should be ordered last. It also makes sense that the difference between world GDP growth and home GDP growth in a quarter be attributed to a country specific shock to the home country that is orthogonal to aggregate world growth. This implies that world growth should be ordered ahead of home GDP growth. This does not mean we are assuming that world growth is exogenous with respect to the home country variables; rather, only, that g^*_t is predetermined within the quarter with respect to g_t, z_t , q_t. Our final restrictions are that, within the quarter, home GDP growth and the current account are predetermined with respect to the real exchange rate and that home GDP growth is predetermined with respect to the current account. The former restriction can be motivated by delays in passing through exchange rate changes to final goods prices; the latter will be true in some simple theoretical open economy macro models but its main advantage is tractability.

With this just-identified SVAR model, we can estimate the dynamic impulse response of the current account to shocks in world growth, home country growth, and the real exchange rate. We expect a rise in world growth to improve the current account, a rise in home country growth to worsen the current account, and an appreciation of the real exchange rate to worsen the current account. These estimates of the structural shocks are also used to decompose the errors in forecasting recent swings in G3 current accounts conditional on the estimated VAR and the history of x_t. Although these exercises are informative, we will argue below that the time series of structural shocks obtained from

an unconstrained conditional current account forecast can provide only an incomplete account of the importance of cyclical factors in explaining recent current account swings.

3. PROPERTIES OF THE ESTIMATED MODELS

Reduced-form VAR models of the form

$$x_t = Dx_{t-1} + u_t$$

where $D = A^{-1}B$, $u_t = A^{-1}e_t$, and $E\, u_t\, u_t' = \Sigma$ were estimated using quarterly data for the US, Japan, and Germany. The lower triangular A matrix was calculated as the inverse of the Choleski decomposition of the reduced-form variance-covariance matrix Σ. For the US and Japan, the sample was 1980:1 - 1997:2 and four lags of each variable and a constant were included in the VAR. For Germany the post-unification sample 1991:1 - 1997:2 was used. With only 26 post-unification quarterly observations, it was necessary to reduce the number of parameters to be estimated so as to conserve degrees of freedom and avoid overfitting. This was accomplished in two ways. First, for Germany, we estimated a three equation VAR with world GDP growth and home country GDP growth entered in difference form in all three equations. Second, only two lags of each variable were included in VAR.

Figure 1 depicts the dynamic response of the current account in each G3 country to a one percent (0.01) appreciation of the real exchange rate. As we would expect, an appreciation shock (orthogonal to world growth, home growth, and the current account itself) causes the current account balance to deteriorate and to continue to worsen for at

least several quarters (and for nearly two years in Japan and four years in the US). Figure 2 depicts the dynamic response of the current account a one percentage point (0.0025in the current quarter) rise in world growth. A shock to world growth causes the current account balance to improve in all three countries and to continue to improve for at least several quarters. Figure 3 depicts the dynamic response of the current account a one percentage point (0.0025 in the current quarter) rise in home country growth. A shock to home growth causes the current account balance to deteriorate in all three countries and to continue to worsen for at least several quarters. These are the impulse dynamics one would expect in response to these sorts of structural shocks. This gives support to our arguments in favor of a lower triangular A matrix.

At any date t the estimated VAR can be used to construct a forecast of the most likely future path for the current account at dates $t+1$, $t+2$, . . conditional on the history of the model's four variables up through date t. Let $E[z_{t+n} \mid x_t]$ denote this conditional but unconstrained forecast of the current account n quarters in the future. The error associated with this forecast $z_{t+n} - E[z_{t+n} \mid x_t]$ can be written as a weighted sum of all the structural shocks to all the equations realized between $t + 1$ and $t + n$. A common technique for investigating the importance of different shocks in explaining the departures of a time series from the conditional forecast path is to compute a historical decomposition of the forecast errors. From such a decomposition of the recent history of G3 current accounts, we can estimate how important shocks to world growth, home country growth, and the real exchange rate have been in pushing the current account away

from its forecasted path. Figures 4,5, and 6 present the decompositions of the US, Japan, and German current accounts shocks for the period 1995:2 - 1997:2.

The results for the US are displayed in Figure 4. The top panel shows the recent history of the difference between the US current account/GDP ratio and the forecast of that ratio based on information available though 1995:1. The US current account deficit began to deteriorate steadily (relative to the forecast path) starting in 1996:1. The source of this decline was a combination of slow world growth (shown in the second panel), rapid US growth (shown in the third panel), and a real appreciation of the dollar (shown in the fifth panel). By construction, any part of the history of the difference between the US current account/GDP ratio and the forecast of that ratio based on information available though 1995:1 that cannot be attributed to world growth shocks, US growth shocks, or real exchange rate shocks is attributed to idiosyncratic current account shocks.

The results for the Japan are displayed in Figure 5. The Japanese current account surplus shrank throughout 1995 and in to 1996 before building again and surging above the forecasted path in 1997. The source of the decline in the surplus in 1995-96 was a combination of slow world growth (shown in the second panel), rapid Japanese growth (shown in the third panel), and the effects of the strong yen (shown in the fifth panel). The return of the large Japanese surplus in 1996-97 is attributed primarily to the weak yen and the slow down in Japanese growth relative to world growth. The results for Germany are displayed in Figure 6. Since 1996 the improvement in the German current account is

attributed to a real depreciation of the DM and a slow-down in German growth relative to world growth.

4. STRUCTURAL CURRENT ACCOUNT BALANCES: NEW ESTIMATES

In this section, we formulate and provide estimates of the structural component embedded in recent G3 current account swings. We propose the following definition:

> The **structural component** of a country's current account balance is the most likely path for the current account between periods $t+1$ and $t+n$ conditional on the history of world growth, home country growth, the current account, and the real exchange rate up to time t and subject to the constraint that during each period $t+1 \ldots t+n$ world growth, home country growth, and the real exchange rate are equal to their respective long run means.

In the terminology of Sims (1982) the structural current account is a *projection* that is *conditional* on the history of x_t that satisfies *constraints* on elements of of x_{t+j}. In symbols we express the structural component of the current account at time t+j as :

$$z^{s}_{t+j} = E[z_{t+j} \mid x_t, g^*_{t+1} = g^*, \ldots, g^*_{t+n} = g^*, g_{t+1} = g, \ldots, g_{t+n} = g, q_{t+1} = q, \ldots, q_{t+n} = q].$$

Our concept of the time varying structural component of the current account differs from the idea that there is a long run equilibrium current account. In our framework, we include the current account/GDP ratio in the VAR and assume (and cannot reject) that this ratio is stationary since 1980:1 in the US and Japan and since 1991:1 in (unified) Germany. Thus our model imposes that assumption that the long run equilibrium current account/GDP ratio is constant and not time varying.

How then to interpret our estimate of a time varying structural current account/GDP ratio? It is the path most likely to take the current account/GDP ratio from its observed level at time t to the constant long run equilibrium *if* world growth, home country growth, and the real exchange rate are constant and equal to their long run equilibrium levels throughout the adjustment process. Our approach interprets the departure of the actual current account from this estimated structural component of the current account path as arising from a combination of cyclical and idiosyncratic factors. The cyclical influences on the current account are assumed to be captured by the deviations of the multilateral real exchange rate, home GDP growth, and global GDP growth from their respective long run averages. Our estimates of an economy's structural current account adjustment path take full account of the endogeneity of the real exchange rate, home GDP growth, and global GDP growth because, as in Sims (1982), they are true conditional projections which satisfy the constraints that the multilateral real exchange rate, home GDP growth, and global GDP growth are equal to their respective long run averages during the adjustment process.

Results for the US, Japan, and Germany are shown in Figures 7, 8 , and 9. In each figure, three series are plotted: the actual path of z_t the current account/GDP ratio, the estimated structural component z^s_t, and for comparison, another estimate $\underline{z}^s_t$ that, as before, constrains world growth and home country growth to equal their respective long run means, but that constrains the real exchange rate to equal its realized post 1995:1 path not it long run mean.

As shown in Figure 7, our decomposition implies that the big surge in the US current account deficit since 1994 is cyclical. According to our estimates, had the dollar real exchange rate remained at its post 1980 average level, and had US and world growth returned to average, we would have expected the ratio of net exports to GDP improve from a deficit of 1.7 percent of GDP to a deficit of less than 1.3 percent of GDP. Instead the deficit widened to nearly 2 percent of GDP in 1997:2. Once we take into account that the dollar was relatively weak during most of this period, the importance of cyclical factors becomes even more evident.

As we can see from Figure 8, the shrinkage of Japan's current account surplus in 1995 and early 1996 was largely cyclical as was the surge in the surplus since mid 1996. According to our estimates, the strong yen accounted for about half of the 1995-1996 decline in the surplus during these years. The results for Germany are shown in Figure 9. We estimate that Germany's structural current account position was essentially in balance over the 1995:2 - 1997:2 period. The strength of the mark accounted for much of the observed deficit in 1995 and the depreciation of the mark contributed to the emergence of the surplus in 1997.

Figures 10, 11, and 12 plot for each country our estimate of the structural component of the current account (the constrained conditional projection) as well as the unconstrained conditional forecast that was discussed in Section 3. Especially for Japan and Germany, the differences are striking. They suggest that the unconstrained conditional forecast, because it embeds persistent departures of growth and the real

exchange rate from long run equilibrium, can provide only an incomplete estimate of the importance of structural in driving the current account back to long run equilibrium.

5. CONCLUDING REMARKS

This paper has used a novel empirical approach for estimating the importance of structural factors in explaining the recent behavior of G3 current account positions. We defined the structural component of a country's current account balance as the most likely path for the current account between periods $t+1$ and $t+n$ conditional on the history of world growth, home country growth, the current account, and the real exchange rate up to time t and subject to the constraint that during each period $t+1 \ldots t+n$ world growth, home country growth, and the real exchange rate are equal to their respective long run means. It is the path most likely to take the current account/GDP ratio from its observed level at time t to its constant long run equilibrium *if* world growth, home country growth, and the real exchange rate are constant and equal to their long run equilibrium levels throughout the adjustment process. We also recovered estimates of how important shocks to world growth, home growth, and the real exchange rate have been in explaining recent movements in G3 current accounts.

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FIGURE 1

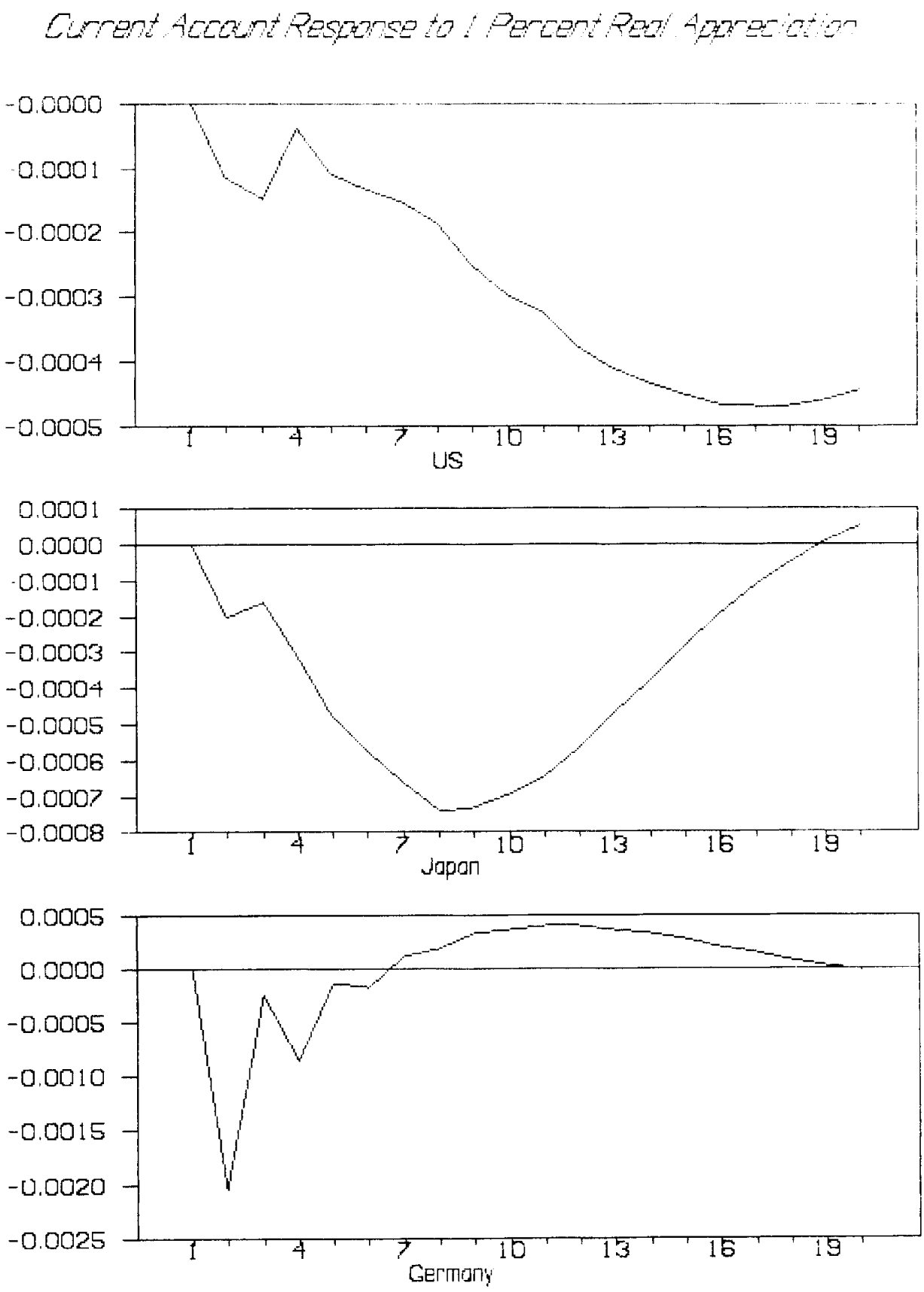

Current Account Response to 1 Percent Real Appreciation
-0.0000
-0.0001
-0.0002
-0.0003
-0.0004
-0.0005
1
4
7
10
13
16
19
US
0.0001
0.0000
-0.0001
-0.0002
-0.0003
-0.0004
-0.0005
-0.0006
-0.0007
-0.0008
1
4
7
10
13
16
19
Japan
0.0005
0.0000
-0.0005
-0.0010
-0.0015
-0.0020
-0.0025
1
4
7
10
13
16
19
Germany

FIGURE 2

Current Account Response to 1 Percentage Point Rise in World Growth

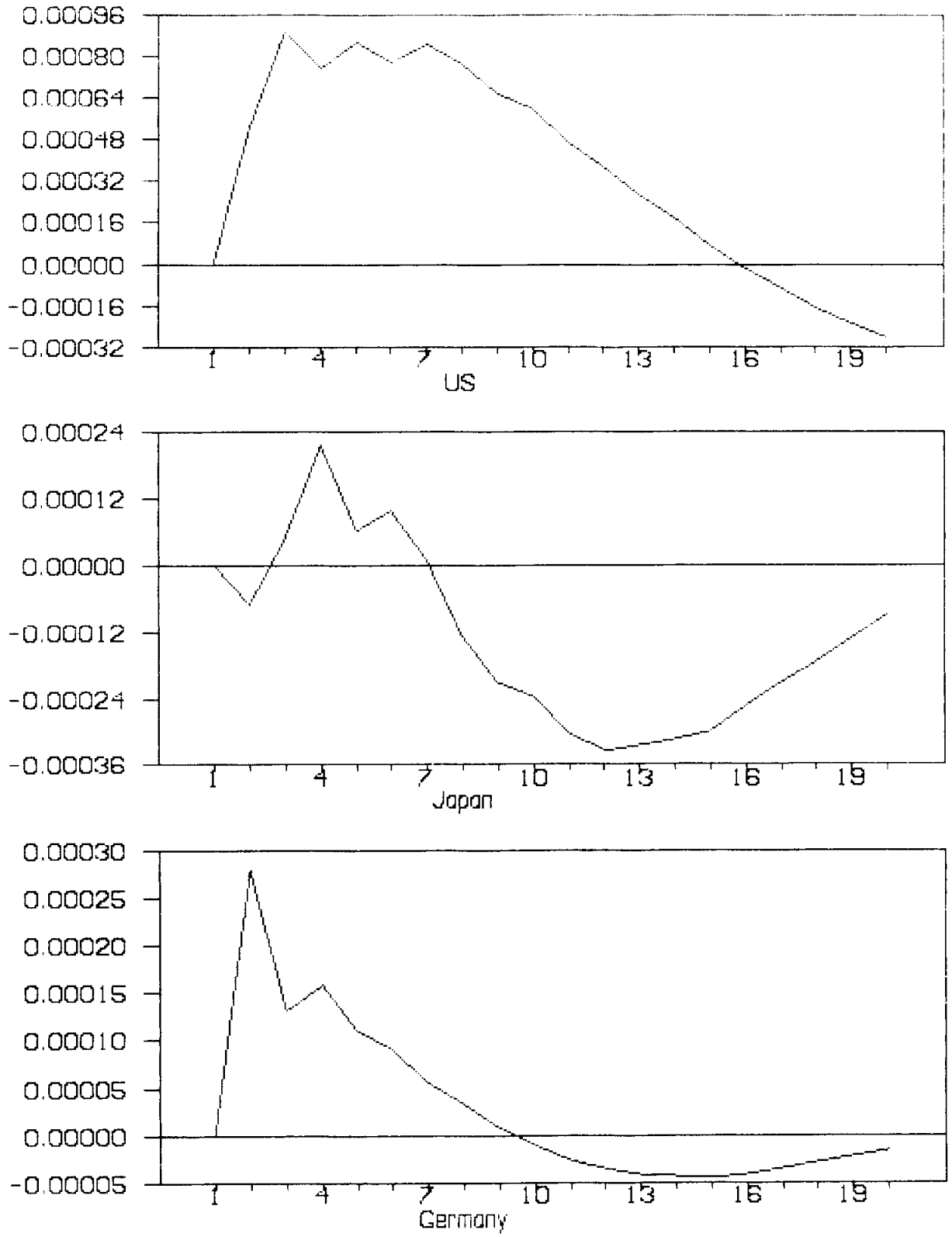
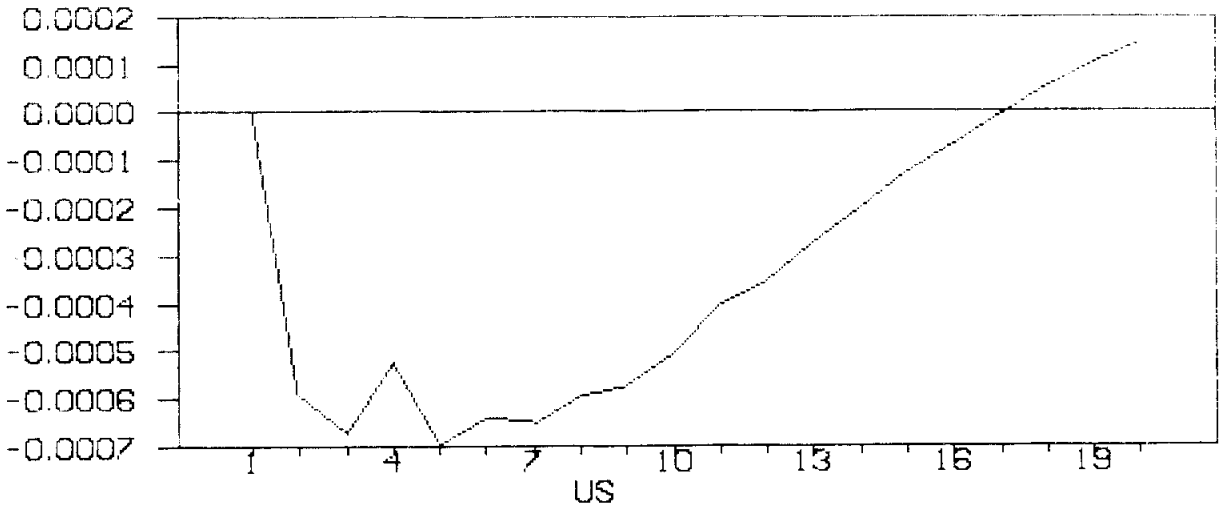
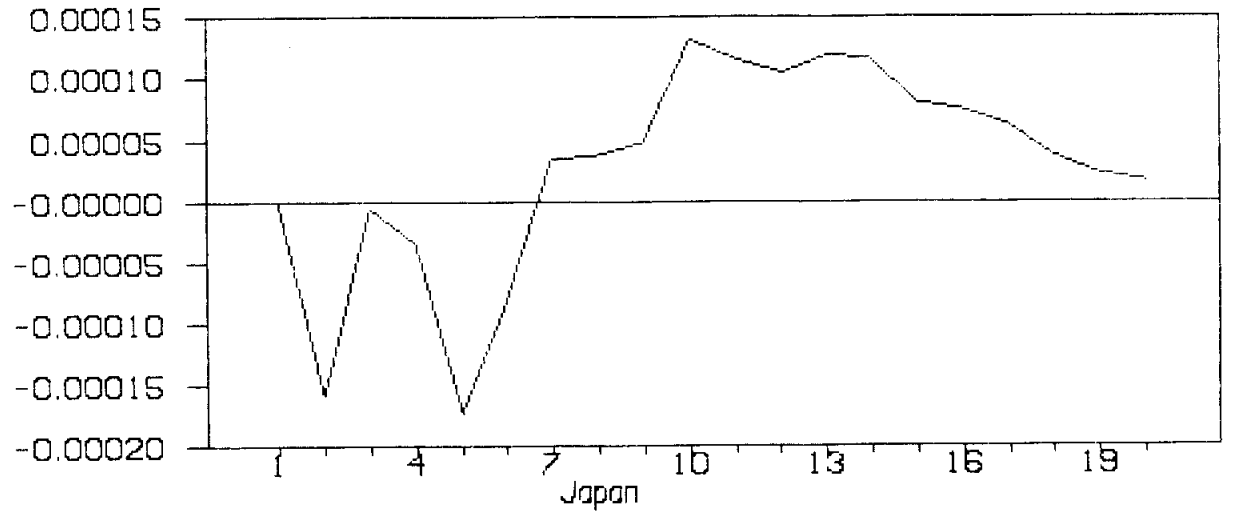


FIGURE 3

Current Account Response to 1 Percentage Point Rise in Home Growth





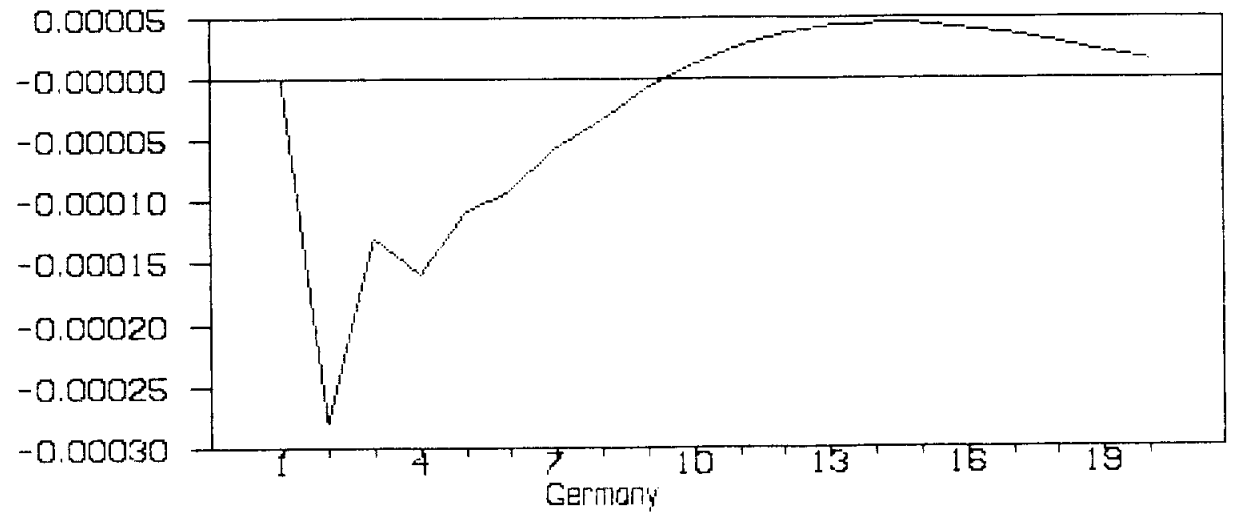


FIGURE 4

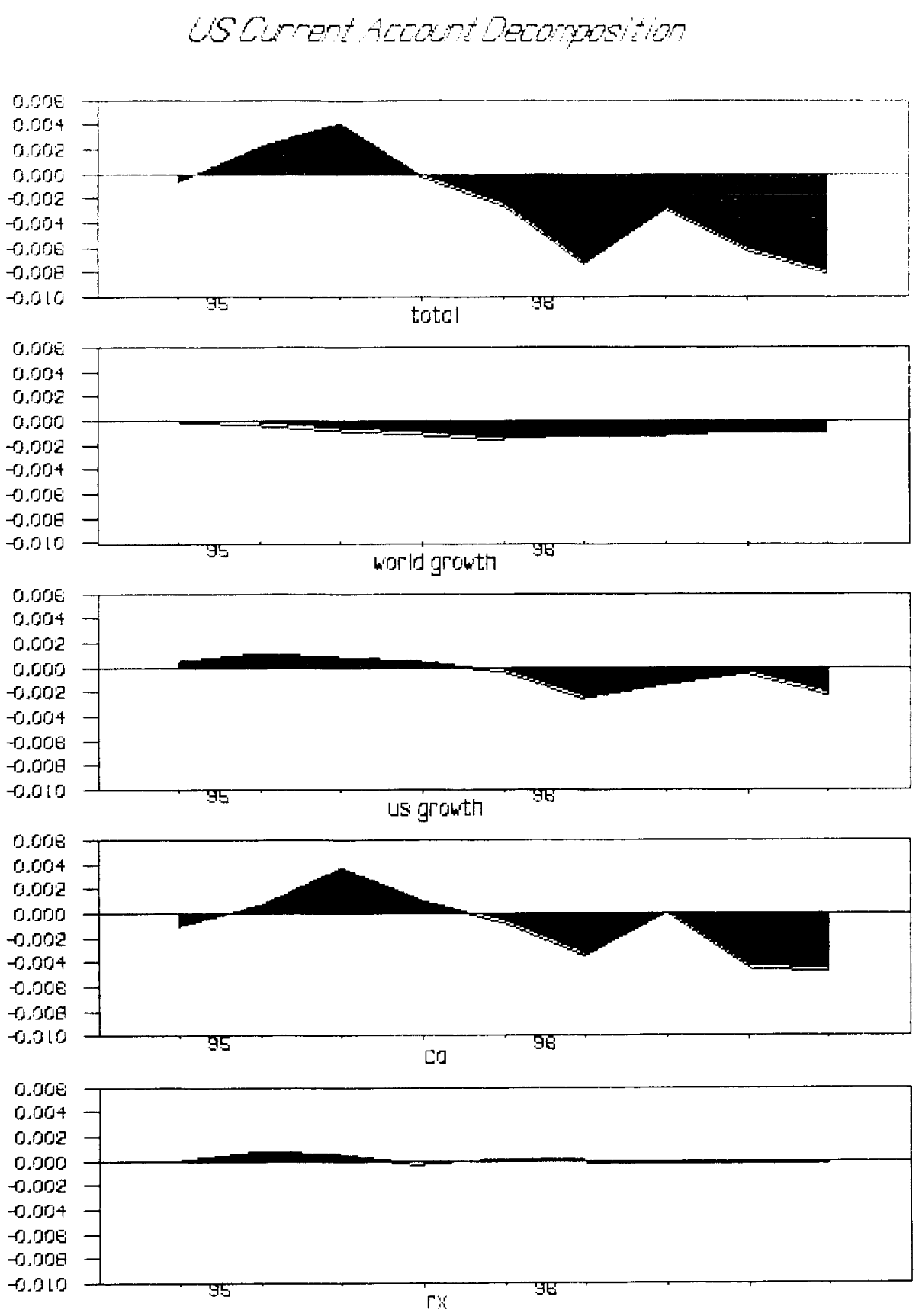
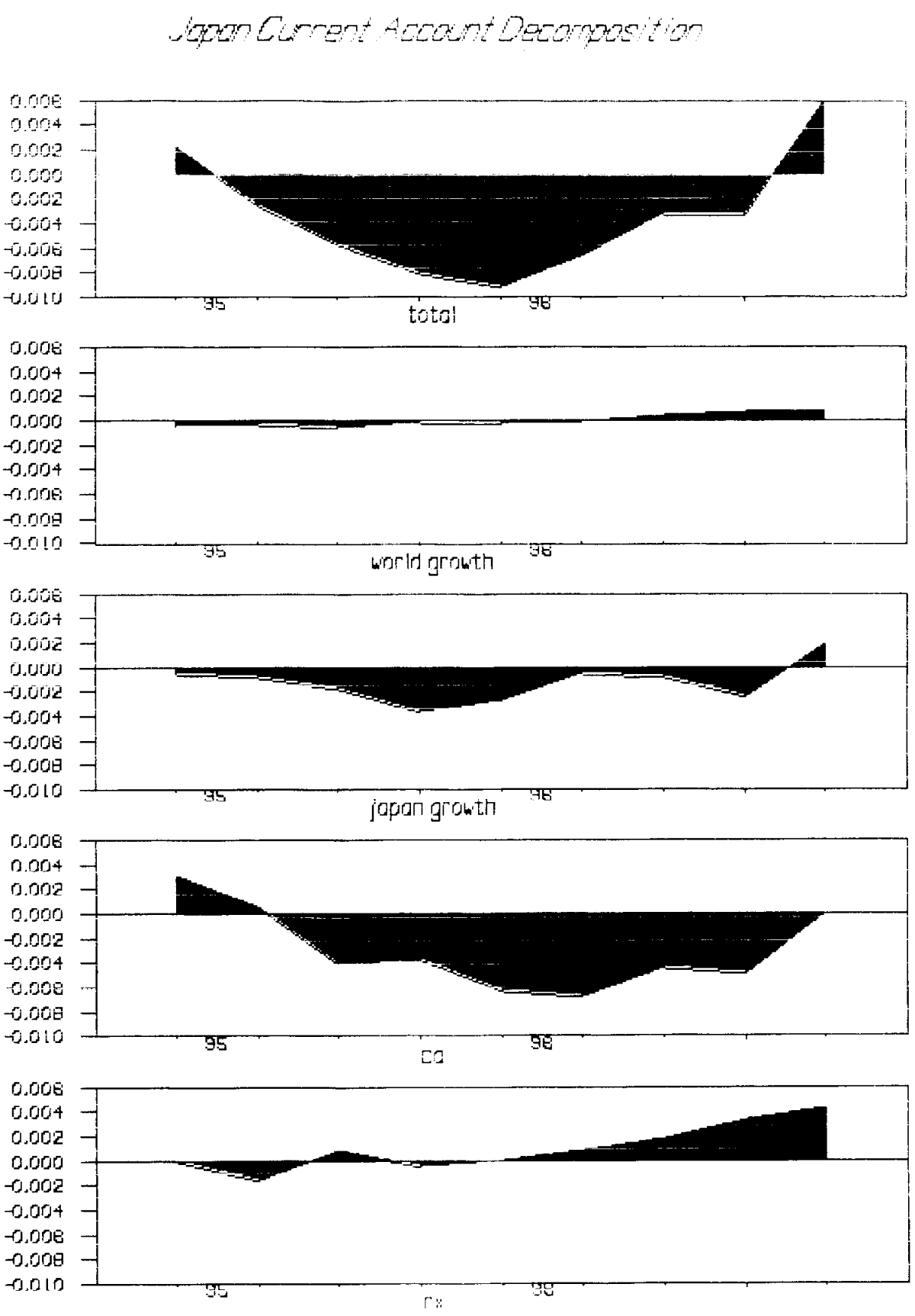

US Current Account Decomposition
0.006
0.004
0.002
0.000
-0.002
-0.004
-0.006
-0.008
-0.010
95
98
total
world growth
us growth
ca
rx

FIGURE 5


Japan Current Account Decomposition
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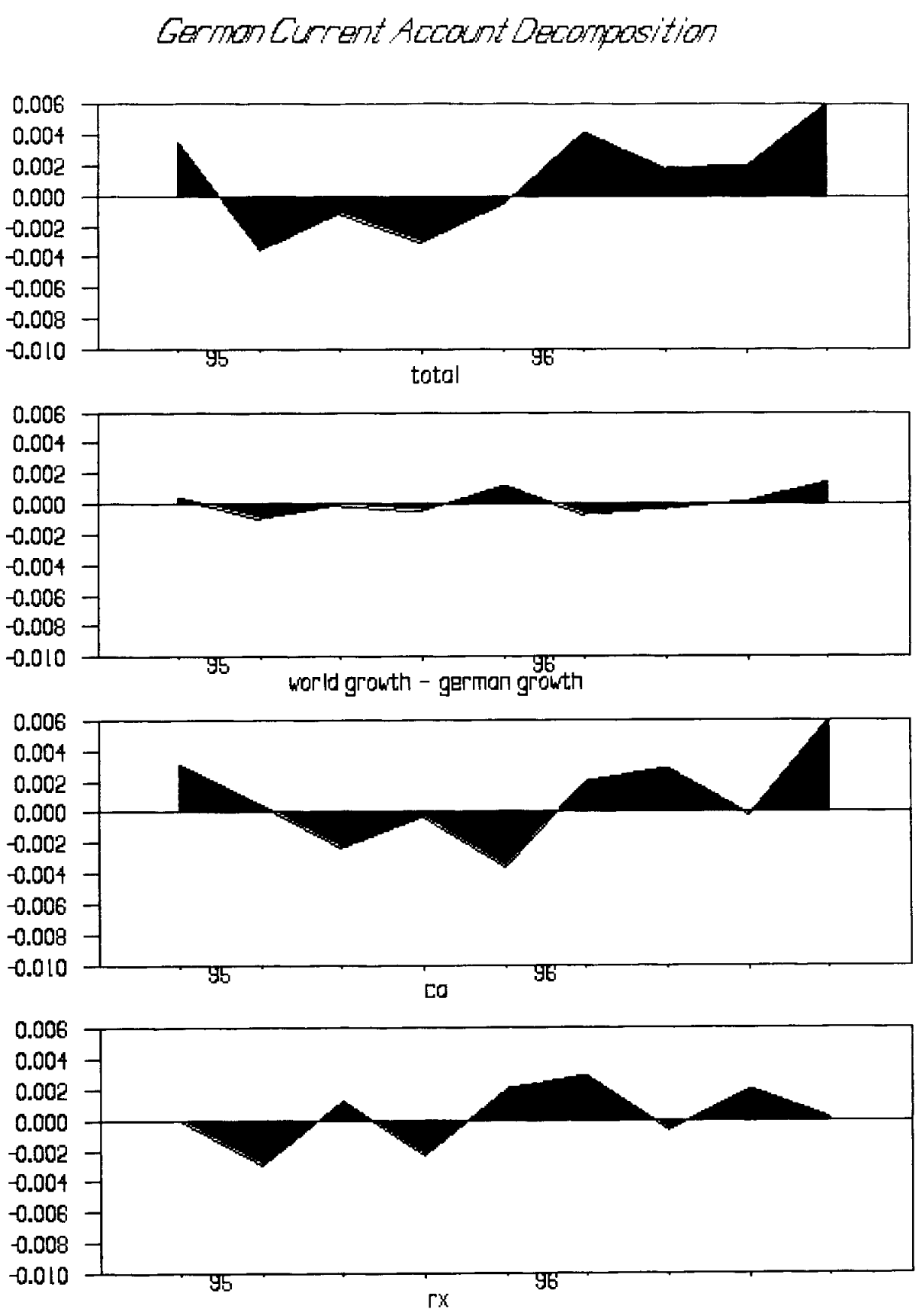
0.002
0.000
-0.002
-0.004
-0.006
-0.008
-0.010
95
96
total
world growth
japan growth
CG

FIGURE 6


German Current Account Decomposition
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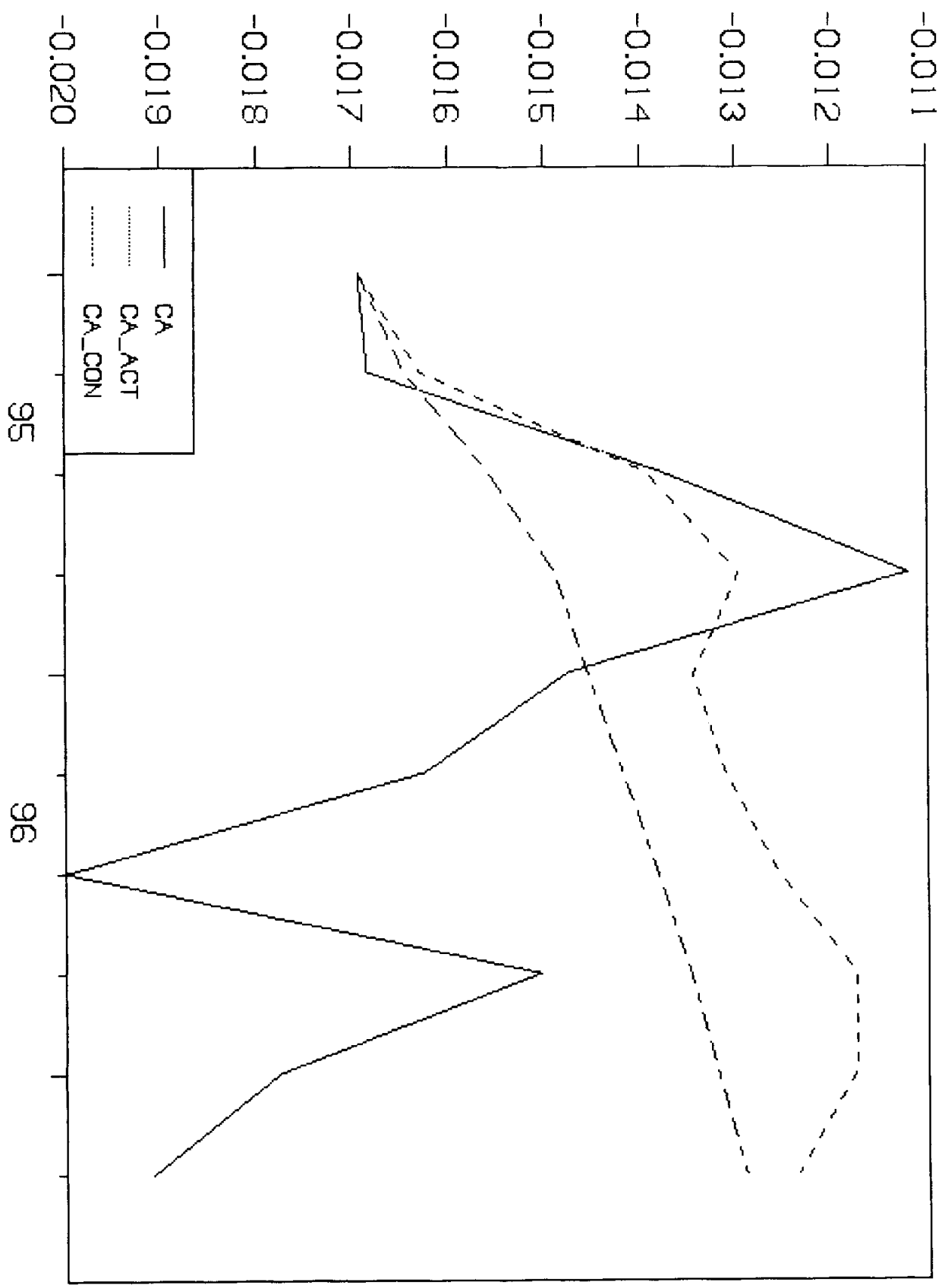
0.004
0.002
0.000
-0.002
-0.004
-0.006
-0.008
-0.010
95
96
total
world growth - german growth
ca
rx

FIGURE 7


US CA/GDP
Structural Component
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-0.012
-0.013
-0.014
-0.015
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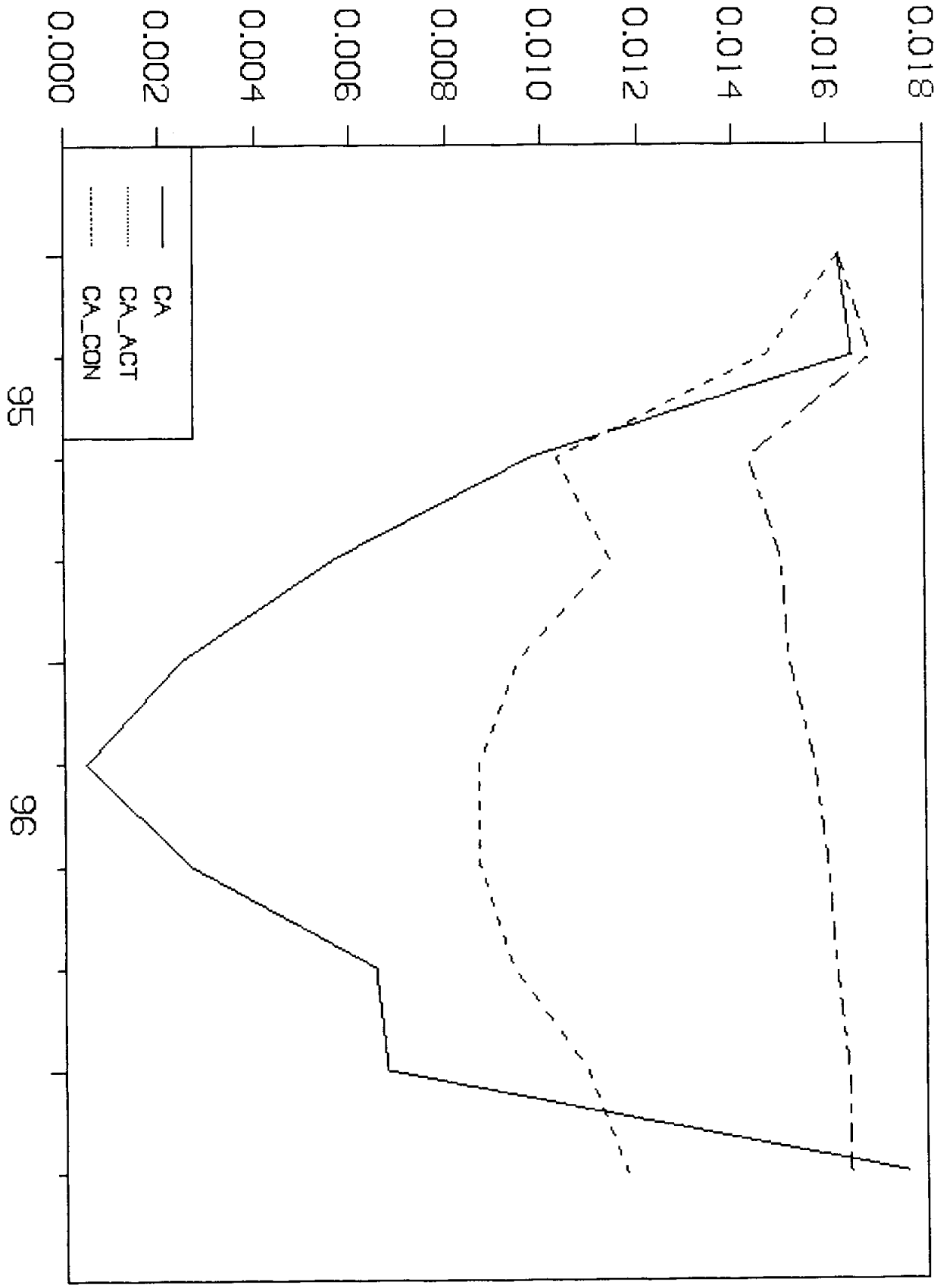
-0.017
-0.018
-0.019
-0.020
95
96
CA
CA_ACT
CA_CON

FIGURE 8


Japan CA/GDP
Structural Component
0.018
0.016
0.014
0.012
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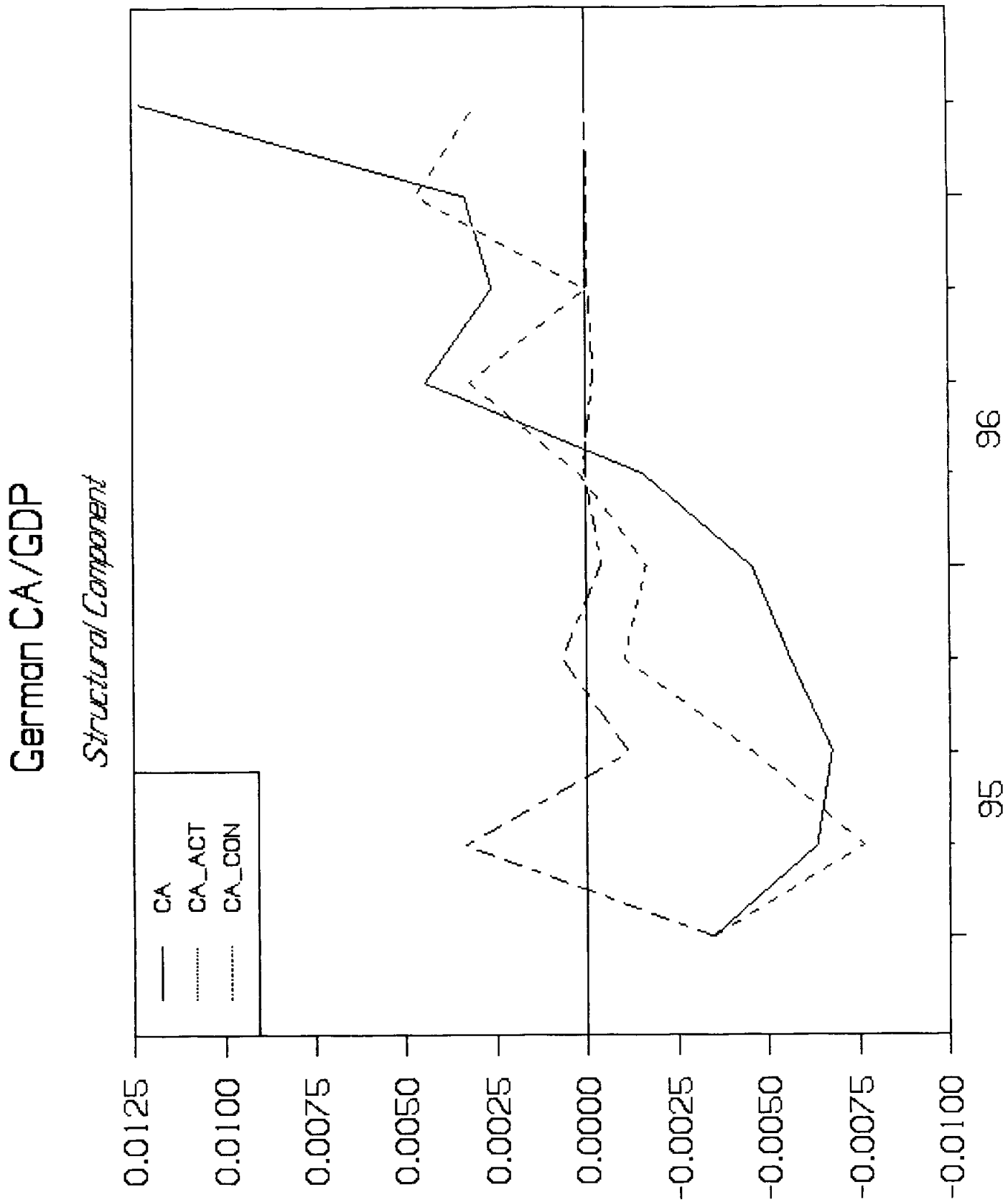
0.008
0.006
0.004
0.002
0.000
95
96
CA
CA_ACT
CA_CON

FIGURE 9


German CA/GDP
Structural Component
CA
CA_ACT
CA_CON
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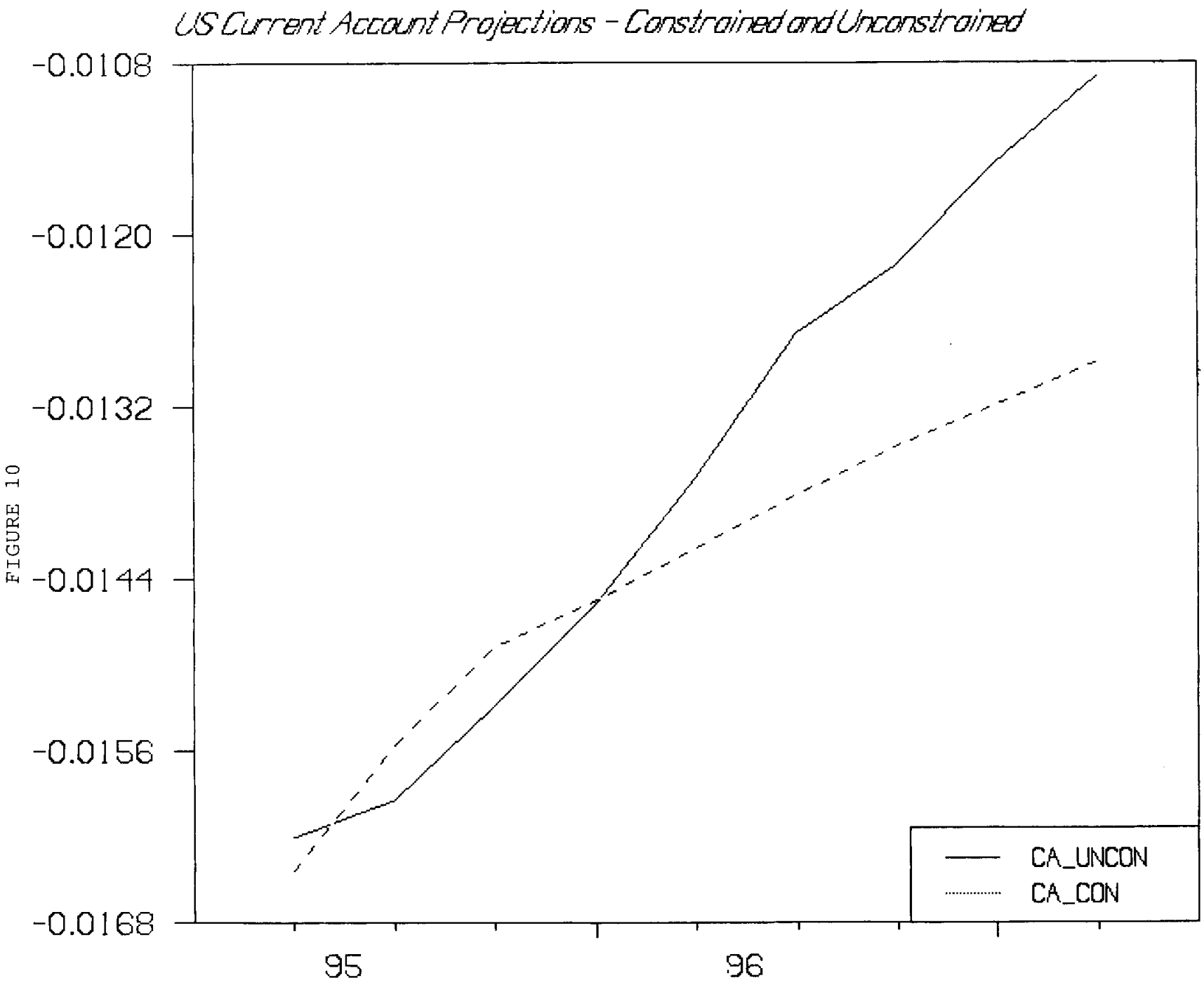
0.0025
0.0000
-0.0025
-0.0050
-0.0075
-0.0100
95
96


US Current Account Projections - Constrained and Unconstrained
-0.0108
-0.0120
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-0.0144
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-0.0168
95
96
CA_UNCON
CA_CON

FIGURE 10

FIGURE 11

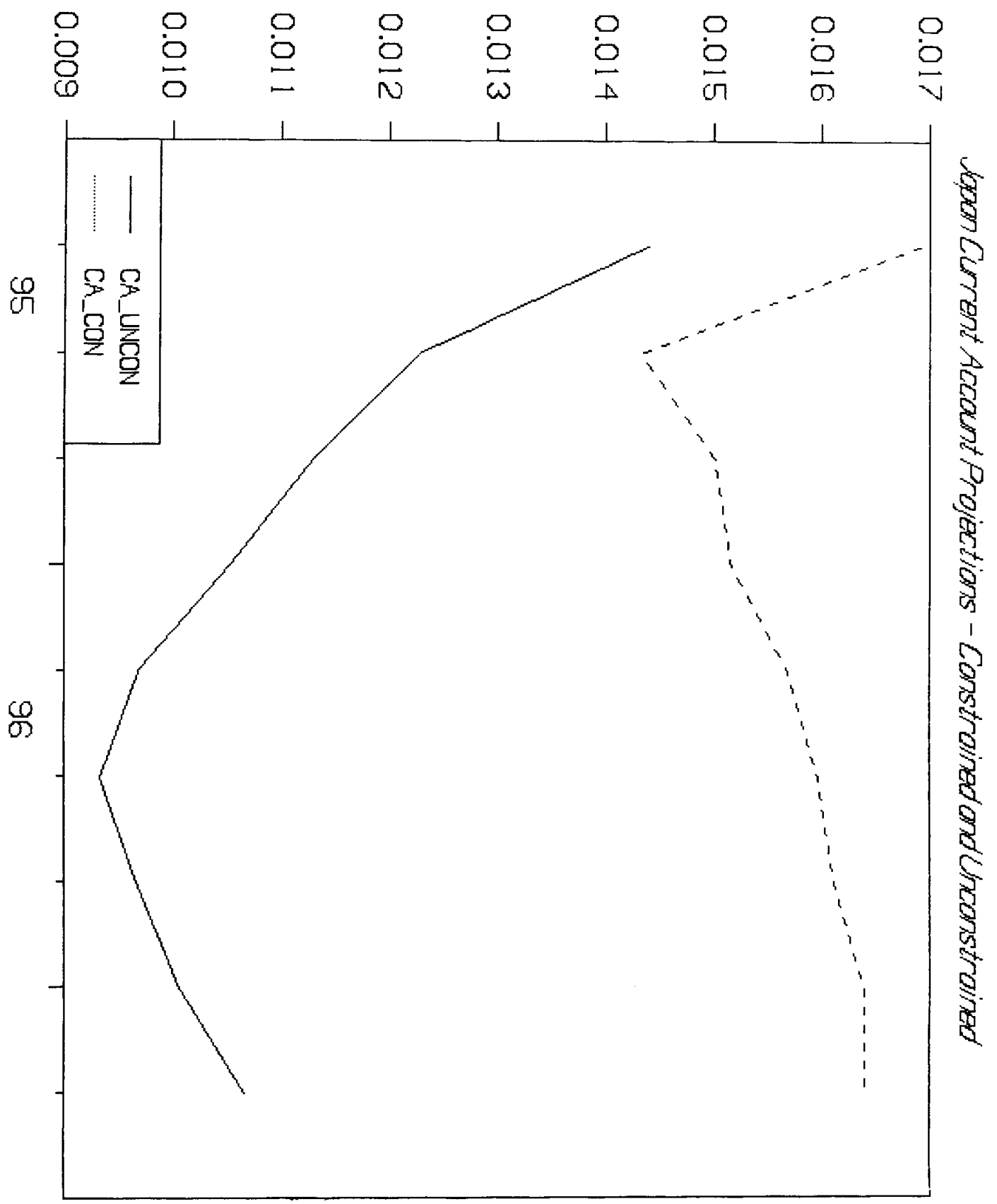
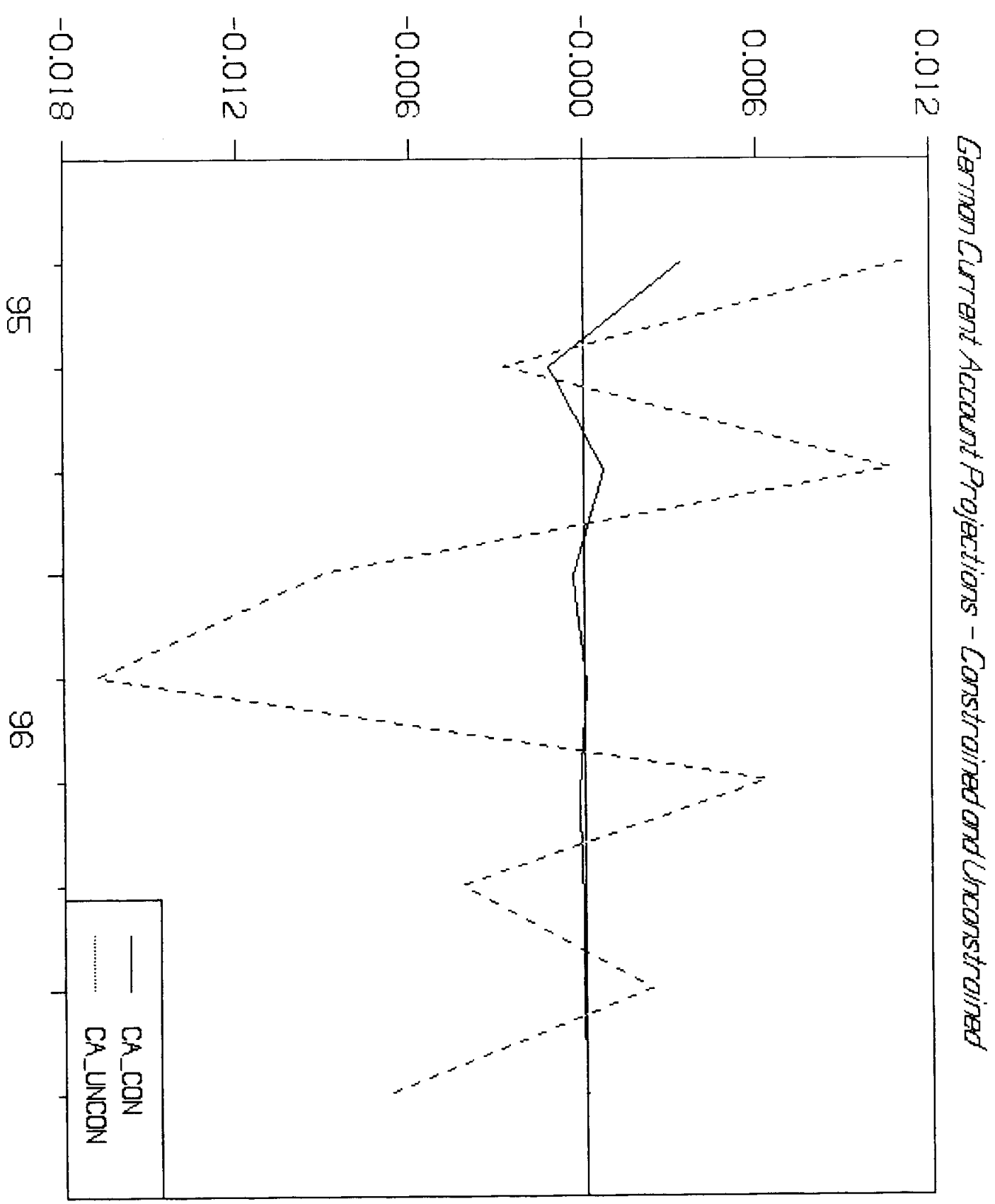

Japan Current Account Projections - Constrained and Unconstrained
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.010
0.009
95
96
CA_UNCON
CA_CON

FIGURE 12


German Current Account Projections - Constrained and Unconstrained
0.012
0.006
0.000
-0.006
-0.012
-0.018
95
96
CA_CON
CA_UNCON