HAL
open science

Impact of informal barriers on agricultural trade: does membership to the Euro Area matter?

Marilyne Huchet, Angela Cheptea

To cite this version:

Marilyne Huchet, Angela Cheptea. Impact of informal barriers on agricultural trade: does membership to the Euro Area matter?. [University works] auto-saisine. 2009, 20 p. hal-01462487

HAL Id: hal-01462487

https://hal.science/hal-01462487v1

Submitted on 6 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

AgFoodTrade

New Issues in Agricultural, Food & Bioenergy Trade

"Informal barriers and agricultural trade: Does the integration matter?"

Marilyne Huchet-Bourdon ***(Agrocampus Ouest, INRA)***

Angela Cheptea ***(Agrocampus Ouest, INRA)***

Working Paper 2009-05

AGFOODTRADE (*New Issues in Agricultural, Food and Bioenergy Trade*) is a Collaborative Project financed by the European Commission within its VII Research Framework. Information about the Project, the partners involved and its outputs can be found at www.agfoodtrade.eu .

Copyright 2009 by [M.Huchet-Bourdon, A.Cheptea] All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Informal barriers and agricultural trade: Does the integration matter?

Marilyne Huchet-Bourdon[a,b] and Angela Cheptea[b,a]

Abstract

EU enlargement revives the debate around the participation to the EMU. We use a gravity model to see whether informal barriers have changed over a ten-year period covering the creation of the EMU, and whether their impact on European member countries' agricultural and food trade has been modified. We find that it has led to lower information costs. We observe a diminishing marginal trade impact of both information and institutional barriers: the lower the level of these barriers, the lower the magnitude of their impact on trade. But this finding can not be directly attributed to the introduction to the Euro.

JEL classification: F15, F33, Q17

Keywords: agricultural trade, informal barriers, monetary union, gravity model.

---

a – AGROCAMPUS OUEST, UMR1302, F-35000 Rennes, France
b – INRA, UMR1302, F-35000 Rennes, France
Marilyne.huchet-bourdon@agrocampus-ouest.fr
Angela.Cheptea@rennes.inra.fr

1. Introduction

Recent works have shown that trade costs are considerably larger than previously thought, even between highly integrated countries (McCallum (1995), Wolf (2000), Anderson and van Wincoop (2003, 2004)). In the quest to understand this finding, economists have examined the role of informal barriers, such as lack of information and contacts, limited trust between foreign sellers and buyers, differences in the institutions governing the market, etc.[1] Gould (1994), Rauch and Trindade (2002), and Combes et al. (2005) explore the role of cross-border business and social networks in reducing transaction costs between countries and regions. Anderson and Marcouiller (2002), Jansen and Nordas (2004), and Koukhartchouk and Maurel (2003) illustrate the pro-trade effect of sound institutions. De Groot et al. (2004) and Cheptea (2007) show that not only the poor quality of institutions, but also their dissimilarity between countries act as relevant obstacles to trade. Francois and Manchin (2007) identify institutional quality as a significant determinant of the level of exports and of the very likelihood that they take place. Turrini and van Ypersele (2006) demonstrate the relevance of legal costs in displacing trade at both inter-national and intra-national level. Guiso et al. (2004) argue that cultural distance or trust is a robust determinant of the volume of international trade. Noland (2005) shows that popular attitudes toward foreign countries convey information about trust, risk, and transaction costs in international trade beyond what can be explained via standard economic models. Nicita and Olarreaga (2000, 2007) and Portes and Rey (2005) insist on the role of information flows in shaping international capital and trade patterns. Following this vein of literature, Anderson and van Wincoop (2004) establish that informal barriers altogether explain a large share of trade costs.

However, in a world marked by increasing trade liberalization, at least at the regional level, we are tempted to believe that informal barriers also decrease in magnitude. This seems to be especially the case for countries having engaged into deeper integration, such as the use of a common currency. The literature on monetary unions affirms unanimously that a main effect of a currency union is lower transaction costs.[2] The use of a common currency eliminates the

[1] A thorough discussion of these barriers is available in Rauch (2001) and Anderson and van Wincoop (2004).

[2] The relationship between monetary unions and trade has been widely investigated in the economic literature. The issue gained in interest on the eve of the EMU creation, as both policy makers and scholars questioned themselves on the effects of a common European currency. The debate was initiated by Rose (2000), who found that establishing a common currency significantly increases trade among union members. More recent studies, including Bun and Klaassen (2007), Micco et al. (2003), Gomes et al. (2004), Baldwin et al. (2005), Rose and Stanley (2005), De Sousa and Lochard (2006), provide results for the specific case of the EMU. Estimates suggest that the EMU has had a sizable impact on member countries' international trade patterns.

exchange rate volatility and the risks and costs associated to the conversion of collateral monetary flows. In addition, labelling all prices in a single currency also increases the transparency of the market and reduces the needs for additional information. In a currency union the market itself provides an increasing amount of information, more rapidly and at lower costs. Moreover, the creation of monetary union is usually accompanied by a reform of institutions, and eventually, by a convergence of economic policies of participating countries. For instance, de Grauwe and Mongelli (2005 pp.9) state that the creation of the EMU should "intensify institutional reforms, which may translate into a catch-up process of countries with lower-quality institutions towards countries with higher-quality institutions." In this work, we argue that the participation of a country to a currency union is likely to reduce the importance of informal barriers for its foreign trade. We could expect a diminishing impact of informal barriers when countries participate to the EMU (due to lower information and institutional costs in particular).

In this paper we question whether the impact of informal barriers on agricultural and food trade[3] evolves with the level of monetary integration. We look at the specific case of EMU countries's trade with all partners between 1996 and 2005. We use a gravity model similar to Anderson and van Wincoop (2003, 2004) to measure the way in which information flows and institutions have shaped trade flows before and after the introduction of the single currency. We consider two types of informal barriers: (i) institutions' quality and similarity across trade partners, and (ii) cross-border information flows.

We choose to focus on trade in agricultural products for the following reasons. First, this sector represents a large share of the economy of the NMS (New Member States which have joined the EU since 2004). Secondly, trade barriers are considerably larger in the agriculture compared to the industrial sector. Finally, in most current EMU members this sector has already benefited from specific government policies aimed at reducing the burden of exchange rate fluctuations many years prior to the creation of the EMU (e.g. agricultural conversion rates or green rates).

There is a handful of studies on the role of informal aspects in the particular case of agricultural products. Porto (2005) shows on the case of Moldova - a country heavily depending on agricultural production and exports - that improving export practices, such as cumbersome practices, costly regulations, and bribes, has a large poverty alleviation impact.

[3] For simplicity reasons, henceforth agricultural trade/products refer to both agricultural and food trade/products.

Boussard et al. (2004) find that imperfect information in the agricultural sector removes the global gains associated with trade liberalization. Ruijs et al. (2004) illustrate that the reform of market institutions is essential for a substantial improvement in food trade in Burkina Faso. Olper and Raimondi (2008) investigate the role played by information-related costs, cultural proximity and preferences on the QUAD (the US, Canada, Japan and the EU) food trade.

Our results demonstrate a diminishing marginal trade impact of both types of informal barriers: the lower the level of these barriers, the lower the magnitude of their impact on trade. But this finding can not be directly attributed to the introduction to the Euro.

The remainder of the paper is organised as follows. In the next section, we present the methodology. Section 3 discusses the data. Our main results and conclusions are reported in sections 4 and 5, respectively.

2. The trade model

We use a theory-based conditional general equilibrium model similar to Anderson and van Wincoop (2003, 2004). This choice is motivated by the fact that trade in agricultural and food products fits well the Armington (1969) assumption, the main feature that distinguishes this model from other gravity models.[4] Besides, gravity models are increasingly used in studies of agricultural trade (see for instance Koo et al. (1994), Otsuki et al. (2001a, 2001b, 2004), Cho et al. (2002), Kandilov (2008), Kim et al. (2003), Paiva (2005), De Frahan and Vancauteren (2006), Pishbahar and Huchet-Bourdon (2009)). Following Anderson and van Wincoop (2003, 2004), we assume that each country is specialized in one agricultural good, and that the bilateral allocation of trade across countries is separable from the allocation of each country's production and consumption levels. Consumers in each country *j* maximize a CES demand structure under the budget constraint. For products imported from each origin country *i* they pay the producer price p_i and some positive trade costs $t_{ij} \geq 1$.[5] The latter include all costs and barriers incurred with getting a good from *i* to *j*:

[4] A large part of the literature on Computable General Equilibrium models applied to the agricultural and food sectors are based on the Armington assumption: e.g. Surry et al. (2002). Following Evenett and Keller (2002), we have computed the Grubel-Lloyds indicator of intra-industry trade (agricultural and food sectors) from product (HS 6-digit) level trade statistics. We find that for 91% of the 19935 observations this index is below the 0.05 threshold level. Using the Rauch (1999) classification of goods into homogeneous, reference priced, and differentiated, we find that 70% of trade flows considered in our sample belong to the first two categories under the conservative definition and 73% under the liberal definition. These characteristics of our data provide additional justification for the use of an Armington type trade model.

[5] The $t_{ij} \geq 1$ condition is necessary to express the trading price p_{ij} as a product of trade costs t_{ij} and the production price p_i (equation (3)).

$$t_{ij} = dist_{ij}^{\gamma_1} land_{ij}^{\gamma_2} \exp(RTA_{ij}^{\gamma_3}) \exp(EMU_{ij}^{\gamma_4}) \exp(EU_{ij}^{\gamma_5}) \\ info_{ij}^{\gamma_6} \exp(instqlt_i^{\gamma_7}) \exp(instqlt_j^{\gamma_8}) \exp(instsim_{ij}^{\gamma_9}) \tag{1}$$

$dist_{ij}$ stands for the bilateral distance between *i* and *j*, $land_{ij}$ and RTA_{ij} are dummies equal to 1 for country pairs that share a common land border, or participate to the same regional trade agreement, respectively. Dummy variables EMU_{ij} and EU_{ij} indicate whether both the importer and the exporter are members of the Euro Area, respectively the European Union. The last four variables of equation (1) capture the effects of informal trade barriers. $instqlt_i$ and $instqlt_j$ stand for the quality of institutions in each country, $instsim_{ij}$ for the similarity of institutions in the two countries, and $info_{ij}$ represents the information flows between *i* and *j*. Imposing market-clearing conditions as in Anderson and van Wincoop (2004), the model predicts a gravity-type expression for imports of agricultural products of country *j* from source country *i*:

$$IMP_{ij} = \frac{Y_i E_j}{Y^w} \left(\frac{t_{ij}}{P_j \Pi_i} \right)^{1-\sigma} \tag{2}$$

where Y_i is the agricultural production of country *i*, E_j is the total expenditure of country *j* on agricultural products, Y^w is the world agricultural income, σ is the elasticity of substitution between any two import sources, P_j is a non-linear price index specific to source country *j*:

$$P_j = \left[\sum_i (p_{ij})^{1-\sigma} \right]^{\frac{1}{1-\sigma}} = \left[\sum_i (p_i t_{ij})^{1-\sigma} \right]^{\frac{1}{1-\sigma}} \tag{3}$$

p_{ij} is the trading price, p_i is the producer price in the origin country, and Π_i is a weighted non-linear average import price – across trade partners – of agricultural goods from country *i*:

$$\Pi_i = \left[\sum_j \frac{E_j}{Y^W} \left(\frac{t_{ij}}{P_j} \right)^{1-\sigma} \right]^{\frac{1}{1-\sigma}}. \tag{4}$$

As in traditional gravity models, equation (2) establishes a positive dependence between the economic size of each country and the value of goods traded between them, and a negative one with respect to the bilateral trade cost or barrier. In addition, (2) asserts the importance of price factors for cross-border trade. Anderson and van Wincoop (2004) name P_j and Π_i inward, and respectively outward, multilateral resistance. P_j corresponds to the average price

of imports of country j from all sources, and Π_i to the average price of goods exported by source country i to all world partners.

Integrating the trade costs function (1) in equation (2), we obtain the final trade equation:

$$\begin{aligned} IMP_{ij} = \frac{Y_i\, E_j}{Y_w} \left(P_j\, \Pi_i\right)^{(\sigma-1)} dist_{ij}^{\gamma_1(1-\sigma)} \exp\left((1-\sigma) land_{ij}^{\gamma_2}\right) \exp\left((1-\sigma) RTA_{ij}^{\gamma_3}\right) \\ \exp\left((1-\sigma) EMU_{ij}^{\gamma_4}\right) \exp\left((1-\sigma) EU_{ij}^{\gamma_5}\right) info_{ij}^{\gamma_6(1-\sigma)} \\ \exp\left((1-\sigma) instqlt_i^{\gamma_7}\right) \exp\left((1-\sigma) instqlt_j^{\gamma_8}\right) \exp\left((1-\sigma) instsim_{ij}^{\gamma_9}\right) \end{aligned} \tag{5}$$

In section 4 we present the estimates of this equation for EMU imports and exports of agricultural and food products. Since the model is specified only for imports (demand side), we use partner imports from each EMU country to measure the exports of EMU member states. This enables to have all trade flows expressed in CIF terms.

3. Data

The empirical analysis in this paper is based on annual agricultural imports and exports of the twelve countries having joined the EMU by 2005. The panel covers 102 trade partners, including the EMU members, and ten years: from 1996 to 2005. The data employed come from several sources. Agricultural trade is obtained from COMTRADE by summing up 6-digit data according to the HS1992 classification for all agricultural and food products.[6] True internationally comparable data on agricultural production are limited to a handful of countries (mainly OECD countries), yielding a severe reduction of our panel. To avoid this problem, we adopt the solution proposed by Baldwin et al. (2005) and use the agricultural value added as a proxy for the agricultural production of the exporting country. Accordingly, the importer's expenditure on agricultural products is proxied by the domestic value added of the sector, plus imports less exports. Countries' agricultural value added is obtained from World Bank's WDI database. Trade, value added, and production data are deflated using the annual Consumer Price Index (CPI).[7]

Data on bilateral distance and common land border are from the Cepii database. The variable on the membership to a regional trade agreement is constructed according to the WTO's list

[6] We build the aggregated bilateral trade according to the WTO list of HS 6-digit codes identified as agricultural products.

[7] Note, that CPI data reflect price changes in domestic currency, while trade and production data are expressed in current USD and Euros. Therefore, we first convert the data in current local currency units, deflate the obtained series with country-specific CPIs, and then apply the 2000 (base-year) USD exchange rate.

of declared agreements.[8] It takes the value one for all years and partners who were granted preferential access to the EU market, and zero otherwise.

We employ two types of data on country's institutions: on their quality or functionality (reliability), and on their similarity with respect to other countries. By the quality of institutions we mean the quality of governance, the respect of law, etc. in a country. By the similarity of institutions we mean the degree of heterogeneity of norms, procedures, business practices, etc. from one country to another. We use the country-specific Rule of Law estimate from the World Bank Governance Indicators database, developed by Kaufmann et al. (2006), as a measure of the quality of domestic institutions.[9] The Rule of Law estimate ranges from -2.5 to 2.5, a larger (positive) value corresponding to a higher (above world average) respect of laws within the country. The data are computed by Kaufmann et al. (2006) on a bi-annual basis from 1996 to 2002, and annually since 2002. We replace missing data for 1997, 1999, and 2001 by the simple mean of scores in the year before and the year after each missing year.[10] The choice of the Governance Indicators database, from the wide range of governance indicators developed in the last years and periodically updated, is motivated by the large number of sources and the econometric (contrary to a purely statistic) technique employed by the authors to build the data. Among the six different governance indicators in the database,[11] the Rule of Law estimate is in our opinion the most informative about the framework within which trade contracts are negotiated, signed, and delivered. The Rule of Law score measures the extent to which agents have confidence in or abide by the rules of society, the police, and the courts. It is built from several indicators, including perceptions of the incidence of crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts. We also note the high correlation of the Rule of Law estimate with other indicators of governance and institutional quality, both from the World Bank Government Indicators database and other sources (Table 1).[12] Therefore, the choice of institutional variables should not affect qualitatively the results of the paper.

[8] For details consult the WTO's RTA gateway: http://www.wto.org/english/tratop_e/region_e/region_e.htm
[9] The data as well as methodological details are available at http://info.worldbank.org/governance/wgi2007/.
[10] Thus the Rule of Law score in 1997 is obtained as the sum of the estimates in 1996 and 1998, divided by two.
[11] Rule of Law, Control of Corruption, Government Effectiveness, Political Stability, Regulatory Quality, Voice and Accountability.
[12] The negative correlation coefficient between the World Bank's Rule of Law estimate and the Heritage Foundation's Property Rights Index is due to the opposite scoring of the same condition by the two bodies.

Table 1:
Indicators of governance and of the quality of institutions

Index of the quality of domestic institutions	Source	Coef. of correlation	Number of obs.
Rule of Law Estimate	World Bank Governance Indicators	1.00	1292
Control of Corruption Estimate	World Bank Governance Indicators	0.98	1265
Government Effectiveness Estimate	World Bank Governance Indicators	0.97	1310
Political Stability Estimate	World Bank Governance Indicators	0.84	1242
Regulatory Quality Estimate	World Bank Governance Indicators	0.91	1298
Voice and Accountability Estimate	World Bank Governance Indicators	0.81	1337
Democracy	Freedom House	0.57	1416
Legal System & Property Rights	Fraser Institute	0.93	614
Property Rights	Heritage Foundation	-0.88	1693
Quality of Government	International Country Risk Guide - The PRS Group	0.94	1209
Corruption Perceptions Index	Transparency International	0.94	1157

Note : Authors' calculations.

As for the similarity of institutions of the importing and the exporting country, we use La Porta et al. (1999)'s data on the origin of the company law or commercial code of each country. Authors identify five possible origins: English common law, French commercial code, socialist/communist laws, German commercial code, and Scandinavian commercial code. We construct a dummy variable equal to 1 if the two countries share the same origin of their legal system, and zero otherwise.

Bilateral information flows for each pair of countries correspond to the mutual trade in newspapers (imports plus exports, both expressed in CIF terms), obtained from the COMTRADE database, code 4902 in the HS1992 classification. This choice is motivated by several reasons. Firstly, we need a bilateral variable to describe information flows between any two countries. Secondly, it is difficult to have such data over a large number of years (a ten-year period in our case). Finally, this solution is also adopted by other empirical works in the literature, including on the agricultural sector (e.g. Olper and Raimondi (2008)).

A key insight of the theory (section 2) is that bilateral trade depends on relative trade costs, i.e. bilateral trade costs t_{ij} divided by the two multilateral resistance terms P_j and Π_i. For simplicity reasons and to avoid making assumptions on the value of the elasticity of substitution, we compute importer and exporter price indices as the average trade-weighted price of imported, respectively exported, goods both expressed in CIF terms. This solution is in line with the interpretation of the two price indices according to the theoretical model.

More specifically, we compute the outward and inward remoteness terms as follows:

$$P_j = \sum_k \left(\frac{\sum_i p_{ij}^k IMP_{ij}^k}{\sum_i IMP_{ij}^k} \right) \left(\frac{\sum_{i,j} IMP_{ij}^k}{\sum_{i,j,k} IMP_{ij}^k} \right) \tag{6}$$

$$\Pi_i = \sum_k \left(\frac{\sum_j p_{ij}^k IMP_{ij}^k}{\sum_j IMP_{ij}^k} \right) \left(\frac{\sum_{i,j} IMP_{ij}^k}{\sum_{i,j,k} IMP_{ij}^k} \right) \tag{7}$$

IMP_{ij}^k is the value of imports of product k by country j from origin i, and bilateral import prices p_{ij}^k are unit values obtained as the ratio of imports expressed in value and in volume terms. In the data, imports are always expressed in CIF terms and exports in FOB terms. Therefore, to express the outward resistance term Π_i in CIF terms, as it is already the case for P_j, we use the import price of goods exported by the country, as charged to its trade partners, rather than the export price of these products in equation (7). Similarly, rather than using country i's exports as weights, we take third countries' imports of products exported by country i. We compute the two multilateral resistance terms at product (k) level, and then aggregate these measures across all agricultural goods to obtain country-level remoteness terms for each country and year within our panel. Global trade in each product k is used as weights for this second-level aggregation.

4. Results

In this section, we question the impact of informal barriers on European countries' agricultural trade. To answer this question, we use a data panel composed of imports of the twelve EMU countries from all world partners from 1996 to 2005.

According to the trade model in section 2, the value of imports of any country j from any source country i in period t can be written as:

$$\begin{aligned} IMP_{ij,t} = \lambda_t \; & \exp\left(\alpha_1 \ln\left(VA_{i,t}\, C_{j,t}\right)\right) \exp\left(\alpha_2 \ln\left(P_{j,t}\, \Pi_{i,t}\right)\right) \exp\left(\alpha_3 \ln dist_{ij}\right) \exp\left(\alpha_4\; land_{ij}\right) \\ & \exp\left(\alpha_5\, RTA_{ij,t}\right) \exp\left(\alpha_6\, EMU_{ij,t}\right) \exp\left(\alpha_7\, EU_{ij,t}\right) \exp\left(\alpha_8 \ln info_{ij,t}\right) \\ & \exp\left(\alpha_9\, legorigin_{ij}\right) \exp\left(\alpha_{10}\, RoL_{i,t}\right) \exp\left(\alpha_{11}\, RoL_{j,t}\right) \varepsilon_{ij,t} \end{aligned} \tag{8}$$

$VA_{i,t}$, the agricultural value added, and $C_{j,t}$, the agricultural consumption, are proxies for sector production and expenditure. We also replace the time-varying world production Y_w from equation (5) by a constant term and year fixed effects. Information flows are represented

by bilateral trade in newspapers ($info_{ij,t}$), the quality of importer and exporter institutions is measured by the Rule of Law score ($RoL_{i/j,t}$), and their similarity by the origin of their legal systems ($legorigin_{ij}$).[13] The model implies identical coefficients for expenditure and production variables, as well as for the two price indices. To comply with this constraint, we consider each time the product of variables. This solution has been already adopted by Baldwin et al. (2005).

We estimate equation (8) using a Poisson Pseudo-Maximum Likelihood (PPML) model. Recent works in the literature (Santos Silva and Tenreyro (2006) for instance) reveal that this technique yields better quality estimates than OSL.[14] This choice is confirmed by our results of specification tests. There is an increasing use of fixed effects in empirical trade studies during the last years. This practice is mainly inspired from two papers: Anderson and van Wincoop (2003) and Baldwin and Taglioni (2007). It has become common to use country and partner fixed effects to account for non linear remoteness terms introduced by Anderson and van Wincoop (2003).[15] With panel data the theory suggests the use of time-varying effects (Berger and Nitsch (2008), Bun and Klaassen (2007)). The main limit of this approach is that it does not permit to explore country specific variance in the data. Baldwin and Taglioni (2007) point out that when the omitted variables and the variable of interest are positively correlated (which is often the case), the estimated trade impact of the latter is biased. They show that the use of country, time, and pair fixed effects eliminate a large part of this so-called "golden medal error". Authors demonstrate that with panel data and significant time variation in the variable(s) of interest, time-invariant pair dummies are superior to nation dummies, whether time-variant or time-invariant. The downside of their solution is that parameters of time-invariant variables ($dist_{ij}, land_{ij}$, and $legorigin_{ij}$ in our model) can no longer be estimated. Moreover, the introduction of pair fixed effects removes a large share of the variance in other explanatory variables. With pair dummies, the estimated trade effect of these variables is identified exclusively on their variation across time. Informal variables we employ vary little across time, yielding non significant estimates of corresponding parameters. Both pair and country dummy approaches, however, do not correct for time-series correlation in the data. To deal with it, one would include time fixed effects, a time trend, or both

[13] The computation of all variables is explained in detail in section 3.
[14] Remoteness terms in equation (8) are computed from trade data in volume and value terms. Therefore, our panel does not include nil trade flows. Hence, the use of Heckman and Tobit procedures is not justified here.
[15] Rose and van Wincoop (2001) are the first to adopt this approach.

(Baldwin and Taglioni (2007), Micco, Stein, and Ordonez (2003), Berger and Nitch (2008), Bun and Klaassen (2007)).

Table 2 shows the results of PPML estimations with time fixed effects for our data sample. Column 1 reports estimated results of equation (8). We obtain statistically significant coefficient estimates of expected signs for standard gravity variables. Our multilateral resistance measure has a positive and highly significant effect on trade, as predicted by the theoretical model. Institutional variables are significant and with the expected sign, confirming that better and similar institutions promote trade. We find a similar pro-trade effect for cross-border information flows. The EMU impact on trade is non significant in all specifications in Table 2. We believe that a large part of the EMU effect is captured by time fixed effects. Indeed, when we drop the latter (Table A3 in the Appendix) we obtain a 16%[=(exp(0.15)-1)*100] trade creation effect. Our EMU dummy may be correlated to other explanatory variables of equation (8). Therefore, we have also used nonparametric methods to estimate the coefficient α_6, i.e. the impact of the European common currency on agricultural trade. We match each observation where the EMU variable takes the value 1 with three observations for which it takes the value 0. For robustness reasons we have used both a propensity score and a nearest neighbour method (Table A4 of the Appendix). The estimated pro-trade effect (from 11%[=(exp(0.10)-1)*100] to 28%[=(exp(0.25)-1)*100]) is significant and close to results reported in Table A3. This is in line with studies dealing with the monetary union – trade relationship (footnote 2).

Table 2
Agricultural imports, EMU membership and informal barriers, the PPML model

	(1)	(2) Non-linear effects information flows	(3) Non-linear effects exporter institutions	(4) Non-linear effects importer institutions
Ln importer's value added × exporter's consumption	0.62	0.52	0.64	0.63
	(0.03)***	(0.05)***	(0.03)***	(0.03)***
Ln inward remoteness × outward remoteness	0.08	0.09	0.08	0.07
	(0.02)***	(0.03)***	(0.02)***	(0.02)***
Ln Distance	-0.54	-0.35	-0.54	-0.52
	(0.07)***	(0.10)***	(0.07)***	(0.07)***
Common land border	0.51	0.38	0.52	0.51
	(0.14)***	(0.16)**	(0.14)***	(0.14)***
Regional trade agreement	0.15	0.47	0.07	0.09
	(0.13)	(0.19)**	(0.13)	(0.13)
Common legal origin	0.38	0.27	0.43	0.43
	(0.11)***	(0.14)**	(0.10)***	(0.11)***
Ln Trade in newspapers	0.04	0.24	0.04	0.05
	(0.01)***	(0.05)***	(0.01)***	(0.01)***
Ln Trade in newspapers - *upper tercile*		-0.03		
		(0.01)**		
Rule of Law exporter	0.31	0.16	0.09	0.27
	(0.06)***	(0.09)*	(0.08)	(0.06)***
Rule of Law exporter - *upper tercile*			0.08	
			(0.03)***	
Rule of Law importer	0.43	0.35	0.42	0.15
	(0.08)***	(0.15)**	(0.08)***	(0.09)
Rule of Law importer - *upper tercile*				0.09
				(0.02)***
Intra-EU	0.55	0.79	0.61	0.53
	(0.14)***	(0.18)***	(0.13)***	(0.13)***
Intra-EMU	0.09	0.14	0.12	0.11
	(0.12)	(0.12)	(0.11)	(0.11)
Fixed effects	year	year	year	year
Ramsey (RESET) specification test	2.25	2.31	1.82	1.91
p-value	0.13	0.13	0.18	0.17
Pseudo R^2	0.80	0.77	0.80	0.80
Number of observations	19935	6377	19935	19935

Note: Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.

Next, we turn to the central question of this paper: did EMU membership affect the impact of informal barriers on agricultural trade? The literature on optimal monetary areas argues that a common currency leads to more market transparency and eventually larger information flows, and to institutional reforms which may translate into a catch-up process of countries with lower-quality institutions towards countries with higher-quality institutions (de Grauwe and Mongelli (2005)). Another vein of the literature based on international trade studies claims that information flows and the quality of institutions have a positive impact on trade. The creation of the EMU may, thus, alter the magnitude of the effects for member countries. To clarify this point, we wonder whether the trade impact of informal barriers varies with their

level, and whether such a change can be explained by the introduction of the Euro. Let us examine first the role of information flows, and then turn to the quality of institutions.[16]

Information flows

We test whether the marginal trade impact of information flows is the same for different levels of flows. For that, we divide the sample into sub-samples according to the terciles of our information flows variable (Table A1 of the Appendix). We cross the dummy designating the upper sample with the value of information flows and add it on the right hand side of equation (8) (column (2) of Tables 2 and A3).[17] This analysis can be carried only on observations for which exchanges of information are not nil. This is the case for one third of our sample: 6377 out of 19935 observations. The negative and statistically significant coefficient for trade in newspapers in the upper group testifies of a decreasing trade impact of information flows. The pro-trade effect is smaller for large amounts of information exchanged between two countries: 23%[=(exp(0.24-0.03)-1)*100] compared to 27%[=(exp(0.24)-1)*100]. Coefficient estimates of other explanatory variables are statistically significant. The few differences relative to those of column (1) are explained by the change in sample size.

We complete the discussion with a test of means on information flows between EMU countries before and after the introduction of the common currency (Table A2 of the Appendix). It reveals that information flows became larger since the Euro. Nevertheless, this result is not supported by gravity-type estimations of information flows and this finding is robust to different trade specifications (with time fixed effects, time-invariant country effects, time-variant country effects, and country pair effects). Hence, the increase in intra-EMU information flows seems to be the output of on-going integration process.

[16] Our discussion does not cover the similarity of institutions because of the lack of time evolution for this variable (see Section 3).
[17] We choose the upper sample in order to highlight the differences in the level of information flows.

The quality of institutions

We follow the same procedure as previously and split our sample into groups increasing in the Rule of Law score of the exporter and the importer.[18] Corresponding estimations are displayed in columns (3) and (4) of Tables 2 and A3. Again, we find a diminishing marginal trade impact of institutions' quality. On average, a one standard deviation increase in the quality of exporters' institutions (1.02) leads to a 37%[=(exp(0.31*1.02)-1)*100] increase of bilateral trade (column (1)). For Rule of Law scores above 1.40 (corresponding to the upper tercile) a similar change generates only a 1.4%[=(exp(0.08*0.17)-1)*100] increase (column (3)). We find an even larger gap for importer's institutions: 52% in average compared to 1.5% for the upper tercile. We then test if the monetary integration was accompanied by an improvement of the institutional framework. Contrary to information flows, the test of means (Table A2) does not depict a significant difference in the quality of institutions before and after the Euro.

In fact the literature refers to different types of institutions. The literature on optimal currency areas targets primarily financial and monetary institutions, while the international trade literature focuses mainly on law enforcement and the judiciary. For this reason, we inspect the evolution and the eventual convergence/divergence of both types of institutions using the indicators listed in Table 1.

The Regulatory Quality is the one attributing the highest weight to the quality of the financial system. We run mean tests on this indicator and find an improvement of its scores for EMU countries after 1999. This goes in hand with the reduction of inflation rates and of short and long term real exchange rate volatilities between EMU countries' currencies.

For institutions relevant to commercial transactions we perform similar tests on all variables listed in Table 1, except the Regulatory Quality and the Rule of Law already discussed. Whatever the variable employed, we find no evidence of an improvement of institutions since the creation of the EMU. This might seem puzzling, but it can be explained by at least four facts characterizing our data. First, institutional changes are a long-term phenomenon, and by consequence not well reflected in the data, yet. Secondly, the deepening of intra-EU integration in general, and the creation of the Euro in particular, have increased the fear of

[18] Institutional similarity, measured by the common origin of importer and exporter legal systems, is constant across time in our data. Therefore we are unable to estimate any change of its pro-trade effect.

transfer of control over many economic and political issues from national to supra-national structures, and have been therefore repeatedly associated with weaker national policies and lower confidence in national institutions. All of these have somewhere downgraded the image and the perception of country-level institutions by member countries' citizens. Thirdly, the acceleration of globalization trends after 1995 (the implementation of the Uruguay round agreements, the WTO creation, the evolution of international financial structures, etc.) has increased the interdependence of national economies and, hence, their exposure to all kinds of shocks.[19] Last but not least, the period of our study (1996-2005) was also marked by a general perception of lower national and international security (an increase of threats of terrorist attacks since 2001). Finally, we also test if the quality of institutions of EMU countries has converged or diverged after the introduction of the European common currency. For that, we compute the absolute difference between the quality of importer' and exporter's institutions, and test the equality of the sample means before and after the Euro. We find convergence for half of the indicators of institutional quality from Table 1 (including the Rule of Law). This provides evidence that member countries' institutions have become more alike under the EMU, but does not confirm that they have also improved in quality.

5. Conclusions

The aim of this paper is to inspect the evolution of informal barriers on agricultural and food trade in the presence of monetary integration. We consider three types of informal barriers: the quality of exporter and importer institutions, their similarity, and cross-border information flows. We employ a data set that covers the imports and exports of the twelve countries having joined the EMU by 2005 with all world partners over a ten year period. We use a gravity model to measure the effects of informal barriers on agricultural imports of EMU member countries before and after the adoption of the Euro.

Several conclusions emerge from this study. Member countries' trade in agricultural products is sensitive to the quality and similarity of institutions, and the availability of information on foreign partners. In addition, we find support for a decreasing pro-trade effect of information flows and of institutions' quality. We establish that the impact of information flows and institutions' quality on trade is lower for countries pairs exchanging a large amount of information and characterized by a strong institutional framework. Besides, non parametric

[19] The current financial crisis and its rapid propagation across the globe confirm this argument.

estimations produce a significant and positive effect of the Euro on agricultural and food trade ranging between 11% and 28%.

The literature suggests that the introduction of the common currency would increase the transparency of markets and promote institutional reforms. These effects would translate by the end of the day by lower information and institutional costs to trade. Yet, we find no evidence of a significant impact of the EMU on information flows between member countries and on the quality of their institutions. The increase in information flows since the introduction of the common currency is merely the result of a long history of European integration. In addition, although the EMU was accompanied by an improvement of financial and monetary institutions, this was not the case for institutions governing trade. Therefore, the diminishing marginal effect discussed above can not be attributed to the monetary integration, but is rather a general result.

References

Abadie, A., Imbens, G. W., 2006. Large sample properties of matching estimators for average treatment effects. *Econometrica.* **74**, 235–267.

Anderson, J. E., Marcouiller, D., 2002. Insecurity and the Pattern of Trade: an Empirical Investigation. *The Review of Economics and Statistics*. **84** (2), 342-352.

Anderson, J. E., van Wincoop, E., 2003. Gravity with Gravitas: A Solution to the Border Puzzle. *American Economic Review*. **93** (1), 170-192.

Anderson, J. E., van Wincoop, E., 2004. Trade Costs. *Journal of Economic Literature*. **42**, 691-751.

Armington, P., 1969. A theory of demand for products distinguished by place of production. *International monetary fund Staff Papers*. **26**, 159-178

Baldwin, R., Skudelny, F., Taglioni, D., 2005. Trade effects of the Euro: evidence from sectoral data. *ECB Working Paper* 446.

Baldwin, R., Taglioni, D., 2007. Trade Effects of the Euro: A Comparison of Estimators. *Journal of Economic Integration*. **22** (4), 780-818.

Berger, H., Nitsch, V., 2008. Zooming out: the trade effect of the euro in historical perspective. *Journal of International Money and Finance*. **27**(8), 1244-1260.

Boussard, J.-M., Gerard, F., Piketty, M.G., Christensen, A.K., Voituriez, T., 2004. May the pro-poor impacts of trade liberalisation vanish because of imperfect information? *Agricultural Economics*. **31**, 297-305.

Bun, M., Klaassen, F., 2007. The Euro Effect on Trade is not as Large as Commonly Though. *Oxford Bulletin of Economics and Statistics*. **69** (4),473-496

Cheptea, A., 2007. Trade Liberalization and Institutional Change. *Economics of Transition.* **15** (2), 211-255.

Cho, G., Sheldon, I.M., McCorriston, S., 2002. Exchange Rate Uncertainty and Agricultural Trade. *American Journal of Agricultural Economics*. **84** (4), 931-942.

Combes, P.-P., Lafourcade, M., Mayer, T., 2005. The Trade-creating effects of business and social networks? *Journal of International Economics*. **66**, 1-30.

De Frahan, H., Vancauteren, M., 2006. Harmonisation of food regulations and trade in the Single Market: evidence from disaggregated data. *European Review of Agricultural Economics*. **33** (3), 337–360.

Francois, J., Manchin, M., 2007. Institution, Infrastructure and Trade. *CEPR Discussion Paper* 6068.

Gomes, T., Graham, C., Helliwell, J., Kano, T., Murray, J., Schembri, L., 2004. The Euro and Trade: Is there a Positive Effect? *Bank of Canada*.

Gould, D. M., 1994. Immigrants links to the Home Country: Empirical Implications for US Bilateral Trade Flows. *The Review of Economics and Statistics*. **76** (2), 302-316.

De Grauwe, P., Mongelli, F. P., 2005. Endogeneities of optimum currency areas - what brings countries sharing a single currency closer together? *ECB Working Paper* 468.

De Groot, H, Linders, Rietveld, G.-J., P., Subramanian, U., 2004. The Institutional Determinants of Bilateral Trade Patterns. *Kyklos*. **57**, 103-124.

De Sousa, J., Lochard, J., 2006. The Currency Union Effect on trade and the FDI Channel. *University of Paris 1. Mimeo*.

Evenett, S., Keller, W., 2002. On Theories Explaining the Success of the Gravity Equation. *Journal of Political Economy*. University of Chicago Press. **110**(2), 281-316.

Guiso, L., Sapienza, P., Zingales, L., 2004. Cultural Biases in Economic Exchange. *NBER Working Paper* 11005.

Jansen, M., Nordas, H. K., 2004. Institutions, Trade Policy and Trade Flows. *CEPR Discussion Paper* 4418.

Kandilov, I. T., 2008. The effects of exchange rate volatility on agricultural trade. *American Journal of Agricultural Economics*. **90**(4), 1028-1043.

Kaufmann, D., Kraay, A, Mastruzzi, M., 2006. Governance Matters V: Aggregate and individual governance indicators for 1996-2005. *The World Bank***.**

Kim, K., Cho, G. D. and Koo, W., 2003. Determining Bilateral Trade Patterns Using a Dynamic Gravity Equation. *Agribusiness & Applied Economics Reports* 525, Center for Agricultural Policy and Trade Studies, North Dakota State University.

Koo W., Karemera D. and Taylor, R., 1994. A gravity model analysis of meat trade policies. *Agricultural Economics*. **10**, 81-88.

Koukhartchouk, O., Maurel, M., 2003. Accession to the WTO and EU Enlargement: What Potential for Trade Increase? *CEPR Discussion Paper* 3944.

La Porta, R., Lopes-de-Silanes, F., Schleifer, A., Vishny, R., 1999. The Quality of Government. *Journal of Law, Economics and Organization*. **15**(1), 222-279.

McCallum, J., 1995. National Borders Matter: Canada-US Regional Trade Patterns. *American Economic Review*. **85**(3), 615-623.

Micco, A., Stein, E., Ordõnez, G., 2003. The Currency Union Effect on Trade: Early evidence from EMU. *Economic Policy*. **37**, 315-356.

Nicita, A., Olarreaga, M., 2000. Information and Export Performance. *Journal of Industry, Competition and Trade*. **7**(2), 95-111.

Nicita, A., Olarreaga, M., 2007. Exports and information spillovers. *Policy Research Working Paper Series* 2474. *The World Bank*.

Noland, M., 2005. Affinity and International Trade. *Peterson Institute Working Paper* WP05-3.

Olper, A., Raimondi, V., 2008. Explaining national border effects in the QUAD Food Trade. *Journal of Agricultural Economics*. **59**(3), 436-462.

Otsuki, T., Wilson, J., Sewadeh, M., 2001a. Saving two in a billion: quantifying the trade effect of European food safety standards on African exports. *Food Policy*. **26**, 495-514.

Otsuki, T., Wilson, J., Sewadeh, M., 2001b. What price precaution? European harmonisation of aflatoxin regulations and African groundnut exports. *European Review of Agricultural Economics*. **28** (2), 263-283.

Otsuki, T., Wilson, J., 2004. To spray or not to spray: pesticides, banana exports, and food safety. *Food Policy*. **29**, 131-146.

Paiva, C., 2005. Assessing Protectionism and Subsidies in Agriculture: A Gravity Approach. *IMF Working Paper* WP/05/21.

Pishbahar, E, Huchet-Bourdon, M., 2009. European Union's Preferential Trade Agreements in Agricultural Sector: a gravity approach. *Journal of International Agricultural Trade and Development*. **5**(1).

Portes, R., Rey, H., 2005. The Determinants of Cross-Border Equity Flows. *Journal of International Economics*. **65** (2), 269-296.

Porto, G., 2005. Informal export barriers and poverty. *Journal of International Economics*. **66**, 447-470.

Rauch, J. E., 1999. Networks versus markets in international trade. *Journal of International Economics*. **48** (1), 7-35.

Rauch, J.E., 2001. Business and social networks in international trade. *Journal of Economic Literature*, **39** (4), 1177-1203.

Rauch, J.E., Trindade, V., 2002. Ethnic Chinese Networks in International Trade. *Review of Economics and Statistics*. **84**(1), 116-130.

Rose, A. K., 2000. One money, one market: the effect of common currencies on trade. *Economic Policy*. **30**, 9-45.

Rose, A. K., 2004. A Meta-Analysis of the Effect of Common Currencies on International Trade. *NBER Working Paper* 10373.

Rose, A. K., Stanley, T. D., 2005. A Meta-Analysis of the Effect of Common Currencies on International Trade. *Journal of economic surveys.* **19**(3), 347-365.

Rose, A. K., van Wincoop, E., 2001. National Money as a barrier to international trade: the Real Case for Currency Union. *American Economic Review*. **91**, 386-390.

Rosenbaum, P.R., Rubin, D.B., 1983. The Central Role of the Propensity Score in Observational Studies for Causal Effects. *Biometrika*. **70** (1), 41-55.

Ruijs, A., Schweigman, C., Lutz, C., 2004. The impact of transport- and transaction-cost reductions on food markets in developing countries: evidence for tempered expectations for Burkina Faso. *Agricultural Economics*. **31**, 219-228.

Santos Silva, J.M.C., Tenreyro, S., 2006. The log of gravity. *Review of Economics and Statistics*. **88** (4), 641-658.

Surry, Y., Herrard, N., Le Roux, Y., 2002. Modelling trade in processed food products: an econometric investigation for France. *European Review of Agricultural Economics*. **29** (1), 1-27.

Swinnen, J. F. M., Banerjee, A. N., de Gorter, H., 2001. Economic development, institutional change, and the political economy of agricultural protection. An Econometric study of Belgium since the 19th century. *Agricultural Economics*. **26**(1), 25-43.

Turrini, A., van Ypersele, T., 2006. Legal Costs as Barriers to Trade. *CEPR Discussion Papers* 5751.

Wolf, H., 2000. Intranational Home Bias in Trade. *Review of Economics and Statistics*. **82** (4), 555-563.

Appendix

Table A1
Information flows, summary statistics

	Obs	Mean	Std. Dev.	Min	Max
Ln Trade in newspapers – nil flows	13558	-	-	-	-
Ln Trade in newspapers - lower tercile	2125	7.41	1.58	-0.17	9.47
Ln Trade in newspapers - middle tercile	2126	11.42	1.08	9.48	13.15
Ln Trade in newspapers - upper tercile	2126	15.48	1.64	13.15	19.22

Table A2
Test of means of informal barriers, EMU countries, 1996-2005

	Before joining EMU* No obs = 370		After joining EMU** No obs = 710		Equality of means	p-value	
Variable	Mean	Std. Err.	Mean	Std. Err.	t-test	Mean no EMU < Mean EMU	Mean no EMU > Mean EMU
Ln Trade in newspapers	13.58	0.22	14.14	0.15	-2.18	0.01	0.99
Common legal origin	0.42	0.03	0.40	0.02	0.69	0.75	0.25
Rule of Law exporter	1.46	0.02	1.44	0.02	0.71	0.76	0.24
Rule of Law importer	1.46	0.02	1.44	0.02	0.71	0.76	0.24

Note: * importer or exporter not in the EMU, ** both importer and exporter in the EMU.

Table A3
Agricultural imports, EMU membership and informal barriers, PPML model

	(1)	(2) Non-linear effects information flows	(3) Non-linear effects exporter institutions	(4) Non-linear effects importer institutions
Ln importer's value added × exporter's consumption	0.61	0.51	0.63	0.62
	(0.03)***	(0.04)***	(0.03)***	(0.03)***
Ln inward remoteness × outward remoteness	0.08	0.07	0.08	0.07
	(0.02)***	(0.02)***	(0.02)***	(0.02)***
Ln Distance	-0.54	-0.35	-0.54	-0.52
	(0.07)***	(0.10)***	(0.07)***	(0.07)***
Common land border	0.50	0.36	0.51	0.50
	(0.14)***	(0.16)**	(0.14)***	(0.14)***
Regional trade agreement	0.16	0.48	0.07	0.10
	(0.13)	(0.19)**	(0.13)	(0.13)
Common legal origin	0.36	0.24	0.41	0.40
	(0.11)***	(0.13)*	(0.10)***	(0.10)***
Ln Trade in newspapers	0.05	0.25	0.04	0.05
	(0.01)***	(0.05)***	(0.01)***	(0.01)***
Ln Trade in newspapers - *upper tercile*		-0.03		
		(0.01)**		
Rule of Law exporter	0.27	0.13	0.05	0.24
	(0.06)***	(0.08)	(0.08)	(0.06)***
Rule of Law exporter - *upper tercile*			0.09	
			(0.03)***	
Rule of Law importer	0.39	0.31	0.38	0.10
	(0.08)***	(0.15)**	(0.08)***	(0.09)
Rule of Law importer - *upper tercile*				0.09
				(0.02)***
Intra-EU	0.57	0.82	0.64	0.55
	(0.13)***	(0.18)***	(0.13)***	(0.13)***
Intra-EMU	0.15	0.16	0.18	0.18
	(0.09)*	(0.09)*	(0.08)**	(0.09)**
Ramsey (RESET) specification test	1.18	2.30	1.01	1.00
p-value	0.28	0.13	0.32	0.32
Pseudo R^2	0.79	0.76	0.80	0.80
Number of observations	19935	6377	19935	19935

Note: Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.

Table A4
EMU effect on agricultural trade, non parametric estimations

	(1)	(2)	(3)	(4)
Abadie and Imbens (2006) nearest neighbour match estimator, three neighbours for each match	0.12	0.10	0.13	0.14
	(0.05)**	(0.05)*	(0.05)***	(0.05)***
Rosenbaum and Rubin (1983) propensity score match estimator, probit with three neighbours for each match	0.21	0.25	0.25	0.22
	(0.12)*	(0.11)**	(0.12)**	(0.12)*

Note: Columns (1) to (4) correspond to specification in columns (1) to (4) in Tables 2 and A3. Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.