Board of Governors of the Federal System

International Finance Discussion Papers

Number 1126

December 2014

Cyclically Adjusted Current Account Balances

Jane Haltmaier

Board of Governors of the Federal Reserve System

Cyclically Adjusted Current Account Balances

Jane Haltmaier*

November 2014

Abstract

The Great Financial Crisis coincided with a sizable reduction in global external imbalances, defined as the absolute value of the sum of individual country current account surpluses and deficits relative to global GDP. Although current account balances should not respond to a downturn that is uniform across countries, one that hits countries with current account deficits harder than those with surpluses might result in a decline in the global balance. This paper quantifies the cyclical portion of the current account balance for 35 countries using estimates of the severity of the cycle in each country relative to that of its trading partners in conjunction with three estimates of the sensitivity of the current account balance to changes in the output gap. Two of the estimates are derived from equations linking trade to income and the third is derived from the relationship between changes in current account balances and changes in output gap differentials. The main result is that the bulk of the reduction in the global current account imbalance since 2006 appears to have been structural. Cyclical forces are estimated to account for between 10 and 30 percent of the decline. In the aggregate, the cyclical effect is estimated to be currently holding down the global current account balance by about ½ percentage point. However, the size of the cyclical effect is more substantial for some countries. Both surplus and deficit countries have contributed to the decline in the absolute value of the global current account imbalance, but the contribution of the deficit countries is about twice as large as that of the surplus countries. Changes in oil prices have had largely offsetting effects on the global current account balance, but changes in real exchange rates in recent years have contributed to the reduction.

Keywords: current account, cycles

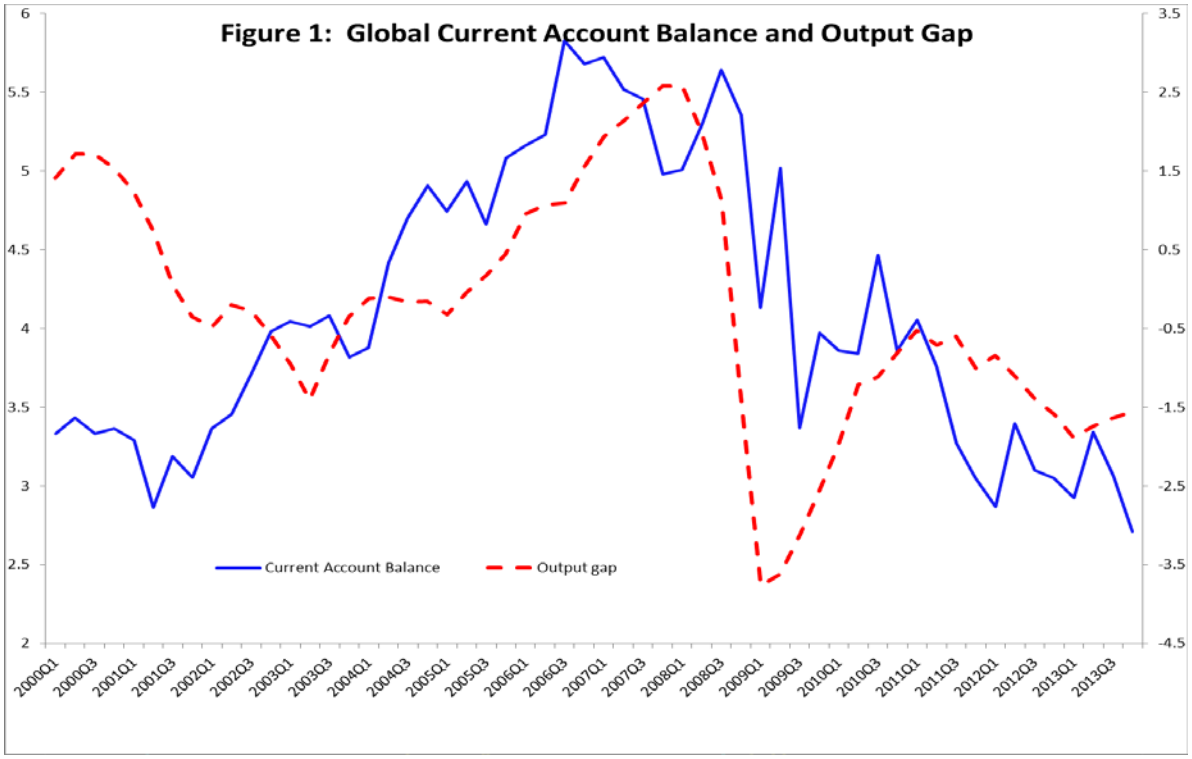
JEL classifications: E32, F17

***** The author is a Senior Advisor in the Division of International Finance. Mailing address: Division of International Finance, Board of Governors of the Federal Reserve System, Mail Stop 20, Washington D.C. 20551, U.S.A. Email: Jane.T.Haltmaier@frb.gov. Telephone: (202)-452-2374; fax (202)-263-4850.

Cyclically Adjusted Current Account Balances

I. Introduction

Whether it was causation or simple correlation, the Great Financial Crisis (GFC) that began in late 2007 has coincided with a sizable reduction in global external imbalances, defined as the absolute value of the sum of individual country current account surpluses and deficits relative to global GDP. As shown in Figure 1, the sum of the absolute value of global surpluses and deficits for 35 countries that make up most of global trade has fallen from a peak of about 5¼ percent of GDP in the third quarter of 2006, shortly before the crisis began, to a current level around 3 percent. This decline has been accompanied by a swing in the estimated global output gap from 2½ percent in late 2007 to a low of -3¾ percent in early 2009, followed by a rebound to -1½ percent near the end of 2013.



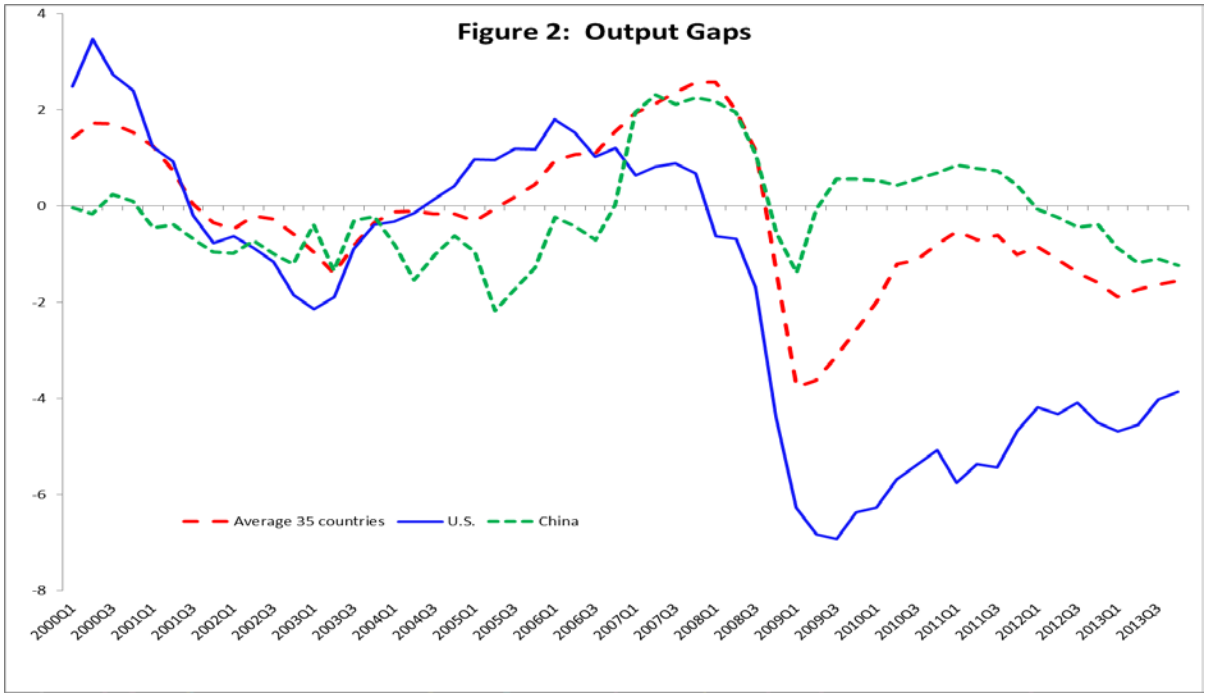
Source: See Appendix

Could the two be related? Should global current account balances shrink in periods of widespread economic weakness? For most countries, the largest part of the current account balance is the trade balance. When a single country experiences a cyclical downturn, its current account balance is expected to improve along with its trade balance because its imports shrink while its exports are not affected. However, when many countries simultaneously experience economic weakness, both exports and imports for each country will contract. Whether there is an impact on the current account of an individual country depends to a large extent on the severity of its own downturn relative to those of its trading partners. A country that experiences a more severe recession than its trading partners should see a cyclical improvement in its trade, and thus, its current account balance in a global recession as its imports fall more than its exports, and vice versa.

Whether a global recession translates into a reduction and/or an increase in the global current account imbalance will depend on the size and direction of the cyclical effect in surplus countries compared with deficit countries. If the recession is more severe, on average, in countries that have current account deficits and less severe in those that have surpluses, global imbalances should shrink. In contrast, if deficit countries experience less severe recessions than surplus countries, global imbalances could widen.

One reason the GFC may have contributed to a reduction in global imbalances is that some of the larger deficit countries (notably the United States) experienced a deeper recession than the average, while some of the larger surplus countries (notably China) experienced a milder slump (figure 2), as evidenced by differences in the deviations of actual output from estimated potential. The recovery to date also has been uneven, with

stronger recoveries in emerging markets on average than in advanced economies. This may also have contributed to differential cyclical effects on current accounts.



Source: See Appendix

In order to separate cyclical from structural changes, we need to isolate the portion of the current account balance that depends on the cycle. Quantifying the cyclical portion of the current account balance requires two pieces of information:

(1) the severity of the cycle in each country, which is usually measured as the extent to which actual output deviates from its potential (output gap) for each country. The relative severity of each country's cycle can be measured as the difference between its own output gap and that of a weighted average of its trading partners.

(2) the sensitivity of the current account balance to changes in the output gap. This should be related to the elasticity of exports and imports to trading partner and home country GDP, respectively.

As detailed in the appendix, output gaps for each country were derived using actual GDP data from country sources along with potential output from the IMF WEO for the advanced economies and from HP filters for the emerging economies. Trading-partner output gaps were calculated for each country by combining the output gaps of its trading partners using bilateral export weights.

Three estimates of the sensitivity of the current account balance to relative changes in output gaps were derived using panel regressions. The first uses an estimate of the long-run, or trend, trade elasticity from co-integrating relationships between trade and income, multiplied by the share of trade in output in each country. The estimated income elasticity is about 1.8 for both exports and imports, well in line with results from the literature. However, because the cyclical response of trade to income may be greater than the long-run response, as discussed in Haltmaier (2011), the long-run elasticity may underestimate the response of trade to the output gap. Therefore, an estimate of the short-run, or cyclical elasticity was calculated by using the method of Vahid and Engle (1993). This estimated elasticity, which was about 3.3 for both exports and imports, also was multiplied by the trade share to provide a second estimate of the cyclical effect. These two estimates might be expected to bracket the cyclical effect based on trade elasticities.

The third estimate comes from a panel regression of changes in the current account balance on changes in the difference in the output gap between the home country and its trading partners, along with other variables likely to affect short-run movements in the current account. The coefficient on the output gap differential provides a direct estimate of the cyclical sensitivity of the current account balance. This estimated

coefficient (adjusted for the presence of the lagged dependent variable in the regression) is a little less than .3, suggesting that an output gap differential of 1 percentage point should raise or lower a country's current account balance by .3 percentage point on average.

The next section describes in more detail the methods used to derive the sensitivity of the current balance to the output gap differential. The third section presents the various estimates of the cyclically-adjusted current balances. Section IV looks at other factors that may have influenced global current account imbalances and section V provides some detail by country. The final section concludes.

II. Methodology

A. Trade Shares and Elasticities

For most countries, trade comprises the lion's share of the current account. If we assume that cyclical changes in the current account balance are dominated by changes in the trade balance, we can write the change as:

$$(1)\ \Delta(CAB/GDP) = \Delta(TB/GDP) = \Delta(X/GDP) - \Delta(M/GDP)$$

$$\approx \Delta X/X * X/GDP - \Delta M/M * M/GDP$$

where CAB = current account balance, X = real exports of goods and services, M = real imports of goods and services, TB = trade balance (X – M), and GDP = real GDP. This relationship can be rewritten as:

$$(2)\ \Delta(TB/GDP) = \varepsilon_X * xshare * \Delta TPGDP/TPGDP - \varepsilon_M * mshare * \Delta GDP/GDP$$

where ε_X and ε_M are the elasticities of exports to trading partner GDP and imports to home country GDP, respectively, and xshare and mshare are export and import shares of GDP.

The portion of the change in the trade balance (and by extension, in the current account) that is a result of cyclical changes in GDP can then be calculated as:

(3) $(\Delta TB/\Delta GDP)_{cyc} = \varepsilon_X * xshare * TPGAP - \varepsilon_M * mshare * GAP$

where TPGAP and GAP are the trading-partner and home-country output gaps, respectively.

If we assume that the elasticities of exports and imports as well as the shares of exports and imports in GDP are approximately equal on average, this expression can be further simplified to:

(4) $\Delta(TB/GDP)_{cyc} = \varepsilon_T * tshare * (TPGAP-GAP)$

where ε_T is the average trade elasticity and tshare is the average of the export and import shares of GDP. The cyclical portion of the trade balance is thus measured as the average trade elasticity multiplied by the share of trade multiplied by the difference between a weighted average of each country's trading partners' output gaps and its own output gap. The cyclically-adjusted trade balance is the difference between the actual trade balance and the cyclical portion.

To make this calculation we need an estimate of the trade elasticity, i.e., the responsiveness of trade to changes in output. The rapid growth in world trade relative to GDP (chart 3) suggests that this elasticity is greater than 1 and in fact most studies have found a long-run elasticity of trade to income of between 1 and 2. Furthermore, as evidenced by the sharp drop in the ratio in the GFC and as explored in Haltmaier (2011), the cyclical elasticity of trade may well be larger than its trend elasticity. This result may reflect the greater proportion of goods compared with services in trade relative to GDP, given that consumption and production of goods tend to be more cyclically sensitive than

consumption and production of services. Thus, using the long-run or trend elasticity may understate the extent to which the current account balance depends on the cycle.

To allow for this possibility, both long-run and short-run trade elasticities were estimated using a two-step procedure that first estimates the co-integrating relationship among exports/imports and trading partner GDP/own GDP in order to uncover the long-run elasticity. Following the methodology of Vahid and Engle, as described more fully in Haltmaier (2011), the short-term or cyclical relationship is then estimated by regressing the change in exports/imports on the change in GDP using GMM with the lagged values of the variables and the error correction term from the co-integrating relationship as instruments.

Source: See Appendix

As shown in table 1, Augmented Dickey-Fuller test statistics for individual unit root processes indicate that exports, imports, trading partner GDP, and own-country GDP all have unit roots. Since trade is also likely to depend on the real exchange rate, this

variable also was evaluated for a unit root. However, the real exchange rate appears to be stationary in levels (other tests for unit roots provided similar results). Pedroni residual cointegration tests with automatic lag length selection suggest the existence of cointegrating relationships between both exports and trading partner GDP and imports and own-country GDP (table 2), as 7 of the 11 statistics are significant at the 5 percent level for exports and all are significant for imports.

Table 1
Augmented Dickey-Fuller Unit Root Test Results

	t-statistic	probability
Exports	69.3292	.3025
Imports	48.1689	.9298
Trading-Partner GDP	39.1122	.9990
Own GDP	61.2673	.7624
Real Exchange Rate	115.197	.0005

Cointegrating equations were estimated for both exports and imports in panel regressions that used data for the 32 countries for which data on total real exports and imports are available. The results from the estimation of the cointegrating equations are shown in table 3. The long-run income elasticities for exports and imports are quite similar at 1.84 for exports and 1.72 for imports. The analysis uses an average of the two, 1.78, as the long-run trade elasticity.

The results from the estimate of the cyclical relationship between exports/imports and real GDP are shown in the lower part of table 3. The change in real exchange rates also was included in this equation. The estimated short-run elasticties are again very similar for exports and imports at about 3.3. The real exchange rate elasticity was -.58 for exports and only .23 for imports, which appears to be implausibly low (these results do not satisfy the Marshall-Lerner condition). However, the estimated income elasticities are very similar when the exchange rate is not included in the equation.

Table 2 **Pedroni Residual Cointegration Test Results**				
Null hypothesis: no conintegration	Exports and Trading Partner GDP			
Alternative hypothesis: common AR coefs. (within-dimension)	Statistic	Probability	Weighted Statistic	Probability
Panel v-Statistic	4.43	.0000	3.80	.0001
Panel rho-statistic	-2.70	.0034	-1.68	.0464
Panel PP-statistic	-1.91	.0281	-1.11	.1326
Panel ADF-statistic	-.512	.3044	.541	.7057
Alternative hypothesis: individual AR coefs. (between-dimension)	Statistic	Probability		
Group rho-statistic	-2.10	.0179		
Group PP-statistic	-2.05	.0201		
Group ADF-statistic	.071	.5283		
Null hypothesis: no conintegration	Imports and GDP			
Alternative hypothesis: common AR coefs. (within-dimension)	Statistic	Probability	Weighted Statistic	Probability
Panel v-Statistic	5.07	.0000	4.72	.0001
Panel rho-statistic	-4.07	.0000	-6.24	.0000
Panel PP-statistic	-3.20	.0007	-4.52	.0000
Panel ADF-statistic	-1.83	.0334	-3.01	.0013
Alternative hypothesis: individual AR coefs. (between-dimension)	Statistic	Probability		
Group rho-statistic	-5.25	.0000		
Group PP-statistic	-5.08	.0000		
Group ADF-statistic	-2.92	.0017		

Table 3 **Trade Equation Results (probabilities in parentheses)** **Estimation period 1980 to 2013**		
	Exports	Imports
Co-integrating equation (long-run elasticity)		
GDP	1.84*	1.72*
Number of observations: 3361 Number of cross-sections: 32		
Cyclical equation (short-run elasticity)		
GDP	3.38*	3.21*
Real exchange rate	-.58*	.24*
Number of observations: 3311 Number of cross-sections: 32		

* Significant at 1% level.

B. Direct Estimation of Effects of Output Gaps on Current Account Balances

The substantial literature linking current account balances to economic variables has generally focused on long-term structural determinants, including demographics, fiscal balances, stage of economic development, oil dependency, financial market development, and institutional factors. These studies typically use panel regressions, following Chinn and Prasad (2003), in which multi-year averages of the current account balance are regressed on the set of structural variables. A recent paper by Cheung, Fuceri, and Rusticelli of the OECD (2010) goes a step further, first estimating a structural equation using five-year averages of the variables, and then estimating a dynamic version using annual deviations of the variables from their five-year averages. The dynamic equation also includes the lagged current account as well as a number of other variables that may not affect structural positions but should have a short-run effect, including growth, openness, oil production and consumption variables, and the real exchange rate. These are all found to be significant.

This paper focuses on quarterly changes in the current account balance as a percent of GDP. The important structural factors generally change only slowly over time or are available only on an annual basis (budget deficits), and are thus not included in the analysis. The analysis is again based on the presumption that, because trade in goods and services is generally the largest portion of a country's current account, short-run changes in the current account should be linked to the same factors that affect trade, namely changes in home country and trading partner income, real exchange rates, and commodity prices, particularly oil.

Panel regressions were estimated for 35 countries for which a substantial amount of quarterly time series current account data were available. The panel is unbalanced, as the time series are longer for some countries than for others. The earliest observations are from 1980, and all series are available from at least 2000.

Changes in the current account balance as a percent of GDP were regressed on the current and lagged values of the explanatory variables. The explanatory variables are: changes in the output gap differential (trading partner output gap minus home-country output gap), changes in the log of the real exchange rate, and changes in the log of oil prices multiplied by a dummy variable for whether a country is an oil exporter or importer. Four lags of the current account balance also were included.

The reason that the differential between the trading partner and home-country output gap was used rather than the two series separately is that they are highly correlated over time, making it difficult to obtain separate estimates of the effect on the current account balance.

The results of the panel regression are shown in table 4. All of the variables are correctly signed and highly significant. A one-percentage point increase in the output gap differential improves the current account balance by .28 percentage points on average. An increase (appreciation) in the real exchange rate reduces the current account balance. An increase in oil prices reduces the current account balance for oil importers and raises it for oil exporters.

Table 4 Current Account Equation Results* Estimation period 1980 to 2013		
	Estimated coefficient	Long-run effect (adjusted for lagged dep. var.)
Change in output gap differential (trading partner minus home gap)	.437+	.276+
Real exchange rate	-.058+	-.037+
Oil price Oil Importers Oil Exporters	 -.021+ .041+	 -.013+ .026+
Lagged current account balance	-.573 +	

*Sum of current and lagged coefficients. + Significant at 1% level.

III. Cyclically Adjusted Current Account Balances

The cyclical portion of the current account balance was calculated by combining the sensitivities derived using the methodologies described in the previous section along with the estimated gaps. The cyclically adjusted balance is the difference between the actual balance and the cyclical portion, i.e.

(5) $CAB_{cyc} = S_i * (TPGAP - GAP)$

where S_i is the estimated sensitivity.

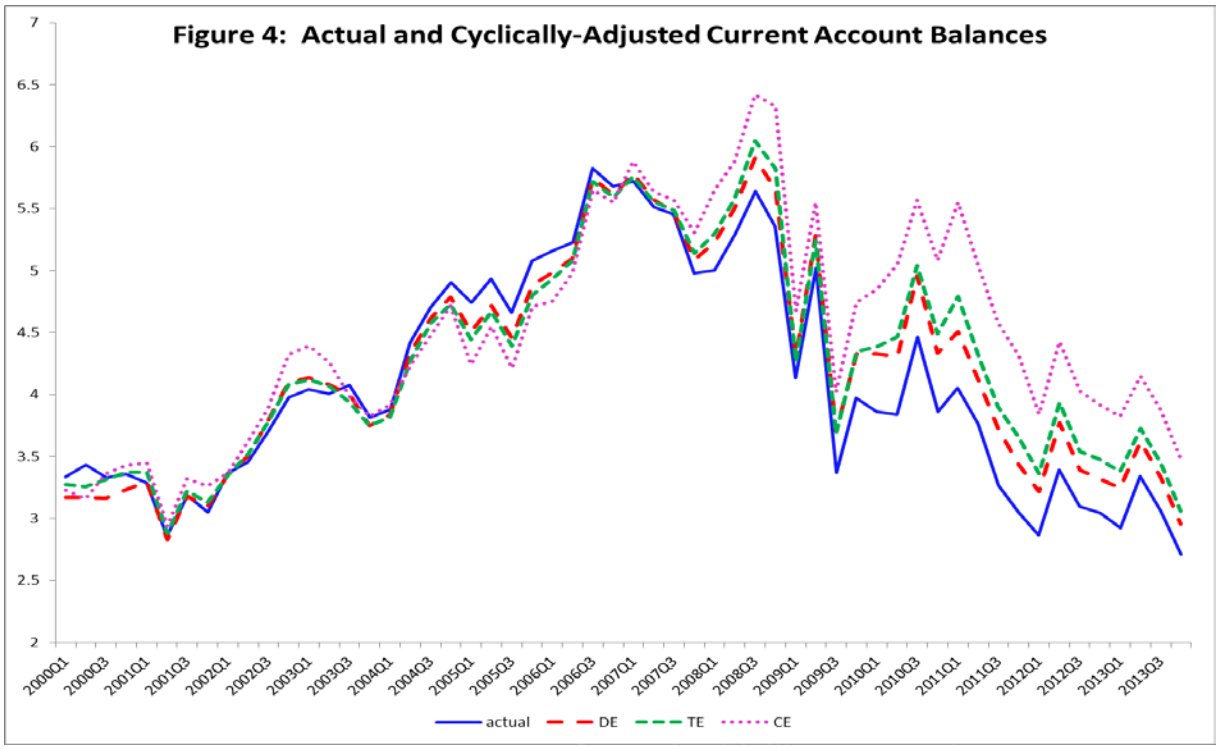
(6) $CAB_{adj} = CAB - CAB_{cyc}$

Three measures of the sensitivity are used: the long-run trend elasticity (LE, equal to 1.78) and the short-run cyclical elasticity (CE, equal to 3.3) each multiplied by each country's trade share, and the direct effect of changes in output gap differentials on the current account balances (DE, equal to .28). The average trade share rises from about .2 early in the sample to .3 in the most recent years, implying an average sensitivity based on the long-run elasticity that increases from about .4 early in the period to about .5 currently. The average sensitivity based on the short-run elasticity is higher, increasing from about .7 early in the period to a current value of around .8. In contrast to the

sensitivity derived from the panel regression with current account balances, the sensitivities based on trade elasticities and trade shares vary across countries.

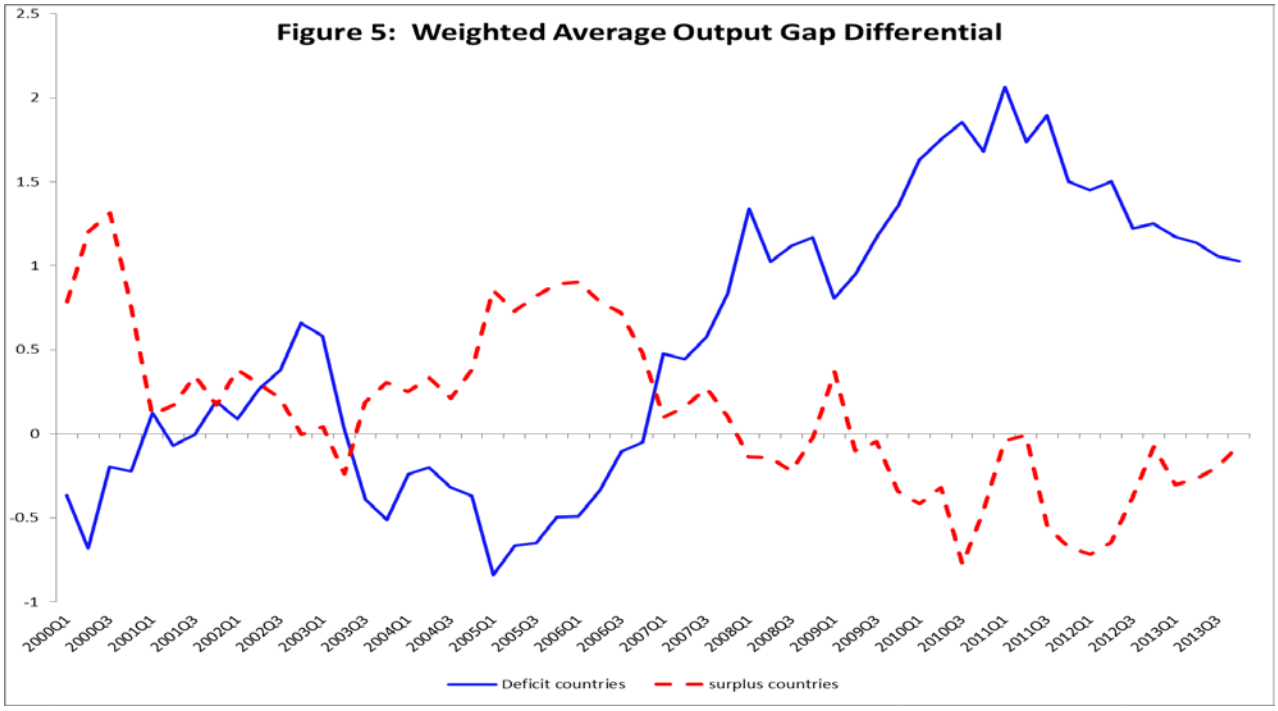
Figure 4 shows the absolute value of the actual global current account balance along with the three cyclically-adjusted current account balances derived using the different sensitivities. Perhaps the most striking result is that most of the sharp decline in the actual balance between its peak value of 5.8 percent in the third quarter of 2006 and its value of 3.4 percent in the third quarter of 2009, close to the recession trough for most countries, does not appear to have been cyclical, as all of the adjusted series also fell substantially.

However, there was a larger divergence in the recovery period. This is because, as shown in figure 5, the faster pace of recovery in the surplus countries as a group (the red line) has meant that the difference between their trading partner output gaps and their own output gaps has mostly been negative, depressing their current account balances. In contrast, the output gap differential for the deficit countries has stayed more decisively positive, imparting a boost to their current account balances. The largest divergence between the actual and adjusted series was in late 2010 or early 2011, when the output gap divergences also were especially large. At that time both the DE and TE methods showed an adjusted balance of around 5 percent, compared with about 4 percent for the actual balance. The CE method suggested the cyclical balance was even higher, at about 5½ percent. Since then, the divergence has narrowed considerably. Both of the DE and TE series suggest that the cyclical effect is nearly gone, while the third series shows a cyclical effect of about ¾ percentage point.



Source: See Appendix

Thus, all of the methods suggest that a larger portion of the decline in the global current account balance since before the GFC has been structural than cyclical, particularly in the earlier part of the period. However, the unevenness of the recovery contributed to a more substantial cyclical effect that peaked in 2011 and has now dropped back as the recovery has become more even.



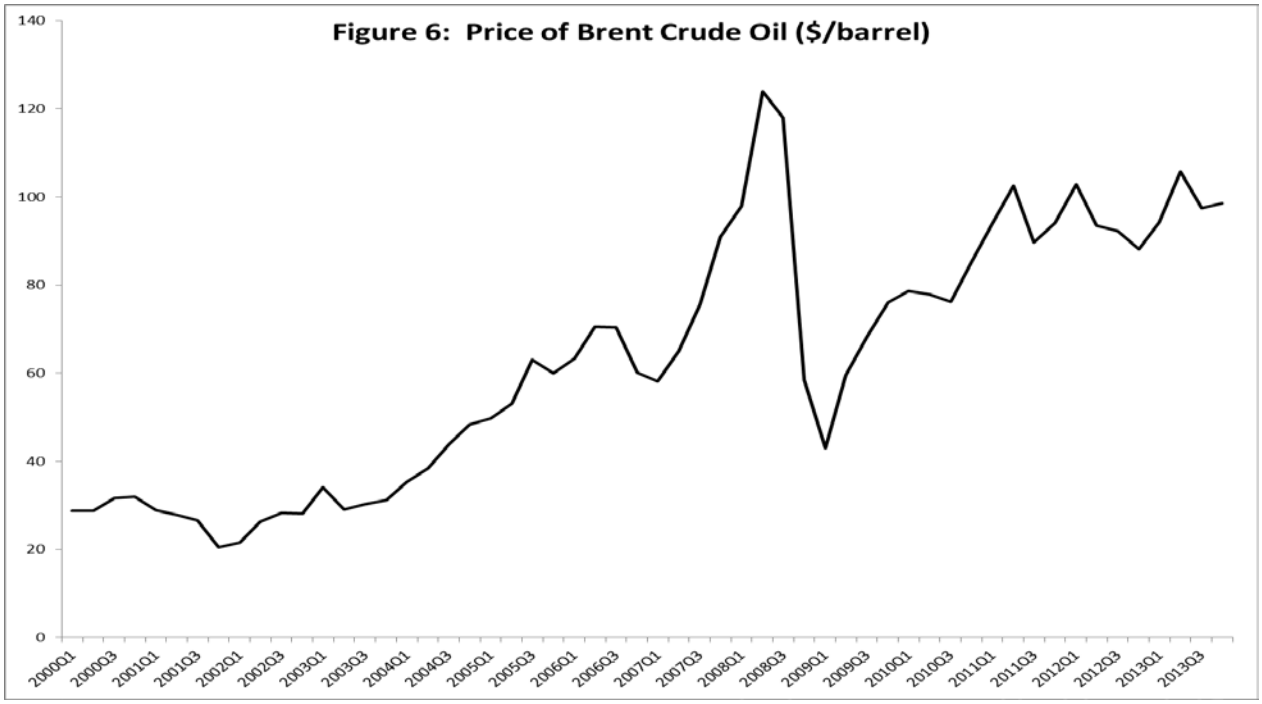
Source: See Appendix

IV. Other Influences on the Global Current Account Balance

If more than half of the decline in the global current account balance since the onset of the GFC cannot be explained by cyclical factors, can we identify other influences that might have played some role? The panel equation used to identify the direct effect of the cycle on the current account also includes both the price of oil and the real exchange rate, providing an avenue to assess the effects of these variables on global current account imbalances.

Oil Prices

The price of oil fell by about 40 percent between the third quarter of 2006 and the first quarter of 2009 (figure 6). However, it later more than recouped that decline, suggesting that whatever effect the fall in prices might have had on global current account imbalances was reversed during the recovery period.



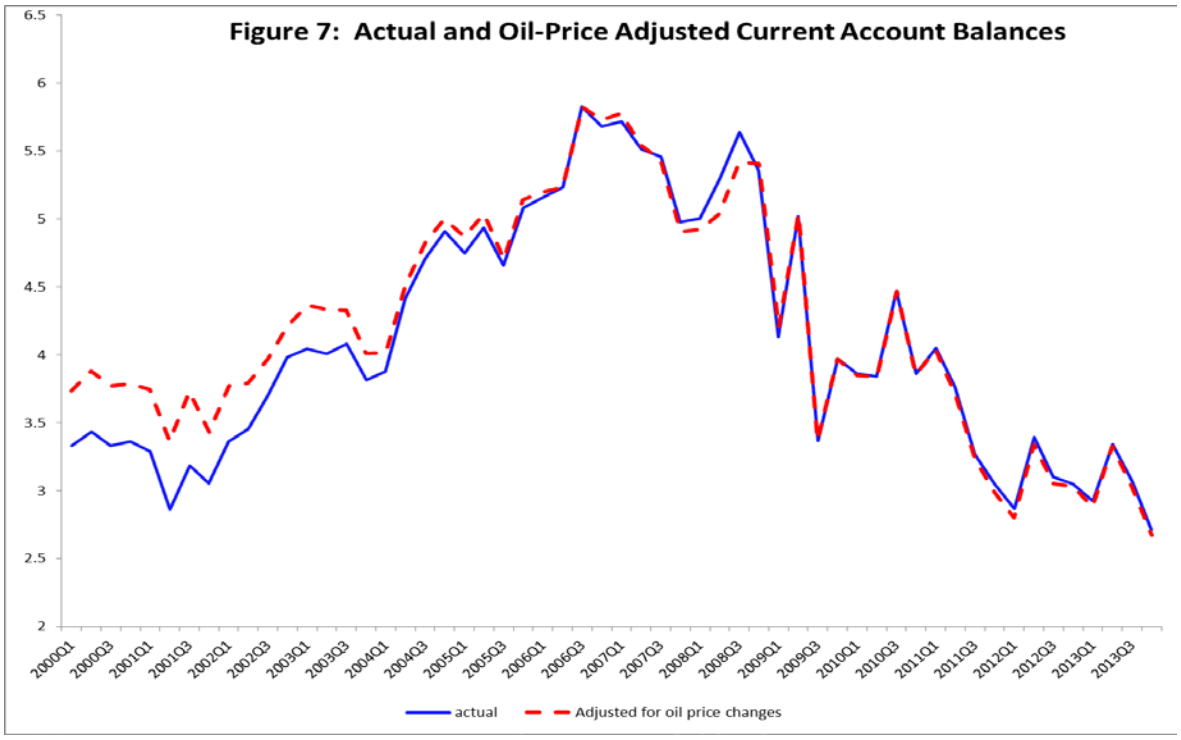
Source: See Appendix

The effect of the change in oil prices on the global current balance since 2006:Q3 was estimated by multiplying the change in oil prices relative to that date by the estimated effect from the panel equation (-.013 for oil importers, .026 for oil importers)[1]. This series is then subtracted from the balance for each country to derive a series that represents the value of the global current balance if oil prices had been constant over the period at the 2006:Q3 level. Figure 7 compares this series with the actual global current account balance.

The effect turns out to be quite small. This is primarily because most of the countries in the sample are oil importers and the effects largely cancel out. For instance, the fall in oil prices between 2006:Q3 and 2009:Q1 is estimated to have reduced the U.S.

[1] The larger absolute effect of oil price changes on the current account balances of oil exporters compared with oil importers likely reflects two factors. First, oil exports are probably a larger portion of exports of oil exports than oil imports are of total imports of oil importers. Secondly, financing constraints may force a contraction in either oil or other imports for oil importers when oil prices rise, providing some offset to the direct impact of higher oil prices, whereas exporters may not immediately expand their imports of other products in response to an increase in oil prices.

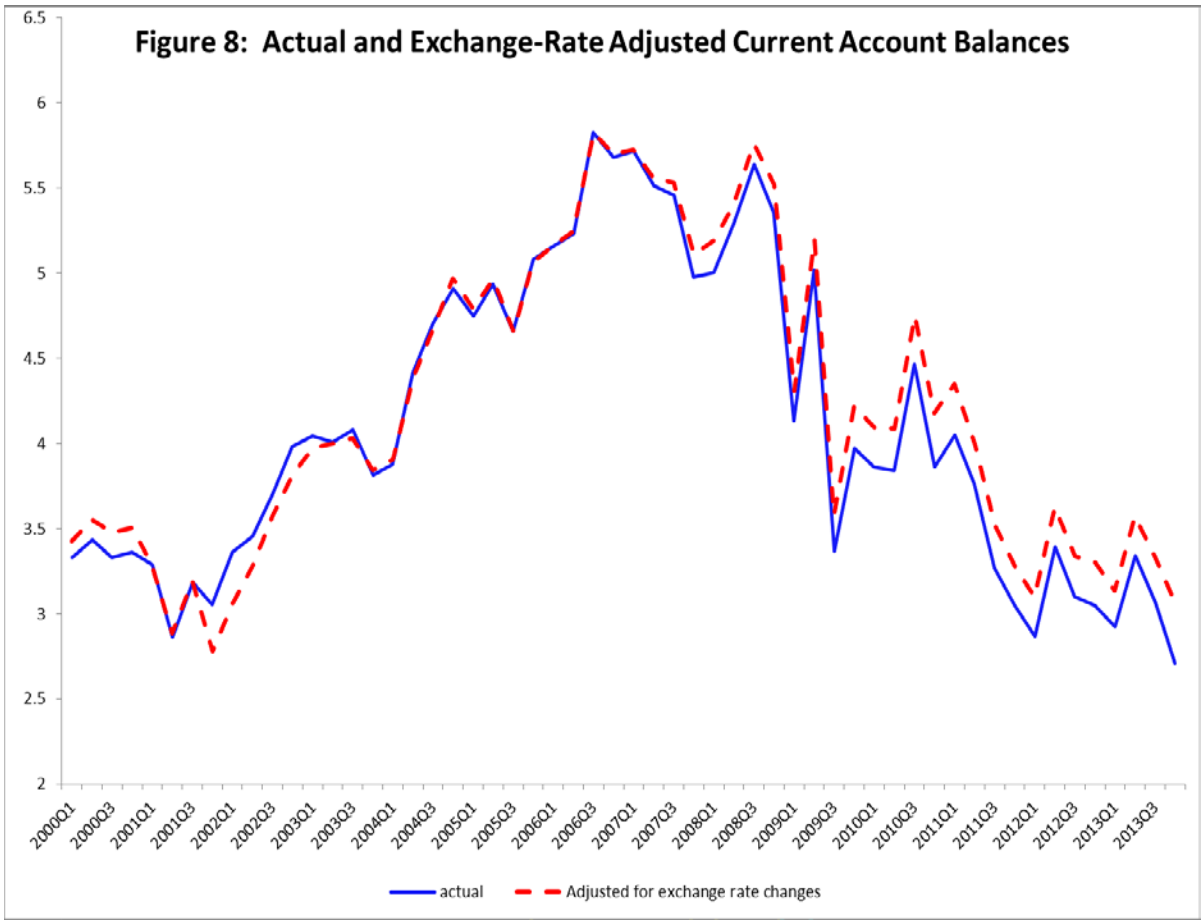
current account deficit by about $90 billion. However, it also increased the German and Chinese current account surpluses by an estimated $20 billion and $30 billion, respectively, offsetting much of the impact of the lower U.S. deficit on the estimated global current account balance.



Source: See Appendix

Exchange rates

A similar exercise can be done assuming that exchange rates remain constant at the 2006:Q3 level. Exchange rate changes explain a small, but more noticeable, portion of the decline in the global current account balance than the change in oil prices (figure 8). The balance would have been .2 percent higher in 2009:Q1 and about .4 percentage point higher in 2013:Q4 if real exchange rates had remained at their 2006:Q3 level.



Source: See Appendix

V. Current Account Balances by Country

Table 5 shows the aggregate current account deficits of a number of individual countries as a percent of their aggregated GDP, along with a decomposition into cyclical and secular components using the sensitivity based on the cyclical trade elasticity. This measure gives the largest estimate of the cyclical effect; results from the other methods would be about half this size on average, although the effects differ across countries. The table also includes the output gap differential that is responsible for the cyclical effect, defined as the weighted-average trading partner output gap minus the own-country gap. Thus, a positive differential should have a positive effect on the current account balance and vice versa. The balances are shown separately for the four countries that had the

largest surpluses and deficits in U.S. dollars in the third quarter of 2006 and for the remainder of each group.

Table 5
Components of Current Account Balances in 2013:Q3 by Deficit and Surplus Countries
(% of global GDP)

	2006:Q3				2013:Q4			
	Actual	**Adj.**	**Cyc.**	**Gap Diff.**	**Actual**	**Adj.**	**Cyc.**	**Gap Diff.**
Deficit Countries								
U.S.	-2.02	-2.05	.03	.2	-.53	-.90	.37	2.7
Spain	-.28	-.25	-.03	-1.1	.02	-.02	.04	1.4
U.K.	-.20	-.16	-.04	-.6	-.24	-.23	-.01	-0.2
Australia	-.10	-.12	.02	1.2	-.06	-.05	-.01	-0.5
Other Deficit	-.29	-.20	-.10	-.5	.02	-.09	.11	0.5
Total Deficit	-2.90	-2.78	-.12	-.3	-.59	-.96	.37	1.2
Surplus Countries								
China	.60	.50	.09	1.9	.26	.30	-.03	-0.4
Germany	.42	.40	.02	.2	.50	.70	-.20	-2.1
Japan	.39	.31	.08	1.5	.00	-.01	.01	0.3
Netherlands	.15	.16	-.01	-.4	.12	.02	.09	2.5
Other Surplus	.90	.94	-.04	-.2	.31	.57	-.26	-1.3
Total Surplus	2.46	2.32	.14	.3	1.19	1.58	-.38	-0.9
Total (abs.value)	5.35	5.14	.21	1.1*	2.76	3.31	-.55	-1.6*

* estimated global output gap.

The aggregate deficit for the group of countries that had deficits in the third quarter of 2006 narrowed sharply from 2.9 percent of global GDP to about .6 percent between the third quarter of 2006 and the fourth quarter of 2013. About a fifth of the narrowing was due to the cyclical component, which rose from a small negative in the third quarter of 2006 to a positive 0.4 percent in the fourth quarter of 2013. This change occurred as these countries as a group went from being somewhat overheated relative to their trading partners to experiencing deeper-than-average recessions. As a result, the average gap differential increased from a small negative in 2006 to 1¼ percent in 2013. This suggests that some of these gains may be reversed as the global recovery broadens and deepens.

The change was particularly notable for the United States, where the deficit dropped from 2 percent of global GDP to just over ½ percent. About a quarter of the improvement owed to the cyclical effect, as the deeper recession in the United States compared with its trading partners raised its output gap differential to 2.7 percent from just 0.2 percent in 2006. However, the adjusted deficit also fell by over a percentage point to a little under 1 percent of global GDP. There was also a very large improvement for Spain, which saw a swing to a small surplus over this period. However, Spain also had a large output gap differential, and its cyclically-adjusted balance still showed a small deficit in 2013.

The balances of the surplus countries also narrowed over this period, although by a lesser amount than the balances of the deficit countries, from 2.5 percent of global GDP to 1.2 percent. The cyclical effect was more important for this group, accounting for about two-fifths of the change. This largely reflects the much shallower recession in Germany than in its trading partners, as its output gap differential swung from a positive 0.2 percent in the third quarter of 2006 to a negative 2.1 percent in the fourth quarter of 2013. Both the actual and adjusted German surpluses actually increased over this period, bringing the adjusted German surplus to 0.7 percent of global GDP.

In contrast, the contribution of the Chinese surplus dropped by more than half to a little under 0.3 percent of GDP. The cyclical component accounted for about a third of the decline, reflecting China's relatively strong performance during the GFC. However, as the Chinese economy has slowed and those of some of its trading partners have improved, its output gap differential, which reached a low of -4.7 percent 2009, has moved closer to zero, and the cyclical portion of its current account surplus has fallen

accordingly. Japan also saw a sharp reduction in its current account surplus over this period to near zero. Most of the decline appears to have been structural rather than cyclical, as the adjusted balance fell by 0.3 percent of global GDP.

Table 6 shows the contributions of oil prices and exchange rates to the changes in the current account balances for the same groups of countries over the 2006-2013 period. The rise in oil prices contributed to a widening of over $100 billion on net for the deficit countries, with the United States accounting for the lion's share of the change. Oil prices also are negative on net for the surplus countries (the sample does not include some of the larger oil exporters, notably Saudi Arabia and Russia). As a result, the overall effect on global imbalances is small.

Table 6
Changes in Current Account Balances by Deficit and Surplus Countries (Billions of US$)

	Change in CA Bal. 2006:Q3-2013:Q4	Contribution of changes in	
		Oil price	Exchange rate
Deficit Countries			
U.S.	533.6	-71.4	75.5
Spain	130.9	-5.7	-3.2
U.K.	-61.6	-10.6	19.9
Australia	6.7	-6.0	-5.3
Other Deficit	138.5	-19.7	-9.0
Total Deficit	748.1	-113.5	77.9
Surplus Countries			
China	-92.9	-39.8	-102.5
Germany	124.0	-15.4	-5.3
Japan	-163.8	-20.5	23.2
Netherlands	7.0	-3.4	-0.9
Other Surplus	-194.1	-6.1	-7.5
Total Surplus	-319.9	-85.1	-93.0

In contrast, changes in real exchange rates appear to have made a notable contribution to global rebalancing over this period. Real exchange rate depreciation in the deficit countries as a group is estimated to have improved their balances by nearly $80 billion, most notably for the United States and the United Kingdom. At the same

time, real exchange rate appreciation in the surplus countries, particularly for China, reduced their surpluses by over $90 billion. Thus, changes in exchange rates can be credited with reducing global imbalances by about $170 billion, a little less than .3 percent of aggregate GDP. As long as these exchange rate changes are not reversed, this portion of the improvement in global imbalances should persist. This result also provides support for the view that exchange rate changes can continue to help to reduce the remaining imbalances going forward.

VI. Conclusion

The results of the preceding analysis suggest that cyclical differences have played some role in changes in current account balances since the start of the GFC, but the effect differs considerably across countries, and they do not explain the bulk of the considerable reduction in the global current account imbalance over that period. Similarly, changes in oil prices have been important for some countries, but largely offset for the aggregate. Changes in exchange rates have, however, contributed to the overall reduction in imbalances.

The cyclical effect at the end of the sample period in 2013 was estimated to be a little less than ½ percent of aggregate GDP for both surplus and deficit countries, suggesting that some of the decline in imbalances since 2006 may be partially reversed as the global economy continues to normalize. However, this analysis still leaves a considerable amount of the reduction in imbalances unexplained. In particular, none of the variables considered here can explain the very sharp reduction in imbalances that occurred between the onset of the GFC and its trough. This leaves open the possibility

that the analysis is not capturing the full cyclical effect and that there could be a more substantial reversal than this analysis would suggest as the global recovery continues.

Appendix: Data Sources and Methods

The dataset includes 35 countries, 20 advanced and 15 emerging markets. Current account balances as a percent of GDP were taken from individual country sources by way of Haver, supplemented with data from the IMF's International Financial Statistics databases in some cases where IFS had longer time series. Balances in U.S. dollars were calculated using nominal GDP data, also from country sources by way of Haver and in some cases supplemented with data from the IFS. Real GDP data were also taken from individual country sources using Haver. Output gaps were calculated from the advanced economies using potential output data from the IMF World Economic Outlook. Potential output for the emerging economies was estimated using HP filters.

Trading-partner GDP was calculated for each country using export weights derived from export data from the IMF Direction of Trade Statistics database and country sources. Real exchange rates were calculated using multilateral trade weights.

The oil price variable is the price of Brent crude from the Commodity Research Bureau. Countries were divided into oil exporters and importers on the basis of the latest DOE data.

References

Cheung, C., D. Furceri, and E. Rusticelli, "Structural and Cyclical Factors Behind Current-Account Balances, *OECD Economics Department Working Paper #775*, OECD, 2010.

Chinn, M., B. Eichengreen, and H. Ito, "A Forensic Analysis of Global Imbalances," NBER Working Paper 17513, 2011.

Gruber, J., and S. Kamin, "Explaining the Global Pattern of Current Account Imbalances," *International Finance Discussion Papers #846,* Board of Governors of the Federal Reserve System, 2005.

Haltmaier, J., "Empirical Estimates of Trend and Cyclical Export Elasticities," *International Finance Discussion Papers #1030,* Board of Governors of the Federal Reserve System, 2011.

Wu, Y.i, "Growth, Expansion of Markets, and Income Elasticities in World Trade, *Review of International Economics*, vol. 16, issue 4, 2008, pp. 654-671.

Vahid, F., and R. Engle, "Common Trends and Common Cycles," *Journal of Applied Econometrics*, vol. 8, 1993, pp. 341-360.