Contestable Financial Integration and Interest Rate Differentials

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The traditional definition of financial integration assumes a certain relationship between arbitrage opportunities and asset price equalization. Once capital starts to move freely across borders, it is assumed that trade continues until arbitrage opportunities fade away. Therefore, countries are generally expected to experience increased growth when they are liberalized by attracting foreign capital. This paper introduces a new definition of financial integration by using contestability approach. According to this new definition, in some cases the financial market structure plays a central role in the determination of asset prices. Equal asset prices are attained without having any financial flows in these countries. Therefore, once contestability concept is taken into account, welfare implications of the traditional models become dubious. A threshold regression for a panel data set is estimated which shows interest rate spreads are determined independently from financial flows for this panel.

Introduction

In the traditional definition of financial integration, once capital is allowed to move freely across borders, it is assumed that trade continues until arbitrage opportunities fade away, and this brings equalization of asset prices across borders. So, the existence of financial flows pursuing arbitrage opportunities plays an important role in the integration process. This article uses a different definition of financial integration which treats the relationship between financial integration and financial flows differently.

This new definition is based on the concept of *contestability* is taken from the IO literature. In financial markets integrated according to the contestability definition, market structure plays role in the determination of asset prices in addition to financial flows. In this new definition, foreign lenders might have an impact on domestic asset prices even without actually entering into their market. Therefore, the traditional link between financial flows and asset prices is different.

Contestability

According to contestability theory developed by Baumol et al. (1982) competitive pricing can be observed in a market even if there is only limited number of firms. In this theory, a market with low (or maybe no) barriers to entry and exit and no sunk costs will be open to hit and run competition. If a firm begins to earn abnormal profits, potential rivals will enter the market to take advantage of these profits. When the incumbents respond by returning prices to levels consistent with normal profits the new firms will exit. Therefore, monopolistic or oligopolistic firms may not behave as economic theories predict because they may be fearful of new entrants to the market. Instead, when it is possible players will take action together to deter entry into their market.

In this article, the theory of contestability is applied to financial markets. Among all markets, financial markets are theoretically the ones that are open to "hit and run competition" the most. When there are no entry barriers, financial funds can easily flow into different places suggesting higher profit opportunities. Therefore, abnormal profits in these markets will attract foreign lenders into the domestic market and foreign lenders' entry threat will affect domestic lenders' behavior. Domestic lenders will charge a price level which deters foreign lender's entry, i.e. one consistent with the non-arbitrage condition. Conversely, when foreign investors' entry to the domestic market does not

occur due to high risk, not only the supply of funds will be reduced. The lack of foreign competition also induces monopolistic pricing behavior among domestic lenders. This in turn causes lower asset prices in the domestic country relative to the foreign country. Therefore, the threat of entry is sufficient to discipline incumbents.

The difference between contestable integration and traditional integration appears in the flows to exploit arbitrage opportunities. According to the traditional definition, when financial barriers are abolished, arbitrage opportunities are immediately exploited and asset price equality results. However, when we define financial integration in the contestability sense, asset prices can be equalized even without experiencing any financial flows into the country at all. When the structure of domestic financial markets supports collusive behavior, agents would prefer to push the equilibrium price to a level that deters foreign lenders' entry into domestic market. In this case, the price level they are going to agree on is going to be higher than what they would choose in the absence of foreign lenders. Therefore, in collusive financial markets asset prices gets closer to the foreign price level even in the absence of capital inflows.

Interest Rate Differentials and Traditional Definition of Integration

Since, in the commonly used definition of financial integration, removal of trade barriers are assumed to bring asset price equality, the degree of financial integration is frequently measured by using interest rate parity condition[1]. For instance Goldberg et al. (2002) investigate both the extent of market integration and its changes over time by using interest rate differentials across the major countries. Due to the frictions and transactions costs, covered interest rates differentials are allowed only to a certain extent in this approach. For any given interest rate differential, transactions costs create an upper and lower limit within which arbitrage can not be profitable. While the price differences outside this band are rapidly eliminated through arbitrage opportunities, transaction costs create a band within which covered interest arbitrage does not occur. Frenkel and Levich (1977) estimate the transaction cost band for UK and US differentials. They find that the length of this band takes values between 0.12 percent and 1.03 percent per annum.

In addition to degrees of financial integration at a certain point in time, convergence among countries are also assessed by using interest rate differentials in this

[1] For a detailed list of alternative ways of measuring financial integration, See Pagano (2002).

literature. In the integrated case, as a result of the growing interdependence among markets, country-specific interest rates are assumed to exhibit a long-run convergence trend. Mean reverting behavior of the interest differentials is seen as an indicator of convergence. For instance, Singh and Banerjee (2006) suggest that real interest rates in the emerging markets show some convergence in the long run but real interest parity does not hold.

That is to say, in the traditional definition, the use of arbitrage opportunities is at the center of the financial integration discussion. Without explicitly analyzing the relationship between the interest rate differentials and the use of arbitrage opportunities, this literature accepts the arbitrage mechanism as a device automatically activated whenever there are interest rate differentials. In this section, I am going to analyze this relationship and show that the use of arbitrage opportunity and interest rate differentials do not always go hand in hand in real life. First I will introduce the measure of arbitrage that will be used and then present basic statistics to see the relationship between two.

Interest Rate Differentials and Cross-Border Arbitrage Opportunities

As in the trade literature, gravity equations are commonly used in order to explain cross-border capital movements. In these equations, flows are generally explained by variables such as size, contiguity, distance etc. In these articles distance proxies information costs, information asymmetry between domestic and foreign investors, and the efficiency of transactions. Equity flows and flows between banking centers are commonly estimated by gravity equation in this literature. Portes and Rey (2005) estimates bilateral cross-border equity flows between 14 countries for 1989–1996 period by using mostly informational friction variables. In addition to Portes and Rey (2005)'s variables, Papaioannou (2004) shows that institutional factors also play a role international investors decision. Lane and Feretti (2004) include variables like correlation between stock market returns and correlation between growth rates.

It is common in the trade literature to use gravity equations as a measure of trade potentials between two countries[2]. The idea is here a certain amount of flows are expected to realize given characteristics of the trade partners such as distance and size. A country which trades below the quantity estimated by gravity equation is accepted not

[2] For an application of this in trade literature see Egger (2002).

using its trade potential in this approach. Conversely, if the trade is above the quantity forecasted by gravity equation, the country analyzed experiences trade flows more than its potential. In this section, I will take this idea one step further and relate the trade potentials to arbitrage opportunities. When flows are more than what is normally expected given partners' characteristics, these extra flows are going to be accepted to exist in order to pursue an arbitrage opportunity. When flows are less than the trade potential, it will be seen as an indicator of lack of arbitrage opportunity.

In the gravity equation, I estimated flows of funds in the international banking sector. The data used is downloaded from BIS for 2000-2006 period. The selection of the countries that are included in this panel data depends on the data availability[3]. Once I get the calculated error terms from my gravity equation, in the second step of my estimation I used these error terms as one of the explanatory variables of the nominal short term interest rates. For each developing country in the sample, spread between a given country's short term nominal interest rate and eight developed country's interest rate spreads are estimated below.

Table 1: Panel Data Estimation of Interest Rate Spreads

spread	Coefficient	Std. Error
error	-0.12	0.19
cpi	0.94	0.02
politics	2.95	0.94
exc	-0.65	0.05
constant	-4.74	1.57

According to the arbitrage argument, the entry of the foreign lenders decreases the interest rates spreads. Therefore, the sign of the error term is expected to be negative here. While the sign of the coefficient is expected, as Table 1 reveals, error terms have no explanatory power in this estimation. On the other hand, other variables which explain the risk premium seem to be significant. In the final section of the article, I will repeat the same estimation in a different structure.

Section 2 of this article presents our theoretical model. This is followed in Section 3 by my estimation results. Section 4 discusses policy implications of the current work and concludes.

[3] For the list of countries, see Appendix 1.

Model:

In the following section, I am going to introduce an extension of Martin and Rey (2004)'s, MR hereafter, model. This is a two-country model analyzing the determination of financial flows, asset prices and the effect of financial integration on this process. Countries we are analyzing here, A and B, are assumed to have different populations, n_A and n_B. In the first period, risk averse agents get their endowments, y_{1A} and y_{1B}, which can be consumed, invested in risky projects or used to buy some stocks. There are L different, equally likely states. Each agent produces only one project and each project pays a dividend equal to d, in only one of those states of nature[4]. The total world population is assumed to be equal to the number of states, $n_A + n_B = L$, with each project paying off in one state. Since the set of projects are assumed to be common knowledge and all the projects have the same expected return, there is no reason to replicate a project that is already developed by another agent.

Utility Function: Agents have a "love for diversity" type of utility function given below. Love for diversity comes from the risk aversion.

$$EU_h = c_{1h} + \beta\left(\frac{c_{2h}^{1-1/\sigma}}{1-1/\sigma}\right) \qquad (1)$$

where h=A, B which represents a typical agent from country A or B.

Budget Constraint:

$$c_{1h} + \sum p_i s_i + \sum p_j s_j = y_{1h} + \sum p_k \alpha_k \qquad (2)$$

where y_{1h} is the initial endowment, s_i is agents' demand for domestic asset developed by other domestic fellows, s_j is agents' demand for foreign asset. Agents sell a portion α_k of each project that he has developed.

Consumption in the Second Period:

An agent's consumption in the second period depends on his asset choices made in the first period.

[4] Differing from Martin and Rey (2004), I do not have project starting costs or endogenous number of assets here.

$c_{2h} = ds_i$ if a state insured by a domestic fellow realizes,

$c_{2A} = ds_j$ if a state insured by a foreign investor realizes,

$c_{2A} = d\left(1-\alpha_k\right)$ if a state insured by the agent himself realizes[5].

At time 1, agents determine their first period consumption, demand for domestic and foreign assets and the proportion of each of his projects to be kept.

In MR, financial integration is defined as an increase in the effective market size. However, when the two countries open their financial markets, the asset prices are not equalized due to the transaction costs and imperfect substitutability between the assets in their model. Since transaction costs are not the main point of this article, in this version they are assumed to be equal to zero.

In the following section, I am going to show the impact of not only the quantity of financial flows between countries, but also market structure on the determination of asset prices. But before doing that, I am going to analyze the predictions of the traditional integration in the structure of my model to make comparison between traditional integration and contestable integration. I will first assume a case in which trade barriers in both Country A and B prohibit international financial flows. In this situation, consistent with both traditional and contestable integration ideas, asset prices are going to be different. They are going to depend on domestic size and endowments of A and B. And then barriers will be totally abolished. Under this scenario, we will have the impact that is defined in the "traditional integration" literature: when financial markets are liberalized, the use of arbitrage opportunities will push the asset prices to equal level in Country A to B given the identical risk assumption that I made. While theoretically attractive, in real life countries are not identical in terms of the risk. Therefore, the third case I am going to discuss will cover a situation in which one of the countries analyzed is riskier than the other. In this situation, the introduction of risk will result in a decrease in the financial flows and countries will have different asset prices due to the risk premium. The last case that I will discuss is going to introduce the contestable integration effect. This time, the degree of collusiveness in the financial markets will play a major role in

[5] In the following section, i represents domestic fellows, j represent projects developed by agents from the other country and finally k is used to indicate agents' own asset.

the determination of asset prices. I will show you when the trade barriers are abolished if market structure allows collusive agreements between domestic agents, asset prices will converge to other country's level even without having financial flows at all.

Case 1: Autarky

In this first case, trade barriers in both Country A and B are assumed to prohibit international financial flows[6]. Under this scenario, since agents are allowed to buy only domestic assets, the risk coverage will be incomplete. Therefore, agents might possibly have zero consumption in the second period.

A typical agent's utility function and budget constraints are given below

$$EU_A = c_{1A} + \frac{D}{1-\frac{1}{\sigma}}\left(\sum_{i=1}^{n_A-1}\left(s_i\right)^{1-\frac{1}{\sigma}} + \left(1-\alpha_k\right)^{1-\frac{1}{\sigma}}\right) \qquad (3a)$$

$$c_{1A} = y_{1A} + p_k\alpha_k - \sum_{i=1}^{n_A-1} p_i s_i \qquad (3b)$$

where $D = \frac{\beta d^{\Delta}}{L}$

These definitions reflect the fact that each agent produces only one project and buys $\left(n_A - 1\right)$ domestic assets. From the first order conditions

$$s_i = p_i^{-\sigma} D^{\sigma} \qquad (4a)$$

$$\left(1-\alpha_k\right) = p_k^{-\sigma} D^{\sigma} \qquad (4b)$$

$$1 - p^{-\sigma} D^{\sigma} = p^{-\sigma} D^{\sigma}\left(n_A - 1\right) \qquad (5a)$$

Equilibrium price level in Country A which satisfies the equilibrium condition in equation (5a) is given below

$$p_A = D n_A^{1/\sigma} \qquad (6a)$$

Total equilibrium welfare in this autarky case can be calculated by using the following equation

$$W_A^{Aut} = y_{1A} + \frac{D}{\Delta} n_A^{1/\sigma} \text{ where } \Delta = 1 - \frac{1}{\sigma} \qquad (7a)$$

[6] In the following section, I am going to analyze only Country A, but the expressions are going to be similar for Country B.

while the equilibrium consumption in the first period is

$$c_{1A} = y_{1A}$$

Similarly, equilibrium price level in Country A

$$p_B = Dn_B^{1/\sigma} \qquad (6b)$$

and total welfare level of Country B is

$$W_B^{Aut} = y_{1B} + \frac{D}{\Delta} n_B^{1/\sigma} \qquad (7b)$$

Therefore, when markets are closed, the equilibrium price levels are going to be different in Country A and B. As it can be seen from (6a) and (6b), country will larger population will have higher equilibrium prices.

Case 2: Traditional Integration

Now, let's assume the political authorities in both Country A and B agree on abolishing financial barriers. After the financial liberalization in which both Country A and B open their borders to each other, an agent who buys both Country A's and B's assets covers the risk completely now.

In this new scenario, the utility functions and budget constraint include both domestic and foreign assets

$$EU_A = c_{1A} + \frac{D}{1-\frac{1}{\sigma}} \left(\sum_{i=1}^{n_A - 1} \left(s_i\right)^{1-\frac{1}{\sigma}} + \sum_{j=1}^{n_B} \left(s_j\right)^{1-\frac{1}{\sigma}} + \left(1-\alpha_k\right)^{1-\frac{1}{\sigma}} \right) \qquad (8a)$$

$$c_{1A} = y_{1A} + p_k \alpha_k - \sum_{i=1}^{n_A - 1} p_i s_i - \sum_{j=1}^{n_B} p_j s_j \qquad (8b)$$

In addition to (4a) and (4b), we now have another first order condition below which determines the demand for foreign asset

$$s_j = p_j^{-\sigma} D^{\sigma} \qquad (4c)$$

Due to the foreign agents' participation, we have a different equilibrium condition in this case

$$1 - p^{-\sigma} D^{\sigma} = \left(n_A - 1\right) p^{-\sigma} D^{\sigma} + n_B p^{-\sigma} D^{\sigma} \qquad (5b)$$

The equilibrium price level in Country A satisfying (5b) is now

$$P_A = D\left(n_A + n_B\right)^{1/\sigma} \qquad (9a)$$

Total equilibrium welfare in the integration case can be calculated by using following equation

$$W_A^{Int} = y_{1A} + \frac{D}{\Delta}\left(n_A + n_B\right)^{1/\sigma} \qquad (10a)$$

where the equilibrium consumption in the first period

$c_{1A} = y_{1A}$

Similarly, equilibrium price level in Country B

$$P_B = D\left(n_A + n_B\right)^{1/\sigma} \qquad (9b)$$

Total welfare level and the equilibrium price level of Country B is going to be similar

$$W_B^{Int} = y_{1B} + \frac{D}{\Delta}\left(n_A + n_B\right)^{1/\sigma} \qquad (10b)$$

When financial restrictions are abolished, the equilibrium price levels in Country A and B are equated now as it can be seen from (10a) and (10b)[7].

Quantity of Flows

Differing from Case 1, we have financial flows between A and B now. Each agent from Country A's demand for Country B is equal to S_j and agent will buy n_B of them. Therefore, an *agents'* total spending on B's assets is equal to $n_B P_B S_j$. *Total flows* from Country A to B, FF_A^B, is given below

$$FF_A^B = P_A S_j n_A n_B = \left(n_A + n_B\right)^{-\Delta} n_A n_B \qquad (11a)$$

Similarly, flows from Country B to A is

$$FF_B^A = P_A S_j n_A n_B = \left(n_A + n_B\right)^{-\Delta} n_A n_B \qquad (11b)$$

Case 3: Uncertain Case and One-Sided Autarky

So far we allow Country A and B to have different sizes and different initial endowments. Other than that, these two countries were identical. In this section, I am analyzing a case in which there is a one sided information asymmetry problem. I assume that states are not verifiable in Country B. So, some of the borrowers from Country B can assert that the state they are insuring against did not realize even if it did. Moreover, the legal system can enforce only ω per cent of total contracts. Therefore, when an agent

[7] Moreover, comparison of equation (7) and (10) reveals that the integrated equilibrium is a better outcome than the autarky for both Country A and B.

from Country A buys an asset developed in country B, the probability of coming across a borrower who might break the law is $1-\omega$. This in turn means that the expected dividend of country B's projects to Country A residents is $\frac{d}{L}\omega$. On the other hand, agents from Country B can still monitor the states in Country B. Therefore domestic agents can not fool each other. This is a one-sided information problem. Because we assume that while agents from Country A can not monitor Country B, Country A is still transparent. The expected dividend of country B's projects to Country B residents is still equal to $\frac{d}{L}$.

Under these conditions agents from Country A will not buy any of the assets produced in Country B when $\omega = 0$, which is our Case 1 and the model is going to be identical to Case 2 when $\omega = 1$. The situations that we are going to analyze in the following section are the cases in which $0 < \omega < 1$.

Equilibrium in Country A

When I introduce the uncertainty in Country B, the utility function of an agent from Country A will be slightly different, while the budget constraint will be the same as (8b).

$$EU_A = c_{1A} + \frac{D}{1-\frac{1}{\sigma}}\left(\sum_{i=1}^{n_A-1}\left(s_i\right)^{1-\frac{1}{\sigma}} + \omega\sum_{j=1}^{n_B}\left(s_j\right)^{1-\frac{1}{\sigma}} + \left(1-\alpha_k\right)^{1-\frac{1}{\sigma}}\right) \qquad (12)$$

This time the demand for foreign asset depends on the level of risk

$$s_j = p_j^{-\sigma} D^{\sigma}\omega^{\sigma} \qquad (4d)$$

Since the risk that introduced has impact only Country B's reliability, nothing will change in A. Therefore the equilibrium condition and therefore equilibrium price level in Country A is still the same as (5b) and (9a). However, the introduction of this one-sided risk will have some welfare effects in A. On the one hand, consumers will be able to consume more in the first period. However, the decrease in the insurance coverage will decrease the welfare.

$$c_{1A} = y_{1A} + n_B D\left(n_A + n_A\right)^{-\Delta} - n_B D\omega^{\sigma}\left(n_A\omega^{\sigma} + n_A\right)^{-\Delta} \qquad (13)$$

$$W_A^{Int-Uncer} = y_{1A} + D\left(n_A + n_B\right)^{-\Delta}\left(\frac{n_A}{\Delta} + n_B\right) + n_B\omega^{\sigma} D\left(n_A\omega^{\sigma} + n_B\right)^{-\Delta}\left(\frac{1}{\Delta} - 1\right) \qquad (14)$$

Equilibrium in Country B

Since Country A's demand for B's assets depends on the risk involved, the equilibrium condition and therefore the market clearing price level in Country B is slightly different now

$$1 - p^{-\sigma} D^{\sigma} = \left(n_B - 1\right) p^{-\sigma} D^{\sigma} + n_A p^{-\sigma} D^{\sigma} \omega^{\sigma}$$

$$p_B = D\left(n_A \omega^{\sigma} + n_B\right)^{1/\sigma} \qquad (15)$$

Calculation of Risk Premium

Risk is completely covered in Case 2. On the other hand, in Case 3 we assume that Country A's assets are still certain, whereas Country B's assets have information asymmetry problem. Therefore, consumption of agents from Country A in the second period might be equal to zero in some states.

Due to the risk they contain, Country B is now offering higher return to Country A in the current case. This can be seen when we compare (15) to (11b). The risk premium is given by the following equation

$$RP_t = \frac{\left(n_A + n_B\right)^{1/\sigma}}{\left(n_A \omega^{\sigma} + n_B\right)^{1/\sigma}} - 1 \qquad (16)$$

$$\frac{\partial RP_t}{\partial \omega} = -\frac{n_A \omega^{\sigma-1} \left(n_A + n_B\right)^{1/\sigma}}{\left(n_A \omega^{\sigma} + n_B\right)^{1+1/\sigma}} < 0$$

Therefore, as the level of enforceability goes up, the risk premium goes down. On the other hand, the as enforceability goes down, risk premium goes up. As it can be seen from equation (17), it is also possible in some cases that risk premium may go to infinity. For instance, when the number of assets produced in country B is very small, n_B is very small, and when ω is close to zero, variable in equation (16) goes to infinity. In this situation, agents in Country A will not be willing to buy any of Country B's assets, while agents from Country B still buy A's assets. This is what we are going to call "one-sided autarky" in this article. In one-sided autarky case, Country B still enjoys the benefits of the financial integration, whereas due to the high risk contained in B's assets, Country A buys only domestic assets.

Quantity of Flows

Financial flows between A and B are different from Case 2 due to the risk involved in Case 3. Each agent from Country A's demand for Country B is equal to S_j and agent will buy n_B of them. Therefore, an *agents'* total spending on B's assets is equal to $n_B P_B S_j$. *Total flows* from Country A to B, FF_A^B, is given below

$$FF_A^B = P_A S_j n_A n_B = n_A n_B D\left(n_A \omega^\sigma + n_B\right)^{-\Delta} \omega^\sigma \qquad (17)$$

Note when $\omega = 1$, expressions in (11a) and (17) are identical. For any other values of ω, flows from A to B is going to be smaller as expected. On the other hand, since Country A is still riskless, flows from Country B to A is the same as before.

One-Sided Autarky

As it is indicated above, in the extreme case, flows from Country A to Country B might approach to zero due to the risk. Since flows from B to A are not interrupted, however from A to B disappear in this situation, this case is going to be called "one-sided autarky" in the remaining part. In this section, I am going to study welfare implications of the one-sided autarky. I am going to analyze weather this one-sided autarky is more desirable for Country B's agents than financial integration.

$$c_{1B} = y_{1B} - n_A D\left(n_A + n_A\right)^{-\Delta} \qquad (18)$$

Equation (18) now gives the level of first period consumption in Country B. Since in the first period, agents in B consumes less due to lack of income transferred from A to B in the first period, the first period consumption is lower in this scenario. On the other hand, due to the absence of Country A's residents in the domestic market domestic assets in Country B are cheaper in Country B.

$$W_B^{Int-Uncer} = y_{1B} + \frac{D}{\Delta}\left(n_B\right)^{1/\sigma} + n_A D\left(n_A + n_B\right)^{-\Delta}\left(\frac{1}{\Delta} - 1\right) \qquad (19)$$

When we compare (10b) to (19), we can se that the one-sided autarky is more desirable from the point of view of Country B if the following condition is satisfied.

$$\frac{D}{\Delta}\left(n_B\right)^{1/\sigma} - \frac{n_A}{\left(n_A + n_B\right)}\Delta > 0$$

Case 4: Contestable Integration (One-Sided Autarky under Collusion)

So far I have shown that traditional financial integration improves the welfare compared to the autarky case. I also showed that under some conditions one-sided autarky is even better than the financial traditional in the traditional sense. That is to say if agents has a right to choose between Case 2 and one-sided autarky version of Case 3, they would choose Case 3. For this reason, the natural question that would come to mind is "If under some conditions one-sided autarky gives us a better outcome than both autarky and integration cases, is there anything that agents from Country B can do to reach this better outcome?". In other words, "is it possible for those agents to deliberately push their economy into the one-sided autarky case?"

I am going to analyze this question in two steps. In the first step, I am going to show that in addition to the risk introduced above, high prices can prohibit Country A's purchase of assets from Country B. When Country B's assets are sufficiently expensive, additional units of those assets purchased would results in a decrease in agents' utility. Therefore, I will show you that when p_B is higher than a threshold price level, that would be discussed below, Country A's entry will be deterred. In the second step I am going to study what agents can do to make this situation happen.

Step1: Calculation of the Threshold Price Level:

Although in general integration gives higher welfare to Country A, now I am going to show that in some situations Country B's assets may not be very attractive to Country A's lenders. That is to say, at some levels of p_B, autarky might be preferable to integration.

To calculate a threshold price level which makes consumers from country A indifferent between buying Country B's assets or not buying, I will compare (7a) to (10a). But, first I am going to let the price level in Country B to be different from the equilibrium price level.

$$W_A^* = c_{1A} + \frac{D}{\Delta}\left(\frac{1}{n_A + n_B}\right)^{\Delta}\left(n_A - 1\right) + \frac{D}{\Delta}\left(\frac{1}{n_A + n_B}\right)^{\Delta} + n_B \frac{D}{\Delta}\left(p^{-\sigma} D^{\sigma}\right)^{\Delta}$$

where

$$c_{1A} = y_{1A} + D n_B \left(n_A + n_B\right)^{-1+1/\sigma} - n_B p^{1-\sigma} D^{\sigma}$$

$$W_A^* = y_{1A} + D\left(\frac{1}{n_A + n_B}\right)^{\Delta}\left(\frac{n_A}{\Delta} + n_B\right) - n_B p^{1-\sigma} D^{\sigma}\left(1 - \frac{1}{\Delta}\right) \qquad (21)$$

From (7a), we know that

$$W_A^{Aut} = y_{1A} + \frac{D}{\Delta} n_A^{1/\sigma} \qquad (7a)$$

The threshold price level is defined in such a way that it satisfies the following condition

$$W_A^*\left(p^*\right) - W_A^{Aut} = 0$$

$$p_B^* = D n_B^{-\frac{1}{1-\sigma}}\left[n_B\left(n_A + n_B\right)^{\frac{1}{\sigma}-1} + \sigma n_A^{\frac{1}{\sigma}} - \sigma\left(n_A + n_B\right)^{\frac{1}{\sigma}}\right] \qquad (22)$$

The price level in equation (22) makes Country A's agents indifferent between buying Country B's assets. When the price level in B is slightly higher than p_B^*, there will be no flows from Country A to B.

Step 2: Price Manipulation

Now that the price level that does not let residents of Country A in to B's market is known, when agent in B can do this, they will push the price to this level since it is more profitable to do so. In the following section I am going to assume that agents from Country B can take action together to change the equilibrium price level. In other words, I am assuming that there is a high concentration in Country B in this section.

In the decision making process, agents from Country B collect their initial endowments together and one person, like a central authority, decides how many financial assets to be produced and bought. In the second period, they share the resulting output equally. Therefore in equation (23) and (24) below, this agent will have demand and supply on behalf of the whole country.

$$EU_B^{Central} = c_{1B} + \frac{D}{1 - \frac{1}{\sigma}} n_B\left(\sum_{i=1}^{n_B}\left(s_i\right)^{1-\frac{1}{\sigma}} + \sum_{j=1}^{n_B}\left(s_J\right)^{1-\frac{1}{\sigma}}\right) \qquad (23)$$

$$c_{1B} = n_B y_{1B} + n_B\left(\sum_{k=1}^{n_B} p_k \alpha_k - \sum_{i=1}^{n_B} p_i s_i - \sum_{j=1}^{n_B} p_j s_j\right) \qquad (24)$$

Now, to deter the entry of the agents from Country A, this agent will want to push the price level higher than he would usually accept. That is to say, the price level in this scenario is pushed to entry deterring price to enjoy the benefits of one-sided autarky.

While the equilibrium price level of the assets bought from Country A is still determined by the market supply and demand, the price level in Country B is equal to $p_B = p_B^* + \varepsilon$, where ε is a small number.

From first order conditions, $s_i = p_i^{-\sigma} D^{\sigma}$ and therefore $p = s_i^{1/\sigma} D$ and

$s_i = \left(p_B^* + \varepsilon \right)^{-\sigma} D^{\sigma}$

The equilibrium price level in Country A is going to be same as in equation (11a) under this scenario.

The welfare that each agent will get under this scenario is given below

$$W_B^{S-Manip-Aut} = y_{1B} + \frac{D}{\Delta} n_B \left(\left(p^* + \varepsilon \right)^{-\sigma} D^{\sigma} \right)^{\Delta} + \frac{D}{\Delta} \left(n_A + n_B \right)^{\frac{1}{\sigma}} \left(\frac{n_A \sigma}{n_A + n_B} \right) \qquad (25)$$

where $c_{1B} = y_{1B} - D n_A \left(n_A + n_B \right)^{-\Delta}$

As it can be remembered from equation (5b), the welfare level in one-sided autarky case is equal to

$$W_B^{S-Aut} = y_{1B} + \frac{D}{\Delta} \left(n_B \right)^{1/\sigma} + \frac{D}{\Delta} \left(n_A + n_B \right)^{1/\sigma} \frac{n_A}{\left(n_A + n_B \right) \sigma}$$

So, the closer $n_B \left(\left(p^* + \varepsilon \right)^{-\sigma} D^{\sigma} \right)^{\Delta}$ term to $\left(n_B \right)^{1/\sigma}$, the closer the welfare outcome will be to Case 3.

In this fourth case, I discussed a situation in which the collusive market structure produced what we called “contestable integration”. As it is explained above, the flows from Country A to B are discouraged as a result of the collusive behavior of agents from Country B. However; the price level in Country B is not a monopolist price level. Limit price is the highest known price in this situation.

Estimations

So far, by using a basic regression equation, I show that quantity of financial flows and interest rate spreads are not moving together for a group of countries I

analyzed. The section that follows this introduced a theoretical model which describes a case in which financial market structure plays the central role in the determination of asset prices. In this section, I am going to test whether the level of concentration plays a role in the determination of asset prices for the panel date set analyzed in this article.

Econometric Methodology

In the theoretical model, I showed that asset prices are determined as a result of cooperative actions in markets that allow collusive behavior among domestic agents. I also showed that for markets in this nature asset prices move closer to the other country's level without experiencing financial flows. In other words, for the collusive markets arbitrage argument frequently used by models of traditional definition of financial integration does not work. On the other hand, for the markets that does not have collusive structure, traditional models' presumption holds and arbitrage argument works. That is to say, the theoretical model introduced suggests that there are two different regimes in the determination of asset prices. Depending on the degree of the collusiveness, either arbitrage or non-arbitrage regime holds.

To analyze this problem for my panel data, I estimate a threshold regression model. As in the structure of my model, threshold models specify that individual observations can be divided into classes based on the value of an observed variable.

$$y_{it} = \mu_i + \beta_1' x_{it} + e_{it}, \qquad q_{it} < \gamma$$

$$y_{it} = \mu_i + \beta_2' x_{it} + e_{it}, \qquad q_{it} > \gamma$$

The observations are divided into two regimes depending on whether q_{it} is smaller or larger than the value of the threshold γ. Each regime is defined by its regression slopes, β_1 and β_2 in this equation.

The methodology used in this section is introduced by Hansen (1999). It is developed for the estimation of non-dynamic panels with individual specific effects. Nice thing about this methodology is that the threshold variable is not taken as given, but estimated like model coefficients. In the first step, the threshold variable which minimizes the sum of the error squares is searched over all possible values. In the second step, for this chosen value of the threshold variable the least squares estimations of the slope coefficients are calculated.

Data and Estimation Results

In the first section, I showed fixed effect estimations of the spread equation. In this equation, while the variables explaining macro economic risk and political risk were significant, the variable representing the arbitrage argument was not found to be significant. In this section, I am going to repeat a similar exercise by using a threshold regression. Equation (26) given below is going to be estimated for the panel data I developed.

$$s_{it} = \mu_i + \beta_1 a_{it} I(c_{it} < \gamma) + \beta_1' a_{it} I(c_{it} > \gamma) + \beta_2 rp_{it} + e_{it}, \qquad (26)$$

where s_{it}, a_{it} and rp_{it} represent spreads, arbitrage variable, variables related to the degree of risk respectively. In this equation, the observations are divided into two classes based on the value of a collusion variable, c_{it}.

The degree of market concentration in the banking sector can be an ideal candidate for the collusion variable that will be used as a threshold variable. Since I only have this variable in annual frequency for 2000-2005 periods for the countries in my panel, I use another variable in this version which has been frequently used in the literature in order to measure market depth: The ratio of total claims of banking sector on private sector to GDP.

Table 2: Threshold Estimation of the Interest Rate Spreads

Spread	Coefficient	Std. Error
Cpi	0.80	0.03
Politics	1.51	0.99
Exc	-0.24	0.05
error (regime 1)	-1.79	0.60
error (regime 2)	-0.19	0.36

The regime 1 in Table 2 represents the period in which financial markets are not collusive, $c_{it} > \gamma$, in the regime 2 markets are collusive, $c_{it} < \gamma$. The coefficients and their standard errors in Table 2 show that the arbitrage varoiable has the expected sign in both of those regimes. On the other hand, this error term is found to be significant only in the first regime, when financial markets are deep, which represents the low collusion period. When financial markets are not deep, in other words when the degree of collusion

is high, the variable of interest is found to be insignificant. The other variables included into the regression have similar magnitudes and signs with variables in Table 1.

These results indicate that for a group of developing countries analyzed in this article, financial integration does not bring financial flows with. Therefore, in evaluating implications of financial integration, using low interest rate spreads as an indicator of integration can be deceptive. Because these countries are not actually gathering traditionally assumed benefit of financial integration.

Policy Implications and Conclusions

In this article, I introduced a new definition of financial integration which breaks the relationship between financial flows and arbitrage argument. I then test the validity of the arbitrage assumption of the traditional integration models. I found that this assumption holds only when the degree of collusion in the banking sector is low. On the other hand, when we observe a collusive market structure, arbitrage argument does not seem to work.

The validity of the arbitrage argument is especially important when we evaluate the advantages and the disadvantages of financial integration. The benefits and risks of financial integration in the traditional sense have been widely discussed in the literature. On the one hand, it is accepted that financial integration will increase worldwide efficiency by channeling funds from capital abundant countries to capital scarce countries. Consequently, it will accelerate growth in developing countries. Increased efficiency in domestic markets due to the introduction of new technologies and consumption smoothing opportunities that were not available before are all among the welfare improving effects of integration. On the other hand, liberalized financial markets are accepted to be open to new risks due to the increased vulnerabilities, like contagion impacts of financial crisis 1990s and 2000s on developing countries. Therefore, volatility in the liberalized countries will be higher than before.

When we define financial integration in the contestability sense, evaluation of the welfare effects will be doubtful. To begin with, in these markets consumers will benefit from low prices even in markets that you would expect to see monopoly prices. On the other hand, the relationship between financial flows and asset prices are not as straightforward as before in these markets. Disappearance of the spreads does not

necessarily mean that the developing country under consideration attracts capital. It might be just collusive structure of this market that leads to this result. If this is the case, it should not be a surprise not to observe the expected acceleration in the growth rate effect in collusive markets.

Similar argument applies to negative effects. In the contestable markets, the threat of foreign entry causes domestic lenders to behave in such a way that is not necessarily optimal from their own points of view. However, when there is a contagion effect in the financial markets, it will actually decrease the entry pressure and therefore domestic lenders will have an opportunity to go back to their monopolist behavior during those turmoil periods. As a result, it is fair to conclude that contestable markets will lose twice in the integration period. First, they will not be able to gather the full benefits of financial integration. Second, they will still be open to negative effects. This brings a widely discussed question into minds: "Is financial liberalization appropriate for all of the developing countries?". The answer to this question is not really. As my theoretical model and empirical estimation reveal, for developing countries to be able to get the most out of the integration process, they first need to promote a non-collusive market structure. Otherwise the benefits of integration is going to be only limited to the price equalization effect described above.

Therefore, financial liberalization should not be seen just as the removal of the financial barriers. For some countries, liberalization might require a transition process in which policmakers can prepare their economies to positive and negative effects of openness. Moreover, international organizations such as the IMF and the World Bank might play a role in this process. As it is discussed in Fischer (2004), while enhancing liberalization of the capital movements, these institutions can ensure "orderly" capital account liberalization. That is to say, they can encourage a sequential liberalization of financial accounts. So, countries may not be allowed to be fully integrated to the world financial markets until they satisfy a certain financial development level.

Appendix 1: Estimation of Gravity Equation

Flows of funds in the international banking sector from a group of developed country to developing countries are estimated by using a gravity equation. Banking Statistics used in this estimation is downloaded from BIS. Banking Statistics that I used were introduced as a semiannual reporting exercise in the late 1970s and early 1980s to provide information on the country risk exposures of major national banking groups to developing countries. They are started to be reported on a quarterly basis since 2000. To facilitate coherence among financial flows and other variables used in the estimation, we are going to use 2000-2006 period. The countries included in this estimation are restricted by the requirement of balanced panel estimation in the second step. The developed countries consist of Austria, Belgium, Netherlands, France, Germany, Japan, Switzerland and the USA. The developing countries in my sample are Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Turkey.

Explanatory variables used in this estimation are distance between financial centers, a colony dummy variable which takes the value of one if countries have a colonial history in the past, cpi inflation and political risk variable in the recipient country, GDP in the source and recipient country, the number of procedures to enforce a contract and GDP correlations between the recipient and the source country.

Table 3: Fixed Effect Estimation of Gravity Equation

Financial flows	Coefficient	Std. Error
Dist	-1.65	0.19
Colony	1.22	0.76
Cpi	-0.01	0.01
Politics	-0.20	0.11
gdp_d	1.16	0.07
gdp_s	1.22	0.11
proce_enf_	-0.65	0.40
gdpcorrel	0.43	0.48
_cons	-5.67	2.07

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