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THE ROLE OF CAPITAL CONTROLS IN MEDIATING GLOBAL SHOCKS

Master's Thesis

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I have written this Master's thesis independently. All viewpoints of other authors, literary sources and data from elsewhere used for writing this paper have been referenced.

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Abstract

This paper studies the role of capital controls in the transmission of global commodity price shocks in explaining domestic business cycles variance in 89 countries for the period 1995–2013. The results suggest that relatively closed and open countries have lower variance in output, consumption and investments explained by global shocks than those countries who have partially liberalised capital markets. On the contrary, relatively closed and open economies have a much higher share of the trade balance to output ratio volatility explained than partially liberalized countries. Although this pattern does not depend on the level of economic development or geographical regions, within groups the share explained by global shocks varies and statistical significance of the differences is rather weak. The results show that partial liberalisation of the capital account might make countries more vulnerable to world shocks, than opening and closing the capital account completely.

Keywords: World Shocks, Capital Controls, Capital Account Liberalisation

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1. Introduction

Discussion about imposing capital control has been re-opened since the Great Recession. After a period of strong move against financial market liberalisation when controls were argued to limit the economic progress and efficiency, they are again considered to be a useful policy tool. Capital controls can help to stabilise the domestic economy against world shocks, and are seen as a protective measure, especially against large capital inflows generating booms as well as outflows during the crises. Therefore, the understanding of the international environment and the effects of different control mechanisms are essential for policymakers to integrate the expected impact that world shocks have on domestic economy to the monetary and fiscal policy decisions.

This thesis investigates the role of capital controls in the transmission mechanism process from world commodity price shocks to domestic business cycles. More specifically, I concentrate on the prices of agricultural commodities, metals and minerals, and fuels, to analyse their effect on macroeconomic variables like output, consumption, investment and trade balance to output ratio. Commodity markets are a prime example of international trade and prices reflect the developments in the world economy. Dividing sample countries into three capital control categories gives a possibility to track differences in the financial liberalisation and draw comparisons between countries with more open capital and closed capital accounts. Furthermore, studying the results in different categories like income groups, commodity and trade net exporters and importers, allows to determine the possible patterns of capital controls in explaining the world shocks in domestic markets. Before the analysis I set the following hypotheses coming from macroeconomic theory (Obstfeld and Rogoff 1996), that opening capital accounts should: increase output volatility, decrease the volatility of consumption thorough higher consumption smoothing, raise investment volatility and make trade balance more unstable. The share of volatility created by world should increase as countries open up their capital accounts. From a theoretical perspective, higher degree of capital mobility is expected to enhance specialisation in goods that countries have comparative advantage. This makes output more volatile, as well as investment, because opening capital accounts provides better investment opportunities, allowing diversify country-specific productivity shocks. In closed economies output fluctuations have an immediate effect on consumption, while opening capital accounts gives a country the possibility to smooth its consumption by using the capital from international markets (Razin and Rose 1992).

The closest paper to the thesis is Fernandez, Schmitt-Grohe and Uribe (2016) who analyse the shares of variances that global shocks generate in domestic business cycles.

The novelty of the paper is to combine two controversial issues and investigate the role capital controls play in mediating the effects of global shocks to domestic business cycles through commodity prices. Previously, the papers have not considered capital controls in the transmission process of world shocks, neither have they looked at capital account liberalisation from the perspective of global shocks. Therefore, the aim of this thesis is to analyse the extent to which multiple commodity prices mediate the effects of global shocks to domestic business cycles. Paper uses the International Monetary Fund's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) capital control indices. The paper divides countries into three categories based on Klein (2012): Open, Gate and Wall. This allows to investigate the connection between financial liberalisation and the transmission of global shocks.

Several findings emerge from this paper. Firstly, the main conclusion of this paper is that capital controls have a role in mediating global shocks to domestic business cycles The shares of output variances explained by global shocks in countries with strong capital control are smaller than in countries, who have liberalised their capital accounts either partly or fully. However, the relationship is not linear, Gate countries, who have partially liberalised their financial markets, are the most influenced by international shocks in output.

Second, the closed Wall group manages to protect from consumption volatility generated by world shocks only to a certain extent. Partly liberalised countries are effected the most, as the share of variance coming from the world fluctuations is the largest.

Third, contrary to expected results, the share of world shocks explaining trade balance volatility is the highest in the Wall group that should be in theory be more protected from world shocks. Moreover also the absolute volatility of the trade balance is the highest in the Wall group.

Fourth result of this paper is that among both commodity and oil exporting countries, world shocks explain almost two times more of the variance in business cycles in output and consumption, whereas in Open countries world shocks explain higher share of variance in trade balance to output ratio.

Lastly, the data shows clearly that capital controls are used more in countries that have lower income and are still considered as developing countries. This is supported by earlier results in which literature suggests that countries with lower income levels should liberalise their capital accounts after reaching a certain level of institutional and financial development, therefore it makes sense, that capital controls are still in place among lower income groups.

The identification of the effect relies on the assumption that the extent of capital controls introduced is exogenous to the business cycle developments and to the share of world shocks explaining domestic variables. It is possible that only the countries that are not sensitive to world shocks open up their capital accounts completely and therefore self-select in the Open group. Partly the results that Wall countries are relatively more volatile than Gate and Open countries could reflect it, but analysis by different level of development and various grou5ps shows main results are not sensitive to observable differences. Financial market liberalisation was strongly suggested to all countries by the International Monetary Fund, alleviating the concerns that countries self-selected to liberalise. Also many papers have shown that capital controls are exogenously decided and do not depend on the business cycle (IMF 2012).

Earlier literature has found that world interest rate and terms of trade shocks are the main drivers of business cycles in small open economies. For example Lubik and Teo (2005) found out that world interest rate and terms of trade shocks constitute together a wide range - from 10% to 90% - of output fluctuation. Whereas Blankenau *et al*. (2001) estimate the share to be much smaller, saying that around one third of changes in output are explained by world interest rate. The estimates differ so vastly because of the method, dynamic stochastic general equilibrium (DSGE) methods tend to have bigger intervals, whereas vector autoregression (VAR) models give more exact answers. Cross and Nquyen (2016) focus the effect of global oil price shocks and found that the impacts on China's output are small and temporary.

Similarly, there are different views on capital controls, economists have even used different measures of capital controls to study capital accounts. Some rely on International Monetary Fund's (IMF) Annual Report in Exchange Arrangements and Exchange Restrictions (AREAER), the others construct their own indicator. Calderon *et al.* (2005) concluded after studying the relationship between international integration and country's external vulnerability, that opening capital accounts promises higher growth and the effect is even stronger when the financial system is stable. Also Klein and Olivei (1999) find the positive effect of financial liberalisation only among industrialised countries. There are also

researchers that find little evidence in favour of financially open countries having higher growth prospects (Stiglitz 2000, Rodrik 1998, Kraay 1998). They even do not support the arguments that the institutional background of a country helps to realise more beneficial effects to a country.

The paper is structured as followed. Section 2 gives an overview of the relevant literature. Section 3 introduces the method used for analysing, whereas section 4 describes the data. Section 5 shows and discusses the results of the analysis, while section 6 concludes and summarizes the paper.

2. Literature review

This section gives a short summary of the literature to place the paper in broader context and help to understand the results. As the paper discusses the role of capital controls in mediating the effects of global macroeconomic shocks to domestic business cycles, the literature review describes the possible transmission channels of world shocks to domestic economies and analyses the role and essence of capital controls. I will first give a general overview of the literature on the importance international transmission of shocks and continue with papers that study the role of capital controls and the positive and negative effects of capital account liberalisation on the economy.

2.1. International transmission of shocks

Earlier papers have been trying to find out the main drivers of business cycles for years and the list of driving forces grows, including for example productivity shocks, shocks to terms of trade and to preferences, monetary and fiscal shocks or commodity price shocks. Estimating the contribution of the shocks to domestic business cycles has made a lot of researchers believe, that the main drivers are terms of trade and interest rate shocks, whereas the exact contribution of the shock varies strongly across different studies and even depends on the econometrical method used conducting a survey. The most used econometrical methods for analysing the effects of international shocks to domestic business cycles are DSGE, VAR together with its different extensions, for example structural VAR (SVAR[1]) or factor augmented VAR (FAVAR) or even the combination between VAR and DSGE.

Mendoza (1991) conducted the first survey using a calibrated DSGE model to study the Canada's business cycle regularities from 1946 to 1985, where he concluded that exogenous shocks follow the fluctuations in productivity or terms of trade. The latter one was pointed out as an appealing topic for future research, as this model gives a framework for the studying the business cycles arising from terms of trade shocks. Mendoza (1995) himself focused on the relationship between terms of trade and business cycles in seven largest industrialised countries (G7) from 1995 until 1990 and 23 developing countries between 1960 and 1990. There the model captures the transmission mechanisms of terms of trade shocks through international capital mobility, overall purchasing power of exports and the cost of imported inputs, Mendoza (1995) concludes that the terms of trade shocks are persistent, weakly

[1] SVAR – Structural vector autoregression method by adding economic restriction to an otherwise statistical modelling method in order to identify the exact sources for macroeconomic fluctuations proposed by Blanchard and Quah (1989)

procyclical and account for about half of the observed variability of GDP and real exchange rate.

Kose and Riezman (1999) came to same conclusion among developing countries. After constructing a DSGE model reflecting the structural characteristics of a 20 non-oil exporting African countries from 1970 to 1990, they found out that almost 45% of the fluctuations in aggregate GDP is explained by trade shocks, whereas financial shocks only play a minor role and world interest rate fluctuations have no significant impact on economic dynamics. On the contrast, Blankenau *et al.* (2001) show using DSGE models based on Canadian dataset from 1960–1996 that world interest rate shocks have an important role in explaining up to one-third of the changes in GDP.

These papers obtained very different results – both, terms of trade and world interest rate shocks can account for varying amounts of the fluctuations in small open economies. This gave motivation to Lubik and Teo (2005) to use Bayesian methods to estimate DSGE models in 5 countries with different background – Australia (1978–2004), Canada (1981–2004), New Zealand (1987–2004), Mexico and Chile (both 1996–2004). They found that world interest rate shocks are the main driving sources of business cycles in small open economies, the mean levels of contribution of world interest rate shocks to output fluctuations range from 40% to 75%, whereas terms of trade shocks have very small contribution, explaining less than 3% of output movements.

Hoffmaister and Roldos (1997) approach to this topic by using SVAR method. They found that from 1970 to 1991 the terms of trade shocks explained around 7% of the fluctuations in output among 15 Asian and 17 Latin American countries. In history the macroeconomic fluctuations in developing countries are similar, especially between Latin America and Sub-Saharan Africa. Therefore, Hoffmaister *et al.* (1998) used the same method in estimating the effect of trade shock on 23 countries from Sub-Saharan Africa from 1971 to 1993 and found the terms of trade shock is estimated to explain a slightly higher share, 16% of the fluctuations in output. In analysing the differences with Mendoza's (1991) findings, they explained that the vast differences can come from the fact that Mendoza does not allow for domestic demand shocks and world interest rate shocks, which makes terms of trade shock to pick up also the effect of these shocks, especially world interest rates (Hoffmaister, Roldos 1997).

Changes in the prices of different commodities, like oil or food, can also affect heavily domestic business cycles. Cross and Nguyen (2016) study the effect of global oil price shocks

on China's output over the data period from 1992 to 2015 and find in their analysis using VAR that the impacts of intertemporal global oil price shocks on China's output are small and temporary. Oil supply together with specific oil demand shock generally produce negative movements in Chinas GDP growth whilst oil demand shocks tend to have positive effects. Rapsomanikis and Mugera (2011) focus on the changes in food prices in developing markets (Ethiopia, India and Malawi), their results point out that short-run adjustment to world price changes in incomplete while volatility spill overs are significant only during periods of extreme world market volatility, but this extreme volatility is due to domestic, rather than world market shocks.

During last decades the factor augmented VAR (FAVAR) has been used in many studies that concentrate on especially the effect that monetary policy has on the economy. FAVAR is not limited by restricted set of variables, allowing to use a broader set of variables that policy makers and researchers are interest in and makes it possible to trace back the effects of global developments on different macroeconomic variables as it takes into account the additional information that central banks and private sector have. Moreover it allows to use less arbitrary measures like employment level instead of measures of real variables. (Bernanke *et al*. 2004)

When SVAR and DSGE tend to be more used on developing countries, then FAVAR approach allows for larger information set making it more suitable to use among developed countries to describe what kind of impact do different monetary policy measures have on overall economy. As in this paper I concentrate on the role of capital control through commodity price shocks, the only short summary of monetary policies is made. For example Lagana and Mountford (2005) follow Bernanke *et al.* (2005) in also applying Stock and Watson (2002) two step principal component approach to monetary policy in a balanced panel containing 105 monthly observations for the UK from 1992 to 2003 covering 10 categories (employment; government finance; consumer and retail confidence; money and loans; interest rates; stock prices etc.). They show that the UK is affected by the changes in foreign interest rates and their results show clearly that using FAVAR method with different possible factors generates models with better prediction qualities and provide a reasonable explanation to unexpected increases in interest rates and how to get rid of price puzzle[2]

[2] Price puzzle – the initial positive response of prices to contractionary monetary policy shock. The term first used by Eichenbaum (1992) in a commentary on "Macroeconomic and reality" by Sims (1980), a study on the effects of monetary policy in several countries. Often referred to as "puzzling" because macroeconomic models are having troubles to explain it theoretically or, even when capable of explaining it in principle, as they do not produce a positive price response empirically.

problem. Vasishtha and Maier (2013) conduct a similar study based on Canadian dataset from 1985 to 2008. Their results indicate that shock to global interest rates and global inflation do not affect Canada as much as in the UK. Canada is more influenced by the shock to foreign activity or commodity prices, which tend to lower the economic activity and hurt the demand for Canadian exports.

Lombardi *et al.* (2012) studied more specifically the relationship between non-energy commodity prices (metals and food) and different macroeconomic variables. After estimating FAVAR they found out that exchange rates and economic activity affect individual non-energy commodity prices, but they cannot find an effect from interest rate. Additionally, the individual commodity prices are affected by common trends that the food and metals factors successfully captured.

This sub-chapter gave an overview of different international shocks transmission mechanism, showing that the results vary heavily. As the many focus of this paper is to find out the role of capital controls, then an overview of them is given next.

2.2. Capital Controls

Organization for Economic Co-Operation and Development (OECD) defines in its Code of Liberalization of Capital Movements (2009) capital controls as "rules, taxes or fees associated with financial transaction that discriminate between domestic residents and those outside the country". They can be divided into two sets of measures: administrative or market-based measures. The last on includes taxes on cross-border capital transactions; an unremunerated reserve requirement and a differential bank reserve requirements for resident and non-resident accounts. Whereas administrative controls consist of outright prohibitions and limits on foreign borrowing or lending and requires primary government approval for international capital transactions. (Klein 2012)

Throughout the history, the attitude towards capital controls has been shaped by different events in global economy and capital markets that made countries to impose capital controls. Capital controls were broadly introduced with Bretton Woods after the World War in 1944 to build up a stable financial system. Then capital controls were destabilizing and countries could not have free capital mobility and free trade in goods at the same time. (Ghosh ad Quereshi 2016) Already in the late 1970s and 1980s, when the economy had stabilised, then

countries started to eliminate capital controls. For example in the 1990s capital controls towards emerging countries were seen as undesirable as they distort the international allocation of capital. Already at the turn of the century several financial and exchange-rate crises made economists and policy makers blame free capital mobility as the reason for real-exchange-rate overvaluation or over-borrowing etc. As a result some countries that had liberalised their capital accounts started to re-introduce capital controls. That kind of behaviour accelerated after the onset of Great Recession, when both advanced economies (Ireland, Iceland) and emerging markets (Brazil, Turkey and Peru) imposed capital controls. Governments saw capital account closing as a protective measure against inflow-fuelled exchange rate appreciating and potentially destabilizing asset price booms. (Klein 2012)

All this led many economists to rethink the pains and gains of financial liberalisation, but the topic remained controversial and divides the economists and policy makers still into two parts – in favour and against capital account liberalisation as empirical analysis has yet failed to yield conclusive results. Magud *et al.* (2011) draw out that the situation is made worse by the fact that capital controls' literature does not have common grounds and unified theoretical framework that helps to analyse the macroeconomic consequences of financial liberalisation as well as compare different the results of different empirical studies.

There are a large number of different indicators and indices that measure the capital account openness of a country. The first measures of financial integrations were mainly compiled on the basis of AREAR, which is a report published by IMF gathering the rules and regulations to govern current and capital transaction as well as the proceedings arising from them between residents and non-residents (Quinn *et al.* 2011). Epstein and Schor (1992) developed the first indicators of capital controls by converting AREAER into binary variable. Johnston and Tamirisa (1998) included different asset categories and the type of investor to the analysis that allowed them to construct Financial Openness Index (FOI). This is a cumulative total of binary scores of 13 categories distinguishing between inflows and outflows, but fails to distinguish between capital inflows and outflows. Miniane (2004) altered the capital control index in order to track world trends towards greater capital account openness. He points out that capital controls should control capital movement and explain how economic shocks influence local markets, while taking into account the channels through which they come. In other words, Miniane divided capital flows between inflows and outflows to understand where they come from. Chinn and Ito (2008) covered 181 countries from 1970 to 2005 and

created an index to measure the extent and intensity of openness in capital account transactions to quantify capital controls (KAOPEN). They assigned four dummy variables from AREAER that indicate, whether there are multiple exchange rates present; restrictions on current or capital account transactions and if the requirement of the surrender of export proceeds is imposed. This makes KAOPEN a standardised indicator over four AREAER table variables, where higher scores indicate greater openness.

Magud *et al.* (2011) focused on the comparability of different studies about capital controls and after standardising the results of more than 30 empirical studies, they constructed two indices of capital controls: Capital Control Effectiveness Index (CCE), and Weighted Capital Control Effectiveness Index (WCCE). In order to assign values to the results of the papers, they asked these following questions, that the capital controls are expected to achieve:

- Are capital controls able to reduce the volume of capital flows?
- Do they alter the composition of capital flow toward longer maturity flows?
- Do they reduce real exchange rate pressures?
- Are capital controls able to allow for a more independent monetary policy?

If the answer to the question was positive, then the corresponding value was 1 and in case of negative value was –1. If the paper did not address to the issue, then the corresponding value was 0. After conducting and summarizing the indices, Magud *et al.* (2011) found that capital controls on inflows make monetary policy more independent and reduce real exchange rate pressures.

As in this paper, I have the core focus on the role of capital controls in the process, where commodity prices transfer global shocks to domestic business cycles. Therefore, it is more relevant to give an overview of the effects of financial liberalisation and macroeconomic performance.

Calderon *et al.* (2005) studies the relationship between international integration and country's external vulnerability and concluded that financial openness does not harm the economic growth of a country. Based on 76 countries covering the period from 1970 to 2000, they find out that there is no evidence that neither trade nor financial openness causes a decline in economic growth. On the contrary, there is a positive effect between opening capital account and higher growth, which increases with the development level of a country. Similarly, they found no evidence that higher degree of financial openness also increases

growth volatility, but their study supported the fact, that if the country's financial system is stable, then financial openness can even decrease the growth volatility.

Additionally, Klein and Olivei (1999) find that capital account liberalisation promotes growth among industrialised countries, but they cannot find supportive evidence on positive effect among developing countries. They analyse 20 OECD and 18 non-OECD countries over the period of 1986 to 1995 doing two steps: first they focus on the effect of capital account liberalisation on financial development and then they consider the effect of financial development on the overall growth. These findings suggest that capital account liberalisation can only be beneficial if there is strong institutional background and sound macroeconomic policies. Similarly, Prasad *et al.* (2013) were not able to conclude that there are strong empirical connections between financial globalisation, macroeconomic volatility and growth, but they did stress, that making the solid institutional grounds for financial liberalisation can help to put a country into better position to benefit from financial globalisation. Moreover, Bekaert *et al.* (2005) stressed that countries with better legal system, good institutions, favourable conditions for foreign investment, and investor protection generate larger growth effects.

On the contrary, there are a lot of economists who somehow follow Stiglitz (2000), who has stated "there is no compelling case for capital market liberalisation, as there is no compelling case against market liberalisation". Meaning they do not support the view that financial openness also enhances country's growth, but at the same time have failed to provide evidence stating that financial openness has negative effect on country's economy. Kraay (1998) finds that there is little evidence suggesting that financially open countries have higher volatility of capital flows. He also considers the possible reason behind the outcome, that there are no results and concludes that existing measures of capital account liberalisation and supportive policies. Rodrik (1998) studies the possible relationship investments and capital controls and he concludes that there are not even evidence in support of the fact that capital account liberalisation in countries with stronger public institutions.

In summary, the studies concerning capital controls carry different results because there is no common ground how to approach this issue and different researchers use even different measurements of capital controls. Still none of the papers find negative relationship between financial liberalisation and economic growth, but positive or no relationship at all.

3. Method

In empirical part of the master thesis to estimate the shares of variances transferred to domestic business cycles through commodity prices, I use the same approach, data and code as Fernandez, Schmitt-Grohe and Uribe (2016)[3]. In order to analyse the role of capital controls, I restrict the dataset with capital controls and divide it to different subset to study the relationships more thoroughly.

As the focus of the thesis is on the role of capital controls, then the method has been adjusted to have applicable results under the hypothesis raised in this work. The capital control indices were gathered by Schindler in 2009 and are based on the annual analysis report AREAER compiled by IMF that distinguishes capital controls using three factors gathered in Table 1.

Table 1. Asset and Transaction Categories for Capital Control Measures

Assets that Each Include Four Transaction Categories		
mm	Money market (Bonds with maturity of 1 year or less)	
bo	Bonds (Bonds with maturity more than 1 year)	
eq	Equities	
ci	Collective investments	
de	Derivatives	
	Categories	
	Inflow Controls	
	_plbn	Purchase Locally by Non-Residents
	_siar	Sale or Issue Abroad by residents
	Outflow Controls	
	_pabr	Purchase Abroad by Residents
	_siln	Sale or Issue Locally by Non-Residents
Assets that Include Only Inflow (i) or Outflow (o) Categories		
gsi and gso	Guarantees, Sureties and Financial Backup Facilities	
fci and fco	Financial Credits	
cci and cco	Commercial Credits	
Real Estate		
Re	Real Estate	
	Categories	
	Outflow	
	_pabr	Real Estate Purchase Abroad by Residents
	_slbn	Sale Locally By Non-Residents
	Inflow	
	_plbn	Real Estate Purchase Locally By Non-Residents
Direct Investments		
dii	Direct Investment Controls on Inflows	
dio	Direct Investment Controls on Outflows	
ldi	Direct Investment Controls on Liquidation	

Source: Fernandez *et al. (2015)*

[3] Data together with Matlab necessary codes for replication are available at: http://www.columbia.edu/~mu2166/fsu/

In order to study the role of capital controls in mediating the effects of global shocks to domestic business cycles, I follow the approach of Fernandez *et al.* (2016) by estimating structural VAR with two blocs, foreign and domestic. As it assumed that the world commodity prices are exogenous for every country, then foreign bloc is the same for every country and consists of commodity price indices of agriculture, metals and minerals, and fuels.

Formally the price vector is denoted by:

$$p_t = \begin{bmatrix} p_t^a \\ p_t^f \\ p_t^m \end{bmatrix},$$

where p_t^a, p_t^f and p_t^m are the cyclical components of the natural logarithms of prices of agricultural, fuel and metal and minerals commodities, the trend from real interest rate is removed by using Hodrick-Prescott (HP) filter with a smoothing parameter of 100.

Moreover, it is assumed that the price vector follows first-order autoregressive model (Fernandez *et al.* 2016):

$$p_t = Ap_{t-1} + \mu_t, \qquad (1)$$

where A is the matrix of coefficients and μ_t denotes a vector of world shocks affecting commodity prices. It is an independent and identically distributed mean-zero random vector with variance-covariance matrix Σ_μ. I am interested in finding out what fraction of business cycle fluctuations in different countries is the result of the world shocks, and mediated through the three previous commodity prices. For that reason, the joint contribution of μ_t is the main focus and the three individual shocks do not need to be identified

The domestic bloc on the other hand is describes separately every country and consists of real GDP, real consumption, real investments, terms of trade, trade balance to output ratio as well as the before mentioned commodity prices. The formula is as follows (Fernandez *et al.* 2016):

$$Y_t^i = B^i p_{t-1} + C^i Y_{t-1}^i + D^i p_t + \epsilon_t^i, \qquad (2)$$

where ϵ_t^i is an innovation with mean zero and variance-covariance matrix Σ_i. Similarly to foreign bloc, the country-specific domestic bloc (2) is estimated by ordinary least squares

(OLS) and all variables are detrended before using the HP filter with a smoothing parameter equal to 100.

Combining foreign (1) and domestic blocs (2), it is possible to estimate the joint behaviour of commodity prices p_t and Y_t in a following autoregressive model (Fernandez *et al.* 2016):

$$\begin{bmatrix} p_t \\ Y_t \end{bmatrix} = F \begin{bmatrix} p_{t-1} \\ Y_{t-1} \end{bmatrix} + G \begin{bmatrix} \mu_t \\ \epsilon_t \end{bmatrix}, \quad (3)$$

where

$$F = \begin{bmatrix} A & \theta \\ DA + B & C \end{bmatrix}, \quad G = \begin{bmatrix} I & \theta \\ D & I \end{bmatrix}, \quad \text{and} \quad E = \begin{bmatrix} \mu_t \mu_t' & \mu_t \epsilon_t' \\ \mu_t \epsilon_t' & \epsilon_t \epsilon_t' \end{bmatrix} = \Sigma \equiv \begin{bmatrix} \Sigma_{\mu} & \theta \\ \theta & \Sigma_{r} \end{bmatrix}$$

Estimates *B, C, D* and Σ_i are country-specific, which gives the possibility to obtain an estimate of the contribution of world shocks (μ_t) to movements in domestic macroeconomic indicators (Y_t) in different countries after doing the variance decomposition. It is important to draw out that world shocks can only affect small open economies through changes in world prices, for example commodity prices or the world interest rate.

In the original the Fernandez *et al.* (2016) use two ways to estimate the domestic bloc, because there is heterogeneity in their sample and the country specific regressions do not display the same number of degrees of freedom. Therefore, they use two methods to estimate the domestic bloc. In my work, the sample is balanced, which means that there is no need for two estimation methods and I use only sequential estimation, that includes only one domestic indicator at the time and then estimates the domestic bloc four times per country, once for each estimator

Similarly to Fernandez *et al.* (2016), I try to reduce the possible issue in estimating the combined SVAR equation system, which comes from the small-sample upward bias in the estimation of the contribution of world shock to the variance of domestic macroeconomic indicators. Statistically the reason behind is that variance is a positive statistic, therefore any correlation between commodity prices and macroeconomic indicators results in some participation of world shocks in the variance of the macroeconomic indicators itself. This would cause problems even if the commodity prices and macroeconomic indicators were independent random variables, because the spurious correlation is still present and there will be positive share of world shocks in the variance of the macroeconomic variable, which would cause an upward bias making the share of world shocks transferred through commodity prices overly big.

Usually the OLS estimates of SVAR coefficients are biased in a short sample, which can cause in turn a bias in the estimated contribution of world shocks to domestic business cycles. The more commodity prices are entering in the price vector, the higher is the bias and *vice versa* bias is decreasing together with sample size. (Fernandez *et al.* 2016)

In order to correct the small sample bias I perform Monte Carlo experiment by using random sampling. The correction is done for every 89 country as follows: the estimates of F, G and Σ, denoted by $\hat{F}$, $\hat{G}$ and $\hat{\Sigma}$ respectively are used to generate artificial time series for Y_t and p_t over 250 years. The estimate of the share of the variance of Y_t explained by μ_t is denoted by $\hat{\sigma}$. Additionally, T^p denotes the same size of the commodity prices and T^y the sample size of Y_t. As I use balanced sample, then both T^p and T^y are set equal to 18. Next, the last T^p observations of the artificial time series are used to re-estimate A and Σ_t in the foreign bloc and the last T^y observations to re-estimate B, C, D and Σ_ϵ in the domestic bloc. This process results in an estimate of the matrices$F$, G and Σ from the simulated data, which is used to get the share of the variance of Y_t explained by μ_t shocks, denoted by σ. After repeating the process for 1,000 times and computing the average estimate of σ, denoted by $\bar{\sigma}$, it is possible to define the small-sample bias as $\bar{\sigma} - \hat{\sigma}$ and the correct estimate of the share of the variance of Y_t explained by μ_t is $\widehat{2\sigma} - \bar{\sigma}$. *(Ibid)*

This paper treats capital controls as exogenous, but identification of the effects of capital liberalisation might be distorted because of possible endogeneity. For example capital controls may be more likely to occur in good times than in bad, or they are correlated with policies that try to enhance the economy. However multiple studies before have found that capital controls are in fact exogenous.

The endogeneity of capital controls have been a problem for several previous studies concerning the capital account liberalisation effects on long run growth. Demirgüc-Kunt and Detragiache (1998) tested the likelihood whether banking crises are more likely to occur in liberalised financial markets well before 1980, when their data on 53 countries started. They used multivariate logit method, where financial liberalisation variable was based on observed policy changes. The paper results in finding that financial liberalisation increases the probability of a banking crises, but less in a weaker institutional environment. Honig (2008) similarly studied the overall effect of financial liberalisation on economic growth and followed the logic of previously mentioned Demirgüç-Kunt and Detragiache (2002) when choosing an instrument for instrumental variable method. He uses the average level of capital

account openness for all countries in a certain region as an instrument in one particular country within that region. The explanation behind that is that a decision over opening capital accounts in one region influences other policy makers in the region and the likelihood of capital account liberalisation increases with the number of countries already adopted the policy. This logic is supported by Kose and Prasald (2012), who interpret capital account liberalisation as signal of country's commitment to good economic policies, which shows foreign investors stable environment. Therefore capital inflows coming from liberalisation should help to transfer of foreign technological skills; encourage competition and financial development, thereby promoting growth.

Several papers use the instrumental variable technique, but it is difficult to find appropriate instruments that do not correlate with explanatory variables, but correlate with capital controls. Arleta *et al.* (2001) uses a wide range of variables, that fulfilled the requirement of not being correlated with capital controls, for example distance to the equator; the fraction of population speaking English or island nation dummy. In order to show exogeneity while using more relevant instruments correlating with capital controls, researchers have used different indicators based on financial openness or more specific instruments. For example Bekaert *et al.* (2006) used price-earnings ratios of the industries that every country has specialised in as an instrument, which in their results exogenously predicts growth. They studied the effect that open capital account can have on consumption growth variability, finding out that liberalisation can be the reason for lower consumption growth volatility. Kraay (1998) studied the reasons for lacking enough empirical evidence in support of free capital movement by using lags of financial openness measures as instruments for current financial openness. He found little evidence in support of higher volatility among financially open economies. Grilli and Milesi-Feretti (1995) support this result and find no evidence of a significant effect of share of years over a period during which the capital account was open on growth of income per capita. Moreover, Gochoco-Bautista *et al.* (2010) analysed the effectiveness of capital controls in Asia and used the real interest rate differential and the second lag of capital flows as an instruments. In both cases they found that none of the capital control variables are statistically significant, which means that endogeneity was not present. Gruben (2001) used mainly country size variables, for example total GDP in 1980 U.S. dollars; total square miles of land and oil exporters. The first test, Hausman-type test raised a possibility for endogeneity, even though the capital controls were exogenous. As an alternative Gruben (2001) used Sargan instrument validity tests that provides better

indication of how capital account liberalisation affects the economy. This test showed that capital controls are not determined within the system, meaning they are exogenous.

4. Data

To study the role that capital controls play in world shocks transmission mechanisms, I use the same dataset about commodity prices as Fernandez *et al.* (2016) and combines it with the capital control indices from IMF's AREAER database, which covers 100 countries over the period from 1995 to 2013 and divides capital controls to inflows and outflows; domestic and foreign; sales and purchases, allowing to track changes in more granular lever. This dataset has used before by Klein *et al.* (2003); Schindler (2009) as well as Fernandez *et al.* (2015)

Because of the restrictions of the availability of data on capital controls the final dataset consists of 89 countries instead of initial 139, the period starts in 1995 instead of 1960 and lasts until 2013 instead of 2015.

The capital control indices take value in the range from 0 to 1, where 0 represents no restriction and 1 indicates absolute control over capital flows. In order to answer to the research question in this master thesis, I divide the sample countries in three capital control groups based on the index value as in Klein (2012):

1. Open countries: 0 – 0.10;
2. Gate countries: 0.11 – 0.69;
3. Wall countries: 0.70 – 1.

Appendix 1 gives the overview of capital controls on inflows and outflows of sample countries in these three groups, as well as in income, geographical and trade groups. The dataset includes ten countries that have no restriction on capital flows – Denmark, Guatemala, Hong Kong, Ireland, the Netherlands, Norway, Panama, Zambia, the United Kingdom and Uruguay. On the other hand, three countries – Algeria, Sri Lanka and Tunisia – have fully restricted capital movements. Almost half of the countries (43) belong to Gate capital control group; 32 countries are considered to be Open and only 14 countries are in Wall category. This last closed category consists only countries that are in upper-middle (5), lower-middle (7) or low income (2) group. In contrast, high income countries are equally divided between Open and Gate category (21 in each). Additionally, among Open category, five countries are in upper-middle and six in lower-middle income group. There are no low income countries.

Whereas in Gate category all the income groups are represented, besides aforementioned high income countries, this category consists of 12 upper-middle; 7 lower-middle and 3 low income countries.

Table 2 below shows the descriptive statistics of capital controls. The overall mean value of capital control is 0.37 and it can be seen, that the average value of capital outflow index is higher than in inflows (0.40 vs 0.35), so countries restrict on average more capital outflow. The standard deviation in overall capital outflow is largest in Gate and smallest in Wall category, while in Wall countries the standard deviation is the largest on capital inflows. The correlation between inflows and outflows is on average 0.34 and it increases with the restriction strength on capital movements.

Table 2. Descriptive Statistics of Capital Controls in Capital Control Groups

	All Countries	Open	Gate	Wall
Controls on overall capital flows				
Mean	0.37	0.04	0.45	0.88
Standard deviation	0.08	0.04	0.16	0.10
Controls on capital inflows				
Mean	0.35	0.04	0.42	0.80
Standard deviation	0.07	0.07	0.17	0.20
Controls on capital outflows				
Mean	0.40	0.04	0.49	0.97
Standard deviation	0.08	0.07	0.20	0.03
Correlations between controls on inflows and outflows	0.34	0.20	0.37	0.45

As this master thesis uses Fernandez *et al.* (2016) as a basis, then the necessary data about world commodity prices and five country specific macroeconomic indicators comes from the same source – the World Bank and covers initially 138 countries from 1960 to 2015. The sources for five macroeconomic variables – real output, real consumption, real investment, the trade balance-to-output ratio and terms of trade – are the World Bank's World Development Indicators (WDI) database and the IMF's World Economic Outlook (WEO) database. GDP, consumption and investment are in local currency units and terms of trade are the ratio of trade-weighted export and import unit-value indices. The source for commodity prices is the World Bank's Pink Sheet, where I focus on three aggregate commodity price indices – fuel, agriculture, and metals and minerals. The fuel index is a weighted average of sport prices of coal, crude oil and natural gas. The agricultural index is a weighted average of prices of different beverages (tea, cocoa, coffee), food (fats and oils,

grains, and other foods), and agricultural raw materials (timber and other raw materials). The price index of metals and minerals is based on the sport prices of aluminium, copper, iron ore, lead, nickel, steel, tin, and zinc. All the other goods are interpreted as composite, whose price is proxied by the US consumer price index and this composite good is used as numeraire. Similarly, these three commodity price indices by the monthly US consumer price index and in order to obtain annual time series, the simple average over the twelve months of the year is taken.

Figure 1 shows the movement level and cyclical effects of prices of fuels, metals and agricultural commodities giving the picture of the volatility of these prices in more than 50 years. The agricultural and fuel prices increased a lot in the 1970s, but in 1980s and 1990s all three prices have declined. Already in 2000s, all three prices started do increase until 2008, when the recession began.

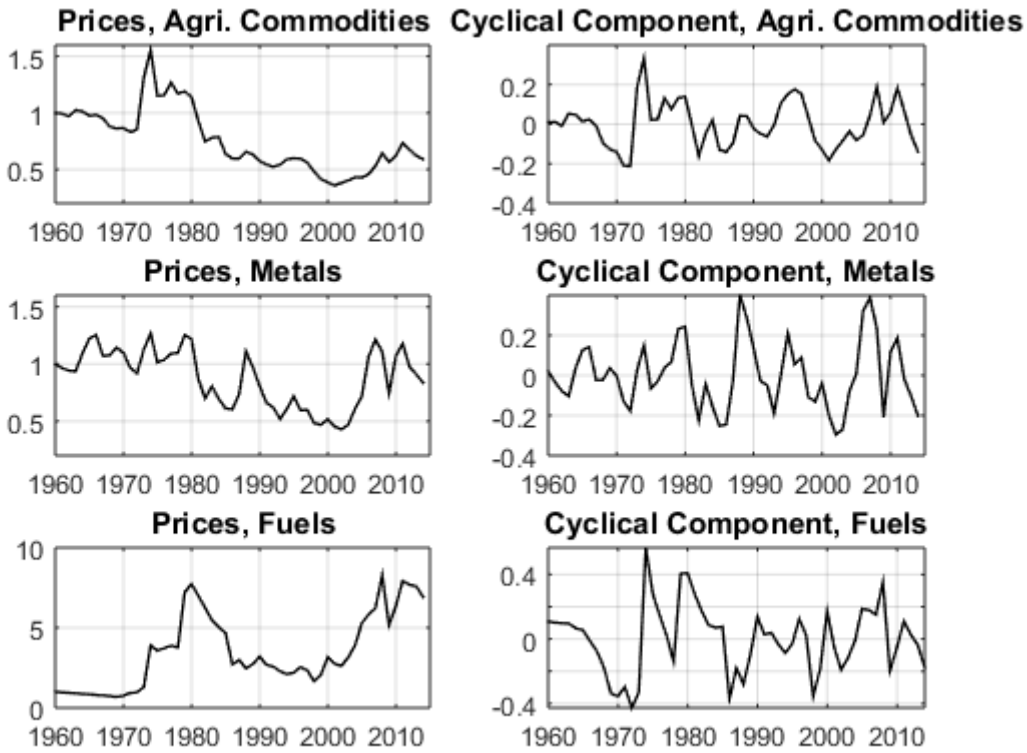

Figure 1. Level and Cyclical Components of Commodity Prices. (Fernandez *et al.* 2016)

On the right side of the figure is the cyclical component of the commodity prices captured by using the HP filter with a smoothing parameter of 100. Already on the figure above, it can be seen that the cyclical components show positive comovement, this is supported by positive correlations ranging from 33 to 62.1 (Table 3). The standard deviation of these prices is

between 11.2 and 27, and the price of fuel is expectedly the most volatile. Comparing this volatility with the volatility of in an average country, then these values are more than three times more volatile and when it comes to fuels, then even more than 5.73 times more volatile.

Table 3. Descriptive Statistics about World Commodity Prices.

Statistic	p^a	p^m	p^f	r
Standard deviation	11.2	14.7	27.4	2.16
Serial correlation	62.3	50.2	50.2	32.23
Correlation with Agri.	100.0	57.9	46.7	-1.50
Correlation with Metals	62.1	100.0	33.0	16.21
Correlation with Fuels	44.4	36.5	100.0	26.91
Correlation with Interest Rates	-4.0	18.0	-31.7	100.00
Relative Std. Dev to Output	3.1	44.9	5.7	3.66

The right side of the Appendix 2 gives the full overview of the standard deviation of the commodity prices in all countries. This basic overview of data and descriptive statistics give the overall understanding of the data and allows to start analysing the data in order to find the answer to research questions.

5. Results

5.1. The Role of Capital Controls in the Transmission of Global Shocks

This subsection presents results about role of capital controls in mediating world shocks to business cycles by performing variance decomposition of the SVAR system (Equation 3) consisting of foreign and domestic bloc. Firstly, the results are analysed in three capital control groups for all countries, then the countries within these groups are divided into income groups, trade and based on their geographical location. In order to give a more detailed understanding and intuition of the results, the share are presented together with the absolute volatility of the same variables. It allows to study the effects of capital account liberalisation also in absolute terms. As this paper follows Fernandez *et al.* (2016), then at the end of the section, I present replication of their result with a shorter period and smaller number of countries in the next subsection.

Table 4 left panel presents the shares of variances in output, consumption, investment and trade balance to output ratio in domestic business cycles that are explained by world shocks. It can be seen from looking at the whole sample group that on average the world shocks are

estimated to explain 35.5% of business cycles fluctuations in domestic output, about 25% of the variances in consumption and investments and 18.6% in trade balance to output ratio.

Table 4. Share of Variance Explained by World Shocks Mediating through Commodity Prices in Capital Control Groups and the Absolute Volatilities of Macroeconomic Variables

Capital Control Group	Group Size	Share of Variance Explained by World Shocks (%)				Median Absolute Deviation (%)				Absolute volatility (%)			
		Y	C	I	TBY	Y	C	I	TBY	Y	C	I	TBY
Baseline	89	35.5	24.8	25.4	18.6	34.4	3.8	8.1	9.9	6.11	4.26	11.0	8.54
Open	32	34.4	19.2	27.8	19.6	13.9	12.0	**19.6**	11.0	4.97	3.41	9.18	6.96
Gate	43	**38.5**	**27.6**	**32.2**	12.9	**20.7**	**19.7**	11.5	**11.5**	6.32	4.32	11.9	9.03
Wall	14	23.6	20.9	20.3	**24.9**	18.4	9.5	6.6	8.8	**8.08**	**6.01**	**12.9**	**10.6**

Table 4 shows that the global shocks explain the largest share of variance in domestic business cycles in Gate capital control group, whereas the smallest share of variance is explained in Wall country group. This means that if country imposes capital controls with an intention to protect themselves from larger fluctuations in output coming from international economy, then this measure works. Global shocks only explain 23.6% of the variance in output in domestic business cycles among Wall countries. The fact that global shocks explain less variation in closed countries aligns with the findings of Ostry *et al.* (2010), who concluded while analysing capital inflows to emerging markets, that countries who had capital controls in place before the global crises of 2007 and 2008 suffered smaller output declines.

Similarly, the world shocks explain the most in consumption among Gate countries – 27.6% of the variance – and the less in Open group (19.2%), even though comparing with Wall countries, the difference is not big – there the variance is 20.9%. Studying the absolute volatilities that world shocks can cause in consumption in Gate (1.3%) and Wall (1.2%) countries, then the difference are not that big because of the high volatility in Wall countries. Investment is most affected by world shocks in Gate countries, where the value is considerably higher than in overall average – 32.9%; in Open countries it is 27.8%, being about two percent points higher than in baseline group, whereas in Wall countries world shocks explain only 20.9% of the variance in investment in domestic business cycles.

On the contrary, global shocks influence more trade in Wall countries, where world shocks cause 2.6% of absolute volatility in trade balance to output ratio, whereas in Open countries

the world shocks cause 1.4% of the absolute volatility. This is interesting under the light of the results by Tamirisa (1999), who concluded that capital controls reduce exports only to transition and developing countries, but the effect on developed and industrialised countries is minimalised. Here this could mean that the data includes a number of developed countries that have imposed capital control, as the global shocks are able to explain the changes in trade in closed countries.

The middle panel of Table 4 gives the median absolute deviation (MAD), helping to estimate how spread the values are without being affected by the outliers. The baseline value of output – 34.4% shows that output level of the countries included varies across countries, whereas MAD of consumption is only 3.8% in the baseline group. In capital control groups, Gate countries have the highest MAD, the output values deviate there 20.7% and in consumption 19.7% and in trade 11.5%. There MAD values in trade across capital control groups deviate the less. In investment group, Open group has the highest deviation measured by MAD. One possible reason for MAD to be the highest in Gate group is that it includes countries with capital controls ranging from 0.11 to 0.69, where countries with extreme values could have very different development level.

Table 4 right panel presents absolute volatilites of the same four indicators in the three capital control groups. As expected, investment is on average the most volatile component, followed by trade, output and consumption. The right side of the table shows that, the volatility decreases when countries have less capital controls – the Wall countries have the highest and Open group the lowest volatilities. Taking into account the absolute volatility of output in these country groups, the differences in the absolute variance that the world shocks generate are small, but nevertheless Gate countries remain to be the strongest affected by the world shocks, generating 2.4% of absolute volatility compared to 1.9% in Wall and 1.7% in Gate countries.

Table 5 allows to look at the distribution of capital control groups in three income groups (lower and low are aggregated together). Higher income also indicates the development level of a country – lower income countries are still emerging while higher income group includes already industrialised countries. Therefore it is possible to detect possible connections between capital controls and the effects of global shocks in different income groups.

Table 5. Share of Variance Explained by World Shocks in Income Groups

Specification		Group Size	Share of Variance Explained by World Shocks (%)			
			Y	C	I	TBY
Baseline		89	35.5	24.8	25.4	18.6
High Income		42	34.7	26.5	31.3	17.2
	Open	21	**35.6**	24.8	30.0	**20.6**
	Gate	21	26.9	**27.2**	**36.4**	12.9
	Wall	-	-	-	-	-
Upper-Middle Income		22	39.3	23.2	23.9	23.0
	Open	5	23.5	19.4	**46.8**	18.2
	Gate	12	**44.1**	**27.4**	29.1	**31.4**
	Wall	5	26.0	17.0	20.0	22.9
Lower-Middle Income		20	38.2	19.8	20.2	24.9
Low Income		5	36.4	19.7	39.5	24.6
	Open	6	16.9	9.2	6.2	23.9
	Gate	10	**56.6**	**33.4**	**24.3**	11.0
	Wall	9	21.2	23.8	20.6	**26.8**

This table shows how in high income groups, there are countries that are Open or Gate, whereas the majority of Wall countries belong to lower income groups. The same was found by Grilli and Milesi-Feretti (1995), that capital controls are more used in countries with lower incomes, as they are seen as protective measure. They add to list also large government and a central bank with limited independence.

The share of variance explained by world shocks in output does not vary across income groups, being roughly between 35 and 39%, therefore the main results are not due to the fact that rich economies are open and poor are mainly closed. This shows that the hypothesis that capital account openness makes output more volatile due to the specialization does not hold here. Whereas on income levels, the wealthier the country is, the bigger share of variance is explained by the world shocks in consumption and the smaller share in trade balance to output ratio. Meaning the poorer the country, the more their trade balance to output ratio is influenced by the shocks in global economy. Countries' investments do not have so concrete directions: it can be said that the share of variance explained by world shocks decreases together with the income level of a country, but the poorest countries have almost extremely higher share of variance explained by global shocks – 39.5%. This exceeds the overall average value by 14.1 percentage points and high income group by 8.2 percentage points.

Table 5 shows that none of the countries with high income are completely closed in terms of capital controls and there are differences between Open and Gate countries in mediating the effects of global shocks to domestic business cycles. In the Open countries, the world shocks

influence more output and trade: the world shocks explain 35.6% and 20.6% of the variance in output and balance to output ratio respectively and these shares are about 8 percentage points higher than in Gate countries. Whereas among Gate countries the shares of variances explained by world shocks are 27.2% of consumption and 36.4% of investments. The difference with Open countries is less than three and more than six percentage points respectively.

Looking at upper-middle income group, the first thing to point out is that in output, consumption and trade balance to output ratio the share of variance explained by global shocks is considerably higher than in other capital control groups, especially in Gate countries global shocks explain 44.1% in output, which is around 20 percentage points higher than in other capital control groups. Similarly are consumption and trade balance-to-output ratio around ten percentage points higher in Gate group than in Open or Wall. Only the share of variance explained by global shocks in investments is higher in Open countries – 46.8%, which besides exceeding the values of other groups, is almost two times as high as in baseline.

Klein (2003) studied the experiences of different countries with capital account opening and he found that it has a U-shaped relationship with income per capita, which means that middle income countries benefit significantly more from capital account openness than poor or rich countries. Here, as upper-middle income group is on average across income groups the most dependent on global shocks. This can mean that during the good times, these countries can enjoy good economic climate, whereas if something happens in global economy, then they are the first ones to be influenced.

The shares vary between capital controls more among lower income countries – for example, in Gate countries the share of variance in output is as high as 56.6%; in consumption it is 33.4% and in investments 24.3%. All these values are more than three times higher than in open countries. In low income group trade balance to output ratio is almost equally influenced by world shocks in Wall and Open countries, where the share of variance is close to 25%.

In Appendix 3, right-side panel of Table A1 shows the absolute volatility in income groups and the tendency that poorer countries with capital controls are more volatile, than countries in higher income groups and allow for capital movement. – the standard deviation of output in low income group and Wall countries is 8.6%, whereas the overall average on baseline level is 3.7%. Looking at absolute volatilities, then the in high income group Gate countries

are more influenced by the world shocks than open countries, as the world shocks generate respectively 1.4% and 1.2% of absolute volatility in output. In upper-middle income group world shocks generate 3.1% of absolute volatility in output among Gate countries, whereas in low income group among Gate countries world shocks generate 3.6% of absolute volatility in output. The left-side panel shows the MAD-s in income groups. Interestingly, within capital control groups the deviation of output is smaller than in baseline group. In consumption, Gate countries have larger deviation in all three income groups, whereas Open and Wall countries are only slightly higher than the overall baseline value. Trade balance to output ratio deviates the most among Gate countries in upper-middle income group, but stays around 10% like in baseline.

After analysing the role of capital controls in overall level and across income group, it can be said that there is an inverse U-shaped relationship between capital account openness and country's acceptance to global shocks through commodity prices. Global shocks explain bigger share of variance among Gate countries with some exceptions in trade balance to output ratio. As several researchers have found that countries with better legal system, good institutions and favourable conditions for foreign investment, and investor protection generate larger growth effects from financial liberalisation (Bekaert *et al.* (2005) and Prasad *et al.* (2013)) Therefore one possible explanation for Gate countries to be the most effected by international markets is that they are attractive enough for capital inflows, but at the same time their legal and institutional development is still fragile to be hit by the changes in global markets. Whereas Open countries have strong institutional background and Wall countries are not that dependent on international markets.

Next I consider the role of capital controls through different trade groups as trade is highly dependent on global markets and assumed to have a substantial influence on capital flows. Moreover, looking at Table 6 can help to confirm or refute my theory that the relationship between capital account openness and share of variance explained by global shocks.

Looking at the pattern in Table 6 shows that global shocks explain the largest share in output, consumption and investment among commodity and oil exporters in Gate countries. In some cases the largest share explained in output or consumption is among Wall or Open countries, but the difference with Gate countries is small – only 1 or 2 percentages. Trade balance to output ratio is the most influenced by global shocks in Open capital control group if I consider only exporters and in Wall group considering commodity and oil importers.

Table 6. Share of Variance and Explained by World Shocks in Trade Divisions.

Specification		Group Size	Share of Variance Explained by World Shocks (%)			
			Y	**C**	**I**	**TBY**
Baseline		89	35.5	24.8	25.4	18.6
Net Commodity						
Exporters		31	25.6	27.1	22.4	28.5
	Open	9	13.7	16.3	17.6	**30.3**
	Gate	18	**44.0**	**47.4**	**26.7**	30.3
	Wall	4	16.5	26.2	23.6	25.7
Importers		56	36.0	23.2	28.7	15.7
	Open	23	35.6	**24.8**	30.4	17.4
	Gate	24	35.5	23.2	**30.7**	11.9
	Wall	9	**37.9**	20.8	18.9	**22.9**
Oil Trade						
Exporters		21	26.0	32.2	21.1	32.2
	Open	5	13.7	18.7	6.1	**35.3**
	Gate	13	**54.2**	**55.3**	**21.2**	32.6
	Wall	3	2.9	21.0	17.4	22.9
Importers		66	35.6	23.8	28.7	16.7
	Open	27	**35.6**	19.4	30.0	18.2
	Gate	29	34.6	**26.6**	**33.9**	12.8
	Wall	10	29.5	22.3	22.7	**24.9**
Excluding Large Commodity Exporters		50	33.7	23.8	20.9	15.9
	Open	13	25.5	19.0	12.5	23.2
	Gate	26	**39.4**	**27.4**	**25.1**	11.8
	Wall	11	21.2	20.8	20.0	**26.8**

Furthermore, net commodity and oil importers have similar shares explained by world shocks and in turn exporters resemble to each other. For example among Gate countries the share of variance in consumption explained by global shocks in domestic business cycles is as high as 47.4% in net commodity exporters and 55.3% in oil exporters. The share of variance in output in exporters in Gate countries is also higher than 50%, while in Wall countries it is only 2.9%. While GDP and consumption are more influenced by global shocks than the average baseline value, then in investment in all three capital control groups, the world shock explain around 20–25% of the variance in net commodity and oil exporters, only for oil exporters in Open group global shocks only explain 6.1% of the variance in domestic business cycles.

The importers among commodity and oil traders are more stable, and it is hard to draw out extreme values. The share of variance in output explained by world shocks is in both commodity and oil importers around 35% and in consumption around 20–25%. The values differ more, if investments and trade balance-to-output ratio are considered. In both,

commodity and oil importers, Open and Gate countries' investments are more affected by world shocks than in Wall countries. There the share of variance explained by global shocks is among importers around 20%, while the share of variance in investment explained by world shocks is among Open and Gate countries commodity and oil importers is more than 30%. The Wall countries trade balance-to-output ratio is the most affected by global shocks – the share of variance is there in both import groups a little bit less than 25%, while in Gate countries it is slightly higher than 10%.

As the export countries' the results vary, then the union of 30 biggest exporters in every commodity exporter is excluded. In the remaining 50 countries, the global shocks explain the largest amount of variance in output, consumption and investment in Gate countries – 39.4%; 27.4% and 25.1% of the variance respectively. In Wall countries the domestic business cycles are influenced by world shocks the most – 26.8% of the variance is explained there. Excluding large commodity exporters lowers the share of variances when comparing the commodity and oil exporters, raising the theory that export countries are more influenced by global shocks as exporting comes with higher risks as countries need to sell their goods and services on foreign markets, whereas importing is just meeting the demand that the country itself cannot satisfy

The panel on the right in Table A2, Appendix 3, shows the absolute volatilities in trade groups. Considering separately exporters and importers, then actually in commodity exporters among Gate and Wall countries, the world shocks generate 2.8% of absolute volatility in trade balance to output ratio, while in Wall countries the world shocks generate only 2.3% of the absolute volatility. Similarly, the world shocks influence the most Gate among oil exporters, where they generate 3.2% of the absolute volatility, whereas among Open countries they generate 2.6% of absolute volatility. On the contrary to absolute volatility, in trade groups it is impossible to draw out a pattern, where the shares of variances are deviated the most by looking at the MAD. The MAD value is smaller than baseline group across capital control groups in different trade divisions in output and exceeds the baseline value among other macroeconomic variables.

Looking the countries in different geographical regions can give assurance that the development level matters when analysing the role of capital controls in transmission of shocks, as countries with similar development level are usually gathered in the same region. Table 7 shows countries and capital control categories in five geographical groups: East Asia,

South Asia and Pacific; Europe, Central Asia and North America; Latin America and Caribbean; Middle East and North Africa; and finally Sub-Saharan Africa.

First looking at groups, which consist of more developed countries with higher income, then even the distribution of capital control groups is the same and among Europe, Central Asia and North America all the countries belong to Open or Gate countries. The share of variances in this regional group also resemble the results of earlier showed high income group. Similarly, the tendency, that Gate countries are more affected by world shocks continues and the share of variance explained in trade balance to output ratio is higher among countries with open capital control policy.

Table 7. Share of Variance and Explained by World Shocks in Geographical Regions.

Specification		Group Size	Share of Variance Explained by World Shocks (%)			
			Y	**C**	**I**	**TBY**
Baseline		89	35.5	24.8	25.4	18.6
East Asia, South Asia & Pacific		16	35.3	19.9	30.9	18.1
	Open	4	37.8	21.6	**31.4**	16.2
	Gate	6	29.8	11.5	29.5	18.8
	Wall	6	**42.6**	**26.9**	28.8	**22.9**
Europe, Central Asia & North America		28	38.9	27.4	28.0	12.3
	Open	15	36.6	21.6	30.4	**22.8**
	Gate	13	**40.3**	**27.2**	**36.4**	11.7
	Wall	-	-	-	-	-
Latin America & Caribbean		17	25.5	26.8	21.1	17.4
	Open	8	24.5	14.2	16.5	16.7
	Gate	9	**49.0**	**27.7**	**21.1**	**18.8**
	Wall	-	-	-	-	-
Middle East & North Africa		14	38.9	27.4	28.0	12.3
	Open	3	13.7	18.7	6.1	**35.3**
	Gate	8	**29.5**	**30.1**	**44.0**	20.3
	Wall	3	1.1	10.2	17.4	27.7
Sub-Saharan Africa		14	39.1	29.0	26.1	26.7
	Open	2	47.3	11.7	**60.1**	26.7
	Gate	7	**54.0**	**34.4**	27.4	15.7
	Wall	5	21.2	14.8	20.0	**35.2**

The share of variances explained by global shocks in East and South Asia and Pacific resemble quantitatively also countries with higher income, even though Gate countries are not influenced by the world shocks the most, but Wall countries are in output, consumption and trade balance to output ratio, whereas share of variance in investment is the highest in Open capital control group, but the differences with Gate and Wall groups are only couple of percentage points.

On the contrary, even though none of the countries in Latin America and Caribbean region belong to Wall capital control group, the shares of variances resemble more to countries with lower income. The share of variance in output explained by world shocks in Gate countries is almost 50%, in consumption it is around 30% and in investment and trade balance to output ration around 20%. These magnitudes are the same as in lower income group.

In case Middle East and North Africa or Sub-Saharan Africa it is hard to draw any parallels with specific income groups as the shares of variance deviate largely within one group. One of the possible reasons for that is that three capital control groups are not distributed equally inside a group, for example Open and Wall capital control groups in Middle East and North Africa region consist of three countries, while in Sub-Saharan Africa there are only two countries in Open group. The world shocks in these three Wall countries in Middle East and North Africa region have basically no effect on the output share of variance in domestic business cycle. This shows if that has been the intention, then capital controls have been effective.

In Middle East and North Africa, world shocks do not influence that much of the domestic markets, because the share of variance in output in Gate countries is only 29.5%, being around five percentage points less than baseline value. The other variables like consumption, investment and trade balance to output ratio are considerably higher than baseline value. World shocks explain 44% of the variance in investment in Gate countries and in Wall countries world shocks explain 35.3% of the variance in trade balance to output ratio.

In Sub-Saharan Africa, 35% of the variance in trade balance to output ratio is explained by global shocks. Overall in Sub-Saharan Africa, the largest shares of variances are exceeding the baseline values even more than two times. For example share of variance explained by world shocks in investment in Open group is as high as 60.1% or in output among Gate countries 54%. On the other side, the shares of variances in consumption among Open and Wall countries are as little as 10%, which is 15 percentage points less than the baseline value.

Appendix 3, Table A3 shows the MADS and absolute volatilities in regional groups. Even though that in East Asia, South Asia and Pacific group global shocks explain among three capital control group almost the same amount of variance in investment, then looking at the absolute volatilities the result is different. In Gate countries world shocks generate 3.7% of absolute volatility in investment, while in Open countries world shocks generate only 2.3% of absolute volatility. Looking at MAD, it can be said similarly as in trade groups, that there

hard to detect one pattern and the regions are deviated differently, even though Wall countries are across all groups the less deviated.

All in all, looking the role of capital controls in different groups has shown, that Gate countries are the most influenced by global shocks in output, consumption and investments, while global shocks explain more of the variance in trade balance to output ratio among

5.2. Comparison with Fernandez *et al.* (2016)

As this master thesis uses Fernadez *et al.* (2016) article as a basis, but focuses on capital controls, then I also show the results after estimating the blocs described in the method part of the thesis.

The country-specific, domestic bloc is estimated by using sequential estimation. Table 8 gathers the overall results of variance decomposition country by country. It shows cross-country median shares of the variances of output, consumption, investment and the trade balance-to-output ratio explained by world shocks mediated by commodity prices[4]. Appendix 6 has the results country by country in both corrected and noncorrected version.

Table 8. Share of Variances Explained by World Shocks and Mediated by Commodity Prices in two different datasets.

	Fernandez *et al.* (2016) 130 countries in 1960-2015 (%)				This paper 89 countries in 1995-2013 (%)			
Sequential Estimation	*y*	*c*	*i*	*tby*	*y*	*c*	*i*	*tby*
Noncorrected estimate	43.9	33.9	33.8	29.3	44.7	35.9	36.9	31.1
Small-Sample Bias	9.8	12.6	12.2	13.3	10.2	13.0	12.1	13.0
Corrected estimate	34.1	21.3	21.6	16.0	35.5	24.8	25.4	18.6
MAD of Corrected estimate	19.7	15.9	15.4	14.5	18.6	13.9	16.6	15.3

Source: Fernandez *et al.* (2016) and author's calculations using the replication files.

The corrected estimate of sequential estimation shows that world shocks explain 35.5% of variance in output. 24.8% of variance in consumption. 25.4% of variance in investment, and 18.6% of variance in trade balance-to-output ratio. The estimated contribution of world shocks varies strongly across 89 countries, because the median absolute value of the corrected value is 18.6%, which means that the share of variance of output can range in an interval with length of almost 20 percentage points. Comparing the results with the original Fernandez *et al.* (2016) results, then the estimates are slightly larger, as the number of countries has

[4] Corrected estimate is achieved after removing the small sample bias through Monte Carlo method

decreased – in the replicated article they had 138 countries. Also the time span in this article is not equalised across the countries, the longest sample period is 55 year (1960–2014) and shortest 25 years. In this master thesis the time period is equally from 1995–2013 across the 89 countries.

6. Conclusion

This paper analyses the role of capital control on transferring the global shocks through commodity prices on domestic business cycle through commodity prices. More specifically, I have studied the effect that global shocks have on the shares of variances in output, consumption, investment and trade balance to output ratio from 1995 to 2013 in 89 developed and developing countries.

The main result is that capital controls have a role in mediating the international shocks to domestic business cycles in macroeconomic indicators like output, consumption and investment. Comparing the shares of variances that global shocks explain in domestic business cycles shows that they are the lowest in output, consumption and investment among Wall countries. The only variable that is explained more by global shocks among Wall countries is trade balance to output ratio. Moreover, I conclude that capital account openness and country's acceptance to global shocks through commodity prices has an inverse U-shaped relationship, meaning that the global shocks explain the largest share of variance in domestic business cycles in countries that belong to Gate countries, and less in Open and Wall countries.

Interestingly, there are substantial differences in trade groups between commodity and oil importers and exporters, where export is more influenced on domestic markets by global shocks. After excluding the biggest exporters, the shares of variances explained by world shocks are lower indicating that the possible reason for exporters being more dependent on fluctuations on international markets is that selling abroad has higher risk than in domestic market, making the export more sensitive.

This paper finds out on average through sub-divisions that the Gate countries are the most affected by global shocks and one reason may be in data, as almost half of the countries belong to Gate capital control group, which ranges from 0.11 until 0.69. For further development, the same issue could be analysed in different framework, meaning using other

division of capital control group or even using totally different measure of capital account openness.

References

1. Bekaert, G., Campbell C.R., Lundblad, C. (2006) "Growth Volatility and Financial Liberalization". *Journal of International Money and Finance*. Vol. 25. no. 3: 379-403
2. Bernanke B.S., Boivin J., Eliasz. P. (2004) "Measuring the Effects of Monetary Policy: A Factor-Augmented Vector Autoregressive (FAVAR) Approach" *National Bureau of Economic Research. Working Paper no 10220. January 2004*
3. Blankenau, W., Kose M. A.,Yi K-M. (2001) "Can World Real Interest Rates Explain Business Cycles in a Small Open Economy?" *Journal of Economic Dynamics & Control 25 867-889*
4. Calderon, C., Loayza, N., Schmidt-Hebbel, K. (2005) "Does Openness Imply Greater Exposure?" *World Bank Policy Research Working Paper,* 3733.
5. Chinn. M. D., Ito. H. (2008) "A New Measure of Financial Openness" *Journal of Comparative Policy Analysis: Research and Practice*. No 89.
6. Cross, J., Nguyen, B.H. (2016) "The Relationship between global oil price shocks and China's output: A time-varying analysis". *Energy Economics* 62. 79–91.
7. Demirguc-Kunt, A., Detragiache. E. (1998) "Financial Liberalization and Financial Fragility" *IMF Working Paper* No. 98/83
8. Demirguc-Kunt, A., Detragiache. E. (2002) "Does deposit insurance increase banking system stability? An empirical investigation" *Journal of Monetary Economics.* Volume 49, Issue 7: 1373-1406
9. Eichenbaum, M. (1992) Comments "Interpreting the macroeconomic time series facts: the effects of monetary policy". European Economic Review Vol. 36; No. 5:1001–1011
10. Eichengreen, B. (2002) "Capital Account Liberalization: What Do Cross-Countries Tell Us? *World Bank Economic Review*, 15:3, 341–65
11. Epstein, G. A., Schor, J.B. (1992) "Structural Determinants and Economic Effects of Capital Controls in OECD Countries" Financial Openness and National Autonomy" (ed) Banuri, T., Schor J.B. *Oxford: Clarendon Press*
12. Fernandez, A., Rebucci, A., Uribe, M. (2015) "Are Capital Controls Countercyclical? *Journal of Monetary Economics 76. 1–14*

13. Fernandez, A., Schmitt-Grohe, S., Uribe, M. (2016) “World Shocks. World Prices. And Business Cycles: An Empirical Investigation” *Journal of International Economics*
14. Gochoco-Bautista, M.S., Jongwanich, J., Lee. J–W (2010) “How Effective are Capital Controls in Asia?” *ADB Economic working Paper Series*. No. 224. October 2010
15. Grilli, V., Milesi-Feretti G. M. (1995) “Economic Effects and Structural Determinants of Capital Controls*”. International Monetary Fund Staff Papers*. Volume 42. Issue 3**:** 517-551
16. Gruben, W.C. McLeod. D. (2001). “Capital Account Liberalization and Disinflation in the 1990s”. *Federal Reserve Bank of Dallas*. Working Papers 0104
17. Hoffmaister, A.F., Roldos J.E. (1997) „Are Business Cycles Different in Asia and Latin-America” *IMF Working Papers 97/9*
18. Hoffmaister, A.F., Roldos, J. E., Wickham, P. (1998) „Macroeconomic Fluctuations in Sub-Saharian Afrika” *IMF Staff Papers, Vol. 45 No.1*
19. Honig, A. (2008) “Addressing Causality in the Effect of Capital Account Liberalization on Growth” *Journal of Macroeconomics*, Vol. 30, Issue 4, 1602-1616
20. International Monetary Fund (2014) “Annual Report of Exchange Arrangement and Exchange Restrictions (AREAER)”, Washington, DC
21. International Monetary Fund (2012) “The Liberalization and Management of Capital Flows: An Institutional View”, Washington, DC.
22. Johnston, R.B., Tamirisa, N.T. (1998) “Why Do Countries Use Capital Controls?” *IMF Working Paper* No. 98/181
23. Kose, M. A., Prasald, E. (2012) “Capital Accounts: Liberalize or Not?” IMF Finance and Development [http://www.imf.org/external/pubs/ft/fandd/basics/capital.htm]
24. Kose, M. A., Riezman (1999) “Trade Shocks and Macroeconomic Fluctuations in Africa” *CSGR Working Paper No. 43/99, October 1999*
25. Klein. M. W., Olivei. G. (2008) “Capital Account Liberalization. Financial Deepness and Economic Growth.” *Journal of International Money and Finance* 27, No 6: 861 – 875
26. Klein, M.W (2003) “Capital Account Openness and the Varieties of Growth Experience” *National Bureau of Economic Research Working Paper no. 9500, February, 2003*
27. Klein, M. (2013) “Capital Controls: Gates versus Walls” *Journal of International Economis, Vol. 87*

28. Kraay, A. (1998) “In Search of the Macroeconomic Effects of Capital Account Liberalization” Stanford Institute for Economic Policy Research Discussion Papers No. 07-004.
29. Lagana, G., Mountford. A. (2005) “Measuring Monetary Policy in the UK: A Factor-Augmented Vector Autoregression Model Approach” The Manchester School Supplement, 1463–6786, 77–98
30. Lombardi, M. J., Osbat, C., Schnatz, B. (2012) “Global Commodity Cycles and Linkages: a FAVAR approach” *Empirical Economcs, No. 43: 651–670.*
31. Lubik, T.A., Teo, W.L. (2005) “Do World Shocks Drive Domestic Business Cycles? Some Evidence from Structural Estimation” - *Working Papers, The Johns Hopkins University, Department of Economics, No. 552*
32. Magud, N., Reinhart, C.M. (2006) „Capital Controls: An Evaluation” ” *National Bureau of Economic Research.* Working Paper 11973.
33. Magud. N., Reinhart, C.M., Rogoff, K.S. (2011) “Capital Controls: Myth and Reality – A Portfolio Balance Approach” *National Bureau of Economic Research,* Working Paper 16805.
34. Mendoza, E. G. (1991) “Real Business Cycles in a Small Open Economy” *The American Economic Review*, Vol. 81, No. 4 (Sep., 1991), pp. 797-818
35. Mendoza, E. G. (1995) “The Terms of Trade, the Real Exchange Rate, and Economic Fluctuations” – *International Economic Review*, Vol. 36, No. 1 (Feb. 1995), 101-137
36. Miniane, J. (2004) “A New Set of Measures on Capital Account Restrictions” *IMF Staff Papers*, Vol. 51, No. 2.
37. Miniane, J., Rogers, J.H. (2007) “Capital Controls and the International Transmission of U.S Money Shocks” *Journal of Money, Credit and Banking,* Vol. 39, No. 5.
38. Obstfeldt, M., Rogoff, K. (1996) “Foundations of international Macroeconomics” Massachusetts Institute of Technology
39. Organization for Economic Cooperation and Development (OECD). 2009. *Code of Liberalization of Capital Movements*, Paris
40. Ostry, J. D., Ghosh, A.R., Habermaier, K., Chamon, M., Qureshi, M.S., Reinhardt, D. B. S. (2010) “Capital Inflows: the Role of Controls” IMF Staff Position Note 10/4, International Monetary Fund, Washington, DC.
41. Prasad, E. S., Rogoff, K., Wei, S.-J., Kose, M. A. (2004) “Financial Globalization, Growth, and Volatility in Developing Countries” *Universiyty of Chicago Press, September 2004*

42. Quinn, D., Schindler, M., Toyoda, A.M. (2011) „Assessing Measures of Financial Openness and Integration" *IMF Economic Review*, Vol. 59, No. 3
43. Rapsomanikis, G., Mugera, H. (2011) "Price Transmission and Volatility Spillovers in Food Markets of Developing Countries" in Piot-Lepetit, I., M'Barek. R. (eds) *Methods to Analyse Agricultural Commodity Price Volatility* (Spirnger New York)
44. Razin, A., Rose, A. (1992) "Business Cycle Volatility and Openness: an Exploratory Cross-Section Analysis" *National Bureau of Economic Research.* Working Paper 4208
45. Rodrik, D. (1998) "Who Needs Capital Account Convertibility?" In Peter Kenen ed. "Should the IMF Pursue Capital-Account Convertibility?" Princeton Essays in International Finance, No. 207.
46. Schindler, M. (2009) "Measuring Financial Integration: A New Data Set." *IMF Staff Papers, Volume* 56, Number 1: 222–38.
47. Schmitt-Grohe, S., Uribe, M. (2015) "How important are terms of trade shocks?" *National Bureau of Economic Research.* Working Paper 215213.
48. Schmitt-Grohe, S., Uribe, M., (2016) "Downward nominal wage rigidity, currency pegs, and involuntary unemployment" *Journal of Political Economy,* Volume 124. Number
49. Sims, C. A. (1980) "Macroeconomics and Reality" *Econometrica,* Vol. 48, No. 1: 1-48
50. Stiglitz, J. (2000) "Capital Market Liberalization, Economic Growth and Instability" *World Development,* Vol. 28, No. 6, pp. 1075–1086.
51. Vasishtha, G., Maier, P. (2013) "The Impact of the Global Business Cycle on Small Open Economies: a FAVAR approach for Canada" *North American Journal of Economics and Finance, No. 24: 191–207.*

Appendices

Appendix 1. Sample Countries in Capital Control Groups (1995-2011).

Sample Countries (1995-2011)			Trade Groups		Capital Controls		
Country	**Income Group**	**Geographic Group**	**Net Commodity**	**Oil**	**Overall**	**Inflows**	**Outflows**
OPEN - 32 countries					**0.05**	**0.05**	**0.04**
Austria	High	Europe. Central Asia and North America	Import	Import	0.10	0.00	0.20
Belgium	High	Europe. Central Asia and North America	Import	Import	0.07	0.00	0.13
Canada	High	Europe. Central Asia and North America	Export	Export	0.09	0.17	0.00
Costa Rica	Upper-Middle	Europe. Central Asia and North America	Import	Import	0.02	0.04	0.00
Denmark	High	Europe. Central Asia and North America	Import	Import	0.00	0.00	0.00
Egypt. Arab Rep.	Lower-Middle	Europe. Central Asia and North America	Export	Export	0.08	0.02	0.13
El Salvador	Lower-Middle	Europe. Central Asia and North America	Import	Import	0.08	0.11	0.06
Finland	High	East Asia. South-Asia & Pacific	Import	Import	0.03	0.07	0.00
France	High	Europe. Central Asia and North America	Import	Import	0.12	0.06	0.18
Greece	High	Europe. Central Asia and North America	Import	Import	0.04	0.01	0.06
Guatemala	Lower-Middle	East Asia. South-Asia & Pacific	Import	Import	0.00	0.00	0.00
Hong Kong SAR. China	High	Europe. Central Asia and North America	Import	Import	0.00	0.00	0.00
Ireland	High	East Asia. South-Asia & Pacific	Import	Import	0.00	0.00	0.00
Italy	High	Europe. Central Asia and North America	Import	Import	0.04	0.00	0.09
Japan	High	Middle East & North-Africa	Import	Import	0.08	0.01	0.00
Mauritius	Upper-Middle	East Asia. South-Asia & Pacific	Import	Import	0.10	0.20	0.00
Netherlands	High	Europe. Central Asia and North America	Export	Import	0.00	0.00	0.00
New Zealand	High	Europe. Central Asia and North America	Export	Import	0.09	0.17	0.00
Nicaragua	Lower-Middle	Europe. Central Asia and North America	Import	Import	0.01	0.03	0.00
Norway	High	Europe. Central Asia and North America	Export	Export	0.00	0.00	0.00
Oman	High	Latin America & Caribbean	Export	Export	0.10	0.20	0.00
Panama	Upper-Middle	Middle East & North-Africa	Import	Import	0.00	0.00	0.00

Appendix 1 continues.

Country	Income Group	Geographic Group	Net Commodity	Oil	Overall	Inflows	Outflows
Paraguay	Upper-Middle	Latin America & Caribbean	Import	Import	0.04	0.02	0.05
Peru	Upper-Middle	Latin America & Caribbean	Export	Import	0.01	0.01	0.00
Singapore	High	Latin America & Caribbean	Import	Import	0.09	0.00	0.18
Spain	High	Sub-Saharan Africa	Import	Import	0.04	0.04	0.04
Sweden	High	Middle East & North-Africa	Import	Import	0.03	0.05	0.00
Zambia	Lower-Middle	Latin America & Caribbean	Export	Import	0.00	0.00	0.00
United Kingdom	High	Sub-Saharan Africa	Import	Import	0.00	0.00	0.00
United States	High	Latin America & Caribbean	Import	Import	0.09	0.00	0.18
Uruguay	High	Latin America & Caribbean	Import	Import	0.00	0.00	0.00
Yemen	Lower-Middle	Latin America & Caribbean	Export	Export	0.08	0.16	0.00
GATE - 43 countries					**0.45**	**0.43**	**0.49**
Argentina	High	Latin America & Caribbean	Import	Import	0.54	0.48	0.68
Australia	High	East Asia. South-Asia & Pacific	Export	Export	0.30	0.28	0.32
Bahrain	High	Middle East & North-Africa	Export	Import	0.31	0.41	0.21
Bangladesh	Lower-Middle	Latin America & Caribbean	Import	Import	0.68	0.66	0.70
Bolivia	Lower-Middle	Europe. Central Asia and North America	Export	Export	0.32	0.39	0.26
Brazil	Upper-Middle	Europe. Central Asia and North America	Import	Import	0.64	0.62	0.67
Bulgaria	Upper-Middle	Europe. Central Asia and North America	Import	Import	0.18	0.14	0.22
Burkina Faso	Low	Europe. Central Asia and North America	Export	Import	0.68	0.39	0.97
Chile	High	Europe. Central Asia and North America	Export	Import	0.44	0.45	0.44
Colombia	Upper-Middle	Middle East & North-Africa	Export	Export	0.69	0.62	0.76
Czech Republic	High	East Asia. South-Asia & Pacific	Import	Import	0.30	0.10	0.50
Cyprus	High	Middle East & North-Africa	Import	Import	0.50	0.41	0.58
Dominican Republic	Upper-Middle	Middle East & North-Africa	Import	Import	0.30	0.34	0.27
Ecuador	Upper-Middle	Europe. Central Asia and North America	Export	Export	0.30	0.23	0.37
Ethiopia	Low	Europe. Central Asia and North America	Import	Import	0.68	0.65	0.71

Appendix 1 continues.

Country	Income Group	Geographic Group	Net Commodity	Oil	Overall	Inflows	Outflows
Germany	High	Europe. Central Asia and North America	Import	Import	0.31	0.26	0.35
Ghana	Lower-Middle	Middle East & North-Africa	Import	Import	0.69	0.80	0.58
Hungary	High	Europe. Central Asia and North America	Import	Import	0.31	0.22	0.41
Iceland	High	Europe. Central Asia and North America	Export	Import	0.32	0.31	0.33
Indonesia	Lower-Middle	Middle East & North-Africa	Export	Export	0.49	0.67	0.31
Iran. Islamic Rep.	Upper-Middle	Latin America & Caribbean	Export	Export	0.69	0.68	0.70
Israel	High	Sub-Saharan Africa	Import	Import	0.30	0.28	0.33
Kenya	Lower-Middle	Sub-Saharan Africa	Import	Import	0.38	0.43	0.33
Korea. Rep.	High	Sub-Saharan Africa	Import	Import	0.37	0.37	0.36
Kuwait	High	East Asia. South-Asia & Pacific	Export	Export	0.35	0.38	0.32
Lebanon	Upper-Middle	Latin America & Caribbean	Import	Import	0.50	0.50	0.50
Malta	High	Sub-Saharan Africa	Import	Import	0.44	0.41	0.48
Mexico	Upper-Middle	East Asia. South-Asia & Pacific	Export	Export	0.60	0.45	0.75
Myanmar	Lower-Middle	Sub-Saharan Africa	-	-	0.69	0.60	0.77
Nigeria	Lower-Middle	East Asia. South-Asia & Pacific	Export	Export	0.35	0.38	0.33
Poland	High	Sub-Saharan Africa	Import	Import	0.37	0.33	0.42
Portugal	High	Latin America & Caribbean	Import	Import	0.35	0.33	0.37
Romania	Upper-Middle	Europe. Central Asia and North America	Import	Import	0.40	0.30	0.50
Russian Federation	High	Latin America & Caribbean	Export	Export	0.69	0.69	0.69
Saudi Arabia	High	Latin America & Caribbean	Export	Export	0.55	0.63	0.47
Slovenia	High	Latin America & Caribbean	Import	Import	0.42	0.44	0.40
South Africa	Upper-Middle	Middle East & North-Africa	Export	Import	0.64	0.44	0.84
Switzerland	High	Middle East & North-Africa	Import	Import	0.30	0.30	0.30
Thailand	Upper-Middle	Latin America & Caribbean	Import	Import	0.70	0.61	0.79
Turkey	Upper-Middle	Europe. Central Asia and North America	Import	Import	0.35	0.20	0.50
Uganda	Low	Sub-Saharan Africa	Import	Import	0.40	0.20	0.59

Appendix 1 continues.

Country	Income Group	Geographic Group	Net Commodity	Oil	Overall	Inflows	Outflows
United Arab Emirates	High	East Asia. South-Asia & Pacific	Export	Export	0.31	0.37	0.24
Venezuela. RB	High	Europe. Central Asia and North America	Export	Export	0.37	0.48	0.27
		WALL - 14 countries			**0.88**	**0.80**	**0.97**
Algeria	Upper-Middle	Sub-Saharan Africa	Export	Export	1.00	1.00	0.99
Angola	Upper-Middle	Sub-Saharan Africa	-	-	0.96	1.00	0.92
China	Upper-Middle	Sub-Saharan Africa	Import	Import	0.98	1.00	0.96
Cote d'Ivoire	Lower-Middle	East Asia. South-Asia & Pacific	Export	Import	0.84	0.70	0.97
India	Lower-Middle	Middle East & North-Africa	Import	Import	0.92	0.90	0.94
Malaysia	Upper-Middle	East Asia. South-Asia & Pacific	Export	Export	0.84	0.69	0.99
Morocco	Lower-Middle	East Asia. South-Asia & Pacific	Import	Import	0.79	0.64	0.97
Pakistan	Lower-Middle	East Asia. South-Asia & Pacific	Import	Import	0.73	0.50	0.96
Philippines	Lower-Middle	Sub-Saharan Africa	Import	Import	0.76	0.53	1.00
Sri Lanka	Lower-Middle	Middle East & North-Africa	Import	Import	1.00	1.00	1.00
Swaziland	Lower-Middle	Sub-Saharan Africa	Import	Import	0.78	0.66	0.89
Tanzania	Low	East Asia. South-Asia & Pacific	Import	Import	0.95	0.95	0.95
Togo	Low	East Asia. South-Asia & Pacific	Export	Import	0.80	0.60	1.00
Tunisia	Upper-Middle	Middle East & North-Africa	Import	Export	1.00	1.00	1.00
				Overall average	**0.38**	**0.35**	**0.40**
				Overall median	**0.32**	**0.33**	**0.33**

Appendix 2. Standard Deviation of Sample Countries Macroeconomic Variables and Commodity prices.

Country	Capital Control Group	Income Group	Std of Macroeconomic Variables				Std. Dev (p)/ Std. Dev (GDP)			
			(GDP)	(C)	(I)	(TBY)	p^A	p^M	p^F	r
Baseline			**0.061**	**0.043**	**0.111**	**0.085**	**0.11**	**0.15**	**0.27**	**0.02**
Argentina	Gate	High	0.06	0.06	0.13	0.09	4.10	5.95	7.58	0.48
Australia	Gate	High	0.04	0.02	0.08	0.05	1.30	1.89	2.41	0.15
Bahrain	Gate	High	0.06	0.04	0.13	0.07	1.78	2.58	3.28	0.21
Bangladesh	Gate	Lower-Middle	0.07	0.06	0.14	0.10	7.79	11.29	14.39	0.92
Bolivia	Gate	Lower-Middle	0.05	0.03	0.12	0.10	7.81	11.33	14.44	0.92
Brazil	Gate	Upper-Middle	0.03	0.03	0.10	0.07	5.09	7.39	9.42	0.60
Bulgaria	Gate	Upper-Middle	0.08	0.06	0.16	0.09	14.59	21.16	26.97	1.72
Burkina Faso	Gate	Low	0.11	0.07	0.17	0.15	7.86	11.40	14.53	0.93
Chile	Gate	High	0.07	0.05	0.12	0.08	4.01	5.81	7.41	0.47
Colombia	Gate	Upper-Middle	0.05	0.02	0.10	0.08	3.51	5.09	6.49	0.41
Cyprus	Gate	High	0.04	0.02	0.08	0.05	1.79	2.59	3.30	0.21
Czech Republic	Gate	High	0.04	0.03	0.11	0.07	4.47	6.48	8.26	0.53
Dominican Republic	Gate	Upper-Middle	0.05	0.03	0.10	0.08	5.40	7.83	9.99	0.64
Ecuador	Gate	Upper-Middle	0.05	0.03	0.10	0.08	2.12	3.08	3.93	0.25
Ethiopia	Gate	Low	0.08	0.05	0.17	0.14	3.53	5.12	6.53	0.42
Germany	Gate	High	0.02	0.02	0.05	0.04	4.40	6.39	8.14	0.52
Ghana	Gate	Lower-Middle	0.07	0.03	0.16	0.14	3.56	5.17	6.59	0.42
Hungary	Gate	High	0.04	0.03	0.07	0.06	2.70	3.91	4.99	0.32
Iceland	Gate	High	0.06	0.03	0.11	0.06	4.33	6.28	8.00	0.51
Indonesia	Gate	Lower-Middle	0.07	0.05	0.13	0.10	2.94	4.26	5.43	0.35
Iran. Islamic Rep.	Gate	Upper-Middle	0.09	0.07	0.16	0.12	5.99	8.69	11.08	0.71
Israel	Gate	High	0.04	0.02	0.08	0.06	3.63	5.26	6.71	0.43
Kenya	Gate	Lower-Middle	0.08	0.06	0.15	0.11	3.73	5.42	6.90	0.44
Korea. Rep.	Gate	High	0.05	0.03	0.09	0.06	3.96	5.75	7.32	0.47

Appendix 2 continues.

Country	Capital Control Group	Income Group	GDP	C	I	TBY	p^A	p^M	p^F	r
Kuwait	Gate	High	0.06	0.04	0.14	0.12	2.76	4.00	5.10	0.33
Lebanon	Gate	Upper-Middle	0.10	0.08	0.18	0.15	2.20	3.20	4.07	0.26
Malta	Gate	High	0.04	0.02	0.07	0.05	3.27	4.74	6.04	0.39
Mexico	Gate	Upper-Middle	0.08	0.06	0.10	0.08	7.76	11.25	14.34	0.92
Myanmar	Gate	Lower-Middle	0.08	0.05	0.18	0.16	6.11	8.86	11.30	0.72
Nigeria	Gate	Lower-Middle	0.10	0.07	0.14	0.12	3.67	5.33	6.79	0.43
Poland	Gate	High	0.05	0.03	0.09	0.06	2.99	4.33	5.52	0.35
Portugal	Gate	High	0.05	0.03	0.10	0.07	4.61	6.69	8.52	0.54
Romania	Gate	Upper-Middle	0.07	0.05	0.12	0.09	3.32	4.81	6.13	0.39
Russian Federation	Gate	High	0.07	0.05	0.15	0.11	3.13	4.54	5.78	0.37
Saudi Arabia	Gate	High	0.06	0.05	0.14	0.11	3.21	4.66	5.94	0.38
Slovenia	Gate	High	0.04	0.03	0.07	0.05	6.05	8.78	11.19	0.71
South Africa	Gate	Upper-Middle	0.05	0.04	0.08	0.06	2.72	3.94	5.02	0.32
Switzerland	Gate	High	0.03	0.02	0.05	0.04	1.46	2.12	2.70	0.17
Togo	Gate	Low	0.11	0.07	0.17	0.16	3.28	4.76	6.07	0.39
Uganda	Gate	Low	0.09	0.07	0.16	0.14	4.41	6.40	8.15	0.52
United Arab Emirates	Gate	High	0.08	0.06	0.12	0.09	6.67	9.67	12.33	0.79
United Kingdom	Gate	High	0.03	0.03	0.07	0.06	5.54	8.04	10.24	0.65
Yemen. Rep.	Gate	Lower-Middle	0.08	0.05	0.14	0.11	4.71	6.82	8.70	0.56
Austria	Open	High	0.03	0.01	0.06	0.04	4.02	5.83	7.43	0.47
Belgium	Open	High	0.02	0.02	0.06	0.05	0.76	1.11	1.41	0.09
Canada	Open	High	0.03	0.02	0.07	0.05	1.07	1.55	1.97	0.13
Costa Rica	Open	Upper-Middle	0.06	0.05	0.10	0.08	3.49	5.06	6.45	0.41
Denmark	Open	High	0.03	0.02	0.06	0.04	4.52	6.56	8.36	0.53
Egypt. Arab Rep.	Open	Lower-Middle	0.07	0.05	0.12	0.08	5.32	7.72	9.83	0.63

Appendix 2 continues

Country	Capital Control Group	Income Group	GDP	C	I	TBY	p^A	p^M	p^F	r
El Salvador	Open	Lower-Middle	0.09	0.05	0.15	0.11	3.29	4.77	6.08	0.39
Finland	Open	High	0.03	0.03	0.07	0.05	4.57	6.63	8.45	0.54
France	Open	High	0.02	0.02	0.07	0.04	2.10	3.04	3.88	0.25
Greece	Open	High	0.06	0.03	0.09	0.07	6.07	8.80	11.22	0.72
Guatemala	Open	Lower-Middle	0.06	0.03	0.13	0.10	4.43	6.43	8.19	0.52
Hong Kong SAR	Open	High	0.04	0.04	0.07	0.05	2.21	3.21	4.09	0.26
Ireland	Open	High	0.04	0.02	0.06	0.04	2.38	3.45	4.40	0.28
Italy	Open	High	0.02	0.02	0.05	0.04	5.50	7.98	10.17	0.65
Japan	Open	High	0.03	0.02	0.06	0.05	4.03	5.85	7.45	0.48
Mauritius	Open	Upper-Middle	0.06	0.05	0.11	0.08	5.93	8.61	10.97	0.70
Netherlands	Open	High	0.03	0.02	0.06	0.04	2.38	3.46	4.41	0.28
New Zealand	Open	High	0.04	0.02	0.06	0.04	2.64	3.83	4.88	0.31
Nicaragua	Open	Lower-Middle	0.08	0.05	0.16	0.12	2.38	3.46	4.41	0.28
Norway	Open	High	0.02	0.02	0.06	0.05	3.17	4.60	5.86	0.37
Oman	Open	High	0.06	0.04	0.11	0.08	2.97	4.30	5.48	0.35
Panama	Open	Upper-Middle	0.06	0.04	0.09	0.06	3.89	5.64	7.19	0.46
Paraguay	Open	Upper-Middle	0.07	0.04	0.13	0.11	1.80	2.61	3.32	0.21
Peru	Open	Upper-Middle	0.08	0.04	0.13	0.12	1.45	2.10	2.68	0.17
Singapore	Open	High	0.06	0.03	0.10	0.07	2.07	3.00	3.82	0.24
Spain	Open	High	0.04	0.03	0.08	0.06	3.19	4.63	5.90	0.38
Sweden	Open	High	0.02	0.02	0.06	0.04	2.53	3.67	4.68	0.30
Tanzania	Open	Low	0.08	0.06	0.16	0.13	5.37	7.78	9.92	0.63
United States	Open	High	0.02	0.02	0.06	0.04	3.99	5.79	7.38	0.47
Uruguay	Open	High	0.03	0.05	0.09	0.08	3.69	5.35	6.82	0.44
Venezuela. RB	Open	High	0.09	0.06	0.12	0.09	3.08	4.47	5.69	0.36

Appendix 2 continues.

Country	Capital Control Group	Income Group	GDP	C	I	TBY	p^A	p^M	p^F	r
Zambia	Open	Lower-Middle	0.10	0.08	0.13	0.12	5.25	7.62	9.71	0.62
Algeria	Wall	Upper-Middle	0.06	0.05	0.12	0.08	5.23	7.59	9.67	0.62
Angola	Wall	Upper-Middle	0.08	0.07	0.13	0.10	5.35	7.77	9.90	0.63
China	Wall	Upper-Middle	0.07	0.03	0.10	0.09	2.71	3.93	5.00	0.32
Cote d'Ivoire	Wall	Lower-Middle	0.09	0.04	0.15	0.12	2.23	3.23	4.12	0.26
India	Wall	Lower-Middle	0.08	0.05	0.10	0.09	5.62	8.16	10.39	0.66
Malaysia	Wall	Upper-Middle	0.09	0.06	0.10	0.08	2.88	4.18	5.32	0.34
Morocco	Wall	Lower-Middle	0.07	0.05	0.11	0.09	3.75	5.44	6.93	0.44
Pakistan	Wall	Lower-Middle	0.07	0.05	0.14	0.10	1.61	2.33	2.97	0.19
Philippines	Wall	Lower-Middle	0.06	0.04	0.12	0.09	5.08	7.36	9.38	0.60
Sri Lanka	Wall	Lower-Middle	0.09	0.08	0.17	0.13	5.83	8.46	10.78	0.69
Swaziland	Wall	Lower-Middle	0.11	0.08	0.19	0.17	2.22	3.22	4.10	0.26
Thailand	Wall	Upper-Middle	0.09	0.07	0.15	0.14	1.84	2.67	3.40	0.22
Tunisia	Wall	Upper-Middle	0.08	0.08	0.12	0.10	3.86	5.60	7.13	0.46
Turkey	Wall	Upper-Middle	0.08	0.07	0.11	0.11	3.40	4.94	6.29	0.40
Relative Standard Deviation (Std. Dev(p)/Mean(StdDev(GDP)))							3.10	4.49	5.73	0.37
Median							3.63	5.26	6.71	0.43

Appendix 3. Absolute Volatilities of Macroeconomic Variables

Table A1. Median Absolute Deviation and Absolute Volatilities in Income Groups

Specification		Group Size	Median Absolute Deviation (%)				Absolute volatility (%)			
			Y	C	I	TBY	Y	C	I	TBY
Baseline		89	34.4	3.8	8.1	9.9	3.71	3.27	12.20	8.21
High Income		42	13.1	10.5	14.5	13.0	3.55	3.13	11.70	5.57
	Open	21	10.8	9.0	15.8	**14.8**	3.37	2.51	7.00	5.06
	Gate	21	**14.6**	**20.2**	**17.9**	10.3	**5.27**	**3.56**	**9.99**	**7.06**
	Wall	-	-	-	-		-	-	-	-
Upper-Middle Income		22	18.3	6.2	15.6	12.8	4.42	3.89	12.81	9.90
	Open	5	11.3	7.3	**15.2**	5.0	6.63	4.52	11.41	9.18
	Gate	12	12.5	**10.5**	14.6	**29.6**	6.93	5.10	**12.36**	**9.67**
	Wall	5	**23.0**	4.0	2.6	5.7	**7.66**	**5.93**	11.46	8.97
Lower-Middle Income		20	22.6	11.4	13.7	9.1	3.70	3.26	12.27	8.35
Low Income		5	10.2	6.7	15.2	8.8	3.71	3.26	12.49	8.44
	Open	6	5.5	3.1	5.2	**9.0**	8.20	5.01	13.76	10.89
	Gate	10	13.7	**22.2**	**17.0**	8.5	8.18	5.42	**15.31**	**12.53**
	Wall	9	**16.7**	7.6	11.2	8.4	**8.59**	**5.98**	14.67	11.96

Table A2. Median Absolute Deviation and Absolute Volatilities in Trade Groups

Specification		Group Size	Median Absolute Deviation (%)				Absolute Volatility (%)			
			Y	C	I	TBY	Y	C	I	TBY
Baseline		89	34.4	3.8	8.1	9.9	3.71	3.27	12.20	8.21
Net Commodity										
Exporters		31	19.0	16.2	16.3	15.7	7.25	4.75	11.91	9.34
	Open	9	8.1	6.1	13.7	12.1	5.85	3.73	9.74	7.71
	Gate	18	**19.7**	**16.5**	**18.3**	**27.7**	7.10	4.66	12.32	9.33
	Wall	4	7.1	9.5	3.8	8.8	**8.80**	**5.86**	**13.67**	**10.97**
Importers		56	14.8	11.9	15.5	11.1	6.06	4.40	11.17	8.68
	Open	23	12.8	11.1	**18.3**	**9.5**	4.37	3.12	8.65	6.44
	Gate	24	**23.3**	**12.5**	14.4	8.8	5.81	4.22	11.29	8.59
	Wall	9	19.7	10.1	9.5	7.1	**8.01**	**5.86**	**13.57**	**10.99**
Oil Traders										
Exporters		21	23.0	22.0	13.1	25.6	6.75	4.64	11.64	9.01
	Open	5	7.9	8.5	4.1	7.3	5.38	3.41	9.91	7.38
	Gate	13	**15.2**	5.9	**13.2**	**29.3**	7.03	4.67	**12.33**	**9.66**
	Wall	3	1.9	**10.8**	5.0	5.7	**7.84**	**6.55**	11.51	8.88
Importers		66	15.0	10.2	15.1	10.4	3.37	2.98	11.74	8.03
	Open	27	7.9	8.5	4.1	7.3	4.67	3.27	8.78	6.69
	Gate	29	15.2	5.9	**13.2**	**29.3**	6.06	4.29	11.46	8.57
	Wall	10	**18.7**	**8.8**	12.9	8.8	**8.38**	**5.65**	**14.23**	**11.62**
Excluding Large Commodity Exporters		50	31.1	23.8	20.9	15.9	6.95	4.77	12.51	9.71
	Open	13	9.9	**15.0**	**16.8**	3.9	6.76	4.51	11.60	9.05
	Gate	26	**20.9**	8.6	14.5	8.8	6.37	4.26	12.23	9.24
	Wall	11	18.3	10.1	8.4	**9.0**	**8.53**	**6.29**	**14.24**	**11.60**

Table A3. Median Absolute Deviation and Absolute Volatilities in Geographic Regions

Specification		Group Size	Median Average Deviation (%)				Absolute Volatility (%)			
			Y	C	I	TBY	Y	C	I	TBY
Baseline		**89**	**34.4**	**3.8**	**8.1**	**9.9**	**3.71**	**3.27**	**12.20**	**8.21**
East Asia, South Asia & Pacific		16	13.5	4.9	25.5	7.4	6.48	4.54	11.24	8.72
	Open	4	7.3	3.5	**28.2**	3.3	4.18	2.90	7.32	5.28
	Gate	6	**19.8**	**10.7**	26.2	**16.3**	6.78	4.84	**12.76**	**10.07**
	Wall	6	12.0	5.0	15.5	4.6	**7.71**	**5.32**	12.33	9.68
Europe, Central Asia and North America		28	14.0	14.8	13.7	10.7	0.04	4.00	2.79	8.09
	Open	15	11.8	**14.1**	11.7	**17.1**	2.97	2.14	6.53	4.63
	Gate	13	**13.4**	9.7	**20.7**	6.6	**5.19**	**3.55**	**9.89**	**7.05**
	Wall	-	-	-	-	-	-	-	-	-
Latin America & Caribbean		17	16.3	17.5	13.7	14.1	6.39	4.18	11.69	9.16
	Open	8	11.3	12.2	**12.6**	6.5	**6.76**	**4.37**	**12.34**	**9.97**
	Gate	9	**16.3**	**13.5**	8.7	**18.7**	6.06	4.01	11.11	8.44
	Wall	-	-	-	-	-	-	-	-	-
Middle East & North Africa		14	12.7	11.6	17.8	16.1	6.92	5.08	12.41	9.37
	Open	3	2.0	8.5	4.1	4.8	**7.27**	4.48	12.22	9.17
	Gate	8	**14.2**	**18.1**	**9.9**	**19.1**	6.69	4.93	**12.77**	**9.54**
	Wall	3	0.5	1.9	3.3	0.9	7.21	**6.09**	11.63	9.14
Sub-Saharan Africa		14	19.0	20.7	13.4	12.4	8.79	6.13	14.89	12.31
	Open	2	**26.3**	7.7	3.7	3.6	7.97	6.58	12.05	9.90
	Gate	7	15.4	**25.4**	**11.4**	**11.6**	8.48	5.62	14.84	12.20
	Wall	5	11.3	14.1	4.9	5.2	**9.55**	**6.67**	**16.09**	**13.41**

Appendix 4. Share of Variances Explained by World Shocks and Mediated by Commodity Prices in Different Countries by Using Sequential Estimation

Country	Corrected estimates				Uncorrected estimates			
	Y (%)	C (%)	I (%)	TB/Y (%)	Y (%)	C (%)	I (%)	TB/Y (%)
Algeria	1.1	21.0	17.4	28.5	20.2	35.6	31.4	39.7
Angola	39.7	14.8	20.0	35.8	48.9	28.6	32.7	46.6
Argentina	63.1	66.8	54.3	45.4	68.8	71.8	61.6	54.9
Australia	23.1	1.1	19.5	33.9	33.0	13.6	29.1	42.1
Austria	35.6	3.5	25.6	25.8	43.4	16.5	34.6	34.6
Bahrain	13.7	26.2	44.6	28.5	33.7	43.3	54.9	42.4
Bangladesh	12.1	0.5	4.8	2.6	27.7	16.1	20.8	15.1
Belgium	63.7	33.8	54.7	36.1	68.6	43.1	60.5	44.9
Bolivia	54.2	10.9	21.1	2.0	60.9	26.1	33.7	19.0
Brazil	24.3	14.2	17.1	48.5	36.1	29.4	30.5	56.1
Bulgaria	59.2	61.3	15.7	63.3	65.6	67.0	32.0	69.1
Burkina Faso	25.6	32.5	2.6	12.8	36.9	41.7	18.4	26.1
Canada	24.8	21.6	38.5	42.5	35.5	32.8	46.2	49.4
Chile	20.1	26.7	41.6	18.8	30.6	36.8	48.1	29.9
China	62.0	17.0	57.4	17.6	67.1	32.5	63.3	31.9
Colombia	62.5	56.9	70.6	69.5	67.2	63.1	74.9	73.0
Costa Rica	23.5	26.8	7.5	1.5	32.7	34.6	18.3	13.3
Cote d'Ivoire	11.8	31.4	24.9	3.8	28.4	42.1	36.9	12.2
Cyprus	40.3	22.2	36.4	9.5	49.1	33.4	46.3	24.4
Czech Republic	45.3	7.0	22.7	15.7	56.9	18.8	39.9	34.3
Denmark	21.6	1.4	19.0	2.4	31.6	13.7	30.4	16.8
Dominican Republic	4.1	27.7	15.2	11.8	20.0	38.1	28.3	23.0
Ecuador	65.4	40.0	5.6	3.3	68.1	45.4	16.7	15.4
Egypt. Arab Rep.	15.6	18.7	31.3	30.5	29.0	31.8	41.4	40.0
El Salvador	18.2	1.2	7.5	11.9	32.4	19.2	12.3	26.3
Ethiopia	2.2	34.4	27.4	4.1	18.9	44.2	38.3	12.6
Finland	40.7	35.9	30.4	0.1	47.9	43.5	40.4	15.5
France	65.6	62.4	74.2	27.3	68.8	66.0	76.4	36.9
Germany	34.6	5.2	38.7	12.9	44.8	22.6	48.7	26.8
Ghana	38.5	2.1	2.9	15.7	45.8	10.8	9.3	26.8
Greece	36.6	31.5	12.2	26.9	44.7	40.1	24.7	36.4
Guatemala	25.5	9.3	4.8	8.5	34.8	23.2	16.7	4.2
Hong Kong SAR	41.6	18.4	6.3	13.9	48.9	30.1	20.0	25.6
Hungary	0.2	29.8	13.4	5.1	16.4	38.9	4.9	18.6
Iceland	37.5	27.2	18.0	7.0	44.8	35.9	29.2	20.0
India	37.9	30.9	35.2	22.9	46.2	40.8	44.2	34.2
Indonesia	66.0	55.3	65.1	61.3	70.7	61.0	69.7	66.4
Iran. Islamic Rep.	39.0	54.8	8.0	0.4	49.4	61.2	25.2	16.6
Ireland	30.0	21.5	12.5	22.8	39.0	32.1	25.1	32.1

Appendix 6 continues.

Country	Corrected estimates				Uncorrected estimates			
	Y (%)	C (%)	I (%)	TB/Y (%)	Y (%)	C (%)	I (%)	TB/Y (%)
Israel	4.7	7.9	14.4	12.1	18.8	6.8	3.6	23.2
Italy	61.9	31.9	42.1	0.8	66.3	41.4	49.2	14.6
Japan	34.1	24.8	56.5	20.6	41.9	34.7	60.3	31.1
Kenya	65.7	60.0	33.9	33.1	70.1	65.1	44.1	43.2
Korea. Rep.	7.8	3.9	1.7	3.7	20.9	11.3	14.1	18.3
Kuwait	6.6	16.1	32.2	2.0	21.7	27.0	42.8	16.9
Lebanon	42.1	22.6	44.4	0.0	54.3	38.3	55.1	21.3
Malaysia	26.0	44.8	22.4	22.9	35.1	50.6	32.6	32.2
Malta	32.5	34.1	43.6	51.9	45.3	44.8	53.1	59.6
Mauritius	20.9	19.4	56.4	23.2	33.9	31.7	62.2	34.7
Mexico	49.0	27.1	21.2	0.1	56.8	38.7	34.0	18.9
Morocco	0.6	8.4	20.6	27.7	12.9	5.9	32.4	37.8
Myanmar	61.5	49.1	57.6	2.3	67.7	58.3	64.0	18.4
Netherlands	45.1	16.3	17.6	6.4	51.5	28.6	28.4	10.0
New Zealand	5.5	16.5	0.0	18.6	20.0	29.5	15.9	29.5
Nicaragua	9.2	9.1	0.1	17.4	22.9	22.3	16.5	30.2
Nigeria	76.4	59.8	19.8	32.6	79.4	65.2	33.5	43.0
Norway	5.8	3.6	4.4	5.7	20.1	17.7	11.5	10.3
Oman	0.0	32.2	6.1	57.7	0.0	46.0	19.7	66.3
Pakistan	47.3	29.9	18.9	26.8	55.5	41.5	32.4	39.2
Panama	57.6	19.0	46.8	16.0	64.3	32.3	54.7	29.2
Paraguay	59.4	44.7	62.0	26.5	64.5	52.4	66.4	36.6
Peru	12.2	2.3	25.4	18.2	22.5	13.8	32.9	27.0
Philippines	18.2	20.8	7.7	6.9	32.2	33.2	23.5	10.3
Poland	26.9	27.6	41.6	1.4	41.8	41.5	52.6	18.2
Portugal	50.1	36.9	15.5	9.7	55.7	45.0	27.5	6.6
Romania	2.9	23.8	37.0	51.4	22.9	39.2	49.9	59.8
Russian Federation	76.5	56.7	80.8	70.7	79.6	63.7	83.4	76.0
Saudi Arabia	26.4	60.1	71.7	32.2	38.8	65.6	75.3	43.5
Singapore	48.8	25.3	72.2	10.6	55.9	37.6	75.5	24.2
Slovenia	12.3	0.3	9.8	11.7	11.4	17.1	12.2	26.6
South Africa	54.0	66.5	72.4	69.6	60.3	71.0	76.1	73.2
Spain	60.6	57.0	45.8	39.0	64.1	61.4	52.9	46.7
Sri Lanka	50.0	23.8	73.0	30.0	56.5	35.0	76.5	40.7
Swaziland	55.8	65.0	17.6	35.2	61.4	70.5	32.2	45.8
Sweden	22.9	7.5	41.8	2.8	34.6	8.1	48.3	17.1
Switzerland	59.4	68.2	61.1	2.6	63.7	71.3	65.2	10.2
Tanzania	73.6	4.0	63.7	30.3	76.3	17.5	67.5	41.2
Thailand	9.9	0.7	9.4	8.6	23.1	15.7	21.8	20.3
Togo	36.4	19.1	39.5	38.3	46.6	33.6	47.8	47.3
Tunisia	21.2	12.5	40.3	40.5	34.9	7.1	50.7	49.2

Appendix 6 continues.

Country	Corrected estimates				Uncorrected estimates			
	Y (%)	**C (%)**	**I (%)**	**TB/Y (%)**	**Y (%)**	**C (%)**	**I (%)**	**TB/Y (%)**
Turkey	2.9	10.2	11.6	10.6	18.2	8.2	25.2	23.9
Uganda	46.0	19.7	57.8	24.6	55.7	33.9	64.0	36.7
United Arab Emirates	59.0	26.6	38.8	9.2	64.6	37.5	47.0	23.7
United Kingdom	60.4	65.6	52.0	44.2	64.8	68.9	57.5	50.6
United States	35.5	46.0	24.6	62.1	43.9	52.2	34.9	65.7
Uruguay	43.2	14.7	42.2	4.2	48.7	23.7	47.5	8.3
Venezuela. RB	34.8	55.9	30.0	34.1	43.6	61.5	39.8	43.7
Yemen. Rep.	15.7	61.1	12.4	61.3	11.8	68.8	32.1	69.4
Zambia	13.7	10.2	1.9	35.3	28.0	24.9	15.1	44.8
Median	35.5	24.8	25.4	18.6	44.7	35.9	36.9	31.1
MAD	34.4	3.8	8.1	9.9	24.4	0.3	5.6	8.6

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