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THE GLOBAL IMPACT OF THE SYSTEMIC ECONOMIES AND MENA BUSINESS CYCLES

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Abstract

This paper analyzes spillovers from macroeconomic shocks in systemic economies (China, the Euro Area, and the United States) to the Middle East and North Africa (MENA) region as well as outward spillovers from a GDP shock in the Gulf Cooperation Council (GCC) countries and MENA oil exporters to the rest of the world. This analysis is based on a Global Vector Autoregression (GVAR) model, estimated for 38 countries/regions over the period 1979Q2 to 2011Q2. Spillovers are transmitted across economies via trade, financial, and commodity price linkages. The results show that the MENA countries are more sensitive to developments in China than to shocks in the Euro Area or the United States, in line with the direction of evolving trade patterns and the emergence of China as a key driver of the global economy. Outward spillovers from the GCC region and MENA oil exporters are likely to be stronger in their immediate geographical proximity, but also have global implications.

JEL Classifications: C32, E17, E32, F44, O53, Q41.

Keywords: Global VAR (GVAR), interconnectedness, global macroeconomic modeling, impulse responses, macroeconomic shocks, international business cycle.

ملخص

تحلل هذه الورقة الآثار غير المباشرة من صدمات الاقتصاد الكلي في الاقتصادات النظامية (الصين، ومنطقة اليورو، والولايات المتحدة) على منطقة الشرق الأوسط وشمال أفريقيا (MENA) فضلا عن الآثار غير المباشرة على الخارج من صدمة الناتج المحلي الإجمالي في دول مجلس التعاون الخليجي (GCC) والبلدان المصدرة للنفط و منطقة الشرق الأوسط وشمال أفريقيا على بقية العالم. ويستند هذا التحليل على نموذج المتجهات العالمي (Autoregression GVAR) ، يقدر 38 بلدا / المناطق خلال الفترة 1979 إلى 2011. تنتقل الآثار غير المباشرة عبر الاقتصادات عن طريق التجارة، المالية، وروابط أسعار السلع الأساسية. وتبين النتائج أن دول المنطقة هي أكثر حساسية للتطورات في الصين من الصدمات في منطقة اليورو أو الولايات المتحدة، وذلك تمشيا مع اتجاه تطور أنماط التجارة وظهور الصين بوصفها أحد المحركات الرئيسية للاقتصاد العالمي. الآثار غير المباشرة على الخارج من دول مجلس التعاون الخليجي والشرق الأوسط المصدرة للنفط من المرجح أن تكون أقوى في قربها الجغرافي المباشر، ولكن أيضا لها آثار عالمية.

1. Introduction

The Global Vector Autoregression (GVAR) literature almost exclusively focuses on business cycle linkages among advanced and major emerging market economies, with limited attention to growth spillovers to/from the Middle East and North Africa (MENA) countries, in particular the Gulf Cooperation Council (GCC) region. While the international business cycle is very important for the MENA region's economic performance, macroeconomic and political developments in this region also have large consequences for the rest of the world, due to the abundance of natural resources in the Middle East and North Africa. We use a GVAR model to disentangle the size and speed of the transmission of different macroeconomic shocks originating from three systemic countries to the Maghreb (Algeria, Libya, Mauritania, Morocco, and Tunisia), Mashreq (Egypt, Jordan, and Syria), and GCC (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE) regions, as well as outward spillovers from the MENA region to the rest of the world. We also focus on the emergence of China as a global force in the world economy, and study how changes in trade patterns between China and the rest of the world may have affected the transmission of the international business cycle to MENA countries and other systemic economies.

Our approach uses a dynamic multi-country framework for the analysis of the international transmission of shocks and is based on the model developed in Cashin et al. (2012). The framework comprises 38 country/region-specific models, among which is a single Euro Area region (comprising 8 of the 11 countries that joined the Euro on January 1, 1999) as well as the GCC region. These individual models are solved in a global setting where core macroeconomic variables of each economy are related to corresponding foreign variables (constructed exclusively to match the international trade pattern of the country under consideration). The model has both real and financial variables: real GDP, inflation, real equity price, real effective exchange rate, short and long-term interest rates, a measure of global oil production, and the price of oil. This framework is able to account for various transmission channels, including not only trade relationships but also financial and commodity price linkages—see Dees et al. (2007a) for more details. Compared to Dees et al. (2007a), the current paper advances the work on GVAR modelling in the following directions: (i) we extend the geographical coverage of the GVAR model to the MENA region as well as to other major oil-exporters; (ii) we add a measure of global oil production to the GCC model to account for supply side factors in the world oil market, as many supply shortfalls originate in the MENA region (for instance, the more recent Arab Spring and associated supply shortfalls from Libya, or the effects of sanctions on Iran and the resulting drop in its oil exports); and (iii) we investigate the growing impact of China's macroeconomic shocks on other systemic economies, the MENA region in general, and major oil exporters in particular.

We estimate the GVAR model based on two sets of fixed trade weights at different points in time, being 20 years apart. Specifically, we make use of a set of weights averaged over 1986 and 1988 and another between 2006 to 2008. This allows us to study how the transmission of shocks has changed following the emergence of China as a major driver of the world economy. Our results, using quarterly data between 1979Q2 to 2011Q2, indicate that the impact of a Chinese GDP shock on a typical MENA economy, as well as on other systemic countries and oil exporters, has increased significantly since the mid-1980s. A negative GDP shock in China (using the 2006-08 weights) would have major global repercussions, especially for less-diversified commodity exporters. The effects on other systemic countries are smaller but not trivial. At the same time, the impact of a U.S. GDP shock on a typical MENA economy is large, and has not changed significantly since the mid-1980s. We also find that outward spillovers from the GCC and MENA oil exporters are likely to be stronger in their immediate geographical proximity, but they also have implications for systemic economies and other major oil exporters.

The rest of the paper is organized as follows. Section 2 describes the GVAR methodology while section 3 outlines our modelling approach and presents the country-specific estimates and tests. Section 4 focuses on the potential macroeconomic consequences of a GDP shock in systemic countries. Section 5 investigates the extent to which the macroeconomic conditions in the GCC region and MENA oil exporters affect, and are affected by, the global economy. Finally, section 6 concludes.

2. The Global VAR (GVAR) Methodology

We consider $N+1$ countries in the global economy, indexed by $i = 0,1,...,N$. With the exception of the United States, which we label as 0 and take to be the reference country, all other N countries are modelled as small open economies. This set of individual VARX* models is used to build the GVAR framework. Following Pesaran (2004) and Dees et al. (2007a), a VARX* (s_i, s_i^*) model for the ith country relates a $k_i \times 1$ vector of domestic macroeconomic variables (treated as endogenous), $\mathbf{x}_{it}$, to a $k_i^* \times 1$ vector of country-specific foreign variables (taken to be weakly exogenous), $\mathbf{x}_{it}^*$, and to a $m_d \times 1$ vector of observed global factors, $\mathbf{d}_t$, which could include such variables as commodity prices:

$$\mathbf{\Phi}_i(L, s_i)\mathbf{x}_{it} = \mathbf{a}_{i0} + \mathbf{a}_{i1}t + \mathbf{\Lambda}_i(L, s_i^*)\mathbf{x}_{it}^* + \quad {}_i(L, s_i^*)\mathbf{d}_t + \mathbf{u}_{it}, \tag{1}$$

for $t = 1,2,...,T$, where $\mathbf{a}_{i0}$ and $\mathbf{a}_{i1}$ are $k_i \times 1$ vectors of fixed intercepts and coefficients on the deterministic time trends, respectively, and $\mathbf{u}_{it}$ is a $k_i \times 1$ vector of country-specific shocks, which we assume are serially uncorrelated with zero mean and a non-singular covariance matrix, $\mathbf{\Sigma}_{ii}$, namely $\mathbf{u}_{it} : i.i.d.(0, \mathbf{\Sigma}_{ii})$. Furthermore, $\mathbf{\Phi}_i(L, s_i) = I - \sum_{i=1}^{s_i} \mathbf{\Phi}_i L^i$, $\mathbf{\Lambda}_i(L, s_i^*) = \sum_{i=0}^{s_i^*} \mathbf{\Lambda}_i L^i$, and $\quad {}_i(L, s_i^*) = \sum_{i=0}^{s_i^*} \quad {}_i L^i$ are the matrix lag polynomial of the coefficients associated with the domestic, foreign, and global variables, respectively. As the lag orders for these variables, s_i and s_i^*, are selected on a country-by-country basis, we are explicitly allowing for $\mathbf{\Phi}_i(L, s_i)$, $\mathbf{\Lambda}_i(L, s_i^*)$, and $\quad {}_i(L, s_i^*)$ to differ across countries.

The country-specific foreign variables are constructed as cross-sectional averages of the domestic variables using data on bilateral trade as the weights, w_{ij}:

$$\mathbf{x}_{it}^* = \sum_{j=0}^{N} w_{ij}\mathbf{x}_{jt}, \tag{2}$$

where $j = 0,1,...N$, $w_{ii} = 0$, and $\sum_{j=0}^{N} w_{ij} = 1$. For empirical application, the trade weights are computed as fixed weights based on the average trade flows measured over the period 2006 to 2008. However, the weights can be based on any time period and can be allowed to be time-varying.

Although estimation is done on a country-by-country basis, the GVAR model is solved for the world as a whole, taking account of the fact that all variables are endogenous to the system as a whole. After estimating each country VARX*(s_i, s_i^*) model separately, all the $k = \sum_{i=0}^{N} k_i$ endogenous variables, collected in the $k \times 1$ vector $\mathbf{x}_t = (\mathbf{x}_{0t}', \mathbf{x}_{1t}', ..., \mathbf{x}_{Nt}')'$, need to be solved simultaneously using the link matrix defined in terms of the country-specific weights. To see this, we can write the VARX* model in equation (1) more compactly as:

$$\mathbf{A}_i\left(L, s_i, s_i^*\right)\mathbf{z}_{it} = \quad _{it}, \tag{3}$$

for $i = 0,1,...,N$, where

$$\mathbf{A}_i\left(L, s_i, s_i^*\right) = \left[\mathbf{\Phi}_i\left(L, s_i\right) - \mathbf{\Lambda}_i\left(L, s_i^*\right)\right], \mathbf{z}_{it} = \left(\mathbf{x}_{it}^{'}, \mathbf{x}_{it}^{'*}\right)^{'},$$

$$_{it} = \mathbf{a}_{i0} + \mathbf{a}_{i1}t + \quad _i\left(L, s_i^*\right)\mathbf{d}_t + \mathbf{u}_{it}. \tag{4}$$

Note that given equation (2) we can write:

$$\mathbf{z}_{it} = \mathbf{W}_i\mathbf{x}_t, \tag{5}$$

where $\mathbf{W}_i = \left(\mathbf{W}_{i0}, \mathbf{W}_{i1},..., \mathbf{W}_{iN}\right)$ with $\mathbf{W}_{ii} = 0$ is the $\left(k_i + k_i^*\right) \times k$ weight matrix for country i defined by the country-specific weights, w_{ij}. Using (5) we can write equation (3) as:

$$\mathbf{A}_i\left(L, s\right)\mathbf{W}_i\mathbf{x}_t = \varphi_{it}, \tag{6}$$

where $\mathbf{A}_i\left(L, s\right)$ is constructed from $\mathbf{A}_i\left(L, s_i, s_i^*\right)$ by setting $s = \max\left(s_0, s_1,..., s_N, s_0^*, s_1^*,..., s_N^*\right)$ and augmenting the $s - s_i$ or $s - s_i^*$ additional terms in the power of the lag operator by zeros. Stacking (6), we obtain the Global VAR$\left(s\right)$ model in domestic variables only:

$$\mathbf{G}\left(L, s\right)\mathbf{x}_t = \varphi_t, \tag{7}$$

where

$$\mathbf{G}\left(L, s\right) = \left(l\mathbf{A}_0\left(L, s\right)\mathbf{W}_0\mathbf{A}_1\left(L, s\right)\mathbf{W}_1 1c.1c.1c.\mathbf{A}_N\left(L, s\right)\mathbf{W}_N\right), \varphi_t = \left(l\varphi_{0t}\varphi_{1t}1c.1c.1c.\varphi_{Nt}\right). \tag{8}$$

For an illustration of the solution of the GVAR model, using a VARX*$\left(1,1\right)$ model, see Pesaran (2004), and for a detailed exposition of the GVAR methodology see Dees et al. (2007a). The GVAR$\left(s\right)$ model in equation (7) can be solved recursively and used for a number of purposes, such as forecasting or impulse response analysis.

3. A Global VAR Model Including the MENA Region

We extend the country coverage of the GVAR dataset used in Dees et al. (2007a) by adding 14 countries located in the Middle East and North Africa region as well as three other Organization of the Petroleum Exporting Countries (OPEC) members (see table 1). Thus, our version of the GVAR model includes 50 countries, covering over 90% of world GDP as opposed to the "standard" 33 country set-up used in the literature (see Smith and Galesi 2010). Of the 50 countries included in our sample, 17 are oil exporters, of which 10 are current OPEC members and one is a former member (Indonesia left OPEC in January 2009). We were not able to include Angola and Iraq, the remaining two OPEC members, due to the lack of sufficiently long time series data. We therefore, extend the country coverage both in terms of major oil exporters and also by including an important region of the world when it comes to oil supply, the MENA region.

For empirical application, we create two regions, one of which comprises the six Gulf Cooperation Council (GCC) countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE); and the other is the Euro Area block comprising 8 of the 11 countries that initially joined the Euro in 1999: Austria, Belgium, Finland, France, Germany, Italy, Netherlands, and Spain. The time series data for the GCC block and the Euro Area block are constructed as cross-sectionally weighted averages of the domestic variables (described in detail below), using purchasing power parity GDP weights, averaged over the 2006-2008 period. Thus, as displayed in table 1, the GVAR model that we specify includes 38 country/region-specific VARX* models.

3.1 Variables

The macroeconomic variables included in the individual VARX* models depend on both the modelling strategy employed as well as whether data on a particular variable is available. Each country-specific model has a maximum of six domestic (endogenous) variables and five foreign (exogenous) variables. We also include two global variables, each of which is treated endogenously in only one country, while being weakly exogenous in the remaining 37 country models. Below, we describe the different variables included in our model and provide justification for our modelling specification. For various data sources used to build the quarterly GVAR dataset, covering 1979Q2 to 2011Q2, see the data appendix.

3.1.1 Domestic variables

Real GDP, y_{it}, the rate of inflation, π_{it}, short-term interest rate, r_{it}^S, long-term interest rate, r_{it}^L, and real equity prices, eq_{it} are the five domestic variables that are included in our model, as well as most of the GVAR applications in the literature. These five variables are constructed as:

$$y_{it} = \ln(GDP_{it}),\ \pi_{it} = p_{it} - p_{it-1},\ p_{it} = \ln(CPI_{it}),\ eq_{it} = \ln\left(EQ_{it}/CPI_{it}\right),$$

$$r_{it}^S = 0.25\ln(1 + R_{it}^S/100),\ r_{it}^L = 0.25\ln(1 + R_{it}^L/100), \quad (9)$$

where GDP_{it} is the real Gross Domestic Product at time t for country i, CPI_{it} is the consumer price index, EQ_{it} is a nominal Equity Price Index, and R_{it}^S (R_{it}^L) is the short-term (long-term) interest rate.

The GVAR literature also typically includes a sixth domestic variable, representing the real exchange rate and defined as $e_{it} - p_{it}$, that is the log of the nominal exchange rate of country i, $\ln\left(E_{it}\right)$, deflated by the domestic CPI. However, in a multi-country set-up, it might be better to consider a measure of the real effective exchange rate, rather than $e_{it} - p_{it}$. We therefore follow Dees et al. (2007b) and construct such a variable, $reer_{it}$.

To construct the real effective exchange rate for country i, we simply take the nominal effective exchange rate, $neer_{it}$, add the log of foreign price level $\left(p_{it}^*\right)$ and subtract the domestic $\left(p_{it}\right)$ price level. Note that $neer_{it}$ is a weighted average of the bilateral exchange rates between country i and all of its trading partners j, where $j = 0,...,N$. In the current application, we have a total of 36 countries and two regions in our model, $N = 37$; therefore, we can use the nominal exchange rates denominated in United States dollars for each country, e_{it}, to calculate $reer_{it}$. More specifically,

$$reer_{it} = neer_{it} + p_{it}^* - p_{it} = \sum_{j=0}^{37} w_{ij}\left(e_{it} - e_{jt}\right) + p_{it}^* - p_{it}, \quad (10)$$

where the foreign price is calculated as the weighted sum of log price level indices $\left(p_{jt}\right)$ of country i's trading partners, $p_{it}^* = \sum_{j=0}^{37} w_{ij} p_{jt}$, and w_{ij} is the trade share of country j for country i. Given that $\sum_{j=0}^{37} w_{ij} = 1$ and $e_{it}^* = \sum_{j=0}^{37} w_{ij} e_{jt}$, the real effective exchange rate can be written as:

$$reer_{it} = e_{it} - e_{it}^* + p_{it}^* - p_{it} = \left(e_{it} - p_{it}\right) - \left(e_{it}^* - p_{it}^*\right). \quad (11)$$

This constructed measure of the real effective exchange rate is then included in our model as the sixth domestic variable.

3.1.2 Foreign variables

We include five foreign variables in our model. In particular, all domestic variables, except for that of the real effective exchange rate, have corresponding foreign variables. The exclusion of $reer_{it}^*$ is simply because $reer_{it}$ already includes both domestic, $e_{it} - p_{it}$, and foreign, $e_{it}^* - p_{it}^*$, nominal exchanges rates deflated by the appropriate price levels, see equation (11). Therefore, $reer_{it}^*$ does not by itself have any economic meaning. The foreign variables are all computed as in equation (2), or more specifically:

$$y_{it}^* = \sum_{j=0}^{37} w_{ij} y_{jt},\ eq_{it}^* = \sum_{j=0}^{37} w_{ij} eq_{jt},\ \pi_{it}^* = p_{it}^* - p_{it-1}^*$$

$$r_{it}^{S*} = \sum_{j=0}^{37} w_{ij} r_{jt}^S,\ r_{it}^{L*} = \sum_{j=0}^{37} w_{ij} r_{jt}^L. \tag{12}$$

The trade weights, w_{ij}, are computed as a three-year average to reduce the impact of individual yearly movements on the weights:[1]

$$w_{ij} = \frac{T_{ij,2006} + T_{ij,2007} + T_{ij,2008}}{T_{i,2006} + T_{i,2007} + T_{i,2008}}, \tag{13}$$

where T_{ijt} is the bilateral trade of country i with country j during a given year t and is calculated as the average of exports and imports of country i with j, and $T_{it} = \sum_{j=0}^{N} T_{ijt}$ (the total trade of country i) for $t = 2006, 2007, 2008,$ in the case of all countries. The trade shares used to construct the foreign variables are given in the 38×38 matrix provided in table 7 of the data appendix.

3.1.3 Global variables

Given the importance of oil price and production for the MENA region, we also include nominal oil prices (in United States dollars), P_t^{oil}, as well as the quantity of oil produced in the world, Q_t^{oil}, in our model. As is now standard in the literature, we include log oil prices, p_t^{oil}, as a "global variable" determined in the U.S. VARX* model; that is the price of oil is included in the U.S. model as an endogenous variable while it is treated as weakly exogenous in the model for all other countries. The main reason for this is that the U.S. is the world's largest oil consumer. On average, about 27% of the world oil between 1979 and 2010 was consumed by the U.S., which is far larger than the other three major oil importers in the world (China, Euro area, and Japan), even when combined.

On the other hand, the GCC countries produce more than 22% of world oil and export around 30% of the world total. They also possess 36% of the world's proven oil reserves, and Saudi Arabia, by itself, has the largest spare capacity in the world. Thus, we include log of oil production, q_t^{oil}, as an endogenous variable in the GCC block, and as a weakly exogenous variable in all other countries. q_t^{oil} is therefore the second "global variable" in our model.[2]

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[1]A similar approach has also typically been followed in Global VAR models estimated in the literature. See, for example, Dees et al. (2007a).

[2]For a more detailed discussion of oil supply and price modelling in the GVAR model see Cashin et al. (2012).

Making one region out of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates, is not without economic reasoning. The rationale is that the GCC countries have in recent decades implemented a number of policies and initiatives to foster economic and financial integration with a view to establishing a monetary union based on the Euro Area model. Given the increased integration of these economies over the last three decades, the peg to a common currency (the United States dollar), flexible labor markets, and open capital accounts, it is therefore reasonable to group these countries as one region.[3]

3.2 MENA trade weights

The MENA countries are globally less competitive relative to their peers. The Middle East accounts for less than 1% of world non-fuel exports, compared with 4% from Latin America, and of its limited global export share, inter-regional trade accounts for less than a tenth, barely more than in 1960. The usual explanation for the poor trade performance in the region is its reliance on crude oil exports, and hence little success in developing significant merchandise exports. Furthermore, since most countries in the region export the same products --oil and gas-- they naturally do not tend to actively trade with each other (see table 2). More trade would enable firms to reap greater economies of scale, increase returns to investment, adopt superior technology, and hence, it would promote growth.[4]

Looking specifically at Table 2b, we note that the Euro Area is the most important trading partner for the Maghreb countries (Algeria, Libya, Mauritania, Morocco, and Tunisia). More than 48% of their trade originates in or is destined for the Euro Area. U.S. and China are also large trading partners for the Maghreb, with the weights ranging between 3-22% and 2-25% with the U.S. and China, respectively. However, Maghreb's trade with the GCC is generally limited to less than 1% of total trade in all countries except for Morocco (for which it is 6%).

On the other hand, the Mashreq countries (Egypt, Jordan, and Syria) trade much more with the GCC, where the shares are between 13-28%.[5] The Euro Area is nevertheless very important for the region as between 16-32% of Mashreq trade is destined for or originates in the eight Euro Area countries in our sample. Europe is also an important trading partner for Turkey (45%), as compared to China, the GCC, UK, and the U.S., where the individual trade weights are just above 6%. Iran's largest trading partner is the Euro Area (24%), but it also trades substantially with China, the GCC countries, and Japan (all exceeding 12%).

Comparing with other countries in the MENA region, the GCC's trade is less concentrated on one country/region, trading more than 10% with China, Euro Area, Japan and the U.S. individually. However, as mentioned before, this is mainly due to oil exports to different regions rather than having a more diversified export basket/market.

Comparing the more recent trade weights, averaged over 2006--2008, with those from 20 years ago in table 2a, we see that for the MENA region as a whole trade with the Euro Area has fallen, but trade with China has increased many fold for all countries. On the other hand, trade with the U.S. has increased for some but decreased for others, while trade between the region and GCC has remained more or less stable, except for Egypt, Iran, Jordan, and Syria for which it has increased between 8 (Iran) and 20 (Syria) percentage points, respectively.

Overall table 2 illustrates the continuing importance of the Euro Area countries in our sample for the MENA region, but also shows that both China and the U.S. are important for the region. We will therefore focus on spillovers from these three systemic economies to MENA countries in section 4. Moreover, given the emergence of China in the world economy and its increasing importance for the MENA region, and for the largest oil exporters in the world in

[3]See Mohaddes and Williams (2012) for more details.

[4]See Behar and Freund (2011) for an extensive discussion of the trade performance of the MENA region over the past 15 years.

[5]See Mohaddes and Raissi (2011) for more details regarding the link between the Mashreq countries and the GCC.

particular, we shall also illustrate how China's impact on the region and other systemic economies has changed over the past two decades.

Table 2 also illustrates that trade between the GCC and other MENA countries is large for a few economies but small for others. This is also the case for the overall trade between the GCC and the rest of the world: the GCC trade weights for China, Euro Area and the U.S. are between 3--4%, although trade with India is more than 20% and the trade shares with Japan and Korea are more than 12%, see table 7. However, given the importance of the Persian Gulf in determining oil supply (and eventually oil prices), we expect the GCC's performance to have a global impact through the commodity channel rather than purely via the trade one. Thus, we look at spillovers from the GCC to the rest of the world in section 5.

3.3 Model specification

Given the discussion in section 3.1, we specify three different sets of individual country-specific models. The first specification is common across all countries apart from the United States and the GCC block. These 36 VARX* models include six endogenous/domestic variables, when available, five country-specific foreign variables, and two global variables (see table 3). Using the same terminology as in equation (1), the 6×1 vector of endogenous and the 5×1 vector of exogenous variables are given by $\mathbf{x}_{it} = \left[y_{it}, \pi_{it}, eq_{it}, r_{it}^{S}, r_{it}^{L}, reer_{it} \right]$ and $\mathbf{x}_{it}^{*} = \left[y_{it}^{*}, \pi_{it}^{*}, eq_{it}^{*}, r_{it}^{*S}, r_{it}^{*L} \right]$ respectively, while the 2×1 vector of global variables is defined as $\mathbf{d}_{t} = \left[p_{t}^{oil}, q_{t}^{oil} \right]$.

The second specification relates to the GCC block only, for which the log of oil production, q_{t}^{oil}, is included in the model endogenously in addition to the 3 domestic variables in $\mathbf{x}_{it}$, while $\mathbf{x}_{it}^{*}$ and the log of nominal oil prices, p_{t}^{oil}, are included as weakly exogenous variables.

Finally, the U.S. model is specified differently from the others, mainly because of the dominance of the United States in the world economy. Firstly, based on the discussion above regarding oil consumption, the price of oil is included in the model endogenously. Secondly, given the importance of U.S. financial variables in the global economy, the U.S.-specific foreign financial variables, $eq_{US,t}^{*}$, and $r_{US,t}^{*L}$, are not included in this model. The exclusion of these two variables was also confirmed by our preliminary analysis, in which the weak exogeneity assumption was rejected for $eq_{US,t}^{*}$ and $r_{US,t}^{*L}$ in the U.S. model. Finally, since e_{it} is expressed as domestic currency price of a United States dollar, $e_{US,t} - p_{US,t}$, it is by construction determined outside this model. Thus, instead of the real effective exchange rate, we included $e_{US,t}^{*} - p_{US,t}^{*}$ as a weakly exogenous foreign variable in the U.S. model.

3.4 Country-specific estimates and tests

Initial estimations and tests of the individual VARX*(s_i, s_i^{*}) models are conducted under the assumption that the country-specific foreign and global variables are weakly exogenous and integrated of order one, $I(1)$, and that the parameters of the models are stable over time. As both assumptions are needed for the construction and the implementation of the GVAR model, we will test and provide evidence for these assumptions in sections 3.4.2 and 3.4.3.

For the interpretation of the long-run relations, and also to ensure that we do not work with a mixture of $I(1)$ and $I(2)$ variables, we need to consider the unit root properties of the core variables in our country-specific models (see table 3). If the domestic, $\mathbf{x}_{it}$, foreign, $\mathbf{x}_{it}^{*}$, and global, $\mathbf{d}_{t}$, variables included in the country-specific models are indeed integrated of order one, $I(1)$, we are not only able to distinguish between short and long-run relations but also to interpret the long-run relations as cointegrating. Therefore, we perform Augmented Dickey-Fuller (ADF) tests on the level and first differences of all the variables. However, as the power of unit root tests are often low, we also utilize the weighted symmetric ADF test (ADF-WS) of Park and Fuller (1995), as it has been shown to have better power properties than the ADF test. This analysis results in over 3200 unit root tests, which overall, as a first-order approximation, support the treatment of the variables in our model as being $I(1)$. For brevity, these test results are not reported here but are available from the authors upon request.

3.4.1 Lag order selection, cointegrating relations, and persistence profiles

We use quarterly observations over the period 1979Q2--2011Q2, across the different specifications in table 2, to estimate the 38 country/region-specific VARX*(s_i, s_i^*) models. However, prior to estimation, we need to determine the lag orders of the domestic and foreign variables, s_i and s_i^*. For this purpose, we use the Akaike Information Criterion (AIC) applied to the underlying unrestricted VARX* models. However, given the constraints imposed by data limitations, we set the maximum lag orders to $s_{\max} = 2$ and $s_{\max}^* = 1$. The selected VARX* orders are reported in table 4, from which we can see that for most countries a VARX*$(2,1)$ specification seems satisfactory, except for seven countries (Australia, Egypt, Iran, Malaysia, Mexico, Singapore, and the United Kingdom), for which $s = s^* = 1$ is selected by AIC.

Having established the order of the 38 VARX* models, we proceed to determine the number of long-run relations. Cointegration tests with the null hypothesis of no cointegration, one cointegrating relation, and so on are carried out using Johansen's maximal eigenvalue and trace statistics as developed in Pesaran et al. (2000) for models with weakly exogenous $I(1)$ regressors, unrestricted intercepts and restricted trend coefficients. We choose the number of cointegrating relations (r_i) based on the trace test statistics, given that it has better small sample properties than the maximal eigenvalue test, initially using the 95% critical values from Mackinnon (1991).[6]

We then consider the effects of system-wide shocks on the exactly identified cointegrating vectors using persistence profiles developed by Lee and Pesaran (1993) and Pesaran and Shin (1996). On impact the persistence profiles (PPs) are normalized to take the value of unity, but the rate at which they tend to zero provides information on the speed with which equilibrium correction takes place in response to shocks. The PPs could initially over-shoot, thus exceeding unity, but must eventually tend to zero if the vector under consideration is indeed cointegrated. In our preliminary analysis of the PPs, we noticed that the speed of convergence was very slow for some countries and for a few the system-wide shocks never really died out. In particular, the speed of adjustment was very slow for the following 18 countries (with r_i based on critical values from Makinnon (1991) in brackets): Australia (4), Canada (4), China (2), Euro Area (2), Indonesia (3), Iran (2), Japan (3), Korea (4), Malaysia (2), Peru (3), Philippines (2), South Africa (2), Singapore (3), Switzerland (3), Thailand (3), Tunisia (2), the United Kingdom (2), and the United States (3).

Moreover, we noticed that a couple of eigenvalues of the GVAR model were larger than unity. Therefore, to ensure the stability of the global model, as well as to deal with the possible overestimation of the number of cointegrating relations based on asymptotic critical values, we estimated a cointegrating VARX* model, based on the lag orders in table 4, for

[6] To save space the lag order and cointegration test results are not reported here but are available on request.

each of the 18 countries separately and used the trace test statistics together with the 95% simulated critical values, computed by stochastic simulations using 127 observations from 1979Q4 to 2011Q2 and 1000 replications, to determine the number of cointegrating vectors.[7]

We then re-estimated the global model reducing the number of cointegrating relations (for the 18 countries only) one by one and re-examined the PPs after each estimation to ensure stability of the model. The final selection of the number of cointegrating relations are reported in table 4. For 12 of the 18 countries we selected r_i based on the trace statistic and the simulated critical values. For four countries (China, Peru, Philippines, and the UK) the asymptotic and simulated critical values were the same so we reduced r_i until the PPs for each country were well behaved; this was also done for Canada and Korea.

The persistence profiles for the set of 23 focus countries, eleven MENA countries, five systemic countries and seven other oil exporters in our model (see table 1), together with their 95% bootstrapped error bands are provided in figure 1. The profiles overshoot for only five out of the 36 cointegrating vectors before quickly tending to zero. The speed of convergence is very fast, the half-life of the shocks are generally less than three quarters, and equilibrium is established before six years in all cases except for Egypt, Jordan and Libya. Amongst the 23 countries, Iran shows the fastest rate of convergence (around three years)[8] and Libya the slowest rate of convergence (8-9 years). The 95% error bands are quite tight and initially widen somewhat before narrowing to zero. The speed of convergence, although relatively fast, is in line with that observed for major oil exporters in Esfahani et al. (2012a).

3.4.2 *Testing the weak exogeneity assumption*

Weak exogeneity of the country-specific foreign variables, $\mathbf{x}_{it}^* = \left[y_{it}^*, \pi_{it}^*, eq_{it}^*, r_{it}^{*S}, r_{it}^{*L}\right]$, and the global variables, p_t^{oil} and q_t^{oil}, with respect to the long-run parameters of the conditional model is vital in the construction and the implementation of the GVAR model. We formally test this assumption following the procedure in Johansen (1992) and Harbo et al. (1998). To this end, we first estimate the 38 VARX*(s_i, s_i^*) models separately under the assumption that the foreign and global variables are weakly exogenous. We then run the following regression for each l th element of $\mathbf{x}_{it}^*$:

$$\Delta x_{it,l}^* = \mu_{il} + \sum_{j=1}^{r_i} \gamma_{ij,l} ECM_{i,t-1}^j + \sum_{k=1}^{s_i} \varphi_{ik,l} \Delta \mathbf{x}_{i,t-k} + \sum_{m=1}^{n_i} \vartheta_{im,l} \Delta \tilde{\mathbf{x}}_{i,t-m}^* + \varepsilon_{it,l}, \tag{14}$$

where $ECM_{i,t-1}^j$, $j = 1,2,...,r_i$ are the estimated error correction terms corresponding to the r_i cointegrating relations found for the i th country model, $n_i = 2$ (although it could be set equal to s_i^*), and $\Delta \tilde{\mathbf{x}}_{it}^* = \left[\Delta \mathbf{x}_{it}^{'*}, \Delta reer_{it}^*, \Delta p_t^{oil}, \Delta q_t^{oil}\right]$.[9] Under the null hypothesis that the variables are weakly exogenous, the error correction term must not be significant; therefore, the formal test for weak exogeneity is an F -test of the joint hypothesis that $\gamma_{ij,l} = 0$ for each $j = 1,2,...,r_i$ in equation (14). The test results together with the 95% critical values are reported in table 5, from which we see that the weak exogeneity assumption cannot be rejected for the overwhelming majority of the variables considered. In fact, only seven out of 263 exogeneity tests turned out to be statistically significant at the 5% level.

[7] The estimations were done in Microfit 5.0. For further technical details, see Pesaran and Pesaran (2009), section 22.10.

[8] The fast convergence for Iran is also documented in Esfahani et al. (2009).

[9] Note that the models for U.S. and the GCC are specified differently, see the discussion in section 3.3.

More specifically, in terms of the variables in $\mathbf{x}_{it}^{*}$, only foreign output in the Indonesian model and foreign short-term interest rates in the model for Argentina, Japan, and Nigeria cannot be considered as weakly exogenous. This assumption is also rejected for the price of oil in the Canadian model, and oil production in the Euro Area and Iranian models. However, considering the significance level assumed here, even if the weak exogeneity assumption is always valid, we would expect up to 14 rejections, 5% of the 263 tests. Overall, the available evidence in table 5, therefore, supports our treatment of the foreign and global variables in the individual VARX* models as weakly exogenous.

3.4.3 Testing for structural breaks

Although the possibility of structural breaks is a fundamental problem in macroeconomic modelling in general, this is more likely to be a concern for a particular set of countries in our sample (i.e., emerging economies and non-OECD oil exporters) which have experienced both social and political changes since 1979. However, given that the individual VARX* models are specified conditional on the foreign variables in $\mathbf{x}_{it}^{*}$, they are more robust to the possibility of structural breaks in comparison to reduced-form VARs, as the GVAR setup can readily accommodate co-breaking. See Dees et al. (2007a) for a detailed discussion.

We test the null of parameter stability using the residuals from the individual reduced-form error correction equations of the country-specific VARX*$\left(s_i, s_i^*\right)$ models, initially looking at the maximal OLS cumulative sum statistic $\left(PK_{sup}\right)$ and its mean square variant $\left(PK_{msq}\right)$ of Ploberger and Krämer (1992). We also test for parameter constancy over time against non-stationary alternatives as proposed by Nyblom (1989) $\left(NY\right)$, and consider sequential Wald statistics for a single break at an unknown change point. More specifically, the mean Wald statistic of Hansen (1992) $\left(MW\right)$, the Wald form of the Quandt (1960) likelihood ratio statistic $\left(QLR\right)$, and the Andrews and Ploberger (1994) Wald statistics based on the exponential average $\left(APW\right)$. Finally, we also examine the heteroscedasticity-robust versions of NY, MW, QLR, and APW.

Table 6 presents the number of rejections of the null hypothesis of parameter constancy per variable across the country-specific models at the 5% significance level. For brevity, test statistics and bootstrapped critical values are not reported here, but are available on request. Overall, it seems that most regression coefficients are stable; however, the results vary considerably across different tests. In the case of the two PK tests, the null hypothesis is rejected between 3.4--7.8% of the time. For the NY, MW, QLR, and APW tests on the other hand, we note that the rejection rate is much larger, between 17.9--52.5%. The QLR and APW rejection rates, for the joint null hypothesis of coefficient and error variance stability, are particularly high with 94 and 89 cases, respectively, out of 179 being rejected. However, looking at the robust version of these tests, we note that the rejection rate falls considerably to between 10.1% and 18.4%. Therefore, although we find some evidence for structural instability, it seems that possible changes in error variances rather than parameter coefficients is the main reason for this. We deal with this issue by using bootstrapped means and confidence bounds when undertaking the impulse response analysis discussed later.

4. Inward Spillovers

This section studies whether the increasing economic integration at the world level and the resulting emergence of large economic players, such as China, have weakened the role of the U.S. economy or the Euro Area as drivers of global growth. To do so, we look at the effects of negative U.S., Euro Area, and Chinese real output shocks on the MENA region, other oil exporters, and systemic economies.[10]

4.1 Shock to U.S. GDP

As a result of the dominance of the United States in the world economy, any slowdown in this country can bring about negative spillovers to other economies. As the recent global economic crisis has shown, the history of past U.S. recessions usually coincides with significant reductions in global growth. Furthermore, the continuing dominance of U.S. debt and equity markets, backed by the still-strong global role of the U.S. dollar, is also playing an important role. The results of our GVAR model, presented in figure 2b, show first that countries with a substantial trade exposure to the U.S. economy have a relatively large sensitivity to U.S. developments. Specifically, in response to a one percent decline in U.S. GDP, Canadian (70%), Mexican (69%), and Nigerian (36%) real outputs fall by 0.37 , 0.56 , and 0.66 percent respectively, with this effect being statistically significant (the numbers in brackets are corresponding trade weights which are reported in table 7).

However, even for countries that do not trade as much with the U.S., they are largely influenced by its dominance through other partners' trade. For instance, following a negative U.S. GDP shock, the Euro Area (16%), Norway (6%), and UK (13%) real outputs fall by between 0.16 and 0.29 percent per annum, with these median effects being statistically significant. Overall, the influence of the U.S. on other economies remains larger than direct trade ties would suggest, owing to third-market effects together with increased financial integration that tends to foster the international transmission of business cycles.

In general, lower demand for commodities is another channel through which a negative U.S. shock affects countries. In particular, about 27% of world oil demand comes from the U.S., so it is not surprising that in response to the U.S. shock, both oil prices and production levels decline, with the latter effect being statistically significant (see figure 3). The oil channel has a negative impact on the MENA countries, where on average, their GDPs fall between 0.17--0.29% after one year. For the GCC, exporting around 30% of world oil, this effect is larger and statistically significant: real output declines as much as 0.41% . The median effects of a negative U.S. output shock for other systemic countries and major oil exporters are generally negative, with those few that have a positive median impacts being statistically insignificant.[11]

To investigate whether the global impact of a U.S. negative output shock has changed over the past two decades, we re-estimated our model using trade weights averaged over 1986 to 1988 (see table 8). Comparing these results, as illustrated in figure 2a, with those from our original specification using trade weights between 2006 and 2008 in figure 2b, we note that the impact of this shock has remained very similar over the past 20 years. This finding suggests that the influence of the U.S. on the global economy remains very prominent.

These results are robust to different ways of constructing the weights, w_{ij} . In particular, we experimented with using exports weights and found the impulse responses to be very similar to those with trade weights. Therefore, as is now standard in the literature, we only report the results with the weights calculated as the average of exports and imports of country i with j (tables 7 and 8).

[10] Due to model and parameter uncertainties, and the possibility of measurement errors in the data (for the MENA countries in particular), the confidence intervals produced for different MENA countries are generally wide. In this case, the median responses are mainly used for inference as they contain useful information about the direction of the responses and their magnitudes.

[11] The output response of China to a negative U.S. shock is not statistically different from zero. This response could arise from the influence of third country (indirect) effects emanating from non-U.S. trading partners of China. Identification of the direct effect of the U.S. shock on China is beyond the scope of this paper, but is an issue for further investigation.

4.2 Shock to Euro Area GDP

We initially shocked the Euro Area GDP, but obtained extremely small (and not statistically different from zero) median responses on both oil prices and production levels. Figure 3 shows that the responses of these two variables to negative GDP shocks in the U.S. and China are much larger (and statistically significant) compared with that of a Euro Area shock. However, given that the Euro Area consumes around 15% of world oil, we would expect a negative shock to its output to be associated with lower oil prices/production levels in line with that of a Chinese shock, in particular given that over the same period, China's consumption of oil was around 5% of the world total (one-third that of the Euro Area). To obtain reasonable estimates, which are in line with economic theory, we imposed sign restrictions on the generalized impulse responses of the oil price and supply variables, such that a negative Euro Area shock is contemporaneously associated with a decline in both of these variables. For more details on sign restrictions within a GVAR model, see Cashin et al. (2012).

The four quarters impulse responses of output to one percent negative GDP shock in the Euro Area, reported in figure 4, are most significant for Maghreb countries, reflecting their geographical proximity to the Euro Area, and the strength of their trade linkages with Europe in general. Maghreb countries rely heavily on Europe as a market for exports (nearly 60 percent of Maghreb's exports are destined for Europe), as well as tourism, workers' remittances, and foreign direct investment.

The impact is in percentage points and the horizon is quarterly. Growth spillovers vary greatly from country to country. The highest dependencies are observed for Algeria and Tunisia, with annual output elasticity of more than a half (Figure 2). Algeria is adversely affected via both trade and commodity price channels. Although the country's share of proven oil reserves in world's total is only about 1 percent at end-2011, it is highly dependent on oil exports (98 percent of its exports still come from the hydrocarbon sector), rendering it extremely vulnerable to a Euro Area shock. Specifically, Algeria exports around 42% of its oil to Europe, and given our assumption about the slowdown in the Euro Area, demand for Algerian oil from Europe declines. However, Figure 2 also shows that the rest of the world (including North America to which 35% of the Algerian oil is destined) experiences a drag on its output as well. Considering this worldwide fall in oil demand, Algeria is not able to readily shift its commodity exports (which is predominantly destined for Europe and North America) to other countries (such as China). The country therefore experiences a fall in oil revenues, which has a direct and large negative impact on its economy. This commodity channel applies equally to other oil exporters in our sample, which is why we note that a negative Euro Area shock has an adverse impact on economic activity in these countries. Moreover, given that 68% of Algerian trade is with the Euro Area, a fall in aggregate demand in this region has a negative impact on Algerian growth through the trade channel.

In the case of Mashreq countries, Syria is the most affected by a downturn in the Euro Area, while the impacts on Egypt and Jordan are moderate due to their larger regional ties with the GCC. Moreover, following a one percent decline in the Euro Area GDP, Turkish output falls by 0.64%, with this effect being highly significant, illustrating the close trade linkages between Turkey and the eight Euro Area countries in our sample. As for the region's oil-exporters, a negative GDP shock in the Euro Area affects their economies mainly through its impact on oil prices and production, lowering their overall growth.

Estimated spillovers from the Euro Area to the other systemic countries, which abstract from financial contagion and may therefore understate the magnitude of true spillovers, are nevertheless of meaningful size with output elasticities ranging between 0.26 and 0.57 (see Figure 2). The response is especially interesting in the case of the UK, which has close trade linkages with continental Europe as illustrated by a trade weight of 0.52, for which output falls by 0.57% following a 1% drop in Euro Area GDP.

Moving beyond the systemic countries, oil exporters outside of the MENA are also adversely affected by the Euro Area's economic downturn through its impact on commodity prices. More specifically, the elasticities for this group of countries range between 0.17 (Norway) and 0.80 (Nigeria). Figure 3 also reports the generalized impulse responses of a negative Euro Area shock for the set of focus countries over a 40-quarter horizon and illustrates how the responses reported in Figure 2 evolve over the long run.

4.3 Shock to Chinese GDP

A negative GDP shock in China affects the economies of oil exporters in our sample mainly through its impact on global demand for oil and associated prices. This is clearly shown in figure 3, as both oil prices and production levels fall significantly in response to a negative output shock. For oil exporters, the slowdown in China translates into lower overall economic growth (see figure 6b). In particular, those countries with large commodity export exposures to China are most vulnerable to a slowdown in this country; for example, Ecuador and Venezuela both experience a statistically significant fall in their outputs, corresponding to 0.34% and 0.33%, respectively. In contrast, larger commodity exporters with more diversified economies do not seem to suffer as much, an example of the latter is Norway for which the response is -0.04% and is not statistically different from zero.[12]

Turning to the systemic countries, figure 6b shows that following a negative GDP shock in China, the output of the other four systemic countries falls, with the average effect being -0.15% and statistically significant. Moreover, China has a large (significant) and growing impact on MENA countries and other oil exporters.[13] This finding is expected given the emergence of China as a key driver of the global economy over recent decades. In fact, re-estimating our model with trade weights averaged over 1986--88, we note that 20 years ago, a negative Chinese output shock would not have had a statistically significant effect on either the systemic economies, major oil exporters, or the MENA region (see figure 6a). Comparing the results in figure 6 we note that not only does a Chinese GDP shock affect the global economy in a much more prominent way, but the median effects are generally much larger than two decades ago.

These results are consistent with the findings in Cesa-Bianchi et al. (2011), who argue that the reason why Latin American economies recovered much faster than initially anticipated from the recent global crisis was due to their increasing trade linkages with China. We also argue that the emergence of China as a driver of growth in the world economy might help to explain the "lower-than-expected" effect of the global crisis on MENA countries and other emerging economies. Indeed, we show that the MENA countries' growth is not only dependent on the United States and Europe, but also on the fast-growing Chinese economy.

5. Outward Spillovers

A positive GDP shock in the GCC region generates significant output gains in Jordan and Syria, 0.43% and 0.34% after a year, respectively, together with mild to moderate output spillovers to the rest of the MENA, the effect ranging from a low of 3% (Tunisia) to a high of 43% (Algeria)---see figure 7b. Spillovers from the GCC to the wider MENA region are transmitted via trade, remittances, foreign direct investment (FDI), and commodity price channels. The macroeconomic situation in Jordan, for example, is closely tied to those of other countries in the Middle East. Remittances from Jordanians working in the region are an

[12] See also Roache (2012) and International Monetary Fund (2012) for a detailed discussion on the outward spillovers from China through commodity price channels.

[13] The results for the other countries in our sample, listed in table 1, are not reported here, but are available on request.

important source of national income (equivalent to 15--20 percent of GDP); the Persian Gulf region is the primary destination for Jordanian exports, and in turn, supplies most of its energy requirements; furthermore, the country receives substantial grants and FDI from other states in the region (see Mohaddes and Raissi 2011).

Subject to data availability, it is of course relatively straightforward to augment the country-specific VARX* models with other aggregate variables such as consumption and investment, or particular variables of interest, for instance remittances, FDI, and grants. However, the inclusion of these variables is unlikely to alter the long-run relationship that we have estimated between $\mathbf{x}_{it}$, $\mathbf{x}_{it}^{*}$, and the global variables if each of consumption, investment, remittances, FDI, and grants are cointegrated with, for instance, output or oil prices. This is because any linear combination of cointegrating relations will also be cointegrated. To illustrate this point, Esfahani et al. (2009b) estimate a cointegrating VAR(2) model for investment and oil export revenues for Iran and find that the hypothesis that the long-run elasticity of investment to real oil income is unity cannot be rejected. They also show that the exactly identified cointegrating relation between log real output and consumption is given by $c_t = y_t + \xi_t$ where ξ_t is a mean zero stationary process. Similarly, Mohaddes and Raissi (2011) estimate a cointegrating VAR(2) model for external income (the sum of remittances, grants, and foreign direct investment) and oil prices, and find that latter represent a good proxy for external income in the Jordanian economy. The above results show that, from a long-run perspective, only one of the variables in the corresponding cointegrating relation needs to be included in the country specific models.

Figure 7b also shows the extent to which the output of the GCC affects, and is affected by the global economy, in particular systemic countries but also other oil-exporters.[14] Specifically, the oil market provides an important channel of impact: for example, Saudi Arabia, being part of the GCC, is currently the largest oil exporter in the world and is at present the only producer with significant spare capacity that can be used to stabilize global energy markets. While the level of oil supply from the GCC has significant macroeconomic effects on developed and emerging economies, raising global growth prospects has an important impact on the demand for oil and hence the economic performance of the GCC. Given a near-vertical global oil supply curve, the increase in output in the GCC region is mainly induced by rising oil prices (figure 3). This increase in p_t^{oil} coincides with higher outputs in systemic countries, reflecting a demand-driven oil price spike, and higher GDP levels in other commodity producers, most of which are statistically significant (see figure 7b).

We performed the same exercise as above, but now adding Algeria, Iran and Libya to the GCC block, calling the nine combined countries MENA oil exporters (MENAEX). These countries include seven out of the current 12 OPEC member countries, supply over 41% of world oil exports, and possess a majority of the total proven oil reserves in the world. As figure 8b shows, the results from a positive MENAEX output shock are more pronounced when compared with a GCC shock, but the channels of impact are unchanged.

To see whether the impact of a positive GDP shock in the GCC and the MENA oil exporters have changed over the past few decades, we re-estimated our model using 1986--1988 trade weights. Figures 7a and 8a show that the effect of these shocks for the region, as well as for the global economy, has not differed much over the past 20 years. This is perhaps not surprising, given that crude oil was and remains the largest exportable and driver of growth in the region, (see for instance Esfahani et al. 2012a.

[14]For panel applications studying the growth effects of higher commodity prices, see Cavalcanti et al. (2011b), Cavalcanti et al. (2011a), and Cavalcanti et al. (2012).

6. Concluding Remarks

In this study we estimated a GVAR model for 38 countries/regions (which includes the GCC countries in particular and the Middle East and North Africa region in general, as well as other major oil-exporters) over the period 1979Q2--2011Q2 to analyze the inwards/outwards output spillovers to/from the MENA countries. We also investigated the growing impact of China's macroeconomic shocks (compared to the U.S. and the Euro Area) on other systemic economies, the MENA region, and other major oil exporters; and examined how the transmission of shocks has changed following the emergence of China as a major driver of the world economy.

The results show that output spillovers from China, the Euro Area, and the U.S. to other systemic economies, as well as the MENA region and other oil exporters, are meaningful. Specifically, the impact of a negative Euro Area GDP shock on MENA economies is modest, and on par with a shock to the GDP of the United States. However, the impact of a shock to output in China is more substantial (being statistically significant in more cases), reflecting the direction of evolving trade patterns, and China's growing role in the global economy and the global oil market in particular. We also find that outward spillovers from the GCC and MENA oil exporters are likely to be stronger in their immediate geographical proximity, although they also have implications for the systemic economies and the rest of the oil exporters.

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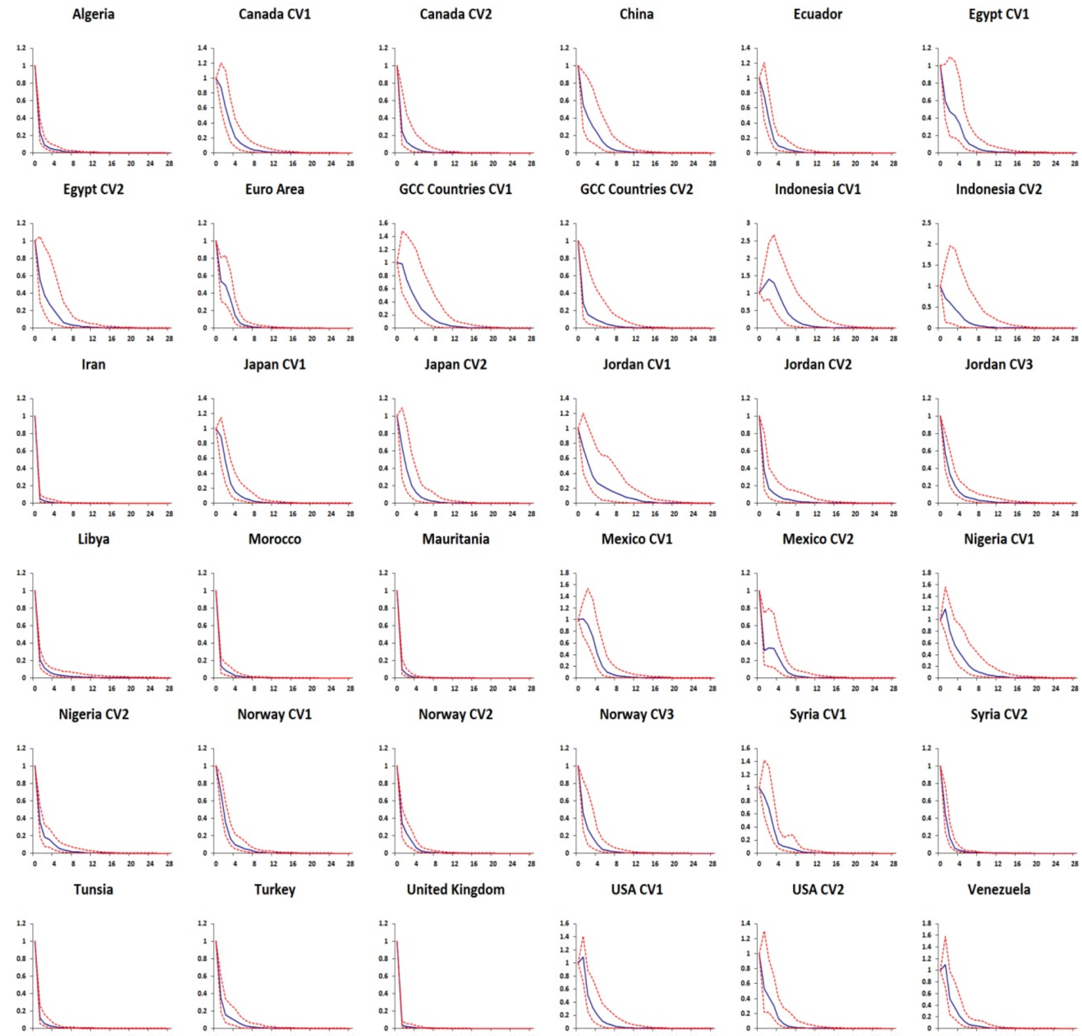
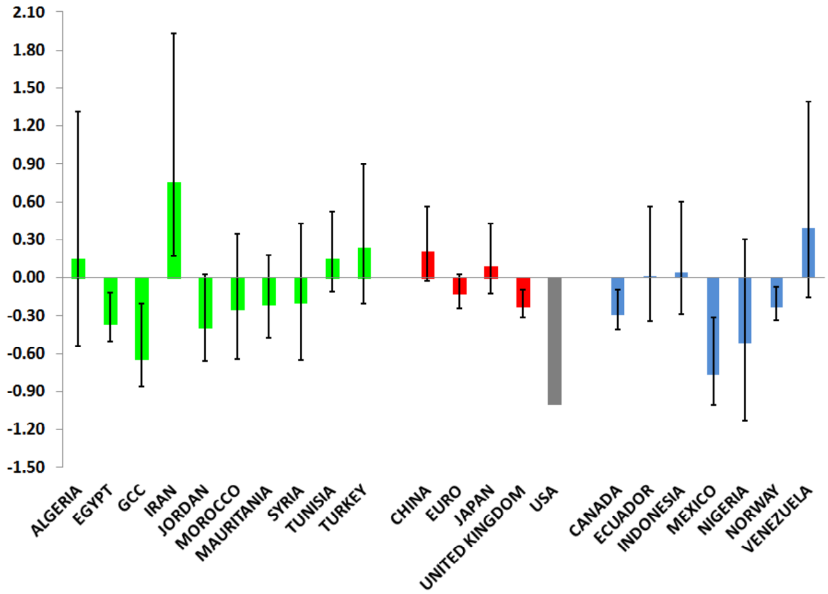
Figure 1: Persistence Profiles of the Effect of a System-wide Shock to the Cointegrating Relations



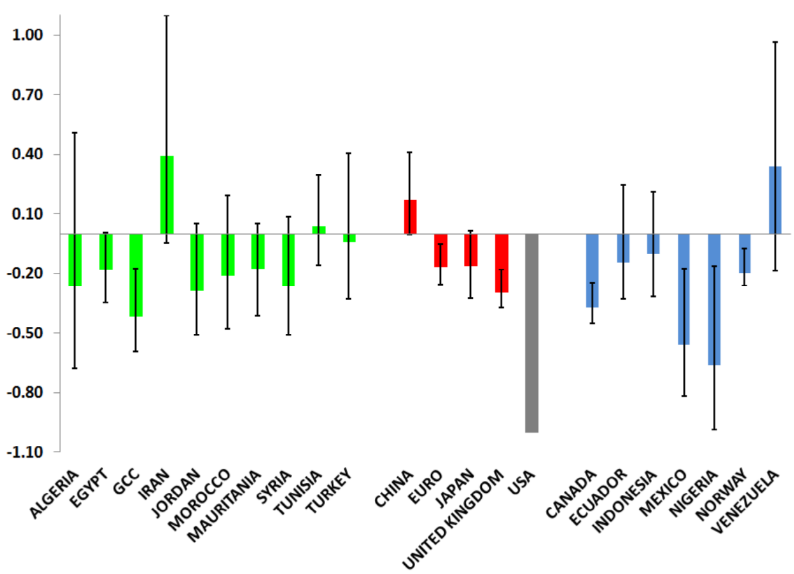
Notes: Figures are median effects of a system-wide shock to the cointegrating relations with 95% bootstrapped confidence bounds.

Figure 2: Four Quarters Cumulated Impulse Responses of Output to a Negative GDP Shock in the United States (relative to the U.S.)

(a) Trade Weights Averaged Over 1986.1988

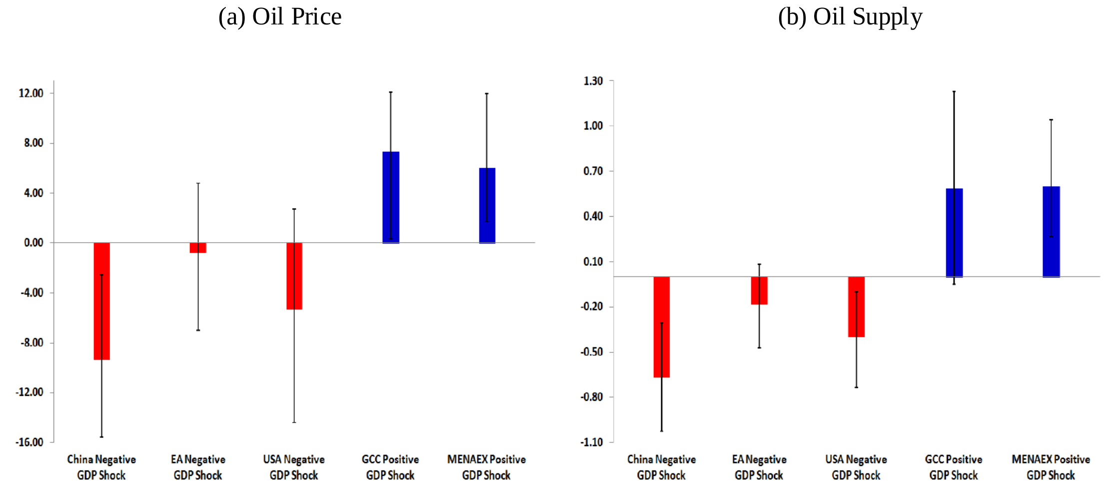


(b) Trade Weights Averaged Over 2006.2008



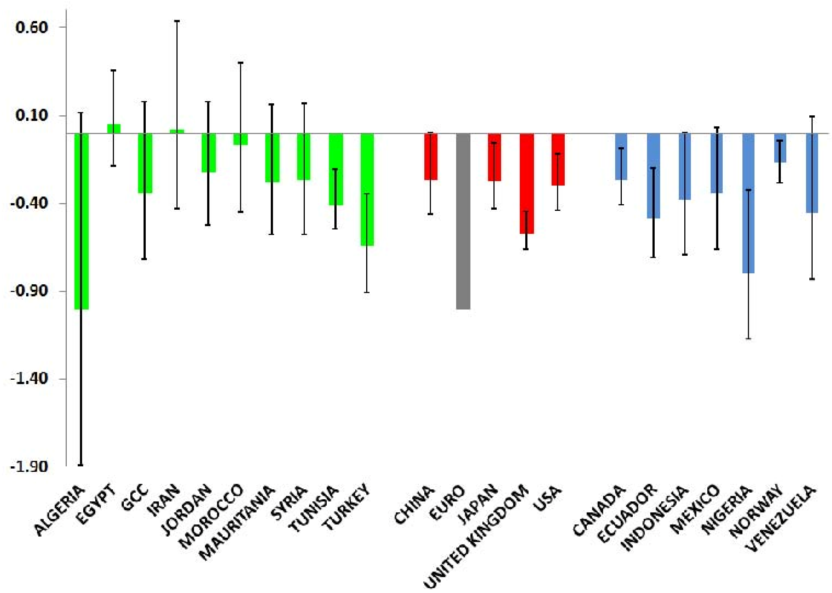
Notes: Depicts annual percent change in output of a given country associated with 1% decline in U.S. GDP, together with the 16th and 84th percentile error bands.

Figure 3: Four Quarters Cumulated Impulse Responses of Oil Prices and Supply



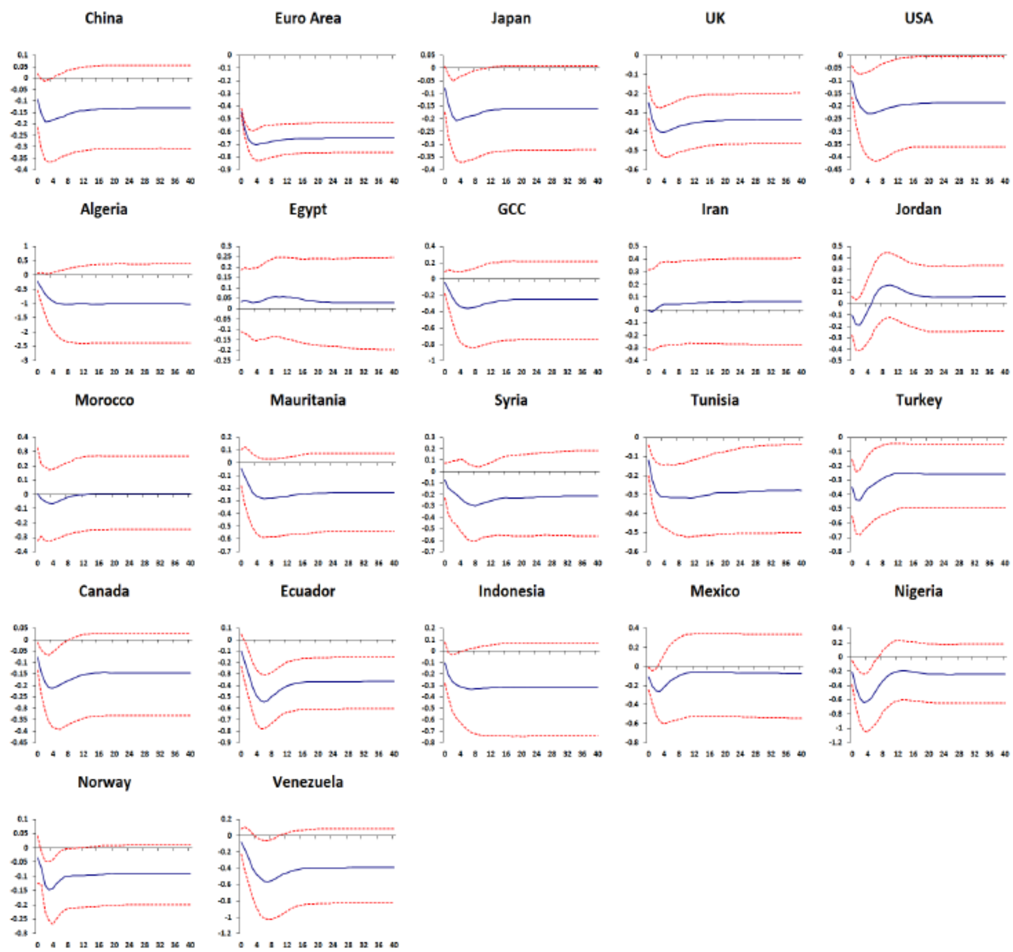
Notes: Depicts annual percent change in oil price and production associated with a negative/positive unit shock (equal to one standard error) to the GDP of corresponding economy or region, together with the 16th and 84th percentile error bands. These responses are based on trade weights averaged over 2006--2008.

Figure 4: Four Quarters Cumulated Impulse Responses of Output to a Negative GDP Shock in the Euro Area (relative to the Euro Area)



Notes: Depicts annual percent change in output of a given country associated with 1% decline in Euro Area GDP, together with the 16th and 84th percentile error bands.

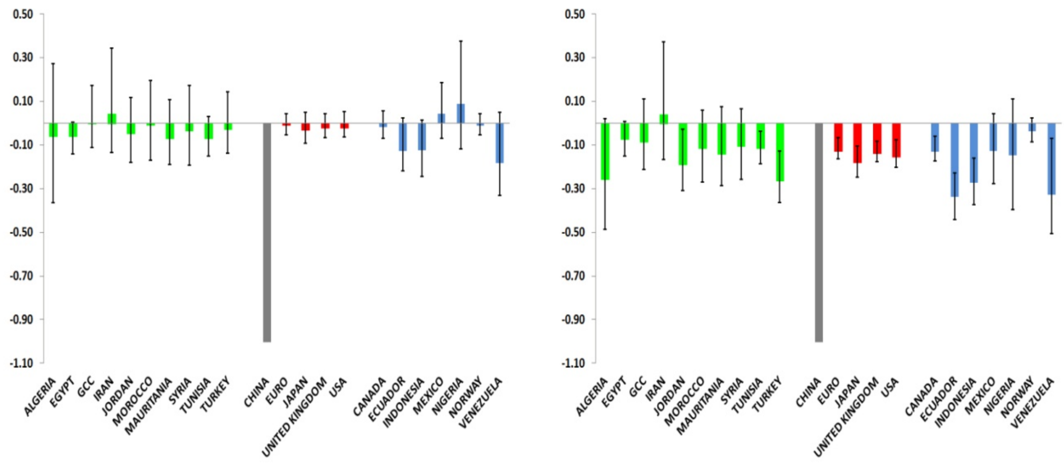
Figure 5: Impulse Responses of a Negative Unit Shock to Euro Area Output



Notes: Figures are median impulse responses to a one standard deviation negative shock to Euro Area GDP with sign restrictions on both oil prices and supply, together with the 16th and 84th percentile error bands.

Figure 6: Four Quarters Cumulated Impulse Responses of Output to a Negative GDP Shock in China (relative to China)

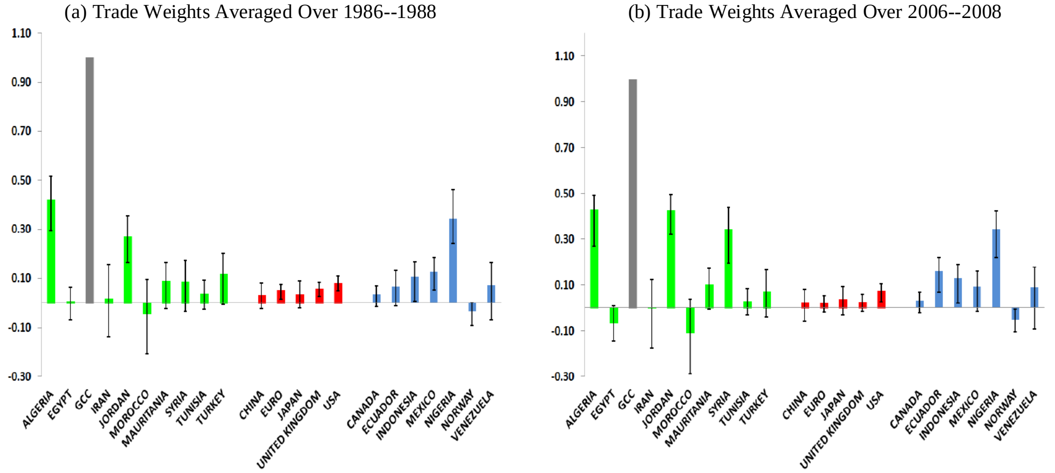
(a) Trade Weights Averaged Over 1986--1988 (b) Trade Weights Averaged Over 2006--2008



Notes: Depicts annual percent change in output of a given country associated with 1% decline in Chinese GDP, together with the 16th and 84th percentile error bands.

Figure 7: Four Quarters Cumulated Impulse Responses of Output to a Positive GDP Shock in the GCC Region (relative to the GCC)

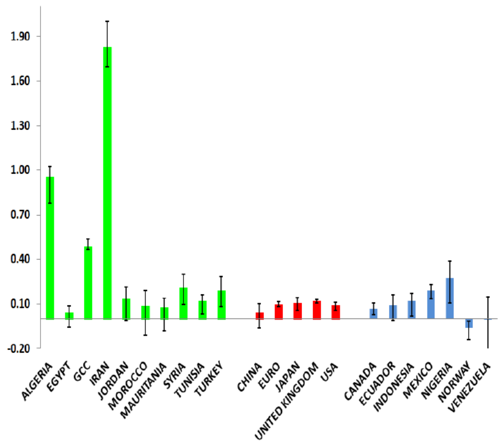
(a) Trade Weights Averaged Over 1986--1988 (b) Trade Weights Averaged Over 2006--2008



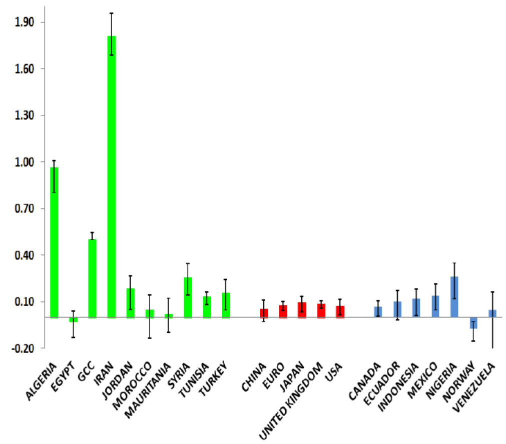
Notes: Depicts annual percent change in output of a given country associated with 1% increase in GCC countries' GDP, together with the 16th and 84th percentile error bands.

Figure 8: Four Quarters Cumulated Impulse Responses of Output to a Positive GDP Shock in the MENA Oil Exporters (relative to the MENAEX)

(a) Trade Weights Averaged Over 1986--1988



(b) Trade Weights Averaged Over 2006--2008



Notes: Depicts annual percent change in output of a given country associated with 1% increase in MENA oil exporters' GDP, together with the 16th and 84th percentile error bands.

Table 1: Countries and Regions in the GVAR Model Including MENA

MENA Oil Exporters	**Systemic Countries**	**Other Oil Exporters**
Algeria*	China	Canada
GCC Countries	Euro Area	Ecuador*
_Bahrain_*	_Austria_	Indonesia
_Kuwait_*	_Belgium_	Mexico
_Oman_*	_Finland_	Nigeria*
_Qatar_*	_France_	Norway
Saudi Arabia	_Germany_	Venezuela*
_UAE_*	_Italy_	
Iran*	_Netherlands_	**Latin America**
Libya*	_Spain_	Argentina
	Japan	Brazil
MENA Oil Importers	United Kingdom	Chile
Egypt*	United States	Peru
Jordan*		
Mauritania*	**Emerging Asia**	**Rest of the World**
Morocco*	Korea	Australia
Syria*	Malaysia	India
Tunisia*	Philippines	New Zealand
Turkey	Singapore	South Africa
	Thailand	Sweden
		Switzerland

Notes:* indicates that the country has been added to the Smith and Galesi (2010) database. Countries in italics are included in a region for estimation purposes.

Table 2: MENA Trade Weights

(a) Averages Over 1986.1988

	Algeria	Egypt	GCC	Iran	Jordan	Libya	Morocco	Mauritania	Syria	Tunisia	Turkey
Algeria	0	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01	0.03	0.01
China	0.00	0.01	0.01	0.01	0.03	0.00	0.02	0.03	0.01	0.01	0.01
Egypt	0.00	0	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.01
Euro Area	0.68	0.48	0.25	0.39	0.29	0.75	0.60	0.63	0.53	0.75	0.47
GCC	0.00	0.03	0	0.04	0.17	0.00	0.05	0.00	0.05	0.02	0.06
Iran	0.00	0.00	0.01	0	0.00	0.00	0.00	0.00	0.08	0.00	0.06
Japan	0.03	0.07	0.27	0.15	0.08	0.04	0.03	0.21	0.06	0.01	0.05
Jordan	0.00	0.01	0.01	0.00	0	0.00	0.00	0.00	0.02	0.00	0.01
Libya	0.00	0.00	0.00	0.00	0.00	0	0.02	0.00	0.03	0.00	0.02
Morocco	0.00	0.00	0.00	0.00	0.00	0.01	0	0.00	0.00	0.01	0.00
Mauritania	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00
Syria	0.00	0.00	0.00	0.01	0.02	0.01	0.00	0.00	0	0.00	0.00
Tunisia	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0	0.00
Turkey	0.02	0.02	0.01	0.07	0.04	0.04	0.01	0.00	0.04	0.02	0
UK	0.02	0.05	0.06	0.06	0.08	0.06	0.03	0.02	0.04	0.02	0.06
USA	0.15	0.17	0.16	0.05	0.12	0.00	0.07	0.02	0.06	0.05	0.11
Other Oil Exporters	0.02	0.01	0.01	0.02	0.02	0.01	0.06	0.01	0.01	0.03	0.02
Latin America	0.02	0.02	0.02	0.06	0.03	0.00	0.02	0.00	0.02	0.01	0.01
Emerging Asia	0.00	0.03	0.11	0.07	0.03	0.03	0.01	0.02	0.00	0.00	0.01
Rest of the World	0.03	0.10	0.07	0.09	0.08	0.04	0.07	0.01	0.04	0.03	0.07

(b) Averages Over 2006.2008

	Algeria	Egypt	GCC	Iran	Jordan	Libya	Morocco	Mauritania	Syria	Tunisia	Turkey
Algeria	0	0.01	0.00	0.00	0.01	0.00	0.02	0.01	0.00	0.02	0.02
China	0.04	0.07	0.10	0.15	0.09	0.05	0.05	0.25	0.08	0.02	0.07
Egypt	0.01	0	0.01	0.00	0.04	0.01	0.01	0.01	0.02	0.01	0.01
Euro Area	0.48	0.30	0.15	0.24	0.16	0.66	0.56	0.48	0.32	0.70	0.45
GCC	0.00	0.13	0	0.12	0.28	0.01	0.06	0.01	0.25	0.01	0.06
Iran	0.00	0.00	0.02	0	0.00	0.00	0.02	0.00	0.04	0.00	0.04
Japan	0.02	0.04	0.18	0.12	0.03	0.01	0.02	0.04	0.02	0.01	0.02
Jordan	0.00	0.01	0.01	0.00	0	0.00	0.00	0.00	0.02	0.00	0.00
Libya	0.00	0.01	0.00	0.00	0.00	0	0.00	0.00	0.03	0.05	0.01
Morocco	0.01	0.01	0.00	0.01	0.00	0.00	0	0.01	0.00	0.01	0.01
Mauritania	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00
Syria	0.00	0.01	0.01	0.01	0.04	0.01	0.00	0.00	0	0.00	0.01
Tunisia	0.01	0.00	0.00	0.00	0.00	0.03	0.01	0.01	0.00	0	0.00
Turkey	0.04	0.03	0.02	0.06	0.02	0.03	0.03	0.01	0.05	0.02	0
UK	0.03	0.03	0.03	0.02	0.02	0.03	0.04	0.02	0.02	0.03	0.07
USA	0.22	0.11	0.11	0.00	0.11	0.07	0.05	0.05	0.02	0.03	0.07
Other Oil Exporters	0.07	0.04	0.02	0.01	0.02	0.01	0.02	0.03	0.01	0.01	0.03
Latin America	0.04	0.04	0.01	0.01	0.02	0.02	0.04	0.03	0.02	0.02	0.01
Emerging Asia	0.02	0.05	0.20	0.11	0.05	0.02	0.02	0.03	0.04	0.01	0.04
Rest of the World	0.03	0.10	0.13	0.14	0.09	0.05	0.06	0.03	0.04	0.04	0.08

Notes: Trade weights are computed as shares of exports and imports, displayed in columns by region (such that a column, but not a row, sums to 1). Source: Direction of Trade Statistics, IMF.

Table 3: Variables Specification of the Country-Specific VARX* Models

The U.S. Model		The GCC Model		All Other Models	
Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
$y_{US,t}$	$y^*_{US,t}$	$y_{GCC,t}$	$y^*_{GCC,t}$	y_{it}	y^*_{it}
$\pi_{US,t}$	$\pi^*_{US,t}$	$\pi_{GCC,t}$	$\pi^*_{GCC,t}$	π_{it}	π^*_{it}
$eq_{US,t}$	–	–	$eq^*_{GCC,t}$	eq_{it}	eq^*_{it}
$r^S_{US,t}$	$r^{*S}_{US,t}$	–	$r^{*S}_{GCC,t}$	r^S_{it}	r^{*S}_{it}
$r^L_{US,t}$	–	–	$r^{*L}_{GCC,t}$	r^L_{it}	r^{*L}_{it}
–	$e^*_{US,t} - p^*_{US,t}$	$reer_{GCC,t}$	–	$reer_{it}$	–
p^{oil}_t	–	–	p^{oil}_t	–	p^{oil}_t
–	q^{oil}_t	q^{oil}_t	–	–	q^{oil}_t

Notes: See equations (9) and (11) for the definition of the variables.

Table 4: Lag Orders of the Country-Specific VARX*(s,s*) Models Together with the Number of Cointegrating Relations (r)

Country	VARX* Order s_i	VARX* Order s^*_i	Cointegrating relations (r_i)	Country	VARX* Order s_i	VARX* Order s^*_i	Cointegrating relations (r_i)
Algeria	2	1	1	Morocco	2	1	1
Argentina	2	1	2	Mauritania	2	1	1
Australia	1	1	3	Mexico	1	1	2
Brazil	2	1	1	Nigeria	2	1	2
Canada	2	1	2	Norway	2	1	3
China	2	1	1	New Zealand	2	1	3
Chile	2	1	2	Peru	2	1	1
Ecuador	2	1	1	Philippines	2	1	1
Egypt	1	1	2	South Africa	2	1	1
Euro Area	2	1	1	Singapore	1	1	2
GCC	2	1	2	Sweden	2	1	3
India	2	1	1	Switzerland	2	1	2
Indonesia	2	1	2	Syria	2	1	2
Iran	1	1	1	Thailand	2	1	2
Japan	2	1	2	Tunisia	2	1	1
Jordan	2	1	3	Turkey	2	1	1
Korea	2	1	1	UK	1	1	1
Libya	2	1	1	USA	2	1	2
Malaysia	1	1	1	Venezuela	2	1	1

Notes: s_i and s^*_i denote the lag order for the domestic and foreign variables respectively and are selected by the Akaike Information Criterion (AIC). The number of cointegrating relations (r_i) are selected using the trace test statistics based on the 95% critical values from Mackinnon (1991) for all countries except for Australia, Euro Area, Indonesia, Iran, Japan, Malaysia, South Africa, Singapore, Switzerland, Thailand, Tunisia, and the United States, for which we use the 95% simulated critical values computed by stochastic simulations and 1000 replications, and for Canada, China, Korea, Peru, Philippines, the UK, for which we reduced r_i below that suggested by the trace statistic to ensure the stability of the global model.

Table 5: F-Statistics for Testing the Weak Exogeneity of the Country-Specific Foreign Variables, Oil Prices, and Oil Production

	F test	Critical Value	y^*	Δp^*	r^{*s}	r^{*l}	(e^*-p^*)	eq^*	p^{oil}	q^{oil}
Algeria	F(1,109)	3.93	0.50	3.63	1.34	0.16	-	0.31	0.13	0.81
Argentina	F(2,106)	3.08	0.30	2.37	6.45*	0.43	-	0.19	0.72	0.04
Australia	F(3,109)	2.69	0.35	1.30	0.81	1.90	-	0.61	0.06	0.49
Brazil	F(1,109)	3.93	0.04	0.04	0.00	0.17	-	0.91	0.01	0.80
Canada	F(2,104)	3.08	0.46	2.42	1.93	0.01	-	0.00	3.37*	1.00
China	F(1,109)	3.93	0.04	2.02	1.33	2.66	-	0.21	0.21	0.43
Chile	F(2,106)	3.08	0.15	0.57	0.97	0.69	-	2.97	0.24	2.24
Ecuador	F(1,109)	3.93	1.57	0.62	0.04	0.23	-	0.05	0.23	0.07
Egypt	F(2,112)	3.08	0.50	0.81	0.93	0.13	-	0.26	0.10	1.05
Euro Area	F(1,105)	3.93	0.98	0.48	0.32	0.44	-	2.26	0.11	3.98*
GCC	F(2,109)	3.08	0.36	0.80	0.11	2.59	-	0.07	0.21	-
India	F(1,107)	3.93	0.03	0.00	0.23	0.42	-	0.22	0.02	0.02
Indonesia	F(2,108)	3.08	3.74*	0.89	0.16	0.37	-	1.24	0.07	0.27
Iran	F(1,114)	3.92	2.88	0.84	3.68	0.17	-	2.73	0.29	6.86*
Japan	F(2,104)	3.08	0.62	0.72	4.00*	2.87	-	0.46	2.47	1.98
Jordan	F(3,107)	2.69	1.36	0.89	1.14	1.56	-	0.77	0.04	1.16
Korea	F(1,105)	3.93	2.53	0.87	0.31	0.01	-	0.02	1.52	2.59
Libya	F(1,111)	3.93	0.28	0.00	0.26	0.19	-	0.06	1.06	0.77
Malaysia	F(1,112)	3.93	2.27	0.02	0.10	0.01	-	3.60	1.27	1.86
Morocco	F(1,111)	3.93	1.18	0.47	1.49	0.24	-	2.82	0.06	2.84
Mauritania	F(1,109)	3.93	0.03	0.45	1.52	0.75	-	1.16	0.67	0.49
Mexico	F(2,112)	3.08	1.17	2.13	1.08	0.40	-	0.81	0.68	0.13
Nigeria	F(2,108)	3.08	1.14	1.98	3.55*	0.77	-	1.26	0.78	0.95
Norway	F(3,103)	2.69	1.38	0.42	0.07	1.58	-	0.90	0.48	1.21
New Zealand	F(3,103)	2.69	2.01	0.67	1.78	0.24	-	1.04	0.58	0.20
Peru	F(1,109)	3.93	3.12	0.22	0.11	0.83	-	0.10	0.37	0.01
Philippines	F(1,107)	3.93	0.07	1.35	0.12	0.21	-	2.89	1.48	0.06
South Africa	F(1,105)	3.93	0.35	0.03	0.56	0.58	-	0.51	0.01	2.08
Singapore	F(2,111)	3.08	0.07	0.13	0.08	1.43	-	0.05	0.12	1.23
Sweden	F(3,103)	2.69	0.43	0.51	0.54	0.63	-	0.21	0.37	0.79
Switzerland	F(2,104)	3.08	1.07	1.15	0.57	0.43	-	1.63	0.89	1.92
Syria	F(2,110)	3.08	1.03	2.09	0.18	0.01	-	0.03	0.45	0.37
Thailand	F(2,106)	3.08	0.11	0.80	0.01	0.27	-	1.11	0.02	2.11
Tunisia	F(1,109)	3.93	1.56	0.52	0.00	0.58	-	1.52	0.75	0.57
Turkey	F(1,109)	3.93	0.00	1.53	3.00	0.16	-	0.07	0.01	0.01
United Kingdom	F(1,111)	3.93	0.54	0.92	0.67	0.32	-	0.11	0.00	0.01
USA	F(2,106)	3.08	0.43	0.89	0.64	-	1.03	-	-	0.35
Venezuela	F(1,109)	3.93	0.00	2.29	0.38	0.00	-	0.40	1.30	0.78

Notes: * denotes statistical significance at the 5% level.

Table 6: Number of Rejections of the Null of Parameter Constancy per Variable Across the Country-Specific Models at the 5% Significance Level

Tests	y	π	eq	$(e-p)$	r^S	r^L	Total
PK_{sup}	5	4	2	1	2	0	14(7.8)
PK_{msq}	4	1	0	1	0	0	6(3.4)
NY	8	5	4	5	4	6	32(17.9)
robust-NY	5	2	5	2	1	3	18(10.1)
QLR	22	18	20	18	9	7	94(52.5)
robust-QLR	6	4	6	2	6	4	28(15.6)
MW	12	10	10	9	6	6	53(29.6)
robust-MW	10	6	3	3	6	5	33(18.4)
APW	17	18	20	18	9	7	89(49.7)
robust-APW	7	5	6	3	6	4	31(17.3)

Notes: The test statistics PK_{sup} and PK_{msq} are based on the cumulative sums of OLS residuals, NY is the Nyblom test for time-varying parameters and *QLR*, *MW* and *APW* are the sequential Wald statistics for a single break at an unknown change point. Statistics with the prefix `robust' denote the heteroskedasticity-robust version of the tests. All tests are implemented at the 5% significance level. The numbers in brackets are the percentage rejection rates.

Data Appendix

Real GDP

We use the International Monetary Fund (IMF) *International Financial Statistics* (IFS) and *World Economic Outlook* (WEO) databases to compile the real GDP data. The 18 countries that we add to the GVAR dataset of Smith and Galesi (2010) are divided into two groups. First, those for which quarterly data are available. Second, those for which annual data are available.

For the first group (Ecuador, Egypt, Iran, Jordan, Morocco, and Tunisia), we use the IFS 99BVPZF series (GDP VOL) when available---quarterly data on GDP are reported since 1991Q1, 2002Q1, 1988Q1, 1992Q1, 1990Q1, and 2000Q1 for Ecuador, Egypt, Iran, Jordan, Morocco, and Tunisia, respectively. We seasonally adjust these quarterly observations using the U.S. Census Bureau's X-12 ARIMA seasonal adjustment program.[15] Quarterly series are then interpolated (backwards) linearly from the annual series---either from the IFS or WEO---using the same method as that applied by Dees et al. (2007a).

For the second group (Algeria, Bahrain, Kuwait, Lebanon, Libya, Mauritania, Nigeria, Oman, Qatar, Syria, Venezuela, and UAE), either the annual seasonally unadjusted IFS series (BVPZF and B..ZF) or the WEO real GDP series are interpolated to obtain the quarterly values. These series are then treated as the quarterly seasonally unadjusted data.

Consumer price index

We obtain seasonally adjusted quarterly observations on the consumer price index (CPI) for all added countries from the International Monetary Fund's INS database. Quarterly data on CPI are available since 1991Q1, 1980Q1, 2003Q2, and 1980Q1 for Lebanon, Oman, Qatar, and United Arab Emirates, respectively. Annual WEO CPI series are interpolated linearly (backwards) to obtain quarterly observations for the missing values for these four countries.

Exchange rates

The IFS AE.ZF series are collected for all added 18 countries from the IMF IFS database.

Short term interest rates

The IMF IFS database is the main source of data for short term interest rates. The IFS discount rate (60...ZF series) is used for Algeria, Ecuador, Jordan, Lebanon, Mauritania, and Venezuela. The IFS deposit rate (60L..ZF series) is used for Bahrain, Egypt, Nigeria, Oman, Qatar, and Syria. The IFS three-month interbank deposit rate or the money market rate (60B..ZF series) is used for Kuwait and Tunisia.

PPP-GDP weights

The main source for the country-specific GDP weights is the World Development Indicator database of the World Bank.

[15] For further information see U.S. Census Bureau (2007): X-12-ARIMA Reference Manual at http://www.census.gov/srd/www/x12a/

Trade matrices

Table 7: Trade Weights, Averages over 2006–2008

	Algeria	Argentina	Australia	Brazil	Canada	China	Chile	Ecuador	Egypt	Euro Area	GCC	India	Indonesia	Iran	Japan	Jordan	Korea	Libya	Malaysia	Morocco	Mauritania	Mexico	Nigeria	Norway	New Zealand	Peru	Philippines	South Africa	Singapore	Sweden	Switzerland	Syria	Thailand	Tunisia	Turkey	UK	USA	Venezuela
Algeria	0	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.01	0.00
Argentina	0.01	0	0.00	0.10	0.00	0.01	0.06	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.02
Australia	0.00	0.00	0	0.01	0.00	0.03	0.01	0.00	0.01	0.01	0.01	0.03	0.04	0.00	0.04	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.01	0.02	0.03	0.01	0.01	0.00	0.04	0.00	0.00	0.01	0.01	0.00
Brazil	0.03	0.29	0.01	0	0.01	0.02	0.08	0.04	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.03	0.03	0.01	0.07	0.01	0.00	0.07	0.00	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.05
Canada	0.06	0.01	0.01	0.02	0	0.02	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.00	0.02	0.00	0.01	0.00	0.01	0.01	0.00	0.03	0.01	0.03	0.02	0.05	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.02	0.21	0.01
China	0.04	0.12	0.16	0.10	0.06	0	0.14	0.05	0.07	0.11	0.10	0.11	0.11	0.15	0.20	0.09	0.23	0.05	0.12	0.05	0.25	0.06	0.06	0.03	0.11	0.13	0.11	0.10	0.13	0.04	0.03	0.08	0.12	0.02	0.07	0.06	0.14	0.05
Chile	0.00	0.06	0.00	0.03	0.00	0.01	0	0.06	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Ecuador	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Egypt	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0	0.01	0.01	0.01	0.00	0.00	0.00	0.04	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.01	0.00	0.00	0.00
Euro Area	0.48	0.17	0.12	0.22	0.06	0.17	0.19	0.12	0.30	0	0.15	0.17	0.09	0.24	0.11	0.16	0.10	0.66	0.10	0.56	0.48	0.08	0.24	0.46	0.11	0.15	0.12	0.29	0.10	0.54	0.67	0.32	0.09	0.70	0.45	0.52	0.15	0.11
GCC	0.00	0.01	0.03	0.03	0.01	0.04	0.00	0.01	0.13	0.04	0	0.20	0.05	0.12	0.12	0.28	0.12	0.01	0.03	0.06	0.01	0.00	0.00	0.00	0.04	0.00	0.06	0.06	0.07	0.01	0.02	0.25	0.09	0.01	0.06	0.02	0.03	0.00
India	0.02	0.01	0.03	0.01	0.00	0.03	0.02	0.01	0.06	0.02	0.10	0	0.04	0.09	0.01	0.06	0.02	0.01	0.03	0.03	0.01	0.00	0.09	0.00	0.01	0.01	0.01	0.03	0.04	0.01	0.01	0.02	0.02	0.01	0.01	0.02	0.01	0.03
Indonesia	0.00	0.01	0.03	0.01	0.00	0.02	0.00	0.00	0.01	0.01	0.01	0.02	0	0.00	0.03	0.01	0.03	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.02	0.01	0.05	0.00	0.00	0.00	0.04	0.00	0.01	0.00	0.01	0.00
Iran	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.02	0.04	0.00	0	0.01	0.00	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.04	0.00	0.00	0.04	0.00	0.00	0.00
Japan	0.02	0.02	0.16	0.04	0.03	0.15	0.09	0.03	0.04	0.05	0.18	0.03	0.18	0.12	0	0.03	0.13	0.01	0.13	0.02	0.04	0.04	0.02	0.02	0.10	0.06	0.17	0.10	0.08	0.02	0.03	0.02	0.19	0.01	0.02	0.03	0.08	0.01
Jordan	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Korea	0.01	0.01	0.06	0.03	0.01	0.10	0.05	0.02	0.02	0.02	0.10	0.03	0.07	0.07	0.07	0.03	0	0.01	0.05	0.01	0.00	0.03	0.03	0.01	0.04	0.03	0.06	0.02	0.05	0.01	0.01	0.03	0.04	0.00	0.02	0.01	0.03	0.00
Libya	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.05	0.01	0.00	0.00	0.00
Malaysia	0.00	0.01	0.03	0.01	0.00	0.03	0.00	0.00	0.01	0.01	0.01	0.03	0.06	0.01	0.03	0.01	0.02	0.00	0	0.00	0.02	0.01	0.00	0.00	0.03	0.00	0.05	0.01	0.16	0.00	0.00	0.01	0.07	0.00	0.01	0.01	0.02	0.00
Morocco	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00
Mauritania	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mexico	0.00	0.03	0.01	0.03	0.03	0.01	0.04	0.02	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.03
Nigeria	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0	0.00	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Norway	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00
New Zealand	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peru	0.00	0.01	0.00	0.01	0.00	0.00	0.03	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Philippines	0.00	0.01	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.02	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0	0.00	0.03	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00
South Africa	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.02	0.00	0.03	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.03	0.00	0.01	0.00	0.00	0	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.02	0.01	0.00
Singapore	0.00	0.00	0.05	0.01	0.00	0.03	0.00	0.00	0.01	0.01	0.04	0.04	0.13	0.02	0.03	0.00	0.03	0.00	0.15	0.00	0.00	0.00	0.00	0.01	0.04	0.00	0.10	0.01	0	0.00	0.01	0.00	0.06	0.00	0.00	0.01	0.02	0.02
Sweden	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.05	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.10	0.01	0.01	0.00	0.01	0.00	0	0.01	0.00	0.00	0.01	0.01	0.02	0.01	0.00
Switzerland	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.08	0.01	0.03	0.00	0.01	0.01	0.01	0.00	0.03	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.06	0.00	0.02	0.01	0.01	0	0.01	0.01	0.02	0.03	0.02	0.01	0.01
Syria	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.01	0.00	0.00	0.00
Thailand	0.00	0.01	0.04	0.01	0.00	0.02	0.01	0.01	0.01	0.01	0.03	0.01	0.04	0.00	0.04	0.01	0.01	0.00	0.06	0.00	0.01	0.00	0.01	0.00	0.02	0.01	0.04	0.02	0.05	0.00	0.01	0.01	0	0.00	0.01	0.01	0.01	0.00
Tunisia	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00
Turkey	0.04	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.03	0.04	0.02	0.01	0.01	0.06	0.00	0.02	0.01	0.03	0.00	0.03	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.05	0.00	0.02	0	0.02	0.00	0.00
UK	0.03	0.01	0.05	0.02	0.03	0.03	0.01	0.01	0.03	0.18	0.03	0.04	0.01	0.02	0.02	0.02	0.02	0.03	0.02	0.04	0.02	0.01	0.03	0.23	0.04	0.01	0.01	0.07	0.03	0.09	0.05	0.02	0.02	0.03	0.07	0	0.04	0.01
USA	0.22	0.12	0.11	0.19	0.70	0.20	0.17	0.43	0.11	0.16	0.11	0.12	0.10	0.00	0.19	0.11	0.13	0.07	0.16	0.05	0.05	0.69	0.36	0.06	0.12	0.22	0.19	0.11	0.13	0.07	0.09	0.02	0.12	0.03	0.07	0.13	0	0.59
Venezuela	0.00	0.01	0.00	0.02	0.00	0.00	0.01	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0

Notes: Trade weights are computed as shares of exports and imports, displayed in columns by region (such that a column, but not a row, sum to 1).
Source: Direction of Trade Statistics, 2006-2008, IMF.

Table 8: Trade Weights, Averages over 1986–1988

	Algeria	Argentina	Australia	Brazil	Canada	China	Chile	Ecuador	Egypt	Euro Area	GCC	India	Indonesia	Iran	Japan	Jordan	Korea	Libya	Malaysia	Morocco	Mauritania	Mexico	Nigeria	Norway	New Zealand	Peru	Philippines	South Africa	Singapore	Sweden	Switzerland	Syria	Thailand	Tunisia	Turkey	UK	USA	Venezuela
Algeria	0	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.01	0.00	0.00	0.00
Argentina	0.00	0	0.00	0.04	0.00	0.01	0.04	0.01	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01
Australia	0.00	0.01	0	0.01	0.01	0.03	0.00	0.00	0.03	0.01	0.02	0.02	0.03	0.02	0.04	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.03	0.01	0.03	0.01	0.01	0.00	0.02	0.00	0.01	0.01	0.02	0.00
Brazil	0.02	0.14	0.01	0	0.01	0.02	0.09	0.04	0.01	0.02	0.02	0.01	0.00	0.04	0.01	0.03	0.00	0.00	0.01	0.02	0.00	0.01	0.02	0.01	0.00	0.06	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.02	0.04
Canada	0.01	0.01	0.02	0.03	0	0.03	0.02	0.01	0.01	0.02	0.00	0.02	0.01	0.01	0.04	0.00	0.03	0.00	0.01	0.03	0.00	0.02	0.02	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.02	0.01	0.01	0.02	0.23	0.04
China	0.00	0.03	0.03	0.02	0.01	0	0.02	0.00	0.01	0.02	0.01	0.01	0.03	0.01	0.05	0.03	0.00	0.00	0.02	0.02	0.03	0.01	0.01	0.01	0.03	0.02	0.03	0.00	0.04	0.01	0.01	0.01	0.04	0.01	0.01	0.01	0.02	0.00
Chile	0.00	0.03	0.00	0.02	0.00	0.00	0	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Ecuador	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Egypt	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0	0.01	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Euro Area	0.68	0.35	0.16	0.26	0.07	0.19	0.28	0.16	0.48	0	0.25	0.27	0.12	0.39	0.13	0.29	0.11	0.75	0.11	0.60	0.63	0.13	0.46	0.42	0.13	0.22	0.13	0.44	0.10	0.51	0.67	0.53	0.17	0.75	0.47	0.54	0.18	0.21
GCC	0.00	0.00	0.02	0.05	0.00	0.01	0.01	0.00	0.03	0.03	0	0.11	0.03	0.04	0.07	0.17	0.05	0.00	0.01	0.05	0.00	0.00	0.00	0.00	0.02	0.00	0.06	0.00	0.06	0.01	0.01	0.05	0.05	0.02	0.06	0.03	0.02	0.00
India	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.03	0	0.00	0.01	0.01	0.05	0.01	0.00	0.02	0.04	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00
Indonesia	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0	0.00	0.03	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.04	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00
Iran	0.00	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.08	0.00	0.00	0.06	0.00	0.00	0.00
Japan	0.03	0.07	0.27	0.08	0.07	0.34	0.12	0.09	0.07	0.08	0.27	0.14	0.40	0.15	0	0.08	0.28	0.04	0.23	0.03	0.21	0.07	0.03	0.04	0.20	0.11	0.20	0.19	0.17	0.04	0.05	0.06	0.25	0.01	0.05	0.05	0.20	0.05
Jordan	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.00
Korea	0.00	0.01	0.04	0.01	0.01	0.00	0.02	0.00	0.01	0.02	0.04	0.02	0.03	0.02	0.06	0.01	0	0.03	0.04	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.03	0.00	0.03	0.01	0.01	0.00	0.03	0.00	0.00	0.01	0.04	0.00
Libya	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.02	0.00	0.00	0.00
Malaysia	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.03	0.01	0.00	0.02	0.01	0.02	0.00	0	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.00	0.16	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.01	0.00
Morocco	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Mauritania	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mexico	0.00	0.02	0.00	0.01	0.01	0.00	0.01	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01
Nigeria	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Norway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.00	0.00	0.03	0.00	0.00
New Zealand	0.00	0.00	0.05	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Peru	0.00	0.02	0.00	0.01	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Philippines	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00
South Africa	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.00
Singapore	0.00	0.01	0.03	0.00	0.00	0.04	0.00	0.01	0.01	0.01	0.04	0.02	0.09	0.03	0.02	0.00	0.02	0.00	0.18	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.04	0.00	0	0.00	0.00	0.00	0.09	0.00	0.00	0.01	0.02	0.00
Sweden	0.01	0.01	0.01	0.01	0.00	0.01	0.02	0.00	0.02	0.06	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.17	0.01	0.01	0.00	0.00	0.01	0	0.02	0.01	0.01	0.01	0.01	0.04	0.01	0.01
Switzerland	0.01	0.01	0.01	0.02	0.00	0.01	0.01	0.01	0.03	0.11	0.01	0.02	0.01	0.04	0.02	0.02	0.01	0.03	0.00	0.01	0.00	0.01	0.01	0.02	0.01	0.03	0.01	0.03	0.01	0.03	0	0.03	0.01	0.01	0.03	0.04	0.01	0.01
Syria	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
Thailand	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.04	0.00	0.00	0.00	0	0.00	0.00	0.00	0.01	0.00
Tunisia	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00
Turkey	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.01	0.01	0.00	0.07	0.00	0.04	0.00	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.04	0.00	0.02	0	0.01	0.00	0.00
UK	0.02	0.01	0.07	0.03	0.03	0.03	0.05	0.02	0.05	0.22	0.06	0.10	0.02	0.06	0.04	0.08	0.03	0.06	0.04	0.03	0.02	0.02	0.10	0.21	0.10	0.05	0.04	0.13	0.03	0.12	0.08	0.04	0.04	0.02	0.06	0	0.06	0.03
USA	0.15	0.18	0.19	0.30	0.75	0.16	0.24	0.52	0.17	0.20	0.16	0.17	0.17	0.05	0.36	0.12	0.35	0.00	0.19	0.07	0.02	0.70	0.32	0.07	0.18	0.32	0.33	0.15	0.22	0.11	0.08	0.06	0.19	0.05	0.11	0.14	0	0.56
Venezuela	0.00	0.01	0.00	0.02	0.00	0.00	0.03	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0

Notes: Trade weights are computed as shares of exports and imports, displayed in columns by region (such that a column, but not a row, sum to 1).
Source: Direction of Trade Statistics, 1986-1988, IMF.