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Exchange and Capital Controls as Barriers to Trade

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Abstract

This paper considers the effect of exchange and capital controls on trade in the gravity-equation framework, in which bilateral exports depend on the distance between countries, the countries' size and wealth, tariff barriers, and exchange and capital controls. The extent of exchange and capital controls is measured by unique indices. In view of the degree to which countries have liberalized their exchange systems, controls on current payments and transfers are found to be a minor impediment to trade, while capital controls significantly reduce exports into developing and transition economies. Thus, further capital account liberalization could significantly foster trade.

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SUMMARY

The significance of the link between exchange and capital controls and trade is a fundamental key to the smooth functioning of the international economic and financial system. During the past several decades, most countries have liberalized controls on current payments and transfers, and the focus of economic policy is increasingly shifting toward liberalizing controls over capital account transactions. Generally, however, the theoretical effect of exchange and capital controls on trade is somewhat ambiguous, and the systematic empirical evidence remains limited.

This paper examines the effect of exchange and capital controls on trade for 1996 in the empirical gravity-equation framework, in which bilateral exports depend on the distance between countries, the countries' size and wealth, tariff barriers, and exchange and capital controls. The extent of exchange and capital controls is measured by unique indices, which aggregate information on 142 individual types of control from the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions*.

Overall, exchange and capital controls represent a noticeable barrier to trade. The specific impact of exchange and capital controls on trade, however, varies depending on the level of development of a country and the type of control. Controls on current payments and transfers are a minor impediment to trade, while capital controls significantly reduce exports into developing and transition economies, but not into industrial countries. These findings may reflect the extent to which controls on current payments and transfers have been liberalized worldwide, while the liberalization of capital controls has so far focused largely on industrial countries. An implication of the study is that further liberalization of exchange and capital controls can discernibly foster trade.

I. INTRODUCTION

In 1944, the Bretton Woods conference recognized the fundamental link between exchange and capital controls[2] and international trade. One of the purposes of the International Monetary Fund, which was created at the conference, was to assist in "the elimination of foreign exchange restrictions which hamper the growth of world trade."[3] However, the maintenance of capital controls was not viewed as inconsistent with this objective, partly because capital controls were considered necessary for supporting the system of fixed exchange rates and thus fostering trade. More than fifty years later, the question about the economic effects of exchange and capital controls is again at the forefront of economic policy debates. Most countries have liberalized controls on current payments and transfers, and the focus of economic policy is increasingly shifting toward liberalizing capital account transactions.

The effect of exchange and capital controls on international trade depends on the structure and effectiveness of controls and their interaction with other distortions in the economy. Exchange controls act as a tax on the foreign currency required for purchasing foreign goods and services and, by raising the domestic price of imports, they tend to reduce trade. Besides this basic effect, exchange and capital controls can influence trade through other channels, for example, transaction costs, exchange rate, hedging foreign exchange risk and trade financing. Capital controls, in particular, can affect trade in goods by reducing intertemporal trade and portfolio diversification, which may substitute or complement intratemporal trade. Given the importance and ambiguity of the link between exchange and capital controls and trade, the systematic empirical evidence on the matter is consequential; yet it remains limited.

This paper examines the effect of exchange and capital controls on trade for 1996 in the empirical gravity-equation framework, in which bilateral exports depend on the distance separating the countries, the countries' size and wealth, tariff barriers, and exchange and capital controls. The extent of exchange and capital controls is measured by unique indices, which aggregate information on 142 individual types of control based on the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions.*

Overall, exchange and capital controls are found to have a significant negative impact on bilateral exports. However, this result varies depending on the level of development and the type of exchange and capital control. Controls on current payments and transfers are a minor barrier to trade. In contrast, capital controls significantly reduce exports into

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[2]Hereinafter, the term "controls on current payments and transfers" refers to exchange controls over current international transactions, while "capital controls" encompasses controls pertaining to capital account transactions. The term "exchange and capital controls" covers both of the above types of controls.

[3]Article I, Articles of Agreement of the International Monetary Fund (IMF).

developing and transition economies and not into industrial countries. These results may reflect the extent to which restrictions on current payments and transfers have been liberalized generally, while the liberalization of controls on capital flows have so far been focused largely on industrial countries.

The paper is organized as follows. It first examines the main economic channels through which exchange and capital controls can affect trade. It then describes the gravity-equation framework with exchange and capital controls and presents the data used in the study, followed by a discussion of the empirical results.

II. Effects of Exchange and Capital Controls on Trade

Theoretically, the impact of exchange and capital controls on trade is somewhat ambiguous. Exchange and capital controls affect trade through a multitude of (interrelated) channels, including the domestic price of imports, transaction costs, the volatility of exchange rate, intertemporal trade, and portfolio diversification. The overall effect of exchange and capital controls on trade through these channels critically depends on the structure and effectiveness of exchange and capital controls and their interaction with other distortions in the economy. The main effects of exchange and capital controls on trade are discussed in more detail below.

The basic economics of exchange controls is similar to that of quantitative restrictions on imports of various goods and services. By taxing foreign money required to purchase foreign goods and services, exchange controls[4] cut the quantity imported and/or raise the *domestic relative price of imports*.[5] Moreover, if the government allocates foreign exchange according to noncompetitive rules, low-valued uses often get approved instead of higher-valued ones, reducing trade further.

Exchange and capital controls often raise transaction and other trade-related costs, reducing trade. Costs and uncertainty associated with international transactions increase, because exchange controls tend to stifle the development of liquid and efficient *foreign exchange markets* and modern *payment instruments*. Additionally, exchange and capital controls often encourage *evasion and rent-seeking*, which impose additional unproductive costs on firms.

Furthermore, exchange and capital controls can reduce trade by limiting the transfer of technology, managerial expertise and skills through *direct foreign investment*. Controls on

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[4]It can be shown that dual exchange rates are equivalent to capital controls, while exchange controls are similar to trade restrictions according to Adams and Greenwood (1985) and Greenwood and Kimbrough (1987) respectively.

[5]See, for example, Greenwood and Kimbrough (1987) and Stockman and Hernández (1988).

repatriation of profits and dividends, repatriation and surrender requirements, as well as direct controls on foreign investment in certain sectors are likely to discourage direct foreign investment and thus limit the dissemination of technological and managerial knowledge and learning-by-doing. The empirical evidence indicates that direct foreign investment tends to increase host country's exports and imports (although the impact on imports is relatively weak).[6] In the presence of tariff barriers, however, controls on direct foreign investment may encourage trade. Direct foreign investment and exports are alternative strategies in this case, and, if direct foreign investment is allowed, a multinational may prefer to avoid paying tariffs and supply the host country's market through its subsidiary.

Capital controls often limit business opportunities for *hedging foreign exchange risks, financing trade*, as well as *managing assets and liabilities*. In the presence of capital controls, financial intermediation is less efficient, and local financial institutions often enjoy a substantial market power. The range of available financial products and services tends to be narrow. Limited opportunities for obtaining forward cover and commercial credits, and portfolio management may inhibit trade. Notwithstanding the above, however, capital controls may foster trade indirectly by serving prudential objectives and helping protect weak financial systems.

Fundamentally, capital controls affect trade by decreasing *intertemporal trade* and *portfolio diversification*. The impact on trade in goods depends on whether this intratemporal trade substitutes for or complements intertemporal trade and portfolio diversification. If trade in goods and trade in factors are substitutes (for example, as found in the basic Heckscher-Ohlin model), the volume of trade in goods is likely to fall. The terms of trade effect is unclear and depends on changes in the patterns of consumption and production in the recipient and the source countries (also known as the transfer problem) for clarification. If trade in goods and trade in factors are complements (as, for example, in some models with increasing returns to scale), the volume of trade in the former increases.

In addition, a number of macroeconomic channels, through which capital controls can potentially help foster trade, have been suggested in theory.[7] The specific effect of capital controls on trade through these macroeconomic channels critically depends on the interaction of capital controls with other distortions and specific characteristics of the economy. In principle, capital controls may help limit the short-term speculative capital flows and hence *exchange rate volatility*. With a stable exchange rate, trade is likely to increase (particularly if domestic financial markets are not well-developed and do not offer adequate opportunities

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[6]For the review of the literature on foreign direct investment, see, for example, World Trade Organization (1996).

[7]See Dooley (1996) for the review of the theoretical and empirical literature on capital controls. The empirical literature suggests that capital controls mainly increase yield differentials (see Dooley 1996) and, in particular, have only a limited role in improving the balance of payments (see, for example, Johnston and Ryan 1994).

for hedging foreign exchange risk). Exchange and capital controls, on the other hand, are often associated with an overvalued exchange rate, which can inhibit trade. Moreover, if capital controls can help retain domestic *savings,* and higher savings lead to higher investment in export sectors, trade may increase. When the taxation of foreign source income is non-enforceable, capital controls could help expand the domestic *tax base*. The adequate tax revenues raised by domestic taxes may induce the government to lower tariff rates, stimulating trade. These effects, however, are likely to be inconsequential in practice, because they tend to be offset by capital flight and the decrease in capital inflow owing to capital controls. Not surprisingly, these arguments received only limited empirical support so far.

Likewise, the empirical evidence on the effects of exchange and capital controls on trade remains scarce. Most of the earlier studies (see, for example, Lee 1993) measured the extent of exchange and capital controls by the black market premium and found that it tends to reduce trade. Although the black market premium often indicates the circumvention of restrictive regulations, it is an imperfect measure of the extent of exchange and capital controls. It may capture the effects of other nontariff barriers to trade, for example, import quotas, and information on the premium is not always reliable. Moreover, with the black market premium, the effects of controls on current payments and transfers and capital controls cannot be isolated. This study, in contrast, uses unique indices of the extent of exchange and capital controls to examine their effect on international trade in the empirical gravity-equation framework.

III. Empirical Model of Trade with Exchange and Capital Controls

The gravity model has been used extensively in empirical studies of international economics since the 1960s. According to this static general equilibrium model, bilateral trade is determined by the wealth and size of countries, the distance between them, and other factors distorting trade. The theoretical foundations of the gravity model are based on the theory of trade under imperfect competition and have been integrated recently with the factor-proportions and demand-based theories of international trade.[8] The basic gravity equation is given by

$$X_{kj}=\alpha_0(Q_k/N_k)^{\alpha_1}(N_k)^{\alpha_2}(Q_j/N_j)^{\alpha_3}(N_j)^{\alpha_4}(D_{kj})^{\alpha_5}(A_{kj})^{\alpha_6}e_{kj}, \qquad (1)$$

where X_{kj} are exports from country k to country j, (Q_k/N_k) and (Q_j/N_j) are per capita incomes of countries k and j; N_k and N_j are population of countries k and j; D_{kj} is the geographical distance between countries k and j respectively; A_{kj} denotes factors distorting/augmenting trade, and e_{kj} is a log normally distributed error term. For the empirical analysis, the above

[8]For more details on the general-equilibrium foundations of the gravity model, see Anderson (1979), Helpman and Krugman (1985), Helpman (1987), and Bergstrand (1985, 1989, 1990).

equation is modified by taking natural logs and defining tariffs and exchange and capital controls as trade distortions, as follows,

$$\ln X_{kj}=\alpha_0+\alpha_1\ln(Q_k/N_k)+\alpha_2\ln N_k+\alpha_3\ln(Q_j/N_j)+\alpha_4\ln N_j+\alpha_5\ln D_{kj}+\alpha_6\ln(1+T_j)+\alpha_7 E_j+\varepsilon_{kj}, \quad (2)$$

where T_j is the import duty imposed by country j on imports from country k, and E_j is an aggregate measure of exchange and capital controls in country j. The intercept accounts for the effect of unmeasured trade distortions on exports. The model can be estimated by the ordinary-least-squares method.

IV. Data

The estimation of the model requires cross-sectional data on bilateral exports of goods and services, population, gross domestic product (GDP) per capita, and measures of tariff barriers and exchange and capital controls by country for a given year. The model is estimated for a sample of forty industrial, developing and transition countries. The data described below refer to 1996, unless specified otherwise.

Data on exports of goods and services (denoted by "EX") are from the IMF's *Direction of Trade Statistics Yearbook*. GDP per capita (denoted by "GDPIM" and "GDPEX" for importing and exporting countries respectively) are adjusted according to the purchasing power parity and come from the World Bank's *World Tables*. Population data (denoted by "POPIM" and "POPEX" for importing and exporting countries respectively) are for 1996 or the latest available year, as published in the IMF's *International Financial Statistics*. The geographic distance (denoted by "DIST") is measured as the direct-line distance between the capital cities of countries.[9]

Trade restrictions are represented by mean tariff rates (denoted by "TAR") by country. The tariff data for 1995 or the latest available year come from the World Bank's *World Development Indicators Database*. Tariff rates are adjusted to take into account free trade agreements, as reported in the *Annual Report* of the World Trade Organization. This measure of trade restrictions is imperfect, because it does not reflect the extent of nontariff barriers, for example, import quotas and voluntary export restraints, which tend to cover a substantial share of imports, particularly in developing countries. The measurement of the intensity of nontariff barriers is challenging, and the available measures are inadequate. Therefore, in this study, the effect of nontariff barriers (other than exchange and capital controls) is not measured separately but accounted for in the intercept.

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[9]Fitzpatrick and Modlin (1986).

The extent of national exchange and capital controls is captured in three aggregate measures: the indices of controls on current payments and transfers (denoted by "CCI"), capital controls (denoted by "KCI"), and exchange and capital controls in their entirety (denoted by "ECI"). The indices summarize information on 142 individual types of national exchange and capital control from the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* (AREAER).[10] Figure 1 depicts individual types of exchange and capital control and their aggregation into categories and indices. Appendix I describes the methodology of constructing the indices.[11] Each index ranges from zero (the lowest extent) to one (the highest extent). CCI measures the extent of controls on current payments and transfers, and KCI reflects the pervasiveness of controls on capital movements. ECI comprises capital controls as well as controls on payments and transfers for current international transactions and hence reflects the overall extent of exchange and capital controls. It can be also interpreted as a broad measure of capital controls that takes into account the scope for the circumvention of capital controls through current international transactions.

Despite their limitations, the indices have some advantages over alternative measures of the extent of exchange and capital controls, for example, the black market premium and dummy variables. Unlike the black market premium, the indices do not reflect the effects of other nontariff barriers, for example, import quotas, and focus exclusively on exchange and capital controls. Unlike dummy variables, the indices summarize information about a broad array of individual types of control, and thus can capture a variety of changes in the regulatory regime. The indices, however, do not explicitly take into account the supervision and enforcement of exchange and capital controls and thus reflect legal (*de jure*) rather than actual (*de facto*) incidence of controls.[12]

The study analyzes a cross section of forty industrial, developing, and transition economies, for which the indices of exchange and capital controls are available. The countries represent various geographical regions and levels of economic development. All of these

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[10]In 1997, the information in the AREAER was presented for the first time in a new tabular format, which classified and standardized the information on members' exchange systems and expanded the coverage of capital controls. The classification of the AREAER information with this new tabular format has made it possible to develop and apply more comprehensive indices of the extent of exchange and capital controls for 1996.

[11]For more details on the indices of exchange and capital controls, see International Monetary Fund (1998).

[12]Although the intensity of exchange and capital controls is not taken into account explicitly, the indices are found to be robust to weighing by subjective intensity measures.

Figure 1. Structure of Indices of Exchange and Capital Controls

Index of Exchange and Capital Controls

Index of Controls on Current Payments and Transfers

Exchange arrangement
- *Exchange rate structure*
  - Dual
  - Multiple
- *Exchange tax*
- *Exchange subsidy*
- *Forward exchange market*
  - Prohibited
  - Official cover of forward operations required

Arrangements for payments and receipts
- *Prescription of currency requirements*
- *Bilateral payments arrangements*
  - Operative
  - Inoperative
- *Other payments arrangements*
  - Regional agreements
  - Clearing agreements
  - Barter agreements and open accounts
- *International security restrictions*
  - In accordance with IMF EB Decision No. 144-(52/51)
  - Other
  - In accordance with UN sanctions
- *Payments arrears*
  - Official
  - Private
- *Controls on trade in gold (coins and/or bullion)*
  - Controls on domestic ownership and/or trade
  - Controls on external trade
- *Controls on exports and imports of banknotes*
  - On exports
    - Domestic currency
    - Foreign currency
  - On imports
    - Domestic currency
    - Foreign currency

Resident accounts
- *Foreign exchange accounts*
  - Held domestically
    - Prohibited
    - Approval required
  - Held abroad
    - Prohibited
    - Approval required

Nonresident accounts
- *Foreign exchange accounts*
  - Prohibited
  - Approval required
- *Domestic currency accounts*
  - Prohibited
  - Approval required
- *Blocked accounts*

Imports and import payments
- *Foreign exchange budget*
- *Financing requirements for imports*
  - Minimum financing requirements
  - Advance payments requirement
  - Advance import deposits
- *Documentation requirements for release of foreign exchange for imports*
  - Domiciliation requirements
  - Preshipment inspection
  - Letters of credit
  - Import licenses used as exchange licenses
  - Other
- *Import taxes collected through the exchange system*

Exports and Export Proceeds
- *Documentation requirements*
  - Letters of credit
  - Guarantees
  - Domiciliation
  - Preshipment inspection
  - Other
- *Export taxes collected through the exchange system*

Payments for invisible transactions and current transfers
- *Freight/insurance*
  - Prior approval
  - Quantitative limits
  - Indicative limits/bona fide test
- *Unloading/storage costs*
  - Prior approval
  - Quantitative limits
  - Indicative limits/bona fide test
- *Administrative expenses*
  - Prior approval
  - Quantitative limits
  - Indicative limits/bona fide test
- *Commissions*
  - Prior approval
  - Quantitative limits
  - Indicative limits/bona fide test
- *Interest payments*
  - Prior approval
  - Quantitative limits
  - Indicative limits/bona fide test
- *Profit/dividends*
  - Prior approval
  - Quantitative limits
  - Indicative limits/bona fide test
- *Payments for travel*
  - Prior approval
  - Quantitative limits
  - Indicative limits/bona fide test
- *Medical costs*
  - Prior approval
  - Quantitative limits
  - Indicative limits/bona fide test
- *Study abroad costs*
  - Prior approval
  - Quantitative limits
  - Indicative limits/bona fide test
- *Subscriptions and membership fees*
  - Prior approval
  - Quantitative limits
  - Indicative limits/bona fide test
- *Consulting/legal fees*
  - Prior approval
  - Quantitative limits
  - Indicative limits/bona fide test
- *Foreign workers' wages*
  - Prior approval
  - Quantitative limits
  - Indicative limits/bona fide test
- *Pensions*
  - Prior approval
  - Quantitative limits
  - Indicative limits/bona fide test
- *Gambling/prize earnings*
  - Prior approval
  - Quantitative limits
  - Indicative limits/bona fide test
- *Family maintenance/alimony*
  - Prior approval
  - Quantitative limits
  - Indicative limits/bona fide test
- *Credit card use abroad*
  - Prior approval
  - Quantitative limits
  - Indicative limits/bona fide test

Index of Capital Controls

Proceeds from Exports, Invisibles, and Current Transfers
- *Repatriation requirements for export proceeds*
- *Surrender requirements for export proceeds*
- *Repatriation requirements for proceeds from invisibles and current transfers*
- *Surrender requirements for proceeds from invisibles and current transfers*
- *Restrictions on use of funds*

Controls on capital and money market instruments
- *On capital market securities*
  - Purchase in the country by nonresidents
  - Sale or issue locally by nonresidents
  - Purchase abroad by residents
  - Sale or issue abroad by residents
- *On money market instruments*
  - Purchase in the country by nonresidents
  - Sale or issue locally by nonresidents
  - Purchase abroad by residents
  - Sale or issue abroad by residents
- *On collective investment securities*
  - Purchase in the country by nonresidents
  - Sale or issue locally by nonresidents
  - Purchase abroad by residents
  - Sale or issue abroad by residents

Controls on derivatives and other instruments
- *Purchase in the country by nonresidents*
- *Sale or issue locally by nonresidents*
- *Purchase abroad by residents*
- *Sale or issue abroad by residents*

Controls on credit operations
- *Commercial credits*
  - By residents to nonresidents
  - To residents from nonresidents
- *Financial credits*
  - By residents to nonresidents
  - To residents from nonresidents
- *Guarantees, sureties, and financial backup facilities*
  - By residents to nonresidents
  - To residents from nonresidents

Controls on direct foreign investment
- *Outward direct investment*
- *Inward direct investment*

Controls on liquidation of direct investment

Controls on real estate transactions
- *Purchase abroad by residents*
- *Purchase locally by nonresidents*
- *Sale locally by nonresidents*

Provisions specific to commercial banks and other credit institutions
- *Borrowing abroad*
- *Maintenance of accounts abroad*
- *Lending to nonresidents (financial or commercial credits)*
- *Lending locally in foreign exchange*
- *Purchase of locally issued securities denominated in foreign exchange*
- *Differential treatment of nonresident deposit accounts and/or deposit accounts in foreign exchange*
  - Reserve requirements
  - Liquid asset requirements
  - Interest rate controls
  - Investment regulations
  - Credit controls
  - Open foreign exchange position limits

Provisions specific to institutional investors
- *Limits (max.) on portfolio invested abroad*
- *Limits (min.) on portfolio invested locally*
- *Currency matching regulations on assets/liabilities composition*

countries, except two (Brazil and Egypt) have accepted the obligations of Article VIII of the IMF's Articles of Agreement.[13] The sample includes fifteen industrial countries (Australia, Canada, Denmark, France, Germany, Greece, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Spain, United Kingdom, and United States), nineteen developing countries (Argentina, Brazil, Chile, China, Egypt, India, Indonesia, Kenya, Republic of Korea, Mexico, Morocco, Pakistan, Philippines, Saudi Arabia, South Africa, Thailand, Tunisia, Turkey, and Uruguay), and six transition economies (Czech Republic, Hungary, Kazakhstan, Latvia, Poland, and Russia).[14]

Summary statistics and correlations are presented in Tables 1–2 respectively. The exchange system in industrial countries is highly liberal, while developing and transition economies have more extensive exchange and capital controls. For instance, the mean ECI for industrial and developing and transition economies is 0.09 and 0.35, CCI is 0.05 and 0.17, and KCI is 0.12 and 0.54 respectively. Controls on current payments and transfers (as measured by CCI) are less pervasive than capital controls (KCI) in industrial and developing and transition economies. Another interesting observation is that controls on current payments and transfers and capital controls are highly correlated with each other (correlation coefficient is above 0.8), and, of course, with the overall measure of exchange and capital controls, ECI (correlation coefficients are above 0.9).[15]

V. Estimation Results

We estimate equation (2) with three alternative measures of exchange and capital controls - CCI, KCI, and ECI[16] - denoting the respective equations as 2a, 2b, and 2c. The results suggest that exchange and capital controls represent a notable barrier to trade in developing and transition economies and not in industrial economies. Controls on current payments and transfers reduce bilateral trade flows insignificantly.

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[13]Under Article VIII of the IMF's Articles of Agreement, members undertake obligations to avoid imposing restrictions on the making of payments and transfers for current international transactions, without the approval of the Fund.

[14]The study uses the IMF's classification of countries into industrial, developing and transition ones.

[15]For the analysis of correlation between the indices and measures of economic development, the efficiency of the financial system, foreign direct and portfolio investment, exchange rate volatility, and trade policy, see International Monetary Fund (1998).

[16]Including both CCI and KCI into the model iutensifies multicollinearity, since the indices are highly correlated with each other (correlation coefficients of 0.8–0.9). Testing for redundant coefficients shows that CCI is redundant. Testing for the stability of coefficients suggests that coefficients are unstable at the 5 percent level of significance.

Table 1. Summary Statistics

	EX	*DIST*	*POPEX*	*POPIM*	*GDPEX*	*GDPIM*	*1+TAR*	*CCI*	*KCI*	*ECI*
All countries										
Mean	1897.731938	4879.7531	107.3051	107.40775	10674.082	10730.402	113.973	0.1259067	0.37769	0.250972
Standard deviation	8268.539605	3873.0583	235.44652	235.4681	7485.2726	7490.822	13.4893	0.0979768	0.29531	0.189783
Minimum	0.005860407	137	2.49	2.49	1380	1380	100	0.0084034	0.0101	0.02774
Maximum	164761.4	79635	1221.5	1221.5	26980	26980	156.3	0.3348739	0.94545	0.6224
Count	1519	1519	1519	1519	1519	1519	1519	1519	1519	1519
Industrial countries										
Mean	3806.800695	4795.8517	107.45149	52.515275	10415.879	19466.586	105.319	0.0533558	0.11809	0.085721
Standard deviation	12689.6017	4478.1845	236.31758	66.64985	7414.256	3491.1161	3.54625	0.0377103	0.11735	0.072685
Minimum	0.0104	187	2.49	3.57	1380	11710	100	0.0084034	0.0101	0.02774
Maximum	164761.4	79635	1221.5	266.5598	26980	26980	110.5	0.1609244	0.53872	0.349822
Count	580	580	580	580	580	580	580	580	580	580
Developing and transition countries										
Mean	718.5414386	4931.5772	107.21468	141.31365	10833.568	5334.2492	119.319	0.1690532	0.53703	0.353043
Standard deviation	2757.08114	3448.2052	235.03293	289.78097	7528.3128	2635.15	14.5533	0.0967652	0.25519	0.16647
Minimum	0.005860407	137	2.49	2.49	1380	1380	100	0.0336134	0.10269	0.100296
Maximum	56760.8	62333	1221.5	1221.5	26980	18940	156.3	0.3348739	0.94545	0.6224
Count	939	939	939	939	939	939	939	939	939	939

Table 2. Correlations

	EX	*DIST*	*POPEX*	*POPIM*	*GDPEX*	*GDPIM*	*1+TAR*	*CCI*	*KCI*	*ECI*
EX	1.000									
DIST	-0.113	1.000								
POPEX	0.036	0.009	1.000							
POPIM	0.037	0.014	-0.028	1.000						
GDPEX	0.231	-0.002	-0.238	0.001	1.000					
GDPIM	0.230	0.009	0.001	-0.239	-0.032	1.000				
1+TAR	-0.136	0.097	0.028	0.554	-0.057	-0.608	1.000			
CCI	-0.103	-0.009	-0.006	0.428	0.021	-0.631	0.615	1.000		
KCI	-0.125	-0.006	-0.005	0.340	0.022	-0.661	0.583	0.829	1.000	
ECI	-0.124	-0.007	-0.005	0.374	0.023	-0.675	0.611	0.901	0.990	1.000

Estimation results are summarized in Table 3. The adjusted R-squares are above 0.70, and F-statistics are significant at the 99 percent level.[17] Tests of the stability of coefficients and the recursive analysis of coefficients indicate that coefficients are stable at the 95 percent significance level. The estimated intercept is negative, implying that unmeasured trade distortions tend to reduce exports. Distance has a significant negative effect on bilateral exports, in part because trade costs (for example, transportation and communication) are likely to increase with distance. Tariff barriers in the importing countries also tend to have a negative, albeit insignificant, effect on exports into these countries. GDP per capita and population, on the other hand, have significant positive effects on bilateral exports.

Overall, exchange and capital controls (as measured by ECI) represent a notable nontariff barrier. The negative parameter on ECI is significant at the 95 percent level for the full sample, suggesting that exchange and capital controls in their entirety significantly reduce bilateral exports. Another interpretation of this result is that capital controls in a broad sense (i.e., including capital controls and controls on current payments and transfers that are used to prevent the circumvention of capital controls) are a significant barrier to trade. The effect of exchange and capital controls on trade, however, varies depending on the type of control.

Capital controls (as measured by KCI) are found to be a significant barrier to trade for the full sample. In contrast, controls on current payments and transfers (as measured by CCI) do not reduce exports significantly. Most countries in the sample have already liberalized exchange controls on current payments and transfers, and the remaining exchange controls, including those on current invisible payments such as tourism etc., do not affect trade noticeably. Very few countries presently maintain significant exchange controls on trade-related transactions or factor services. In contrast, capital controls continue to remain more widespread, particularly in developing and transition economies. The variation in the extent of the liberalization of exchange and capital controls across industrial and developing and transition countries is reflected in the estimation results for the respective sub-samples.

Exchange and capital controls are a barrier to exports into developing and transition economies, but not into industrial countries. This finding can be attributed to capital controls, which noticeably reduce bilateral exports into developing and transition economies, and have only a minor negative impact on bilateral exports into industrial countries. The reason is that industrial economies have relatively liberal regimes for international capital movements, while many developing and transition economies continue to maintain various capital controls. Controls on current payments and transfers represent only a minor barrier to bilateral exports into all countries, since these controls have been substantially liberalized worldwide.

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[17]Since heteroskedasticity may be a problem due to differences in the country size, standard errors and covariances are calculated on the basis of the White heteroskedasticity-consistent matrix.

Table 3. Estimation Results

	All countries			Industrial countries			Developing and transition countries		
	Eq. (2a)	Eq. (2b)	Eq. (2c)	Eq. (2a)	Eq. (2b)	Eq. (2c)	Eq. (2a)	Eq. (2b)	Eq. (2c)
C	-37.13*	-37.34*	-37.11*	-33.56*	-33.27*	-33.73*	-38.69*	-38.03*	-38.91*
ln DIST	-0.91*	-0.91*	-0.91*	-0.59*	-0.60*	-0.58*	-1.06*	-1.04*	-1.07*
ln POPIM	0.94*	0.94*	0.94*	0.94*	0.95*	0.93*	0.96*	0.95*	0.96*
ln POPEX	1.03*	1.03*	1.03*	0.99*	0.99*	0.99*	1.06*	1.06*	1.06*
ln GDPIM	1.37*	1.39*	1.37*	0.97*	0.93*	0.99*	1.48*	1.40*	1.51*
ln GDPEX	1.90*	1.90*	1.90*	1.77*	1.77*	1.77*	1.99*	1.98*	1.99*
ln (1+TAR)	-0.73	-0.83	-0.73	-7.14	-6.69	-7.30	-0.21	-0.64	-0.10
ECI	-0.66**			-1.20			-0.75**		
CCI		-0.89			-2.21			-0.65	
KCI			-0.42**			-0.71			-0.53**
Number of observations	1519	1519	1519	580	580	580	939	939	939
R-squared	0.76	0.76	0.76	0.80	0.80	0.80	0.72	0.72	0.72
F-statistic	697.05*	694.76*	697.26*	318.81*	318.52*	318.59*	334.31*	332.47*	334.82*

* Denotes coefficient that is significant at the 99 percent level.

** Denotes coefficient that is significant at the 95 percent level.

The results should be interpreted with caution, in view of the potential endogeneity and measurement problems. The endogeneity problem can emerge, if exchange and capital account regulations depend on the level of economic development and trade flows in a given year. This effect, however, is likely to be limited, because regulations in the current year are likely to be determined by economic variables in the previous years. In turn, the measurement problem can be traced to the fact that the indices of exchange and capital controls do not account for the enforcement of controls. Controlling for this measurement error requires using the instrumental variable approach and is left for the future study. The measure of trade barriers (mean tariff rate) does not account for differences in actual tariff rates across export partners other than those due to free trade agreements. To control for this measurement problem, we use several alternative measures of trade barriers: import duties as a share of imports (calculated on the basis of the IMF's *Government Finance Statistics Yearbook*), both adjusted and unadjusted for free trade agreements; mean tariff rates unadjusted for free trade agreements, and simple average tariff rates from the trade policy database compiled by the IMF.[18] The results are found to be robust to the alternative measures of trade barriers.

VI. Conclusion

After analyzing the foregoing results, we have determined on an overall basis for 1996 that exchange and capital controls represent a significant barrier to trade. This finding, of course, depends on the level of development in each country and the type of exchange and capital control. Controls on current payments and transfers are a negligible impediment to trade. Capital controls, in contrast, reduce bilateral trade for developing and transition economies, but not for industrial countries. These results reflect the variation in the extent of liberalization across countries and types of control: controls on current payments and transfers have been largely abolished worldwide, while controls on capital flows continue to prevail in many developing and transition economies, but not in industrial countries. An implication of this study is that further liberalization of exchange and capital controls can discernibly foster trade.

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[18]The trade policy database is compiled by the Trade Policy Division, Policy Development and Review Department, International Monetary Fund on the basis of various sources (among others, the International Monetary Fund, the World Trade Organization, and the United Nations Conference on Trade and Development). The author is grateful to Robert Sharer and the staff of the Trade Policy Division for providing the data.

INDICES OF EXCHANGE AND CAPITAL CONTROLS

The tabular presentation of the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* identifies 142 individual types of exchange and capital control. These are aggregated hierarchically into 16 categories; these categories are aggregated into indices, which measure the extent of exchange and capital controls (Figure 1). The index of controls on current payments and transfers includes exchange controls pertaining to the exchange arrangement, arrangements for payments and receipts, resident and nonresident accounts, import payments, and export proceeds. The index of capital controls encompasses controls on capital and money market securities, derivatives, credit operations, direct foreign investment, real estate transactions; provisions specific to commercial banks, other credit institutions and institutional investors; as well as surrender and repatriation requirements. The index of exchange and capital controls covers controls on current payments and transfers and capital movements.

The presence of control i in country j is reflected in a dummy variable D_{ij}, which is assigned a value of 1 when the individual type of control is in place and zero otherwise, according to the conventions described below. The *index of controls in category k* (denoted by CI_{kj}) is defined as the actual number of controls normalized by the total feasible number of controls in the category (N_k), as follows:

$$CI_{kj}=\frac{1}{N_k}\sum_1^{N_k} D_{ij}, \tag{3}$$

The *indices of controls on current payments and transfers and capital controls* (CCI_j and KCI_j respectively) are the averages of the indices for the respective categories:

$$CCI_j=\frac{1}{N_{CCI}}\sum_1^{N_{CCI}} CI_{kj}, \tag{6}$$

$$KCI_j=\frac{1}{N_{KCI}}\sum_1^{N_{KCI}} CI_{kj}, \tag{5}$$

where N_{CCI} and N_{KCI} denote the number of categories in CCI and KCI respectively. The overall *index of exchange and capital controls* (ECI_j) is the average of CCI_j and KCI_j:

$$ECI_j=\frac{1}{2}(CCI_j+KCI_j) \tag{4}$$

Conventions for assigning values of the dummy variables D_{ij} are as follows. The value of 1 corresponds to prohibitions, quantitative limits, approval and registration requirements,[19] restrictions on investors' opportunity set (for example, the type and maturity of securities), as well as cases where the respective markets do not exist. The value of zero is assigned for measures for statistical purposes, administrative verification,[20] optional official cover of forward operations, liberal granting of licenses, the lack of access to the formal market for foreign exchange transactions, and a favorable treatment of foreign residents or foreign currency deposits.[21]

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[19] Likewise, registration requirements are treated as restrictions in the World Bank (1997).

[20] Under the Fund's jurisdiction, registration or licensing used to monitor rather than restrict payments and verification requirements such as requirement to submit documented evidence that a payment is *bona fide* do not constitute an exchange restriction, unless the process results in undue delays. With indicative limits, authorities approve all requests for foreign exchange for *bona fide* current international transactions in excess of limits or for transactions for which there is no basic allocation of foreign exchange. If the public is made aware of such a policy, indicative limits do not constitute a restriction.

[21] On average, 99 percent of the AREAER data on exchange and capital controls are available for the countries in the sample. Nonetheless, the baseline indices are defined as the averages of the indices calculated under two alternative assumptions about missing data: controls and no controls.

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