Determinants of current account imbalances in the global economy: A dynamic panel analysis

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Abstract

This research presents an empirical investigation of the determinants of current account imbalance for the large sample of developed, emerging and developing countries during 1980-2011. Using dynamic panel GMM techniques, this study characterizes that current account balance are positively correlated with net foreign assets, trade openness and exchange rate stability and negatively associated with commodity price, real GDP growth and real effective exchange rate for the developed countries. While, among emerging countries, commodity price, real GDP growth, trade openness and de-jure capital openness is positively and net foreign asset, exchange rate stability index is negatively related with current account balance. These findings suggest that the current account determinants explain different characteristics in terms of different country groups. The results also hold Chinn and Ito (2007) and Chinn and Prasad (2003) along with three more important determinants with significant influence on current account which have not ever considered in literature.

Key Words: Current account Determinants, Global imbalance, Dynamic Panel GMM.

JEL Code: F62, F30, C33

1 Introduction

Today the world aggregate current account balances as a share of global output are twice as large as in mid 1980s, while the net foreign asset positions have boosted up threefold (Bracke et al., 2010). Global current account imbalance is also rising with the United States and other major developed economies running a persistent current account deficit against some emerging market countries with big surpluses. Notably, the 2007 US current account deficit has enlarged to 6% from 2.4% in 1998. Alike the euro zone current account deficit has widened over 4% of GDP in 2008. This unexpected rise in current account deficit beyond historical standard has received a substantial attention in recent year.

On contrary, China and other Asian Tigers (South Korea, Malaysia, Singapore, Indonesia and Thailand) are running current account surplus on an average 6.4% of GDP in 2000 to 2009 which put forward them to one of the world's largest lender. In spite of having rapid growth and enormous domestic investment opportunities, these economies have increasingly been outflowing a major portion of their savings to foreign countries. Additionally, other emerging economies including Mexico, Argentina, Brazil and Middle-eastern oil exporters also are increasing their potentiality towards current account surpluses since 1990s. Thus, many (Bernanke, 2005, Prasad et al., 2007, Carroll and Jeanne, 2009, Buera and Shin, 2009, Aguiar and Amador, 2011, Miller et al., 2011) observe that superfluous savings is uphilling from capital-scarce emerging and developing economies to the capital-abundant developed countries during the last two decades. This observed counterintuitive phenomenon widely revealed as 'Lucas Paradox'[1].

Many alternative theoretical models (Bussière et al., 2004, Obstfeld and Rogoff, 1996, Caballero et al., 2008, Edwards, 1996, Gourinchas and Jeanne, 2007) have given diverse forecast of the underlying determinants of current account imbalances. Some empirical studies (Debelle and Faruqee, 1996, Chinn and Prasad, 2003, Chinn and Ito, 2007, Lee, 2008) have tested these theoretical framework, either directly or indirectly to examine the determinants of current account balance. Since, most of the studies consider only developed

[1] Lucas (1990) stressed the failure of standard neoclassical growth models to explain the movement of international capital flows. In fact, neoclassical models forecast capital flows from rich to poor countries whilst Lucas Paradox accounts for the dynamics of current account imbalances and uphill capital flows.

and some emerging economies, which limit to capture the actual impact of potential current account determinants. Given this background, it is essential to find out the significant determinants using advanced technique and large sample which is rarely portrayed either in theory or empirical investigation. Thus, the determinants of global current account imbalance remain ambiguous in theoretical and empirical discussion. Hence, this research contributes a broad empirical characterization to analyze the determinants of global current account imbalances covering a large heterogeneous group of 106 countries under dynamic panel GMM framework.

The main reference comes from few empirical papers (Glick and Rogoff, 1995, Calderon et al., 2002, Chinn and Prasad, 2003, Gruber and Kamin, 2007, Chinn and Ito, 2007) on the determinants of current account balance from which I borrow the baseline information. Except others' I improve this work in two ways, first I use commodity price index, de-jure classification of capital openness and exchange rate stability index along with other commonly used determinants (e.g net foreign assets, real effective exchange rate, real GDP growth and trade openness), which better captures the determinants of global current account imbalances. Second, I employ the difference and system GMM estimation in a strongly balanced panel framework of 106 sample countries (among them 27 developed, 32 emerging and 47 developing economies) using enriched data from various sources over the time period 1980–2011.

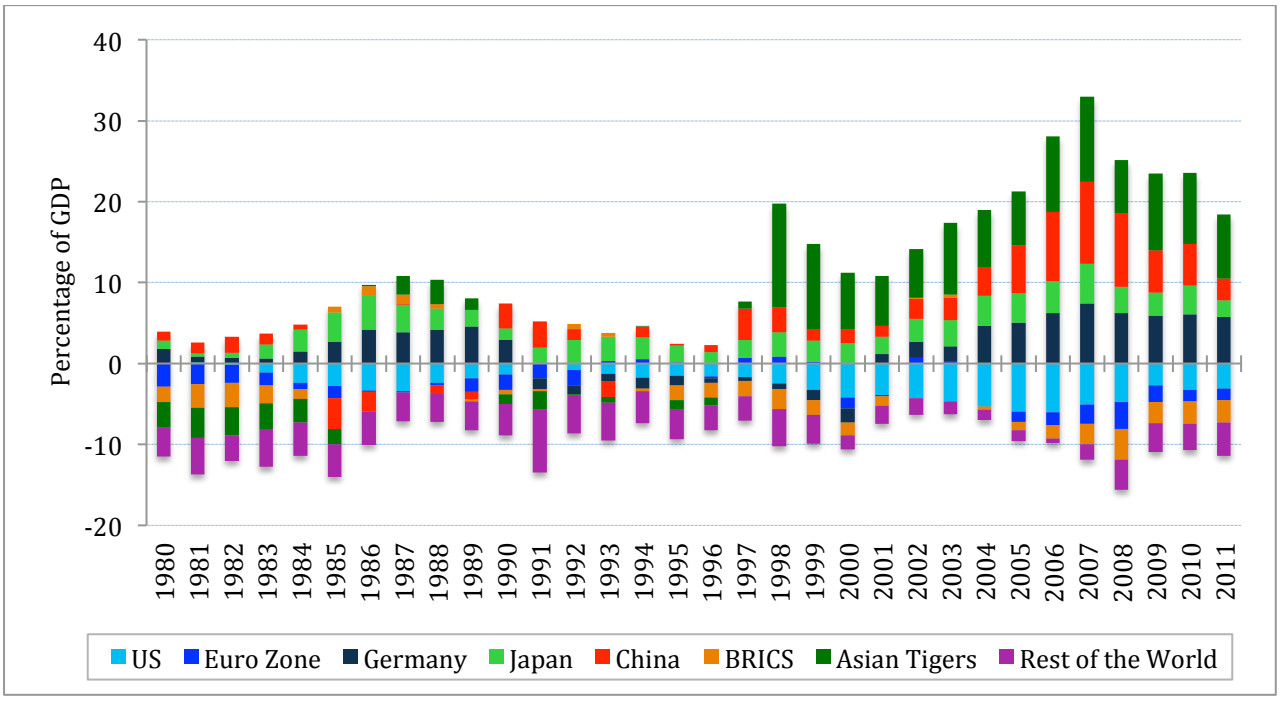
It is essential to emphasis at this point that I do not intent to revisit the previous finding in the current or capital account literatures. Instead, I draw on those finding only to obtain a reasonable set of additional explanatory and control variables along with commonly used determinants in literatures to find the determinants of global current account imbalances.

This research proceeds as follows. Section 2 lays out the empirical motivation. Section 3 contains a discussion of some theoretical and empirical literature. Section 4 describes data and descriptive statistics. Section 5 presents estimation techniques. Section 6 describes the results, while section 7 details the results of selected robustness checks. Finally, section 8 offers conclusion and direction for future research.

2 Empirical motivation

The first fact that motivates this analysis is the observation of global current account imbalance as emerging economies run current account surplus while developed economies widen their deficits. Figure 2.1 shows the global current account balance as percentage of GDP[2] considering different countries and groups i.e. Euro zone, BRICS, Asian tigers and so forth. I mainly observe that United States (US) and Euro-zone economies (excluding Germany) have run large and persistent current account deficit from 2000s. Where, China and other emerging economies are running high and persistent current account surpluses.

Figure 2.1: Current account balnce as a share of GDP



[Source: Author's calculation based on IMF-WEO 2012 and IMF- IFS 2012]

Note: The chart is based on the following country groups: **Euro Zone:** *Austria, Cyprus, France, Greece, Ireland, Italy, Malta, Netherlands, Portugal and Spain,* **BRICS:** *Brazil, India and South Africa,* **Asian Tigers:** *Indonesia, South Korea, Malaysia, Singapore and Thailand,* **Rest of the world:** *Angola, Antigua and Barbuda, Argentina, Australia, Bahrain, Bangladesh, Belize, Benin, Botswana, Bolivia, Burkina Faso, Burundi, Canada, Cameroon, Chile, Colombia, Cape Verde, Congo Republic, Costa Rica, Cote d'Ivoire, Denmark, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, Fiji, Finland, Gambia, Ghana, Grenada, Guinea-Bissau, Guatemala, Guyana, Honduras, Hungary, Iceland, India, Israel, Jamaica, Jordan, Kuwait, Kenya, Lesotho, Mauritius, Mexico, Morocco, Madagascar, Malawi, Mali, Mozambique, Nepal, Nicaragua, Nigeria, Niger, Oman, Panama, Poland, Pakistan, Peru, Philippines, Papua New Guinea, Paraguay, Rwanda, Senegal, Sierra Leone, Syria, Saudi Arabia, Sri Lanka,*

[2] GDP measures in current US $.

Sudan, Swaziland, Switzerland, Togo, Trinidad and Tobago, Turkey, Tunisia, Uganda, Uruguay, United Kingdom, Venezuela and Zambia.

Thus, it can be plausible that this disorder current account imbalance is carrying risk. As a result the uphill capital flows funding for current account deficit could be a big change of exchange rate with possibly global ramifications. Additionally, there is always a potential risk of huge trade imbalances that might force deficit economies twist to protectionist measures.

Accordingly to analyze the determinants of global current account imbalance, it's vital to check whether the trend of current account balance is persistent or not. While dealing with dynamism, if the current account is not persistent, the validity of the estimated result will be debatable. Although the implication of the current account has undergone through several tests, it is very difficult to draw a generalized conclusion about its sustainability because of the inconsistency in literature (Clower and Ito, 2011). Some studies reveal that some economies may hold unsustainable current account balance for the short term (Raybaudi et al., 2004, Taylor, 2002). Hence, the key attentions search through the persistency of current account balance prior to examine its determinants.

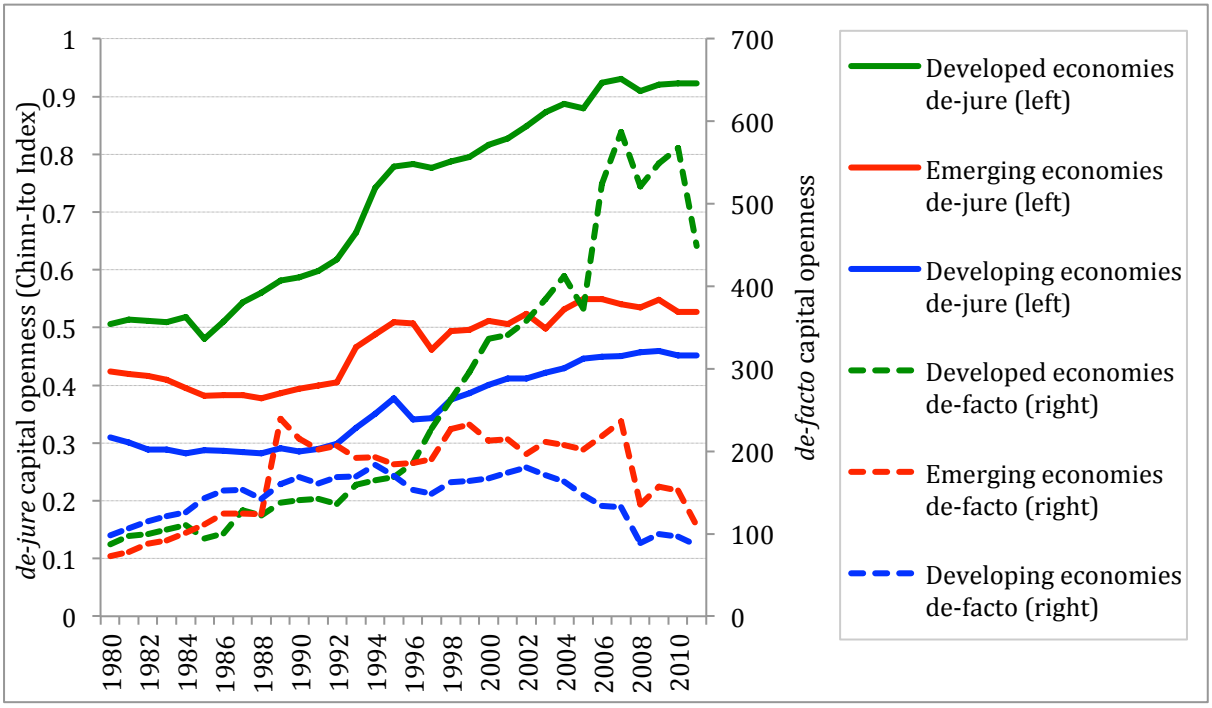
The second key observation induces this work that relates to the financial openness in perspectives of both *de-jure* and *de-facto* measures by considering Chinn and Ito (2008) index of the degree of capital openness as a *de-jure* measure. This index value is based on information regarding restrictions in the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* (*AREAER*), which is normalized between 0 and 1. Higher values of this index indicate that a country is more open to cross-border capital transactions.

As de-jure capital openness depicts how flexible the countries' law is, thus to get complete picturisation, I have also measured *de-facto* capital openness which indicates the sum of total foreign assets and total foreign liabilities over GDP multiplied by 100. The de-facto capital openness shows that how much the country is really open for the financial and macroeconomic integration.

Figure 2.2 exhibits the *de-jure* capital openness (in left axis) for the group of developed, emerging and developing economies. This index captures that developed economies have been more opened gradually last three decades, following emerging and developing

economies have also been started to more open after 1990s but not as fast as developed economies are. While in de-facto measures reflects that developed economies started closely as open as in *de-jure* measure in 2000s; whereas emerging and developing economies are not reflects practically as much as their de-jure measures are, because of most of the developing and emerging economies coupled with underdeveloped domestic financial markets.

Figure 2.2: *de-jure* and *de-facto* capital openness

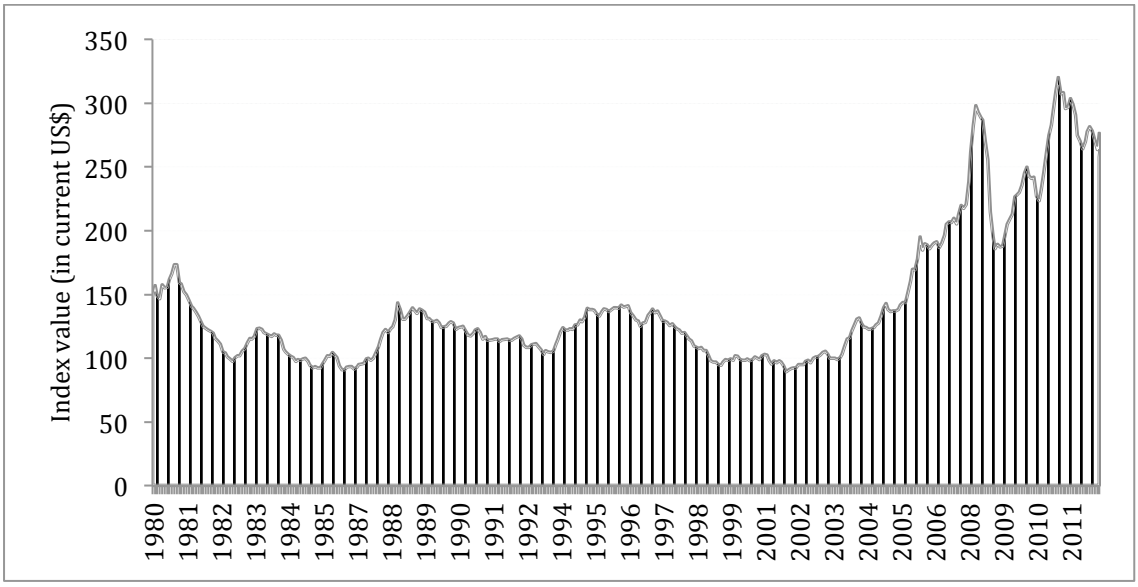


[Source: Author's calculation based on Chinn and Ito (2008), Lane and Milesi-Ferretti (2008) and IMF- IFS]

The third fact emerges from the issue of manufacture exporting developed countries and commodity exporting emerging and developing countries. The large volume of export from emerging and developing countries are increasing their aggregate savings and national income. Along with their cautious financial policy against Western exuberance in consumption and residential investment, a massive export earnings helps to boost up the current account surplus (Miller et al., 2011). Therefore, the commodity price might have an influence in balancing the current account imbalance. Hence, I constitute commodity price index by using an interaction dummy variable which is the multiplication of price indices of prime export items and commodity export dummy. In Figure 2.3, the commodity price index exhibits an upward trend after 2000s with an elevated pace of economic globalization. Although the trend got some sudden shock after global financial crisis in 2007-2008; the

price trend restored its peak position in 2010 again. Seemingly, the commodity price index trend assists the emerging and developing countries to hold a standard surplus whose current account transactions mainly dependent on commodity exports.

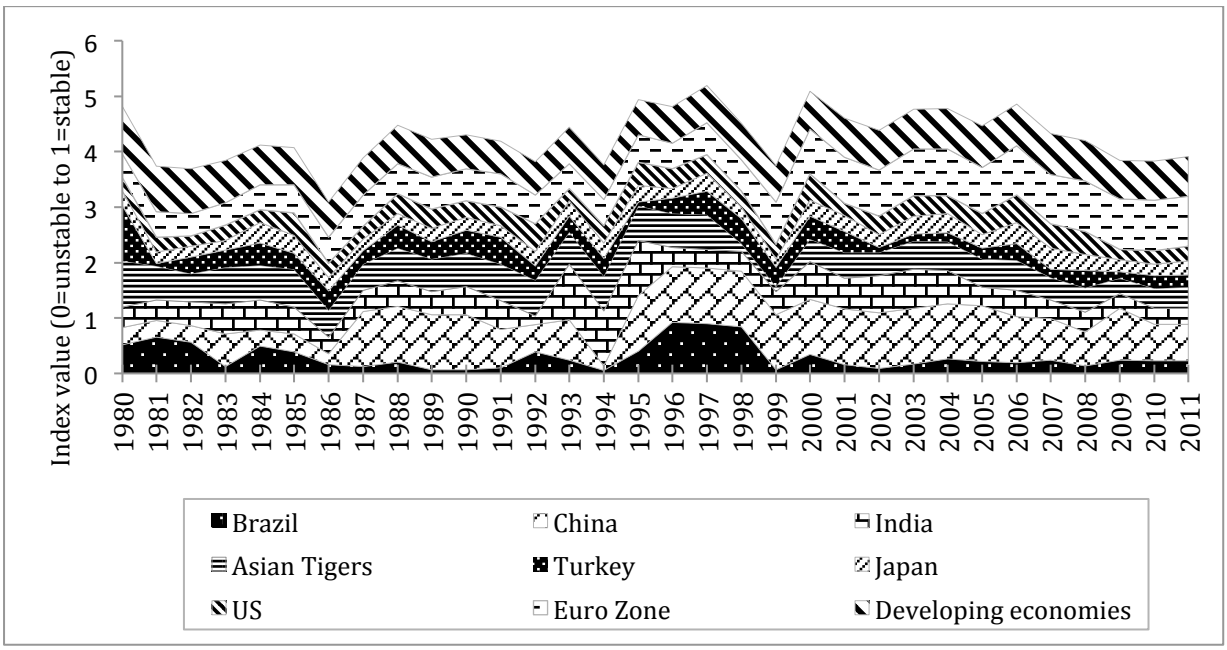
Figure 2.3: Commodity price index



[Source: Author's calculation based on UNCTAD 2012]

Finally, I also consider the fact of exchange rate stability as a determinant of current account imbalance. The index value calculates yearly standard deviation of monthly exchange rate between home and base country to measure exchange rate stability index (Aizenman et al., 2010).

Figure 2.4: The exchange rate stability index



[Source: Author's calculation based on Aizeman et. al., (2012)[3]]

The US is considered as the base country for emerging and developing economies and Germany is treated as base for EU countries. The index value is normalized between 0 and 1 by using the prescribed formula[4].

Figure 2.4 represents the exchange rate stability index of some individual and group of countries from 1980 to 2011. The lower bound of the exchange rate stability index indicates the instability and the upper bound indicates exchange rate stability.

3 Literature Review

The beginning of the global current account imbalance analysis dates back to Sachs (1981) through the intertemporal approach and follows up by Obstfeld and Rogoff (1984), Milesi-Ferrett and Razin (1996) and Maria Milesi-Ferretti and Razin (1998). The standard approach to this hypothesis focuses on the issue that current consumption is equal to the share of the present discounted value of future expected net output or net assets. Therefore, the change in current consumption is determined by either change in interest rate or future expectation of assets due to productivity shocks or reduced investment and government expenditure (Chinn et al., 2011). This model provides diversified channels of positive and negative income shocks, productivity shocks, and liquidity constraint for explaining current account determination (Obstfeld and Rogoff, 1996). Several empirical studies (Sheffrin and Woo, 1990, Milbourne and Otto, 1992, Otto and Voss, 1995, Bergin, 2006) have been focused on intertemporal approaches of global current account imbalances. They mainly observe the additional determinants that possibly will affect consumption and savings decision.

However, the origin of current account imbalance has been theoretically explicated in two basic views. The first view deems imbalance as an oscillating trend, which is better termed as 'disequilibrium approach'. The second view characterizes a completely reverse outlook that current account imbalance is an equilibrium situation in which the change in determinants can be self-sustaining, which is better termed as 'equilibrium approach'. Under the disequilibrium approach, Obstfeld and Rogoff (2005), (2010) emphasize the magnitude of depreciation and trade balance correction for the current imbalance. Some studies

[3] http://web.pdx.edu/~ito/trilemma_indexes.htm

[4] $ERS = 1/[1+\{\text{stdev (exch\_rate)}/d\log E_t/dt+0.01\}]$

(Gourinchas and Rey, 2007, Blanchard et al., 2005) dictate that real adjustment and financial adjustment are necessary for global financial or balance sheet correction because of the change in countries' net foreign asset positions. Since, net foreign asset position consists of the change in the price of foreign asset and liabilities and the current account balance.

As opposed to the disequilibrium approach, which emphasizes the current account, equilibrium approach highlights the capital account. On the issue of international asymmetries in the supply and demand of financial assets, Caballero et al. (2008) emphasizes that the financial underdevelopment of the emerging economies causes less attractive financial tools for the savers due to instable and volatile financial market. This financial underdevelopment and financial crisis including Mexico in 1994, East Asian countries in 1997, Brazil in 1999, Argentina in 2002 and Turkey in 2003 creates flow of US deficit, which is usually known as 'global saving glut' hypothesis (Bernanke, 2005, Clarida, 2005). Miller et al. (2011) discerns, after the financial crisis in the emerging countries, they adopted cautious financial policy whereas exuberance in consumption, housing and credit of the Western countries crafted the global imbalance severe.

Moreover, for investigating the ground of saving glut hypothesis, one should assess the financial and institutional development explaining the pattern of global current account imbalance. Using a structural model (Chinn and Ito, 2007) makes opposite stand to the lower savings rate after achieving the infrastructural and financial development in emerging market particularly in East Asia. Similarly Roubini and Mihm (2010) finds the massive saving in Asian emerging nations hardly been a causal factor for the current account imbalance. For the explanation and forecasting of the current account imbalance, the results are very sensitive to the different indicators of financial development such as bond, equity, insurance market activity, cost, size and activeness of the industry (Ito and Chinn, 2007). Additionally, on the ground of the stakeholder's behavior, irrational optimistic or pessimistic vision (Akerlof and Shiller, 2010), market imperfections because of asymmetries in information (Stiglitz, 2010) and rent seeking (Johnson and Kwak, 2010) causes financial distortion and paves the way to global current account imbalance.

A small number of researchers have highlighted the capital flows to emerging and developing countries underlying the 'push' and 'pull' factors (Calvo et al., 1993, Corbo and Hernandez, 1996, Fernandez-Arias and Montiel, 1996). While dealing with capital flow, one may need to consider current and capital account reversal. A large deficit indicating

temporary flow of investment with high productivity growth and profitability will have a different implication that the temporary deficit with high public consumption and currency overvaluation. Milesi-Ferretti and Razin (2000) analyzes the indicators that could forecast current account reversal and suggested to reduce current account deficit at least 3 to 5 percent of GDP over the time of 3 years. De Mello et al. (2010), (2011) claim that current account reversal has a long-term impact on the economic growth whereas other policy analyst (Abiad et al., 2009, Freund and Warnock, 2007, Debelle and Galati, 2007) treated it as short-lived phenomenon.

Chinn and Prasad (2003) emphases that instead of capital controls country's financial development is positively correlated with current account balance in developing countries. Contradicting this result, Cheung et al. (2010) and Mendoza et al. (2009) show that financial sector development measured by private credit ratio has a negative impact on current account balance. Such negative relation might arise from the fact that developed financial system and legal investment protection regulation may divert the capital flows into other countries with more liquid assets and competitive market (Bernanke, 2005, Ju and Wei, 2006). Similarly, Alfaro et al. (2008) confirms that domestic and international market imperfection, low institutional quality and weak governance structure in developing countries increase the investor's high risk of return. Thus capital is uphilling in the relatively more stable and developed financial system particularly in European and North American economies (Caballero et al., 2008). Besides, based on an empirical research of a panel of developing countries Calderon et al. (2002) reveals that high current account deficit tends to associate with output growth, terms of trade shock and currency appreciation. However, past global economic shocks such as Asian crisis, Latin American crisis and recent financial crisis reduce the investment levels (Reinhart and Rogoff, 2008, Chinn and Ito, 2007, Eichengreen, 2006).

From the above literature survey, it is obvious that various theory and empirical results produce heterogeneous predictions on the underlying determinants of current account imbalance which opens the avenue for further investigation. However, in the literature some important variables like commodity price, exchange rate stability are largely ignored as a determinant. Thus, the main objective of this research is to investigate considering these variables together with other important determinants supported by literature (Glick and

Rogoff, 1995, Chinn and Prasad, 2003, Chinn and Ito, 2007) employing advanced estimation techniques across different group of countries.

4 Data and descriptive statistics

I consider a strongly balanced panel of annual data for 106 countries over the period 1980-2011. The data set includes 27 high income industrial, 32 emerging and 47 developing countries around the world.[5] This constructed data set considers 8 potential current account imbalance determinants for the analysis. I assume that a subset of the fundamental along with the main variables is relevant and let the estimation techniques to determine which are the most important determinants in the global economy.

This research use data from various sources, including IMF Balance of Payment Statistics (BOPS), World Bank Development Indicators (WDI), United Nations Conference for Trade and Development (UNCTAD), IMF International Financial Statistics (IFS), Bank of International Settlements (BIS), Lane and Milesi-Ferretti (2008), Chinn and Ito (2012), PWT (2012), Laeven and Valencia (2012), Aizenman et al. (2012) and Darvas (2012).

For this panel dataset, I consider current account balance (is the sum of net exports of goods, services, net income, and net current transfers) as a share of Gross Domestic Product (GDP) as an dependent variable and the explanatory determinants used in this study are lagged dependent variable, real GDP growth rate, real effective exchange rate, commodity price index, net foreign assets as a share of GDP, trade openness, de-jure capital openness index and exchange rate stability index. Table 3.1 represents the summary statistics of the concerned variables.

Table 3.1: Summary statistics

Variable Description	Obs.	Mean	Std. Dev.	Min.	Max.
Current account balance (% of GDP)	3392	6.77	17.72	-62.43	134.47
Real GDP growth rate	3392	3.47	4.68	-48.81	50.69
Δ Real effective exchange rate	3392	0.41	18.80	-100	792.23
Commodity price index	3392	-0.46	0.79	-10.16	5.41
Net foreign assets (% of GDP)	3392	110.70	83.24	0	789.93
Trade openness	3392	58.59	38.89	4.95	394.48
de-jure capital openness (Chinn-Ito index)	3392	0.49	0.35	0.06	1

[5] See Appendix for detail sample countries lists.

Exchange rate stability index	3392	0.61	0.33	0.01	1

5 Estimation techniques

Considering the panel data, I would like to take into account the determinants of global current account imbalance in the global economy during 1980-2011. To estimate the corresponding model, firstly I employ the panel unit root test to reveal that whether a cointegration relationship is present in the current account balance for all countries during the sample period. Secondly, I use the dynamic Generalized Method of Moments (GMM) panel estimators.

5.1 Panel unit root test

This work starts with Panel unit root test for corresponding variables. Panel unit root test developed from time series unit root test. This development emphasized to combine the asymptotic characteristics of the time series dimension *T* and cross sectional dimension *N*. There are several procedures to analyze the panel unit root tests. Among these I use Levin-Lin-Chu test (LLC) and Im-Pesaran-Shin test (IPS) for this research.

5.1.1 Levin-Lin-Chu (LLC) test

One of the first panel unit root test formulated by Levin et al. (2002) suggest the following hypotheses for testing stationarity in panel data. Under null hypothesis, LLC shows that each time series contains a unit root i.e. $H_0 : \rho_i = 0 \ \forall \ i$ and for alternative hypothesis, each time series is stationary i.e. $H_0 : \rho_i = \rho < 0 \ \forall \ i$. Like other unit root tests in the literature, LLC assume that the individual processes in each cross-section are independent. The LLC test is mainly based on the estimation of the following equation.

$$\Delta y_{i,t} = \alpha_i + \delta_i t + \theta_t + \rho_i y_{i,t-1} + \varsigma_{i,t} \quad \text{where } i = 1,2,.....N, t = 1,2,.....T \qquad (1)$$

This test might be treated as a pooled Dickey-Fuller or Augmented Dickey-Fuller Test potentially with different time lag across the units of the panel.

5.1.2 Im-Pesaran-Shin (IPS) test

The IPS test formulated by Im et al. (2003) is the extension of LLC test incorporating

heterogeneity in the dataset under alternative hypothesis. Here IPS test estimation is also based on equation (1). The null hypothesis is stated as $H_0 : \rho_i = 0 \ \forall \ i$ against the alternative hypothesis of $H_A : \rho_i < 0$ where $i = 1,2,3.....N_1$; $\rho_i = 0$, $i = N_1 + 1, N_1 + 2.....N$. In IPS test it is presumed that all series is non-stationary under null hypothesis and a fraction of the series is stationary under alternative hypothesis. It is the difference with LLC, in which all series are supposed to be stationary under alternative hypothesis.

5.2 GMM estimators for dynamic panel models

I use the dynamic panel GMM estimators that were pioneered by Holtz-Eakin et al. (1988), Arellano and Bond (1991), Arellano and Bover (1995), Blundell and Bond (1998) and Bond et al. (2001). The panel consists of data from 106 countries over the time period 1980-2011. Since this research use yearly data, the panel permits 32 observations for each country. In dynamic framework, equation can be written in following specifications;

$$CAB_{i,t} = \alpha + \gamma_1 CAB_{i,t-1} + \beta^{'}[X]_{i,t} + \eta_i + \varepsilon_{i,t} \qquad (2)$$

Where CAB is the current account balance treated as a dependent variable and *X* represents the set of explanatory variables (Real GDP growth rate, Δ Real effective exchange rate, Commodity price index, Net foreign assets, Trade openness, *de-jure* capital openness (Chinn-Ito index), *de-facto* capital openness, Exchange rate stability index and Crisis dummy) other than the lagged current account balance. $\varepsilon_{i,t}$ is an independently distributed error term with $E[\varepsilon_{i,t}] = 0$ and the subscripts i and t denotes country and time period respectively. η_i is an unobserved country specific effects which are not correlated with $\varepsilon_{i,t}$. For $i = 1,.....N$ and $t = 2,....T$, where $(\eta_i + \varepsilon_{i,t})$ have the standard error component structure;

For Eq. (2), $E[\eta_i] = 0$, $E[\varepsilon_{i,t}] = 0$, $E[\varepsilon_{i,t}\eta_i] = 0$ for $i = 1,.....N$ and $t = 2,.....T$

Now, take the first difference to eliminate country specific effects of Eq. (3),

$$CAB_{i,t} - CAB_{i,t-1} = \alpha + \gamma_1 (CAB_{i,t-1} - CAB_{i,t-2}) + \beta^{'}[X_{i,t} - X_{i,t-1}] + (\varepsilon_{i,t} - \varepsilon_{i,t-1}) \qquad (3)$$

In the fact that Eq. (3), the lagged dependent variable $(CAB_{i,t} - CAB_{i,t-1})$ and are correlated with error term $(\varepsilon_{i,t} - \varepsilon_{i,t-1})$ which implies that the regressors are likely endogenous. Thus, I need to use instruments to deal with Eq. (3). According to econometric assumptions, the

error term is not serially correlated and the regressors are weakly exogenous[6]. Therefore, the dynamic panel GMM estimator employs the following moment conditions based on difference estimator for Eq. (2);

$$E[CAB_{i,t-s}(\varepsilon_{i,t}-\varepsilon_{i,t-1})]=0 \qquad \text{for} \quad t=3,.....T, \quad s\geq 2 \tag{4}$$

$$E[X_{i,t-s}(\varepsilon_{i,t}-\varepsilon_{i,t-1})]=0 \qquad \text{for} \quad t=3,.....T, \quad s\geq 2 \tag{5}$$

Which can be written in following matrix form as;

$$M=\begin{pmatrix} y_{i1} & 0 & 0 & \text{L} & 0 & \text{L} & 0 \\ 0 & y_{i1} & y_{i2} & \text{L} & 0 & \text{L} & 0 \\ \text{M} & \text{M} & \text{M} & \text{M} & \text{M} & \text{M} & \text{M} \\ 0 & 0 & 0 & \text{L} & y_{i1} & \text{L} & y_{i,T-2} \end{pmatrix}$$

Here, M is the instruments matrix corresponding to the endogenous variables, where $y_{i,t-s}$ refers to $CAB_{i,t-s}$ for Eq. (4).

However, the first differenced estimator is criticized in terms of bias and imprecision. Thus, to reduce potential biases and imprecision, Blundell and Bond (1998) suggest that, when regressors have short time period, I can use a new estimator that combines a system in the difference estimator with the estimator in levels, which is called the Blundell and Bond system GMM. The difference operator in Eq. uses the same instrument as above and the instruments for the levels are the lagged difference of the regressors. The econometric assumption here is that the difference in the regressors and the country specific effect are uncorrelated. Therefore the stationary properties are:

$E[CAB_{i,t+p}\eta_i]=E[CAB_{i,t+q}\eta_i]$ and $E[X_{i,t+p}\eta_i]=E[X_{i,t+q}\eta_i]$ $\forall p$ and q

The additional moment conditions for the levels are

$$E[\Delta CAB_{i,t-s}(\eta_i+\varepsilon_{i,t})]=0 \qquad \text{for} \quad s=1 \tag{6}$$

$$E[\Delta X_{i,t-s}(\eta_i+\varepsilon_{i,t})]=0 \qquad \text{for} \quad s=1 \tag{7}$$

Now I can use system GMM technique for both models to estimate consistent and efficient parameter by employing the moment conditions given in Eq. (4), (5), (6) and (7). To get more robustness of the result, I have also instrumented the net foreign assets and exchange rate stability index and *de-facto* capital openness to overcome the potential endogeneity which generates more consistent and efficient parameters.

[6] Assuming that the regressors are not correlated with future error terms.

Finally, to check the validity of the instruments in the system-GMM estimator, we implement two specification test, which is suggested by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998). First, the Sargan test of over-identification to check the validity of the instruments and second the Arellano-Bond test to check the hypothesis that error term is serially uncorrelated.

6 Results

This section presents the estimation results of our research, which aims to find the determinants of current account imbalances in the global economy. Firstly, check the stationarity of the panel dataset by using LLC and IPS unit root test. Later on estimate eq. (2) on the dataset described above by using difference and system GMM panel estimation. I also run Sargan and Arellano-Bond (AB) tests to check the validity of our model and subsequently discuss the robustness checks of our estimation results.

6.1 Panel unit root test results

The analysis begins with the panel unit root test using Levin-Lin-Chu (LLC) and Im-Pesaran-Shin (IPS) test. Table 6.1, reports the panel unit root test estimates for the potential determinants of current account imbalances in the sample of 106 countries. The test specification exhibits that in all series the null hypothesis is rejected. This implies that there is no conintegrated relationship because the current account balance is stationary series in panel countries during the sample period.

Table 6.1: Panel unit root test

Variables[7]	CAB (% of GDP)	Real GDP growth rate	Δ REER	NFA (% of GDP)	Openness of trade
Levin-Lin-Chu (LLC)	-11.06***	-30.62***	-32.64***	-5.19***	-10.50***
Im-Pesaran-Shin (IPS)	-8.61***	-31.09***	-32.43***	-3.19**	-7.15***

Note: *** significant at 1%, ** significant at 5%, * significant at 10%.

[7] Panel Unit root is not tested for Commodity Price index, De jure capital openness and Exchange rate stability index. These variables are containing either index or dummy (0 and 1) value, which is irrelevant for test in this respect.

6.2 Basic results: persistency

Table 6.2 shows the results of the different estimators for simple AR(2) regression of the current account balance to observe its persistency. As various theoretical frameworks confirm that if the dynamics of current account generates persistent stochastic shocks to the economy, it remains stationary around steady state which affects optimal intertemporal income-savings decision (Glick and Rogoff, 1995, Obstfeld and Rogoff, 1996, Trehan and Walsh, 1991, Aizenman, 2006). Considering this theoretical standpoints, various estimation techniques (presented in section 5) shows (in table 6.2) the coefficients of the lagged dependent variables are persistent as I expected and described in section 2.

Table 6.2: Persistency results (AR (2) process of current account balance)

	(1)	(2)	(3)	(4)
Lag 1. CAB (% of GDP)	0.535***	0.434***	0.382***	0.378***
	(0.0174)	(0.0179)	(0.004)	(0.0054)
Lag 2. CAB (% of GDP)	0.157***	0.065***	0.039***	0.024***
	(0.0172)	(0.0176)	(0.002)	(0.0017)
Observations	3,180	3,180	3,074	3,180
R-squared	0.42	0.47	--	--
Number of Country	106	106	106	106

Note: Dependent variable is Current account balance (% of GDP) (CAB). Standard errors in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. (1) Pooled OLS, (2) Fixed Effects (within group estimator), (3) Difference GMM (Arellano and Bond, 1991) and (4) System GMM (Blundell and Bond, 1998).

The estimators of the one year lagged current account balance add to 0.535 and two years lagged 0.157 for the Pooled OLS model in specification (1), 0.434 and 0.065 in the within groups (fixed effects) estimator of specification (2), 0.382 and 0.039 in the difference GMM estimation in specification (3) and 0.378 and 0.024 in the system GMM model in specification (4) respectively. These results provide the persistency of the dynamics of current account balance as I expected. Additionally various panel unit root tests (in table 6.1) confirmed that the current account balance (as a share of GDP) are stationary. With this viewpoint of persistent current account balance play a prominent role to capture the determinants of current account imbalance.

6.3 Dynamic panel GMM estimation results

According to the econometric assumptions, we know that the pooled OLS estimation is upward biased and the fixed effects model is downward biased (Baltagi, 2008). Thus, I consider difference GMM and system GMM techniques as an efficient estimator. Even though, using Monte Carlo experiments Blundell and Bond (1998), (2000) and Blundell et al. (2002) demonstrate that the difference GMM estimators of the lagged dependent variable are strongly downward biased. Thus, they suggests for the system GMM estimation, which is set between the upper bound of pooled OLS estimation and lower bound of fixed and difference GMM estimation. Thus, I consider both difference GMM and system GMM in our following specifications. Moreover, in each estimation, I check the validity of the additional instruments and moment restrictions in the system GMM model compare to the difference GMM estimation. Table 6.3 and 6.4 expose difference and system GMM estimation result of developed, emerging, developing and all countries specified in specification (1), (2), (3) and (4) respectively.

6.3.1 Difference GMM estimation

The dynamic panel difference GMM estimation result shows the effect of potential determinants on current account imbalance in specification (1) to (4). Table 6.3 presents the result using Arellano and Bond (1991) difference GMM estimators. These specifications consider current account balance (CAB) (% of GDP) as a dependent variable with a lagged dependent variable and set of other explanatory variables (Eq. 2). The coefficients of the lagged current account balance confirms the significance of including this variables in all specifications the effect is quite similar which means it has persistency as described earlier (section 5.2)

Column 1 of Table 5.3 presents the result from specification (1) containing the standard variables posited by literature and new determinants. It demonstrates the result for developed economies considering the relatively new determinant i.e. commodity price, exchange rate stability and *de-jure* capital openness along with the theoretically established determinants e.g. real GDP growth rate, real effective exchange rate, net foreign assets and trade openness. Each coefficient has expected sign and most of them are significantly

different from zero. The coefficient of lagged dependent variable shows that the current account deficit in developed economies is persistent.

The real GDP growth rate (-0.174) has a significant negative influence on current account balance. This implies that increasing real GDP growth will amplify developed country's higher income leading more consumption expenditure resulting negative impact on current account balance. This result is also confirmed by Glick and Rogoff (1995), Chinn and Prasad (2003), (Bussière et al., 2004) and Chinn and Ito (2007). Similarly, the real effective exchange rate is significantly negative, as expected, but is far smaller than unity (-0.019). This finding is supported by the previous works (Obstfeld and Rogoff, 1995, Herrmann and Jochem, 2005) which demonstrates that increase in REER will decrease country's savings. Because, it will appreciate the domestic currency thereby influence to purchase more important goods from abroad. Therefore, much spending on consumption will result in lowering savings ratio which leads to lessen current account balance.

Commodity price index (-0.003) has exerted a negative influence on current account balance as well. Since, developed economies are largely manufacture exporter and commodity importer, so, soaring of commodity price will increase the import value of commodity products which will widen the current account deficit. Albeit, the coefficient is insignificant and very tiny in value, its right expected sign creates an insight to include this indicator. While, the net foreign assets plots a positive relationship which reveals that developed countries have relatively large stock of net foreign assets will lead to large current account surplus. The coefficient estimated for trade openness impacts by 0.021. Alike, Chinn and Prasad (2003) and Chinn and Ito (2007) advocate the degree of openness to international trade could reflect tariff regime and other policy choice will positively effect on current account.

The coefficient of the de-jure capital openness captures negative impact (-0.32). As it is measured based on binary dummy which reflects cross-border financial transaction restriction i.e. multiple exchange rate, current account transaction, capital account transaction and so forth reported in IMF's AREAER (Chinn and Ito, 2008). Accordingly, the coefficient implies that countries are more open for capital and financial transaction would lead them a negative current account.

Exchange rate stability index in which value ranges from 0 (unstable) to 1 (stable) is measured by Aizeman et al. (2008). The estimator finds exchange rate stability effect of 3.17 with a 10 percent significance level on the current account balance, meaning that capital will inflow in relatively stable exchange rate regime. In support with Aizenman et al. (2008) this result also finds a positive link in terms of developed country's current account balance.

Table 6.3: Difference dynamic panel estimation results (Arellano and Bond 1991 difference GMM approach)

	(1) Developed	(2) Emerging	(3) Developing	(4) Full sample
Lag CAB (% of GDP)	0.752***	0.396***	0.602***	0.420***
	(0.0262)	(0.00605)	(0.0610)	(0.000702)
Real GDP growth rate	-0.174***	0.627***	-0.0485***	0.383***
	(0.0155)	(0.0490)	(0.0124)	(0.00214)
Δ REER	-0.0191***	-0.0457***	-0.000500	-0.000689
	(0.00584)	(0.00673)	(0.00105)	(0.000626)
Commodity price index	-0.00317	0.00999**	0.00717***	0.00894***
	(0.00381)	(0.00472)	(0.00189)	(0.000425)
Net foreign assets (% of GDP)	1.502	-8.069***	1.432**	-2.192***
	(1.612)	(1.817)	(0.582)	(0.100)
Openness of trade	0.0219*	0.0961***	0.00549**	0.0449***
	(0.0194)	(0.0200)	(0.00877)	(0.00177)
de-jure capital openness	-0.321	-2.576	-0.391	-1.558**
	(3.352)	(2.443)	(4.472)	(0.313)
Exchange rate stability index	2.171*	-1.171**	-1.177*	-1.767*
	(1.810)	(1.821)	(1.672)	(0.206)
Sargan test *(p-value)*	0.181	0.174	0.183	0.212
A-B test *AR(1) (p-value)*	0.042	0.021	0.001	0.003
A-B test *AR(2) (p-value)*	0.383	0.382	0.390	0.377
Observations	837	992	1,457	3,286
Number of countries	27	32	47	106

Note: Dependent variable is Current account balance (% of GDP) Standard errors in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%.

Specification (2) discloses the determinants of current account imbalance for emerging countries. The sign of the determinants are counterintuitive with developed economies. Unlike developed economies real GDP growth Rate and commodity price index have shown positive impact at a 1% significant level. As long as emerging economies are more cautious about their financial policy against Western exuberance in consumption and residential investment, massive export earnings helps to boost up the current account surplus (Miller et

al., 2011). Hence the higher real GDP growth is more likely to increase their savings with less growing consumption. So, the higher real GDP growth rate steers the path of current account surplus. One of the striking result carries from commodity price is the strong positive relationship with current account. However, the statistically significant coefficient captures a little positive impact. In fact, it gives a new message for current account since, emerging countries are primarily commodity exporters, thus increasing commodity price will rise their export opportunities to the overseas.

On the other hand, net foreign assets and exchange rate stability have statistically significant negative impact. Net foreign asset refers to total foreign assets minus total foreign liabilities, hence the negative coefficient weigh the countries having more foreign liabilities record negative income flows. Next emerging economies' exchange rate stability is measured by considering the US as base country and thus increasing exchange rate stability will not impact positively on emerging economies' current account because of volatile US exchange rate. This result is also validated by Aizeman et al. (2008) for emerging economies. Similarly, real effective exchange rate, trade openness and *de-jure* capital openness reflect the same magnitude on the current account likewise developed economies.

The results for the developing economies are shown in specification (3). The real GDP growth rate shows the similar negative impact at 1% significance level which also matches with the findings of Chinn and Prasad (2003). The coefficients of real effective exchange, net foreign asset de-jure capital openness, exchange rate stability are also followed by negative impact. This reports that high net foreign asset increase the foreign flows as a result from an intertemporal approach it supports the theory. Similarly the coefficient of the real effective exchange rate implies that increased REER will reduce the propensity to save and thus this cause a deficit current account balance. For exchange rate stability likewise emerging economies it measures US as a base country, therefore, volatility in exchange rate will lead negative impact even if developing economies' stable exchange rate. Nevertheless, the coefficient of commodity price enters positively in current account which supports with the findings in terms of developing countries. Alike, emerging economies, developing economies also primarily commodity exporter thus high commodity price accumulate high foreign earnings from export which helps to improve the current account balance.

Lastly, specification (4) shows the result of full sample countries taking into account the same determinants. The sign and value of coefficients are quite dissimilar in comparing with

different group of countries. The result compactly shows that real effective exchange rate, net foreign asset and *de-jure* capital openness and exchange rate stability are similar with emerging and developing economies. But real GDP growth rate has shown little positive impact which contradicts the findings of Chinn and Ito (2007) and Chinn and Prasad (2003).

However, to test the validity of the result I use both Sargan and Arellano Bond serial correlation test in all specifications. In Sargan test, the null hypothesis is not rejected which implies that the first difference instrumental variables are not correlated with error term. Hence the instruments are valid for the estimation. Subsequently, the Arellano Bond test supports that there is no serial correlation which entails the null hypothesis is that the errors in the first difference regression exhibit no second order serial correlation.

6.3.2 System GMM estimation

Table 6.4 gives the full results of system GMM estimation. This analysis conducts the same explanatory variable set as I have used in difference GMM technique. In addition, to get rid of the possible biases and imprecision associated with the difference GMM estimator, system GMM estimator combines the regression in difference with regression in levels. Under this system I have also instrumented the net foreign assets and exchange rate stability to overcome the potential endogeneity which generates consistent and efficient parameters. Both Sargan and Arellano-Bond test satisfy the validity of the instruments in the system GMM estimator.

The specification (1) to (4) has shown the coefficients are very close to those I obtain from the difference GMM estimator. For instance, commodity price index, real GDP growth, real effective exchange rate and trade openness have almost same coefficient for developed, emerging, developing and full samples as reported in the difference GMM result (Table 6.4), while net foreign assets, *de-jure* capital openness and exchange rate stability have comparatively large impact in the system dynamic panel GMM result reported in Table 6.4 (specification (1)-(4)). The sign and value of coefficients are quite similar in comparing with other specifications i.e. developed, emerging and developing. As noted earlier these coefficients suggest that the exogenous change in the determinants imply a large change in current account balance. Subsequently, the positive lagged dependent variable suggests the existence of significant dynamic effect on the current account balance.

To test the validity of the result, both Sargan and Arellano Bond serial correlation test use in all specifications. In Sargan test, the null hypothesis is not rejected which implies that the first difference instrumental variables are not correlated with error term. Hence the instruments are valid for the estimation. Subsequently, the Arellano Bond test supports that there is no serial correlation which entails the null hypothesis is that the errors in the first difference regression exhibit no second order serial correlation.

Table 6.4: System dynamic panel estimation results (Blundell and Bond 1998 system GMM approach)

	(1) Developed	(2) Emerging	(3) Developing	(4) Full sample
Lag CAB (% of GDP)	0.740***	0.407***	0.645***	0.414***
	(0.0445)	(0.00346)	(0.0135)	(0.000820)
Real GDP growth rate	-0.225***	0.819***	-0.0491***	0.471***
	(0.0181)	(0.0241)	(0.0158)	(0.00374)
Δ REER	-0.0155***	-0.103***	-0.00298**	-0.00807***
	(0.00597)	(0.00912)	(0.00146)	(0.000917)
Commodity price index	-0.00510	0.0139***	0.00899***	0.000149
	(0.00469)	(0.00414)	(0.00202)	(0.000483)
Net foreign assets (% of GDP)	2.893	-0.423	2.064***	-0.146**
	(1.957)	(0.538)	(0.715)	(0.0642)
Openness of trade	0.0422***	0.0363***	0.0112	0.0658***
	(0.0129)	(0.0113)	(0.00793)	(0.00253)
de-jure capital openness	-1.114	0.981	-4.499	-0.856*
	(3.749)	(2.139)	(4.094)	(0.153)
Exchange rate stability index	1.517*	-2.079**	-0.712*	-3.200***
	(1.084)	(1.294)	(1.369)	(0.230)
Sargan test *(p-value)*	0.231	0.185	0.217	0.280
A_B test *AR(1)*	0.056	0.021	0.000	0.014
A-B test *AR(2)*	0.483	0.458	0.478	0.479
Observations	837	992	1,457	3,286
Number of countries	27	32	47	106

Note: Dependent variable is Current account balance (% of GDP). Standard errors in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%.

In summary, I get the expected results which capture the some important determinants (commodity price, de-jure and de-facto capital openness and exchange rate stability) together with commonly used determinants in literature such as net foreign asset, real effective exchange rate, trade openness and real GDP growth of current account balance. Thus, this interesting result can be contributed to for the theoretical and policy implication of global current account imbalance.

7 Robustness

This section examines the robustness and sign of the results using adding different variables. For robustness check firstly, I have been include two additional variables (*de-facto* capital openness and Asian crisis dummy) instead of *de-jure* capital openness and net foreign assets. All robustness check specifications use the same dynamic panel GMM techniques (see section 5.2). The results obtained (Table 7.1 and 7.2) virtually identical those reported in specification (1)-(4) (Table 6.3 and 6.4). Furthermore, when I include *de-facto* capital openness and Asian crisis dummy and instrument *de-facto* capital openness; in both difference and system dynamic panel GMM estimates, I still find a highly significant relationship between the exogenous components of the determinants of current account balance with the unchanged sign.

Table 7.1: Robustness checks (Difference dynamic panel estimation)

	(1) Developed	(2) Emerging	(3) Developing	(4) Full sample
Lag CAB (% of GDP)	0.684***	0.384***	0.615***	0.404***
	(0.0395)	(0.00463)	(0.0310)	(0.000923)
Real GDP growth rate	-0.156***	0.661***	-0.0389***	0.366***
	(0.0232)	(0.0365)	(0.00992)	(0.00239)
Δ REER	-0.0157***	-0.0596***	-0.000823	-0.00260***
	(0.00469)	(0.00394)	(0.00106)	(0.000650)
Commodity price index	-0.00292	0.000495	0.00633***	0.00176***
	(0.00439)	(0.00458)	(0.00168)	(0.000424)
Openness of trade	0.00666	0.164***	0.00152	0.0726***
	(0.0105)	(0.0384)	(0.00647)	(0.00189)
de-facto capital openness	-0.000159	-0.00386***	-0.00348**	-0.00675**
	(0.000448)	(0.000342)	(0.00154)	(0.000200)
Exchange rate stability index	6.611**	-0.418	-0.0347	-2.405***
	(3.073)	(1.917)	(1.196)	(0.168)
Asian crisis dummy	12.25	-22.37*		0.855
	(7.649)	(12.63)		(1.114)
Sargan test *(p-value)*	0.121	0.191	0.214	0.192
A-B test *AR(1) (p-value)*	0.032	0.041	0.004	0.001
A-B test *AR(2) (p-value)*	0.483	0.482	0.490	0.477
Observations	837	992	1,457	3,286
Number of countries	27	32	47	106

Note: Dependent variable is Current account balance (% of GDP) Standard errors in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%.

In Table 7.1 and 7.2, I have replaced the net foreign assent and *de-jure* capital openness by Asian crisis dummy and *de-facto* capital openness. By doing so the effects of the contemporaneous determinants and lagged dependent variable are very similar for developed, emerging and developing economies group. Thus, the result confirms that there is no surprise change as I obtain in the main specifications in Table 6.3 and 6.4.

Table 7.2: Robustness checks (System dynamic panel estimation)

	(1) Developed	(2) Emerging	(3) Developing	(4) Full sample
Lag CAB (% of GDP)	0.798***	0.400***	0.639***	0.405***
	(0.0314)	(0.00700)	(0.0287)	(0.000614)
Real GDP growth rate	-0.215***	0.798***	-0.0275**	0.458***
	(0.0180)	(0.0336)	(0.0125)	(0.00441)
Δ REER	-0.0137***	-0.0908***	-0.00354**	-0.00762***
	(0.00403)	(0.0112)	(0.00170)	(0.00117)
Commodity price index	-0.00505	0.00916***	0.00722***	-0.00374***
	(0.00342)	(0.00354)	(0.00155)	(0.000574)
Openness of trade	-0.00366	0.0422***	-0.00283	0.0835***
	(0.0253)	(0.00796)	(0.00460)	(0.00238)
de-facto capital openness	0.000143	-0.00204***	-0.00437***	-0.00560***
	(0.000603)	(0.000115)	(0.00152)	(0.000148)
Exchange rate stability index	1.081	-4.948**	0.304	-2.937***
	(1.683)	(1.925)	(1.034)	(0.135)
Asian crisis dummy	10.54*	-2.253*		0.684
	(6.071)	(18.74)		(0.612)
Sargan test *(p-value)*	0.193	0.214	0.197	0.221
A-B test *AR(1) (p-value)*	0.024	0.011	0.007	0.004
A-B test *AR(2) (p-value)*	0.583	0.582	0.590	0.577
Observations	837	992	1,457	3,286
Number of countries	27	32	47	106

Note: Dependent variable is Current account balance (% of GDP) Standard errors in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%.

To sum up, all of global current account determinants (Real GDP growth rate, net foreign assets, commodity price index, real effective exchange rate, trade openness, exchange rate stability and financial openness) show the significant effect on current account balance. Besides, the specification tests (Sargan and Arellano-Bond test) supports the robustness check results. This implies that robustness results pass from endogeniety and serial

correlation bias. I therefore conclude that the estimated coefficients derived from the quantitative measures are robust.

8 Conclusion

The nature of current account imbalance, their importance and their potential path in the global economy have been taken a mainstream debate on the international macroeconomic outlook. This research examined the determinants of current account imbalance in global economy. I employed two econometric techniques to find the determinants empirically. The first, difference GMM dynamic panel and second, system GMM dynamic panel estimators. This study specially designed to deal with the key problems of the past literature of the global current account imbalance, for instance omitted variable bias, endogeneity and simultaneity bias containing that originated from unobserved country specific effects. As a robustness check I also used the same techniques with adjusted variables. The both results present the same story: the exogenous determinants have a strong impact on current account balance. In particular, current account balance has positive link with commodity price real GDP growth and trade openness in emerging economies, whereas negative link in developed economies. In contrast, it has a significant negative channel with net foreign assets, real effective exchange rate and exchange rate stability in terms of emerging economies, on the other hand positive channel with these variables except real effective exchange rate. However, to overcome endogeneity, simultaneity and omitted variable bias the specification tests (Sargan and Arellano-Bond) support the estimating results.

Finally, this research reveals the implication of incorporating new determinants such as commodity price, exchange rate stability and de-jure capital openness. Compacting this intuition, results support Chinn and Prasad (2003) and Chinn and ito (2007) analysis. Due to data limitation however I do not conduct the comprehensive evaluation of the net foreign asset and commodity price valuation, capital controls and international risk management, which is also very important to measure the global current account imbalance. Future work should considerably be widen and intense to understand the determinants in this context.

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Appendix:

Table A1: List of countries and sample years

Developed countries *(27 countries)*			
Countries			Sample Years
Australia	Iceland	Portugal	1980-2011
Austria	Ireland	Spain	1980-2011
Canada	Israel	Sweden	1980-2011
Cyprus	Italy	Switzerland	1980-2011
Denmark	Japan	Trinidad and Tobago	1980-2011
Finland	Korea, Rep.	United Kingdom	1980-2011
France	Malta	United States	1980-2011
Germany	Netherlands		
Greece	New Zealand		
Hungary	Norway		

Emerging countries *(32 countries)*			
Countries			Sample Years
Argentina	Jordan	Poland	1980-2011
Bahrain	Kuwait	Saudi Arabia	1980-2011
Bangladesh	Malaysia	Singapore	1980-2011
Botswana	Mauritius	South Africa	1980-2011
Brazil	Mexico	Sri Lanka	1980-2011
Chile	Morocco	Sudan	1980-2011
China	Nigeria	Thailand	1980-2011
Colombia	Oman	Turkey	1980-2011
Egypt	Pakistan	Tunisia	1980-2011
India	Peru	Venezuela	1980-2011
Indonesia	Philippines		

Developing countries *(47 countries)*			
Countries			Sample Years
Angola	Ethiopia	Nepal	1980-2011
Antigua and Barbuda	Fiji	Nicaragua	1980-2011
Belize	Gambia, The	Niger	1980-2011
Benin	Ghana	Panama	1980-2011
Bolivia	Grenada	Papua New Guinea	1980-2011
Burkina Faso	Guinea-Bissau	Paraguay	1980-2011
Burundi	Guatemala	Rwanda	1980-2011
Cameroon	Guyana	Senegal	1980-2011
Cape Verde	Honduras	Sierra Leone	1980-2011
Congo, Rep.	Jamaica	Syria	1980-2011
Costa Rica	Kenya	Swaziland	1980-2011
Cote d'Ivoire	Lesotho	Togo	1980-2011
Dominica	Madagascar	Uganda	1980-2011
Dominican Republic	Malawi	Uruguay	1980-2011
Ecuador	Mali	Zambia	1980-2011
El Salvador	Mozambique		1980-2011

Table A 2: Description of the variables and sources

Variable	Descriptions	Sources
Current account balance (% of GDP)	Current account balance is the sum of net exports of goods, services, net income, and net current transfers as a share of gross domestic product.	IMF-BOPS, IMF-WEO and WDI and own calculation
Real GDP growth rate (annual %)	Real GDP growth rate is a measure of the rate of change in GDP from one year to another.	UNCTAD
Δ Real effective exchange (annual %) (2005=100)	Real effective exchange rate is the nominal effective exchange rate (a measure of the value of a currency against a weighted average of several foreign currencies) divided by a price deflator or index of costs.	IMF-IFS, Z-D, BIS and own calculation
Commodity price index	Commodity price index considered as an interaction dummy variable that takes the average value of the prime exporting commodities of the respecting commodities exporting countries and 0 for the manufacturing countries.	UNCTAD and Own calculation
Net foreign assets/GDP	Net foreign assets measured by *total assets* minus *total liabilities* over GDP. Where *total assets* is the sum of foreign direct investment assets, portfolio equity assets, debt assets, financial derivatives assets and foreign exchange reserves excluding gold and *total liabilities* is the sum of foreign direct investment liabilities, portfolio equity liabilities, debt liabilities, financial derivatives liabilities.	L-M-F, IFS and own calculation
Trade openness	Trade openness is the sum of exports and imports measured as a share of gross domestic product.	WDI
De-jure capital openness (Chinn-Ito index)	*De jure* capital openness measured by Chinn and Ito (2008) based on information regarding restrictions in the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* (*AREAER*). The Chinn-Ito index is normalized between 0 and 1. Higher values of this index indicate that a country	C-I

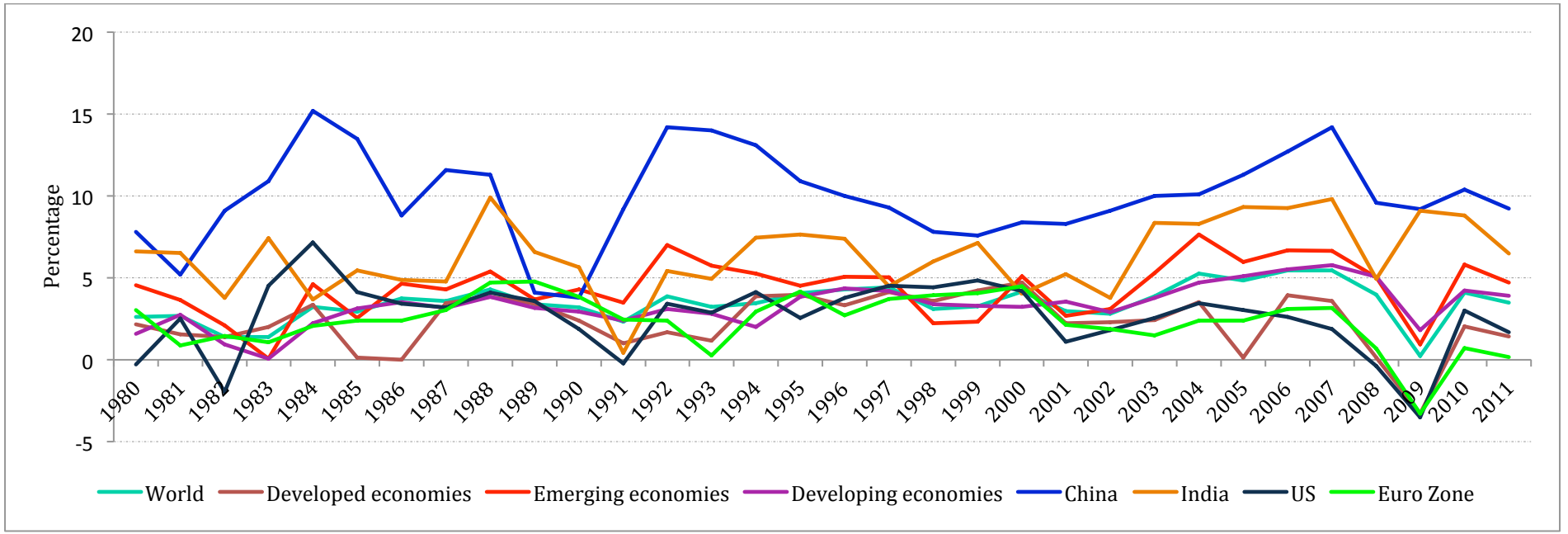
	is more open to cross-border capital transactions.	
De-facto capital openness	De facto capital openness measured by the sum of total foreign assets and total foreign liabilities over gross domestic product multiplied by 100.	L-M-F, IFS and Own calculation
Exchange rate stability index	To measure exchange rate stability (Aizenman et. al 2010) considers annual standard deviations of the monthly exchange rate between the home country and the base country are calculated and included in the following formula to normalize the index between 0 and 1: *ERS= 0.01/0.01+stdev(Δ(log(exchange rate)))* Higher values of this index indicate more stable movement of the exchange rate against the currency of the base country.	A-C-I
Crisis dummy	Crisis dummy considered as a dummy variable that takes the value of 1 during the years of banking, currency and Asian crisis happen and 0 otherwise.	L-V
Asian crisis dummy	Asian crisis dummy considered as a dummy variable that takes the value of 1 during the years of Asian crisis happen and 0 otherwise.	L-V

Note: ***IMF-BOPS*** is 2012 version of International Monetary Fund- Balance of Payment Statistics database, ***IMF-WEO*** is 2012 version of IMF World Economic Outlook database, ***IMF-IFS*** is 2012 version of IMF International Financial Statistics database and ***WDI*** is 2012 version of World Bank Development Indicators database , ***UNCTAD*** is 2012 version of United Nations Conference for Trade and Development, ***BIS*** is 2011 version of Bank of International Settlements, ***L-M-F*** is update and extended version of database constructed by Lane and Milesi-Ferretti (2008), ***C-I*** is updated and extended version of database constructed by Chinn and Ito (2012), Pen World Table 7.1 is 2012 updated version of database constructed by University of Pennsylvania, ***L-V*** is updated and extended version of dataset constructed by Laeven and Valencia (2012), ***A-C-I*** is updated and extended version of dataset constructed by Aizeman, Chinn and Ito (2012) and ***Z-D*** is 2012 version of dataset constructed by Zsolt Darvas (2012).

Table A3: Correlation matrix

Variables	CAB	RGDPG	ΔREER	COPI	NFA	TO	DjCOI	EXSI
Current account balance/GDP (CAB)	1.000							
Real GDP growth rate (RGDPG)	-0.058	1.000						
Δ Real effective exchange rate	-0.014	-0.016	1.000					
Commodity price index (COPI)	0.010	0.066	0.031	1.000				
Net foreign assets/GDP (NFA)	0.181	0.075	-0.027	-0.056	1.000			
Trade openness (TO)	-0.047	0.098	-0.009	0.011	0.071	1.000		
de-jure capital openness (DjCOI)	0.142	-0.025	-0.011	-0.149	0.314	0.173	1.000	
Exchange rate stability index (EXSI)	-0.157	0.052	0.044	0.074	0.020	0.146	0.025	1.000

A 4: Real GDP growth rate



[Source: Author's calculation use IMF-IFS 2012]