The Impact of Financial Crises on Trade Flows: A Developing Country Perspective[*]

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Abstract:

The global financial crisis has hit hard international trade that dropped below levels not seen since the Great Depression with disastrous consequences for the developing world. This paper estimates an extended gravity model of trade on a sample of 83 developing countries over the period 1990-2007 to shed light on how banking crises and global economic downturns affect bilateral exports flows from developing countries. In addition to traditional variables, we include a trade finance variable and foreign aid among the regressors. Differences between developing regions are taken into account. Our results show that (i) trade finance has a positive and significant impact on bilateral export flows in all developing regions except Latin America; (ii) foreign aid matters in all regions; (iii) global economic downturns exert a negative and significant impact on export flows in all developing countries, and especially in Latin American and Sub-Saharan African economies; (iv) banking crises appear to have no significant impact in most regions.

Keywords: Banking Crises, Developing Countries, Foreign Aid, Global Downturn, International Trade, Trade Finance, Mixed Effects Panel Data, Random Coefficients.

JEL Codes: C23, F11, F12, F34, F35, G01.

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I. Introduction

After a sustained period of economic growth accompanied by a commodities price boom, the recent global twin financial crises of the credit crunch and the economic slowdown have hit hard both the developed and developing world. Global economic output fell by 0.8 percent in 2009, and national income in the advanced economies dropped by 3.2 percent over the same year (IMF 2010). The consequent severe downward shift in demand affected the flow of international trade and bore special burden to developing countries, whose export flows were primarily directed towards the advanced and developed economies. According to the Organisation for Economic Co-Operation and Development (OECD), levels of international trade fell roughly by 15% in 2009 compared to 2008 (McKibbin and Stoeckel 2009). Not since the Great Depression had such an abrupt decline in trade flows occurred (Cheung and Guichard 2009). Exports from emerging and developing countries dropped by 12% in 2009 (IMF 2010). Trade declines in developing economies occurred in many sectors: in Kenya the volume of horticultural exports (mainly directed to the EU market) fell by 35% between January and August 2009; Bangladesh experienced a slump of almost one-third in the value of its readymade garment exports directed to the US markets between January and October 2009; and in Tanzania tourist revenues dropped by 22% between January and April 2009 compared with the same period in 2008 (ODI 2010).

In addition to the fall in demand, the financial crisis negatively affected the availability of trade credit, especially in the short-term market segment. Short-term finance is considered the life-line of international trade and a lack of trade credit can bring the flow of imports and exports to a forcible halt (Auboin and Meier-Ewert 2003). In fact, a recent survey conducted by the IMF indicates that the collapse in trade during the economic downturn is in part due to the lack of available credit to

exporters and importers (IMF 2009). The trade-intensive sectors that most developing countries specialize in tend to be the most sensitive to credit availability. So, tightening credit conditions can have a significant negative impact on short-term trade flows from developing countries.

The financial instability of the developed world is also expected to dampen the flow of international aid to the developing world. Anecdotal evidence shows that a few developed economies already cut their aid spending: Italy by 56% and Ireland by 24% (Massa and Te Velde 2009). Even under current levels of foreign aid, per-capita aid flows are likely to fall as more individuals become in need for foreign assistance. In addition, recent evidence indicates that banking crises tend to result in lower aggregate levels of foreign aid from donors in the developed world to their developing country recipients (Dang, Knack, Rogers 2009). Perhaps even more unfortunate is that the reduction in aid flows immediately following a bank crisis tends to persist for at least ten years. Not only will a reduction in aid flows hurt developing countries above and beyond the dual blows received by the reduction in world demand and collapsing global trade, but foreign aid has been shown to be a predictor of trade flows (McGillivray and Morrissey 1998; Lahiri and Raimondoes-Moller 1997) and is relied upon by many developing countries.

Assessing the impact of financial crises on trade flows is important for the developed world, but is of special consequence to the developing world. The goal of this paper is to estimate a gravity model of trade to shed light on how banking crises and global economic downturns affect trade flows from developing countries in particular through trade finance and aid. Different from previous studies in the literature (e.g. Ronci 2004, Thomas 2009), this paper uses an extended gravity model, which in addition to the traditional gravity-type variables (e.g. gross domestic product, distance, common language, etc.) also includes simultaneously as regressors

proxies for trade finance and the flow of international foreign aid assistance. This analysis also makes use of a broader sample of developing countries covering a longer time span and takes into account differences between developing regions around the world. The reminder of the paper is structured as follows. Section II discusses the current financial crisis and the impact on international trade with a focus on developing countries. Section III introduces the gravity model and Section IV discusses the estimation method and data used. Section V presents the main results paying particular attention to differences between developing regions such as Latin America, Asia, Middle East and North Africa, and Sub-Saharan Africa. Finally, Section VI offers some conclusions and policy recommendations.

II.   Financial Crises, International Trade and the Developing World

The volume of world trade collapsed in 2009 compared to 2008, and the negative impact of the economic contraction on global trade is expected to haunt trade volumes well into 2010. The financial crisis has not only depressed aggregate demand and threatened global production, but has also dissolved the availability of trade finance, the life-line of international trade (Auboin and Meier-Ewert 2003). The trade collapse is likely to have more disastrous consequences for developing countries than developed ones. Not only are developing countries more susceptible to the demand contractions and production shortfalls resulting from the financial crisis, but they also depend more heavily on healthy trade flows to maintain their balance of payments and fiscal balance accounts (Frenkel and Rapetti 2009). Since developing countries use trade credit to finance exports of trade-intensive goods, a dearth of trade finance will hinder their ability to finance exports. Furthermore, foreign aid assistance may fall as developed countries respond to their own economic recessions. The possible reduction in foreign assistance will come at a time when developing countries will need it most.

The financial crisis has negatively affected the developing world primarily through the trade channel. International demand has dropped as reduced incomes and increased exchange rate volatility led to a decline in consumer spending in the developed world and in particular in the U.S. and Europe, thus reducing the demand for developing countries' exports (i.e., agricultural, manufacturing, and commodity goods). The effects of the crisis on trade flows differed among developing regions and countries depending on their trade openness, degree of export concentration, dependence on crisis hit developed economies, and exchange rate management. For example, there is evidence that Latin America, which had strong export-led economic growth for the past two decades, has been hit hard with a 30% (annualised) contraction in export revenues in the last quarter of 2008 (Antonio-Ocampo 2009).

In addition to the negative demand shock, problems with trade credit financing are another reason for the collapse of world trade. The decline in trade finance availability concurrent with the rise in price of trade finance has been attributed as the second most important culprit (after decreased demand) for recent declines in trade volumes (IFC 2009; OECD 2009; Malouche 2009). Of the $15 trillion in trade flows in 2008, the World Bank (Auboin 2009) estimates between $10 - $12 trillion were financed by some form of trade credit option (i.e., open account, letter of credit, documentary collection, and cash-in-advance). At the G-20 summit in April 2009, the gap in affordable and available trade finance was put in the range of $25 - $250 billion, prompting a pledge of $250 billion in support of trade finance options (Chauffour, Saborowski, and Soylemezo 2010). A gap in trade finance may be due to two main factors. First, relationships between firms tend to be damaged by growing market uncertainty in times of economic duress. As a result, trade credits that are normally extended between exporting and importing companies become more difficult to obtain either because of increased risk or decreased financial ability.

Second, the supply of trade finance tends to be reduced because of distress in the international banking system. Thus, letters of credit (assures exporters that importers will pay) and domestic bank lending (credit to exporters to cover pre- and post-shipment costs) falls in short supply.

Emerging markets and developing countries are especially vulnerable to a weak trade finance market (Ronci 2004; Thomas 2009). Exporters in developing countries have limited access to working capital and rely on trade finance to process or manufacture products before receiving payment while importers rely on trade finance to purchase raw materials and production equipment (Auboin and Meier-Ewert 2003). Moreover, trade in sectors that depend more on short-term financing options are especially vulnerable (Freund 2009). Developing countries also tend to have less access to foreign finance and limited alternatives to bank financing thereby making times of bank distress more severely felt (Dell'Ariccia et al. 2008). While reliable statistics on trade finance are scarce, and thorough empirical analyses are as a result equally scant, recent historical episodes suggest that financial crises are associated with a decline in available trade finance. During the banking crises that affected emerging markets in the 1990s and 2000s, trade financing became a serious issue as short-term external debt fell sharply and the cost of credit rose substantially in emerging markets (Humphrey 2009). For example, the 1997 Asian financial crisis witnessed a 16 per cent decline in available trade credit (Herger 1997). One recent study by Iacovone and Zavacka (2009) finds that trade finance is in fact negatively affected by banking crises and that poorer countries are especially susceptible to trade finance reductions and reduced trade flows.

In addition to the loss of affordable and readily available trade finance, developing countries may also have to deal with a drying up of foreign aid assistance. While statistical association between aid and trade is a common finding in the

literature (Lloyd et al. 2000), the precise causal relationship is open to debate. The possibility of trade causing aid has been investigated extensively in the context of the aid allocation and effectiveness literature in which trade flows or openness between country pairs are included as an explanatory variable in foreign aid disbursements or economic growth regressions (Alesina and Dollar 2000; Hansen and Tarp 2001; Rajin and Subramanian 2008). However, the causal relationship of aid causing trade has taken recent note in the literature (Lloyd et al. 2000; Suwa-Eisenmann and Verdier 2007; Nelson and Silva 2008), though rigorous and thorough empirical analysis is still in short supply. There are two general reasons why aid might result in additional trade flows. First, there may be a direct effect from aid on trade as a result of foreign aid funds being directly linked to trade agreements with the recipient (i.e., so-called tied aid). Second, indirect effects from aid flows may induce donor exports to the recipient country either because of the general economic effects on the recipient, or because it reinforces bilateral economic and political links. Whatever the direction of causality, the relationship between aid and trade may also be negative, for example when untied aid generates an increase in the income of recipient countries that is used to buy goods provided by countries different from the donors (Morissey 1993), when donors use aid to promote trade in countries in which they have a smaller market share (McGillivray and Oczkowski 1992), when aid leads to Dutch disease effects, or when donors use trade as an indicator of recipient countries' prosperity so that they reduce aid when trade increases.

The emerging body of research that examines the "aid causing trade" relationship can be categorised into two subsets. The first subset examines the aid-trade relationship using Granger causality analysis (McGillivray and Morrissey 1998; Arvin, Cater, and Choudhry 2000; Lloyd et al. 2000). Results from this body of studies suggest that although there is a relationship between aid and trade, the specific

nature of the relationship can vary between pairs of donors and recipients. Generally, these studies conclude that due to the complex economic, political, and cultural links between aid and trade a direct casual relationship is either difficult to obtain or may not even exist. The second subset of research analyses the determinants of a donor country's exports to the recipient country, often in a gravity model framework (Tajoli 1999; Wagner 2003; Osei, Morrissey, and Lloyd 2004; Nelson and Silva 2008; Martínez-Zarzoso et al. 2009). While these studies also conclude that the aid-trade relationship varies depending on the donor-recipient pair, evidence is found regarding aid flows increasing trade flows in certain circumstances. For example, Wagner (2003) finds that for every \$1 worth of aid sent by Japan, roughly \$0.35 comes back to the donor in terms of additional exports related to direct effects while \$0.98 comes back to donor due to indirect trade effects. Nilsson (1997) finds that \$1 of EU aid generates \$2.6 of exports from donor to recipient. However, Tajoli (1999) and Osei, Morrissey, and Lloyd (2004) find little evidence that the tying of aid generates trade over and above that explained by control variables. While the evidence to date is mixed, given the potential for aid flows to decrease substantially as a result of the financial crisis (Dong, Knack, and Rogers 2009) it remains an important consideration that is worthy of additional study.

III.   The Empirical Gravity Model

The dominant framework for modelling bilateral trade flows is the gravity model of trade (Anderson 1979; Bergstrand 1985, 1989; Anderson and van Wincoop 2003). The basic classical gravity model of trade is given by the benchmark econometric specification

$$\ln(EXP_{ijt}) = \alpha_0 + \alpha_1 \ln(GDP_{it}) + \alpha_{12} \ln(GDP_{jt}) + \alpha_3 \ln(POP_{it})$$

$$+\alpha_4 \ln(POP_{jt}) + \alpha_5 \ln(DIST_{ij}) + \varepsilon_{ijt} \qquad (1)$$

where i stands for the source exporting country, j for the target importing country, and t for the time period and ε_{ijt} is a normally distributed idiosyncratic error term, with mean 0 and variance σ_{ε}^2. The dependent variable EXP_{ijt} represents the export trade flows from country i to country j at time t. Among the explanatory variables, GDP_{it} and GDP_{jt} measures the gross domestic product of country i and j in period t, respectively. The population is given by POP_{it} and POP_{jt} for each of the two countries. The distance between the exporting and importing country is given by $DIST_{ij}$, which represents trade costs or market frictions. According to the theory, countries that are larger and similar in economic size (as measured by gross domestic product) and have greater market size (as measured by population) will tend to trade more. Trade costs, or the frictional aspect of trade flows, will inhibit actual trade between countries. Accordingly, the expected signs of the parameters are $\alpha_1, \alpha_2 > 0$, $\alpha_3, \alpha_4 > 0$, and $\alpha_5 < 0$.

The specification in equation (1) is in line with the classical trade models of Ricardo and Heckscher, Ohlin, and Samuelson (HOS). However, classical specifications have been criticised for ignoring economies of scale (Helpman 1999). The New Trade Theory (NTT) of Krugman (1979; 1980) and Helpman and Krugman (1985) reflects a more appropriate theoretical justification for gravity models of trade in the presence of increasing returns to scale.[5] The key determinants for trade in the NTT framework include difference in relative factor endowments, overall size between pairs of trading countries, and similarity in size between country pairs (Baltagi et al. 2003). For example, Bergstrand (1990) estimates a gravity model of trade for a sample of developed countries and finds that the difference in relative

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[5] For empirical applications of the NTT approach see Helpman (1987); Bergstrand (1990); Hummels and Levinsohn (1995); Egger (2000); Baltagi, Egger, and Pfaffermayr (2003); and Serlenga and Shin (2007).

factor endowments between countries is negatively related to bilateral trade. This finding is consistent with Linder's (1961) hypothesis for trade in which trade is positively associated with countries who share similar preferences in terms of economic demand.

The general specification of a gravity model in the spirit of the NTT is

$$
\begin{aligned}
\ln\left(EXP_{ijt}\right) = {} & \beta_0 + \beta_1\left(LGDT_{ijt}\right) + \beta_2\left(LSIM_{ijt}\right) + \beta_3\left(RLFA_{ijt}\right) \\
& + \beta_4 \ln\left(DIST_{ij}\right) + \varepsilon_{ijt}
\end{aligned}
\tag{2}
$$

A measure of overall country size between trading pairs is defined as

$$
LGDT_{ijt} = \ln\left(GDP_{it} - GDP_{jt}\right),
\tag{3}
$$

which should be positively associated with greater total volumes of trade. A similarity index describing the relative country size of trading pairs is

$$
LSIM_{ijt} = \ln\left[1 - \left(\frac{GDP_{it}}{GDP_{it} + GDP_{jt}}\right)^2 - \left(\frac{GDP_{jt}}{GDP_{it} + GDP_{jt}}\right)^2 \right],
\tag{4}
$$

which is bounded between 0 (absolute divergence in country size) and 0.5 (equal country size). A larger similarity index means that the two countries are more similar in terms of GDP and should therefore imply a greater volume of trade. An absolute measure of the difference in relative factor endowments between two country trading pairs is

$$
RLFA_{ijt} = \left| \ln\left(\frac{GDP_{it}}{POP_{it}}\right) - \ln\left(\frac{GDP_{jt}}{POP_{jt}}\right) \right|,
\tag{5}
$$

which would be zero in the extreme case of equality in relative factor endowments.

Evidence in favour of the NTT suggests that the estimated coefficients on $LGDT_{ijt}$ and $LSIM_{ijt}$ would be positive. According to the HOS theory of trade, the estimated coefficient on $RLFA_{ijt}$ would be positive, meaning that trade rises with differences in relative factor endowments. However, Linder's (1961) hypothesis

would imply a negative coefficient on $RLFA_{ijt}$ meaning that more dissimilar two countries are in terms of relative factor endowments the smaller are the trade volumes. Accordingly, the expected signs of the parameters for the model in equation (2) are $\beta_1, \beta_2 > 0$, $\beta_3 > 0$ or $\beta_3 < 0$, and $\beta_4 < 0$.

As is often done in the estimation of gravity models in general, the model in equation (2) can be subsequently extended by including the real exchange rate (as a proxy for prices) and by including dummies for the existence of colonial relationships and if there is common language between trading partners. Moreover, in addition to the standard set of variables, the gravity model estimated in this paper also includes trade finance as measured by the outstanding short-term credit, foreign aid as measured by official development assistance (ODA), and dummies for national bank crises and previous global economic downturns.

The proposed extended gravity model in its log-linear form is the following:

$$
\begin{aligned}
\ln\left(EXP_{ijt}\right) = {} & \beta_0 + \beta_1 LGDT_{ijt} + \beta_2 LSIM_{ijt} + \beta_3 RLFA_{ijt} \\
& + \beta_4 \ln\left(DIST_{ij}\right) + \beta_5 LAN_{ij} + \beta_6 COL_{ij} \\
& + \beta_7 \ln\left(RXR_{ijt}\right) + \beta_8 GED_t + \beta_9 \ln\left(FIN_{it}\right) \\
& + \beta_{10} \ln\left(AID_{jit}\right) + \beta_{11} BAN_{it} + \varepsilon_{ijt}
\end{aligned}
\tag{6}
$$

where the term LAN_{ij} is a dummy variable indicating a common language between the exporter and importer and the term COL_{ij} is a dummy variable that indicates whether the country i is a former colony of country j. The real exchange rate between the exporting country currency and the importing country currency at time t is given by RXR_{ijt}.[6] The GED_t term is a dummy variable indicating the time periods for which

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[6] The real exchange rate is obtained by deflating the nominal exchange rate between the source country and target country at a specified time period (e_{ijt}), and deflating by the countries' respective consumer price index (CPI_{it}, CPI_{jt}). That is, by computing the expression:
$RXR_{ijt} = e_{ijt}\left(CPI_{jt}/CPI_{it}\right).$

a global economic downturn occurred. Trade finance is represented by FIN_{ijt}, while foreign aid from country j to country i at time t is given by AID_{jit}. Finally, the dummy variable BAN_{it} indicates a bank crisis at time t in the source exporting country.

In terms of expected results, the terms sharing a common language (LAN_{ij}) and sharing a previous colonial relationship (COL_{ij}) are expected to improve trade prospects between two countries. The real exchange rate (RXR_{ijt}) is expected to positively influence bilateral trade flows. As the currency of the exporting country appreciates against the currency of its trading partner, the more costly its products become and so lower export flows are anticipated. Trade finance (FIN_{ijt}) and foreign aid (AID_{jit}) are expected to have a positive impact on export flows, while source country banking crises (BAN_{it}) or global economic downturns (GED_t) are expected to negatively affect trade flows.

IV.   Data and Estimation Strategy

The data come from a number of different aggregate macroeconomic databases. International trade flows data for the period 1990-2007 are from the IMF's Direction of Trade Statistics. Data on GDP, GDP per capita, CPI, and exchange rates are sourced from the World Bank's World Development Indicators. The foreign aid data represents official development assistance in actual funds dispersed as published by the OECD. Actual trade finance is represented by total outstanding short-term credit reported by the World Bank's Global Development Finance database. The trade finance proxy includes both the OECD measure of short-term credit for trade as well as short-term claims from international banks as compiled by the Bank for

International Settlements.[7]   Only those developing countries for which data on the trade finance proxy could be obtained are included in the analysis. A complete list of the 83 developing countries used in the estimation is presented in Table 1. Also, note that all figures for the financial variables are in 2000 U.S. dollars. Data on distance between trade partners as well as indicators on common language, geographic border, and former colonial status are sourced from CEPII.

The dummy variable indicating banking crises is based on the database developed by Laevan and Valencia (2008) who identify the starting year of 124 distinct systemic banking crises for 37 different countries over the 1970-2007 time period. A systemic banking crisis is identified for those countries in which a substantial number of defaults occur in the financial sector concurrent with difficulty in ability of financial institutions and corporations to repay contracts. Only crises that occurred for the developing countries included in the analysis between 1990-2007 are used in the construction of the dummy variable, which includes 42 distinct systemic banking crises for the source countries included in the dataset. Table 2 lists the identified banking crises by country and start year.

To differentiate the impact of banking crises from the effect of global economic downturns, a dummy variable based on the occurrence of a world-wide recession is created. The dummy variable for global economic downturns is sourced from Freund (2009), who identifies two world-wide economic recessions in the time frame considered by this paper (i.e., 1991 and 2001). Freund (2009) uses a filter to identify episodes of global downturns, which must satisfy the following: (1) world GDP growth falls below 2 percent, (2) a drop of more than 1.5 percentage points in world real GDP growth from the previous five year average to the current rate must

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[7] Using short-term credit as a proxy for trade financing has a number of limitations as discussed by Ronci (2004).

have occurred, and (3) considering the previous two years and the following two years, growth is at a minimum.[8] Given that the dataset in this paper consists of international trade flows for the 1990-2007 time period, dummy variables are created to indicate a global economic downturn for the years 1991 and 2001.

From an estimation perspective, one of the main problems that arise when dealing with bilateral trade flows in panel data is the heterogeneity of the sample, especially when dealing with developing countries. To address this issue, previous studies have used mainly fixed-effects models (see, for example, Egger (2000), Cheng and Wall (2005)). However, by doing so, it is assumed that the effects of the variables included in the model are common across trading partners, thus ignoring additional heterogeneity within countries and pairs of countries. In order to overcome this shortcoming, a mixed-effects linear model is estimated (Cameron and Trivedi 2005). These types of models contain both fixed and zero-mean random parameters, thus allowing coefficients and slopes to vary across country pairs.

The general specification of a mixed-effects model is

$$y_{it} = X_{it}^{'}\beta + R_{it}^{'}\alpha_i + \varepsilon_{it} , \tag{7}$$

where the set of regressors $X_{it}^{'}$ includes an intercept, $R_{it}^{'}$ consists of a vector of observable characteristics, α_i is a random zero-mean vector, β corresponds to the fixed effect parameters, and ε_{it} is the error term. In particular, a random-coefficients version of equation (7) is estimated by permitting $LGDT_{ijt}$ to vary across countries, which will allow the slope of $LGDT_{ijt}$ to vary randomly across country pairs. The random-coefficient model for the gravity model is specified in general as

$$y_{ij} = \beta_1 + \beta_2 X_{ij} + \beta_3 LGDT_{ijt} + \zeta_{1j} + \zeta_{2j} LGDT_{ij} + \delta_{ij} , \tag{8}$$

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[8] The filter used in Freund (2009) is based on the filter developed in Milesi-Ferretti and Razin (1998).

where X_{ij} is a matrix that includes all the previous mentioned regressors in equation (6), ζ_{1j} is the random intercept and δ_{ij} is the residual, both normally distributed with zero means, independent from one another, ζ_{1j} being independent across countries and δ_{ij} independent across countries and pairs. Finally, β_1 and β_2 are the fixed parameters of equation (8), while ζ_{2j} is the random coefficient for the sum of the GDPs for country i and country j, therefore allowing the model to incorporate both a fixed and a random component.

V.   Results

The gravity model in equation (6) is estimated using the random coefficients framework in equation (8) for five specific regions. These regions include the whole developing country sample (i.e., the developing world) and four specific regions: Latin America, Asia, Sub-Saharan Africa, and the Middle East and North African region. Four sets of regressions are estimated for each region. An overall regression representing equation (6) is estimated and then three variants of equation (6). In the first variant, an interaction term is included between the trade finance variable and the banking crisis dummy. In the second variant, an interaction term between the foreign aid variable and the global economic downturn dummy is included. In the third and final variant, both the interaction terms are included.

Table 3 presents the results of the panel regressions. In the specifications from columns (1) through (4), we test the impact of our variables of interest (trade finance, aid, global economic downturns and banking crises) on bilateral export flows for the whole sample, including all 83 countries (see Table 1). Columns (5) through (20) provide more details on the importance of our key variables by splitting the sample into the four regions: Latin America (LA) in columns (5) through (8), Asia in columns

(9) through (12), Sub-Saharan Africa (SSA) in columns (13) through (16), and the Middle East and North Africa (MENA) in columns (17) through (20).

The results in panel A of Table 3 correspond to the fixed part of the model, while the results in panel B correspond to the random part of the model. The first column for each region (i.e. columns (1), (5), (9), (13) and (17)) reports the coefficients for the specification presented in equation (6), while the successive specifications add the interaction terms for banking crises and trade finance, global downturn and aid, and the previous two interactions simultaneously (see columns (4), (8), (12), (16) and (20)).

The total mass of trading partners' GDPs ($LGDT_{ijt}$) is strongly significant and around one in almost all specifications across all developing regions, and this in line with previous studies by, for example, Baltagi et al. (2003). Also, the similarity index ($LSIM_{ijt}$), as expected, is positive and significant throughout all regions. However, its magnitude appears to be smaller in the MENA and SSA regions. This might be due to the fact that the majority of these countries are commodities exporters, trading mostly with developed economies. Given that both coefficients on $LGDT_{ijt}$ and $LSIM_{ijt}$ are positive and significant, the results support the NTT model of trade.

Moving to the effects of differences in relative factor endowments ($RLFA_{ijt}$), the results show that the coefficients are significant and negative throughout all specifications and regions, supporting Linder's (1961) hypothesis that trade flows should be smaller the more dissimilar two countries are in terms of relative factor endowments. In other words, the more unlike the demand structures of each individual country in the trading pair, the more likely they are to trade with one another. This result is also in accord with that found in Baltagi (2003).

Distance ($DIST_{ij}$) is found to exert a strong negative and statistically significant impact on trade flows, which is consistent with the general notion of a gravity model of trade. This result is consistent across all regressions and regions. Both common language (LAN_{ij}) and past colonial relationships (COL_{ij}) are found to be positive and significant. Moreover, being a past colony appears to have a bigger impact on exports flows from the Sub-Saharan African region. This might be due to the fact that SSA countries gained their independence relatively recently compared to developing countries in other regions which had become independent after the Second World War or in early 1960s. Thus, SSA trade flows are still dominated by previous colonial ties, for example to Europe, which still represents a key destination market for African exports.

Looking at the effects of the real exchange rate (RXR_{ijt}), its effects are significant and positive, even though small in magnitude in the whole sample (around 0.005) and in all regions, with the exception of Sub-Saharan Africa. This is explained by the fact that an increase in the exchange rate, which corresponds to a depreciation of the exporting country's currency, makes exported products more competitive and less expensive with respect to those in the importing country, thus inducing an increase in export flows. In the case of SSA, the non-significance of the exchange rate may be explained by considering the types of products this region tends to export, which are mainly commodities usually priced in US dollars and so not likely to be affected by changes in the exchange rate.

The global economic downturn dummy (1991, 2001) is negative and significant for all developing countries, showing that in the past global crises reduced by almost 8 percent developing countries' export flows. Looking separately at each region, we can see that Latin America was the most affected by previous global crises

experiencing a 12 percent average reduction in its trade flows, followed by Sub-Saharan Africa (9%), the Middle East and North Africa (8%), and Asia (7%). This gives an idea on the likely exposure of each region to trade shocks due to the current global economic downturn. Latin America is clearly particularly vulnerable as suggested also by the fact that most LA countries depend on the US economy for their export flows. Mexico alone, for example, directs more than 80 percent of its exports to the United States. On the other hand, Asian economies which have more diversified exports (by products and by markets) are likely to weather the economic storm better than all other regions.

Trade finance as represented by outstanding short-term credit in US dollars is positive and significant for all developing countries, but once we split the sample it appears to have a small impact on Asia and SSA while it turns non-significant for Latin America. The results for the SSA region are in line with Humphrey (2009) who surveyed 30 medium- and large-scale African firms in the garments and horticulture sectors and found that very few of their businesses were affected by the contraction in trade finance due to the global financial crisis mainly thanks to the resilience of the domestic banking system and the nature of trading relationships.

The aid variable (AID_{jit}) is positive and significant throughout all the regions, and it appears to exert a greater impact in Latin American and Asian countries. This result supports previous findings in the literature according to which aid flows may increase trade flows. Wagner (2003) finds a similar positive relationship, though the results in Table 3 are smaller in magnitude. Moreover, Wagner (2003) finds that the relationship between aid and trade varies between donor countries. The results in Table 3 suggest a similar result except in terms of the recipient country. Nelson and Juhasz Silva (2008) also estimate a gravity model of trade and find that foreign aid

has a positive and significant impact on exports from the source country to the recipient target country.

The banking crisis dummy is mainly insignificant for the whole sample and for the LA and SSA regions. Given the substantial size of the sample, the limited number of observations on systemic financial crises may not be enough to uncover the variation in trade flows as a result of a banking crisis. However, it is negative and significant for the Asian economies (see columns (9) and (11)) perhaps due to the considerable effects of the previous Chinese banking crises in 1992. In the MENA region, instead, the coefficients are positive and highly significant. Although puzzling, we should notice that in this particular subsample we have only two main banking crises, one for Algeria (1990) and one for Tunisia (1998), and in both cases the crisis coincided with increases in export flows, so the regression is picking up these effects as positive events.

Finally, in regards to the interaction terms, the interaction between banking crises and trade finance ($BAN_{it} \times FIN_{ijt}$) is only significant, and negative, in the overall sample. The partial derivative of export flows with regards to trade finance implies that while trade finance has a positive impact on trade flows, during a banking crisis this effect is dampened. Accordingly, urgent calls to surge the global economy with an influx of trade finance support may not be the best course of action. The interaction term between global economic downturns and foreign aid ($GED_{it} \times AID_{ijt}$) is only significant for the MENA region and is also negative. The partial derivative of export flows with respect to foreign aid implies that while the existence of foreign aid improves trade flows between country pairs, during a global economic downturn, for the MENA region, overall foreign aid has a negative impact on export flows. Note that this result only holds for the MENA region and not the other developing regions

nor the sample overall. However, care should be taken with an interpretation of this result as the global economic downturns in 1991 and 2001 are also concurrent with military conflicts in the region.

VI.   Conclusions

The global financial crisis has hit hard international trade with disastrous consequences for the developing world. This paper highlights the extent to which global economic downturns and banking crises may affect bilateral exports flows from developing countries through the trade finance and foreign aid channels. A sample of 83 developing countries over the period 1990-2007 is analysed, and given the potentially large degree of heterogeneity within the sample, a sub-sample analysis is undertaken to determine whether the effects of key variables of interest on bilateral exports flows are different among developing regions (such as Latin America, Asia, Sub-Saharan Africa, and Middle East and North Africa).

In the whole sample, both trade finance and foreign aid are found to contribute significantly to bilateral exports flows. On the other hand, global economic downturns have a negative impact on trade flows, while banking crises are not statistically significant. Notably, global economic downturns appear to hit Latin America particularly hard. Meanwhile trade finance seems to play a small role in fostering exports flows in Asia and Sub-Saharan Africa and is not significant for Latin America where trade flows are driven mainly by foreign aid. Results broadly confirmed previous findings commonly encountered in the literature.

These results underline the importance of both trade finance and aid in boosting developing countries' exports flows, thus suggesting that trade finance is not the only form of financing with implications for trade flows. Therefore, policymakers should not focus only on trade finance to foster exports flows especially in periods of crises. However, the impact of these financial flows is very uneven among developing

regions. In a similar way, the impact of global crises on developing countries' exports is highly differentiated by region. So, responding to the new challenges requires carefully targeted support. Specific targeted policies may be more relevant than general interventions aiming at increasing aid or trade finance availability in periods of global economic downturns or banking crises. For example, an increase in foreign aid during periods of global economic downturns may not necessarily benefit all developing regions alike.

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Table 1. List of developing countries (alphabetical order)

Algeria	Dominica	Kenya	Rwanda
Angola	Dominican Republic	Lao	Samoa
Argentina	Ecuador	Madagascar	Senegal
Bangladesh	Egypt	Malawi	Seychelles
Belize	El Salvador	Malaysia	Solomon Islands
Benin	Ethiopia	Mali	South Africa
Bolivia	Fiji	Mauritania	Sri Lanka
Brazil	Gabon	Mauritius	Sudan
Burkina Faso	Gambia, The	Mexico	Tanzania
Burundi	Ghana	Mongolia	Thailand
Cambodia	Grenada	Morocco	Togo
Cameroon	Guatemala	Mozambique	Tonga
Cape Verde	Guinea-Bissau	Nicaragua	Tunisia
Central African Republic	Guyana	Niger	Uganda
Chad	Haiti	Nigeria	Uruguay
Chile	Honduras	Pakistan	Vanuatu
China	India	Panama	Venezuela
Colombia	Indonesia	Papua New Guinea	Vietnam
Congo, Republic of	Iran	Paraguay	Zambia
Costa Rica	Jamaica	Peru	Zimbabwe
Cote d'Ivoire	Jordan	Philippines	

Table 2. List of banking crises

Countries Affected	Crisis Year
Algeria	1990
Argentina	1990
Argentina	1990
Bolivia	1991
Brazil	1991
Brazil	1991
Burkina Faso	1991
Burundi	1991
Cameroon	1991
Cape Verde	1991
Central African Rep.	1991
Chad	1992
China, P.R.	1992
Colombia	1992
Congo, Rep. of	1992
Costa Rica	1992
Croatia	1992
Dominican Republic	1993
Ecuador	1993
Guinea-Bissau	1994
Guyana	1994
Hati	1994
India	1994
Indonesia	1994
Jamaica	1994
Kenya	1994
Malaysia	1995
Mexico	1995
Nicaragua	1995
Nicaragua	1995
Nigeria	1995
Paraguay	1996
Philippines	1996
Thailand	1998
Togo	1998
Tunisia	1998
Uganda	1998
Uruguay	1998
Venezuela	2000
Vietnam	2000
Zambia	2002
Zimbabwe	2003

Table 3. Estimation results, 1990 – 2007

Panel	Variables	Developing World				Latin America				Asia				Sub-Saharan Africa				Middle East and North Africa			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(A)	LGDT	1.141[a]	1.141[a]	1.187[a]	1.187[a]	1.248[a]	1.248[a]	1.248[a]	1.248[a]	1.332[a]	1.332[a]	1.332[a]	1.332[a]	0.611[a]	0.612[a]	0.611[a]	0.612[a]	1.348[a]	1.348[a]	1.348[a]	1.348[a]
	LSIM	0.504[a]	0.504[a]	0.531[a]	0.531[a]	0.572[a]	0.572[a]	0.572[a]	0.572[a]	0.596[a]	0.596[a]	0.596[a]	0.596[a]	0.097[a]	0.098[a]	0.097[a]	0.098[a]	0.254[a]	0.254[a]	0.254[a]	0.254[a]
	LRFA	-0.037[a]	-0.037[a]	-0.037[a]	-0.037[a]	-0.017[a]	-0.017[a]	-0.017[a]	-0.017[a]	-0.022[a]	-0.022[a]	-0.022[a]	-0.022[a]	-0.049[a]	-0.049[a]	-0.049[a]	-0.050[a]	-0.095[a]	-0.095[a]	-0.095[a]	-0.095[a]
	DIST	-0.848[a]	-0.848[a]	-0.891[a]	-0.891[a]	-0.976[a]	-0.976[a]	-0.975[a]	-0.975[a]	-0.888[a]	-0.888[a]	-0.888[a]	-0.888[a]	-0.657[a]	-0.657[a]	-0.657[a]	-0.657[a]	-0.801[a]	-0.801[a]	-0.801[a]	-0.801[a]
	LAN	0.438[a]	0.438[a]	0.452[a]	0.452[a]	0.451[a]	0.451[a]	0.451[a]	0.451[a]	0.552[a]	0.552[a]	0.552[a]	0.552[a]	0.246[a]	0.246[a]	0.246[a]	0.246[a]	0.733[a]	0.733[a]	0.733[a]	0.733[a]
	COL	0.863[a]	0.862[a]	0.827[a]	0.827[a]	0.415[a]	0.415[a]	0.415[a]	0.414[a]	0.789[a]	0.789[a]	0.789[a]	0.790[a]	1.299[a]	1.299[a]	1.299[a]	1.299[a]	0.847[a]	0.847[a]	0.846[a]	0.846[a]
	RXR	0.005[a]	0.005[a]	0.004[a]	0.005[a]	0.007[a]	0.007[a]	0.007[a]	0.007[a]	0.006[b]	0.006[b]	0.006[b]	0.006[b]	0.000	0.000	0.000	0.000	0.027[a]	0.027[a]	0.027[a]	0.027[a]
	GED	-0.080[a]	-0.080[a]	-0.083[a]	-0.083[a]	-0.118[a]	-0.118[a]	-0.103[a]	-0.103[a]	-0.070[a]	-0.070[a]	-0.062[a]	-0.062[a]	-0.095[a]	-0.094[a]	-0.089[a]	-0.088[a]	-0.083[a]	-0.082[c]	-0.043	-0.043
	FIN	0.014[a]	0.014[a]	0.018[a]	0.019[a]	0.005	0.005	0.005	0.005	0.012[a]	0.012[a]	0.012[a]	0.012[a]	0.012[a]	0.012[a]	0.012[a]	0.012[a]	0.103[a]	0.103[a]	0.105[a]	0.105[a]
	AID	0.026[a]	0.026[a]	0.023[a]	0.023[a]	0.035[a]	0.035[a]	0.035[a]	0.035[a]	0.029[a]	0.029[a]	0.030[a]	0.030[a]	0.015[a]	0.015[a]	0.016[a]	0.016[a]	0.008[b]	0.008[b]	0.009[a]	0.009[a]
	BAN	-0.034	0.224	-0.046[c]	0.273	-0.035	-0.018	-0.036	-0.019	-0.147[a]	-0.767	-0.147[a]	-0.766	-0.023	0.472	-0.023	0.47	0.423[a]	0.308	0.417[a]	0.335
	BAN*FIN		-0.011[c]		-0.014[c]		-0.001		-0.001		0.026		0.026		-0.024		-0.024		0.005		0.004
	GED*AID			-0.001	-0.001			-0.005	-0.005			-0.003	-0.003			-0.002	-0.002			-0.015[b]	-0.015[b]
(B)	cons	12.202	12.17	11.736	11.708	12.682	12.68	12.69	12.687	12.62	12.615	12.624	12.619	8.599	8.596	8.6	8.596	9.973	9.974	9.972	9.972
	random	0.471	0.47	0.452	0.451	0.484	0.484	0.485	0.484	0.483	0.482	0.483	0.482	0.349	0.349	0.349	0.349	0.389	0.389	0.389	0.389
	AIC	321067	321066	289418	289416	91896	91898	91896	91898	80916	80918	80918	80919	113449	113450	113450	11351	31485	31487	31482	31484
	BIC	321210	321219	289569	289576	92021	92031	92029	92039	81039	81049	81049	81059	113577	113586	113587	113596	31592	31601	31597	31606
	N	103829	103829	92486	92486	29992	29992	29992	29992	27117	27117	27117	27117	37068	37068	37068	37068	9652	9652	9652	9652

[a] denotes significance at 1 percent.
[b] denotes significance at 5 percent.
[c] denotes significance at 10 percent.