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The Impact of Global Crises, Trade Finance and Aid on Export Flows: A Developing Country Perspective

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ABSTRACT

In this paper, we use a mixed-effects trade gravity model on a sample of 83 developing countries over the period 1990-2007 to assess the impact of trade finance and foreign aid on bilateral export flows. In addition to traditional variables, we also include a banking crises variable and a global economic downturns variable among the regressors. Differences across developing regions are taken into account. Our results suggest 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 developing regions.

I. INTRODUCTION

The recent twin crises of the credit crunch and the economic slowdown have severely hit export flows from emerging and developing countries, which dropped by 12 percent in 2009 compared to 2008 (IMF 2010). According to the International Monetary Fund, such decline in trade flows was triggered by both a fall in international demand and a contraction in available trade finance (Thomas 2009). International demand, on one hand, 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. On the other hand, the distress in the international banking system and the deterioration of the relationships between firms, due to the growing market uncertainty, led to a decline in trade financing. In November 2008 the International Chamber of Commerce (2008) reported that the credit crunch was raising concern about the availability of trade finance, especially in developing countries, and in 2009 this fact was confirmed by a survey conducted by the IMF jointly with the Bankers' Association for Finance and Trade which showed that trade finance transactions in developing economies had fallen on average by 6 percent (IMF 2009; Auboin 2009). Previous historical episodes also suggest that crises are associated with a decline in available trade finance. For example, the 1997 Asian financial crisis witnessed a 16 percent decline in trade financing (Herger 2009).

Despite anecdotal evidence points out to the existence of a linkage between trade flows and trade financing, there are to date very few empirical studies in the literature assessing the impact of constrained trade finance on trade flows. Among them, it is worth to mention Ronci (2004) who studied, over a 10-years period, the relationship between trade financing and trade flows in 10 emerging economies experiencing financial crises by using different econometric techniques – generalized least squares (GLS), instrumental variables (IV) and generalized method of moments (GMM). His results show that a fall in trade finance may explain part of the trade loss during crises. A similar analysis was conducted on a sample of 36 emerging markets and two low-income countries by Thomas (2009), who found that trade finance has an important impact on international trade. More recently Korinek et al. (2010), looking at a sample of 43 countries over the period 2005-2009, found that the availability of short-term trade finance has affected trade flows during the recent crisis, but this impact has been smaller than that of falling demand. This paper aims to contribute to this stream of the literature by assessing the impact of trade finance on trade flows making use of an extended gravity model. Differently from previous studies, we look at a broader sample of 83 developing countries over the period 1990-2007, and we also take into account differences between developing regions around the world.

In addition to trade finance and the traditional gravity-type variables (e.g. gross domestic product, distance, common language, etc.), in our analysis we also include international foreign aid assistance among regressors. The recent global economic and financial crisis has dampened the flow of international aid to the developing world. Anecdotal evidence, indeed, shows that a few developed economies, such as Italy or Ireland, cut their aid spending (Massa and te Velde 2009). This is consistent with recent findings in the literature by Dang et al. (2009) according to which banking crises tend to result in lower aggregate levels of foreign aid from donors in the developed world to their developing country recipi-

ents. But more importantly for the purposes of our study, foreign aid has been shown to be a predictor of trade flows (McGillivray and Morrissey 1998; Lahiri and Raimondos-Møller 1997). 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.

The 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 et al. 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 causal 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 similar to the one used in this paper (Tajoli 1999; Wagner 2003; Osei et al. 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 USD 1 worth of aid sent by Japan, roughly USD 0.35 comes back to the donor in terms of additional exports related to direct effects, while USD 0.98 comes back to donor due to indirect trade effects. Nilsson (1997) finds that USD 1 of EU aid generates USD 2.6 of exports from donor to recipient. However, Tajoli (1999) and Osei et al. (2004) find little evidence that the tying of aid generates trade over and above that explained by control variables. So, while the evidence to date is mixed, given the potential for aid flows to decrease substantially as a result of the financial crisis (Dang et al. 2009), the impact of aid on trade remains an important issue that is worthy of additional study in this paper.

Finally, the recent fall of trade flows due to the global economic and financial crisis has brought renewed attention on the relationship between crises and export flows. Indeed, it is not clear to date to what extent banking crises or global economic downturns are responsible for the drop in exports compared to other factors such as trade finance or foreign aid. While there are several studies analyzing the effects of periods of financial distress on the real economy, the literature on the linkages between financial or economic crises and exports is very thin. Iacovone and Zavacka (2009), for example, analysed the effects of 23 banking crises over the period 1980-2000 on exports growth and found that banking crises exert a negative and significant impact on exports growth. In a similar way, Thomas (2009) assessed whether banking crises have affected trade volumes over the period 1980-2005 and showed that the former had a significant and negative effect on the latter. In this paper, we also look at the crises impact on trade flows, but differently from previous studies in the literature, we distinguish between banking crises and global economic downturns.

The remainder of the paper is structured as follows. Section II introduces the gravity model. Section III discusses the estimation method and data used. Section IV 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. Section V concludes and offers some policy recommendations.

II. 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

$$\ln(EXP_{ijt}) = \alpha_0 + \alpha_1 \ln(GDP_{it}) + \alpha_2 \ln(GDP_{jt}) + \alpha_3 \ln(POP_{it}) + \alpha_4 \ln(POP_{jt}) + \alpha_5 \ln(DST_{ij}) + \varepsilon_{ijt}\,, \quad (1)$$

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 flows from country i to country j at time t. Among the explanatory variables, GDP_{it} and GDP_{jt} measure 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[1]. 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 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

$$\ln(EXP_{ijt}) = \beta_0 + \beta_1 (LGDT_{ijt}) + \beta_2 (LSIM_{ijt}) + \beta_3 (RLFA_{ijt}) + \beta_4 \ln(DIST_{ij}) + \varepsilon_{ijt}\,. \quad (2)$$

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

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

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

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

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

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

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

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 the 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:

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

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}[2]. The GED_t term is a dummy variable indicating the time periods for which a global economic downturn occurred. Trade finance is represented by FIN_{ijt}, while foreign aid from coun-

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

try 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.

III. DATA AND ESTIMATION STRATEGY

The data used 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 represent 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[3]. 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 Appendix 1. Also, note that all figures for the financial variables are in 2000 USD. 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 Laeven 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 and 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. Appendix 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)

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

uses a filter to identify episodes of global downturns, which must satisfy the following: (i) world GDP growth falls below 2 percent, (ii) 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 have occurred, and (iii) considering the previous two years and the following two years, growth is at a minimum[4]. 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. Summary Statistics can be found in Appendix 3.

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

$$y_{it} = X'_{it}\beta + R'_{it}\alpha_i + \varepsilon_{it}, \qquad (7)$$

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

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

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.

IV. 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.

Table 1 presents the results of the panel regressions. In the specification in column (1) we test the impact of our variables of interest (trade finance, aid, global economic

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

Table 1. Estimation results, Mixed Effects Model, 1990 – 2007

		Developing World	*Latin America*	*Asia*	*Sub-Saharan Africa*	*Middle East and North Africa*
Panel	Variables	(1)	(2)	(3)	(4)	(5)
(A)	$LGDT_{ijt}$	1.141[a]	1.248[a]	1.332[a]	0.611[a]	1.348[a]
	$LSIM_{ijt}$	0.504[a]	0.572[a]	0.596[a]	0.097[a]	0.254[a]
	$LRFA_{ijt}$	-0.037[a]	-0.017[a]	-0.022[a]	-0.049[a]	-0.095[a]
	$DIST_{ij}$	-0.848[a]	-0.976[a]	-0.888[a]	-0.657[a]	-0.801[a]
	LAN_{ij}	0.438[a]	0.451[a]	0.552[a]	0.246[a]	0.733[a]
	COL_{ij}	0.863[a]	0.415[a]	0.789[a]	1.299[a]	0.847[a]
	RXR_{ijt}	0.005[a]	0.007[a]	0.006[b]	0.000	0.027[a]
	GED_t *(dummy)*	-0.080[a]	-0.118[a]	-0.070[a]	-0.095[a]	-0.083[a]
	FIN_{it}	0.014[a]	0.005	0.012[a]	0.012[a]	0.103[a]
	AID_{jit}	0.026[a]	0.035[a]	0.029[a]	0.015[a]	0.008[b]
	BAN_{it} *(dummy)*	-0.034	-0.035	-0.147[a]	-0.023	0.423[a]
(B)	*cons*	12.202	12.682	12.62	8.599	9.973
	random	0.471	0.484	0.483	0.349	0.389
	N	103829	29992	27117	37068	9652

Notes: All variables in natural logarithms unless otherwise stated.
[a] denotes significance at 1 percent. [b] denotes significance at 5 percent. [c] denotes significance at 10 percent.

downturns and banking crises) on bilateral export flows for the whole sample, including all 83 countries (see Appendix 1). Columns (2) through (5) provide more details on the importance of our key variables by splitting the sample into the four regions: Latin America (LA) in column (2), Asia in column (3), Sub-Saharan Africa (SSA) in column (4), and the Middle East and North Africa (MENA) in column (5).

The results in panel A of Table 1 correspond to the fixed part of the model, while the results in panel B correspond to the random part of the model.

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 is 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 et al. (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 the early 1960s. Thus, SSA trade flows are 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 (GED_t; 1991, 2001) is negative and significant for all developing countries, showing that in the past global crises reduced by about 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 (2008-2010). 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 (FIN_{it}) 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[5]. The results for the SSA region are in line with Humphrey (2009) who surveyed 30 medium- and large-scale African firms in the

[5] It is important to highlight that the results were obtained using a proxy for trade finance. In particular, in Sub-Saharan Africa, actual trade finance is rather small and quite difficult to measure; therefore results should be taken with caution.

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. Moreover, previous studies found that a country's level of financial development has a strong positive impact on high value exports and manufactured goods that are dependent on external finance (Kletzer and Bardhan 1987; Beck 2002, 2003; Demir and Dahi 2011). However, the positive effect of financial development is asymmetric depending on the direction of exports (i.e., North-North, North-South, South-South, and South-North) which may be the cause for the small and insignificant impact of the trade finance variable. In a recent paper Demir and Dahi (2011) found that financial development has a strong and positive effect on South-South trade but a non-significant impact on South-North trade. Given the possibly different factors associated with South-South versus South-North trade, our specification may not be able to pick up the differential affects of the trade finance variable.

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) found a similar positive relationship, though the results in Table 1 are smaller in magnitude. Moreover, Wagner (2003) found that the relationship between aid and trade varies between donor countries. The results in Table 1 suggest a similar result except in terms of the recipient country. Nelson and Juhasz Silva (2008) also estimated a gravity model of trade and found that foreign aid has a positive and significant impact on exports from the source country to the recipient target country.

The banking crisis dummy (BAN_t) 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 Table 1, column (3)) perhaps due to the considerable effects of the previous Chinese banking crisis in 1992. In the MENA region, instead, the coefficient is 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.

V. CONCLUSIONS

This paper investigates through a mixed-effects trade gravity model the extent to which trade finance, foreign aid, banking crises and global economic downturns may affect bilateral exports flows. 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 subsample analysis is undertaken to determine whether the effects of key variables of interest on bilateral exports flows are different among developing regions (i.e. 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 on traditional gravity-type variables broadly confirmed previous findings commonly encountered in the literature.

Our 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 challenges posed by the recent global financial crisis requires carefully targeted support. In periods of global economic downturns or banking crises, specific targeted policies may be more relevant than general interventions aiming at increasing aid or trade finance availability.

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Appendices

Appendix 1. List of developing countries (alphabetical order)

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

Appendix 2. List of banking crises

Countries affected	*Crisis Year*	*Countries affected*	*Crisis Year*
Algeria	1990	Guyana	1993
Argentina	1995	Haiti	1994
Argentina	2001	Indonesia	1997
Bolivia	1994	Jamaica	1996
Brazil	1990	Kenya	1992
Brazil	1994	Malaysia	1997
Burkina Faso	1990	Mexico	1994
Burundi	1994	Nicaragua	1990
Cameroon	1995	Nicaragua	2000
Cape Verde	1993	Nigeria	1991
Central African Republic	1995	Paraguay	1995
Chad	1992	Philippines	1997
China, P. R.	1998	Thailand	1997
Colombia	1998	Togo	1993
Congo, Democratic Republic of	1991	Tunisia	1991
Congo, Democratic Republic of	1994	Uganda	1994
Congo, Republic of	1992	Uruguay	2002
Costa Rica	1994	Venezuela	1994
Dominican Republic	2003	Vietnam	1997
Ecuador	1998	Zambia	1995
Guinea-Bissau	1995	Zimbabwe	1995

Source: Laeven and Valencia (2008)

Appendix 3. Summary Statistics

	Latin America				*Asia*				*Sub-Saharan Africa*				*Middle East and N. Africa*			
Variable	*Mean*	*S.D.*	*Min*	*Max*	*Mean*	*S.D.*	*Min*	*Max*	*Mean*	*S.D.*	*Min*	*Max*	*Mean*	*S.D.*	*Min*	*Max*
Exports[a]	1.9	2.1	0.0	12.3	2.5	2.3	0.0	12.4	1.2	1.6	0.0	10.3	2.0	2.0	0.0	9.8
LGDT[b]	25.7	1.5	20.1	30.1	26.0	1.4	19.5	30.3	25.0	1.9	20.0	30.1	25.5	1.2	22.5	30.1
LSIM[c]	-2.3	1.6	-9.9	-0.7	-2.7	1.8	-10.4	-0.7	-2.6	1.8	-10.3	-0.7	-1.7	1.0	-6.5	-0.7
DIST[d]	8.8	0.9	5.1	9.9	8.9	0.7	5.8	9.9	8.5	0.8	4.7	9.9	8.3	0.8	4.7	9.8
LRFAC[e]	8.2	1.4	-1.7	10.9	7.7	1.8	-3.6	10.9	7.8	2.1	-3.6	10.9	7.8	1.6	-0.1	10.9
XR[f]	-2.0	2.8	-10.4	14.2	-2.5	2.7	-10.1	4.3	-2.3	3.1	-15.3	21.9	-2.5	2.7	-10.2	4.3
FIN[g]	21.2	3.5	0.0	34.9	20.5	5.2	0.0	25.9	19.1	4.3	0.0	39.4	21.1	1.1	18.4	25.2
AID[h]	2.8	5.8	0.0	29.0	2.6	5.8	0.0	22.1	3.5	6.6	0.0	36.1	2.5	5.6	0.0	22.5

Sources: Authors elaborations using IMF's International Financial Statistics, World Bank's World Development Indicators, OECD, CEPII, and Bank for International Settlements.

Notes: (a) Bilateral export flows, (b) Overall size of trading partners given by $\ln(GDP_{it} - GDP_{jt})$, (c) Similarity index describing relative country size of trading partners, (d) distance between trading partners, (e) Absolute measure of relative factor endowments between trading partners, (f) real exchange rate, (g) trade finance, (h) Aid received by exporting country. All variables are in natural logarithms unless otherwise stated.