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Interest Rates in Open Economies

Real Interest Rate Parity, Exchange Rates, and Country Risk in Industrial and Developing Countries

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Policymakers must address the central questions: How much do world interest rates influence domestic rates? And what are the respective roles of monetary policy, real interest parity, expectations of change in the exchange rate, and "country risk?"

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Summary findings

Das Gupta and Das Gupta test whether the integration of the international capital market is more important than domestic factors in determining interest rates, in a broad sample of industrial and developing countries.

The recent turbulence in industrial financial markets has underscored concerns about what shapes interest rates. Some believe an independent national policy on interest rates to be possible. Others believe there is little room for managing interest rates in open economies — without destabilizing effects on exchange rates — given the massive volumes of capital market transactions that force interest-rate parity across countries.

Much less attention has been paid to the formation of interest rates in developing countries, although the issue is increasingly important as more and more countries undertake financial liberalization. Policymakers must address the central question: To what degree are domestic interest rates influenced by world interest rates?

A separate concern is domestic rates that are higher in some developing countries than world interest rates.

Das Gupta and Das Gupta propose a model of real interest rate parity as the main test for capital market integration — that is, that nominal interest rate differences across countries are explained largely by inflation differentials (rather than by covered or uncovered nominal interest parity).

The evidence suggests strongly that although economic monetary policies play a significant role, real interest parity is a dominant factor in both industrial and developing countries.

But expectations of changes in the exchange rate also significantly influence interest rates.

A third key factor is the apparent presence of significant "country risk," unexplained by macroeconomic balances, for some developing countries (for example, Chile, Indonesia, Mexico, and the Philippines). Such country risk pushes real domestic interest rates higher than would otherwise be predicted.

They discuss possible reasons for such country risk in Indonesia.

This paper — a product of the Country Operations Division, East Asia and Pacific Region, Country Department III — is part of a larger effort in the region to analyze the impact of international interest rates and capital flows on domestic interest rates and monetary policies in open capital account economies such as Indonesia. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Boonsri Kian, room D9-097, extension 82467 (22 pages). April 1994.

Interest Rates in Open Economies: Real Interest Rate Parity, Exchange Rates and Country Risk in Industrial and Developing Countries

by

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Abstract

The paper tests for the relative importance of international capital market integration (vis-a-vis domestic factors) in determining interest rates in a broad sample of both industrial and developing countries. Because interest rates are a key factor that affects economic activity, the issues surrounding interest rate determination in open economics has attracted considerable policy attention, both in industrial and developing countries. The recent turbulence in industrial country financial markets has underscored these concerns. One view holds that it is possible for countries to conduct an independent domestic interest rate policy. The other suggests that there is very little room for doing so in open economies---without destabilizing effects on exchange rates---given the massive volumes of capital market transactions that force interest rate parity across countries. Interest rate formation in developing countries has attracted much less attention. But it is an increasingly important issue as a growing number of them undertake financial liberalization. The central question for policy-makers is again the degree to which domestic interest rates are influenced by world interest rates. A separate concern is high domestic interest rates, relative to world interest rates, in some developing countries.

A model of real interest rate parity is proposed as the main test for capital market integration---i.e., that nominal interest rate differences across countries are largely explained by inflation differentials (rather than uncovered or covered nominal interest parity). The evidence suggests strongly that although domestic monetary policies play a significant role, real interest parity is a dominant factor, for both industrial and developing countries. However, expectations of exchange rate changes also significantly influence interest rates. A third key factor is the apparent presence of significant "country-risk", unexplained by macroeconomic imbalances, for some developing countries---e.g., Chile, Indonesia, Mexico and the Philippines---pushing domestic real domestic interest rates higher than what would be otherwise predicted. The concluding section discusses the possible reasons for such "country-risk" in the case of Indonesia.

A. Introduction

1. The world economy has become increasingly integrated in terms of trade, investment and financial flows between countries over the past three decades. The integration of the economies of industrial countries accelerated in the 1960s and 1970s and has continued to grow in the 1980s. A large number of developing countries too have become much more closely integrated with the world economy since the 1970s and especially since the mid-1980s. Trade barriers have been significantly reduced and outward-oriented growth policies pursued in an increasingly larger number of countries. Simultaneously, foreign investment barriers have been reduced, attracting sizeable inflows of foreign investment. A third key development has been the increasing deregulation of domestic financial sectors in many developing countries---with greater reliance on market-based interest rates, and a progressive dismantling of barriers to capital account transactions. These developments have been most evident in the East Asian NICs---Singapore, Hong Kong, Taiwan, and Korea; but also in an increasingly larger number of other developing countries, such as Chile, Colombia, Indonesia, Malaysia, Mexico, Thailand and other countries since the early to mid-1980s.

2. Coinciding with the above, there has been an enormous increase in the volume of financial flows across countries---both of short-term speculative capital flows, searching for the highest rates of short-term financial returns across currency and interest rates, and of longer-term investment. The size of short-term flows in global financial markets is now estimated at about $1 trillion, while that for longer-term capital is estimated at over $800 billion annually. While no firm estimates are available of short-term flows to and from developing countries, the developing countries accounted for about 10% of total world long-term capital flows in 1990 (up from about 7% in 1986). One indirect measure of short-term flows in developing countries is the enormous rise in cross-border interbank liabilities of borrowing banks in the developing countries---by about $150 billion annually between 1986-1991. While some part is attributable to long-term flows, most (nearly 80%) of it is short-term flows. Similarly, cross-border bank deposits (of nonbanks) in developing countries have nearly doubled between 1986-91. The emergence of major offshore banking centers in

the developing world---e.g., in Hong Kong and Singapore---is another indication of the growing crossborder financial markets in developing countries.

3. The most important implication of this rapid growth in international capital mobility is that, in theory, it forces a greater degree of interest rate parity across countries, and reduces the scope for independent domestic interest rate policy in individual countries. For example, significantly lower (or conversely, higher) interest rates than in world markets in any country would be expected to cause large outflows (or conversely, inflows) of international capital, eventually raising domestic interest rates. In a world of flexible exchange rates, however, the sustainability of such capital outflows would also be dependent on exchange rate expectations---if the balance of payments position were such as not to be able to sustain large capital outflows (or conversely, inflows), the exchange rate would have to adjust and much more quickly, again limiting the degree to which independent interest rate policies could be pursued without destabilizing exchange rates. The central policy dilemma that a high degree of capital market integration introduces is that although policy-makers would like to be able to pursue independent domestic interest rate policies, it becomes difficult to do so.

4. Although the recent turmoil in industrial financial markets has anectodatally shown this to be the case, the degree to which interest rate parity conditions apply remains an issue in industrial countries. In developing countries, much less is known about how significant a factor international capital mobility is in determining domestic interest rates and whether interest rate parity conditions apply. A complicating factor is that many developing countries have potentially greater risks for investors---raising the possibility of significant "country-risk" premiums. This paper therefore tests for the relative importance of international capital market integration vis-a-vis domestic factors in determining interest rates in a broad sample of industrial and developing countries.

5. The paper starts with a review of the theory and literature on interest rate determination in economies with relatively open financial and real sectors, under conditions of international capital mobility. It then develops a model for interest rate determination

under these circumstances, and tests the model---from a cross-country sample that includes the major industrial countries and relatively open economies in East Asia and elsewhere in the developing world. A different test is proposed---of real interest rate parity--rather than that of uncovered or covered interest rate parity found in the literature. The last part of the paper applies the framework to the specific case of Indonesia, for a closer examination of the factors that determine domestic interest rates there and the causes of an apparently significant "country-risk" premium---which is evidently unexplained by macroeconomic imbalances or exchange rate expectations.

B. Capital Mobility and Interest Rate Parity--A Review

6. The relaxation of capital controls, financial liberalization, and the very large volumes of international capital flows in industrial countries are recognized to hate brought about a close integration of financial markets in these economies in recent decades (IMF, 1991). One testable proposition for this is the Fisher hypothesis (Fisher 1930) on uncovered interest rate parity (UIP): it states that when two financial instruments are similar in all respects except the currency of denomination, asset market equilibrium requires that and-nominal rate of return differential between them be offset by an expected exchange rate change over the holding period. A second test is Keynes' (Keynes, 1923) covered interest rate parity (CIP): the difference in interest rates on similar instruments denominated in different currencies, adjusted for the cost of forward exchange cover, must have mean that is zero---because of arbitrage on profit opportunities.

Uncovered Interest Parity (UIP) Tests

7. In an economy open to the rest of the world, with no impediments to capital flows, and with no transaction costs and risk- neutral agents, the UIP relationship can be expressed as:

$$(i_t - i_t^*) = ep_t \text{ -- (1)}$$

where i is the domestic nominal interest rate at time t, i* is the world interest rate on a financial asset of the same characteristics (e.g., maturity, etc .), and ep is the expected rate of depreciation of the domestic currency.

8. The difficulty with the testing of the UIP relationship is that the expected rate of depreciation is not directly observable. One way to test it is through analysis of the time-series properties of the uncovered interest parity differential. If these time series are not serially correlated---that it is, if they are white noise---it is usually concluded that the domestic interest rate depends only on open economy factors. Cumby and Obstfeld (1981) adopted this approach and found that in five of six industrialized countries the series exhibited strong serial correlation, which they attributed to the existence of a foreign exchange premium. Cumby and Obstfeld (1984) again reviewed the evidence and rejected the hypothesis that nominal interest rate differentials are an unbiased estimator of exchange rate changes and interpreted the finding as a rejection of uncovered interest rate parity. Boughton (1988) surveys the work on empirical tests of the UIP hypothesis and concludes that departures from UIP could reflect: (a) a lack of financial integration; (b) errors in measuring the expected rate of depreciation; and (c) or the existence of a risk-premium. The evidence on the validity of the Fisher UIP hypothesis therefore remains mixed.

Covered Interest Parity (CIP) Tests

9. CIP tests have, however, performed much better, and provide the main evidence for integration of financial markets in industrial countries. In an open economy with no impediments to capital flows and no transaction costs and risk-averse agents, the CIP relationship can be expressed as:

$$(i_t - i_t^*) = fd_t \text{ ----(2)}$$

where fd reflects the forward exchange rate discount (or premium). Covered interest rate parity is achieved because of arbitrage activities that drive the difference between interest rate differential and the forward exchange discount (or premium) to zero. Frenkel and Levich (1975) showed that once transaction costs are permitted, empirical evidence is consistent with the CIP hypothesis. In more recent years, CIP and such arbitrage has been clearly evident for Eurocurrency deposits and for onshore and offshore interest rates (IMF, 1991), and recent empirical studies have concluded that the removal or weakening of exchange controls in industrial countries have helped establish CIP in many short- term markets (Frenkel, 1991). A problem of the CIP test is limited availability of forward exchange cover for medium and longer-term maturities, although the rapid growth of markets for interest rate and foreign exchange swaps has been filling the gap.

Interest Rate Determination in Developing Countries

10. The literature on the determinants of interest rates in open market economies have dealt primarily with industrial countries. The main reason is that historically capital flows have been tightly restricted, financial sectors heavily "repressed", and goods markets protected from international trade in most developing countries. It has therefore been assumed that, under such conditions, interest rates in developing countries have largely been determined by domestic factors and policies, with little, if any, relationship to world interest rates.

11. However, with the liberalization of the goods and assets markets and rapidly growing integration with world markets evident in many developing countries in the past decade or so, attention has recently turned to interest rate determination and tests of interest rate parity in these countries. A key issue, in particular, is how interest rates are determined once the domestic financial market has been liberalized (accompanying the liberalization of the goods markets).

12. Edwards (1985) develops a model of a "semi-open" economy in which interest rates depend on both domestic credit conditions as well as on covered foreign interest rates,

and found Colombia to be financially semi-open. Edwards and Khan (1985) extends the approach and develops a general model of interest rate determination---by combining elements of a completely financially open economy, and a completely financially closed economy. They test the applicability of the model for two countries, Colombia (1968-82) and Singapore (1976-83), because the countries are at different stages of relative financial openness---Singapore being a highly open economy, while Colombia has only a partially free domestic financial sector with restrictions on capital movements. Evidence is shown that, as expected, Singapore interest rates are entirely determined by world interest rates (covered interest parity term has a coefficient equal to about unity), while in Colombia's case, both domestic and foreign factors are important. Frankel and MacArthur (1988) test for the factors underlying real interest differentials across 24 countries, including seven "developing countries". The real interest differential is decomposed into a covered interest differential, and an exchange premium. Evidence is shown that in 3 relatively open developing countries (i.e. Hong Kong, Singapore and Malaysia), the covered interest differential is very low, and lower than even in the group of European industrial countries; but high in the other 4 developing countries (i.e. Bahrain, Greece, Mexico and South Africa). Blejer (1982) performed tests for uncovered interest rate parity in Argentina for the period 1977- 81 and could not disprove the hypothesis that UIP applied. Lizondo (1983) found evidence for large and persistent covered interest parity differentials for Mexico during 1979- 80. McNelis and Schmidt-Hebbel (1991) in a study of financial liberalization in Chile for the period 1975- 82 find that nominal interest rates became dominantly influenced by foreign interest rates (covered interest rate parity), as financial liberalization proceeded, and much less by domestic monetary conditions (as represented by time-varying coefficient of domestic credit). Ahmed and Kapur (1990) in a study of Indonesia that follows the framework of Edwards and Khan (1985), find that domestic interest rates between 1984-87 are largely explained by three main factors: (a) domestic monetary factors; (b) lagged world interest rates adjusted for the central bank forward exchange (i.e. the swap) rate---a test of covered interest parity; and (c) expected real exchange rate change as proxied by the price of oil exports[1].

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[1] The most significant coefficients for domestic interest rate determination are found to be: (a) the central bank discount rates and the dummy for domestic monetary policy shock; and (b) the lagged covered interest parity term.

13. The broad conclusion that emerges from the above is that interest rate parity theory is found to be increasingly applicable to developing countries as they undertake significant financial liberalization and opening up of their capital accounts. However, other factors continue to play a prominent role in the determination of domestic interest rates. Covered interest rate parity (CIP) is the primary test applied. Nevertheless, a full generalization is not possible, partly because the work done so far has concentrated on a limited sample of developing countries.

C. A Model and Test For Interest Rate Determination In Relatively Open Economies

14 As discussed earlier, the uncovered interest rate parity (UIP) test of capital market integration is imprecise, because of the difficulty in measuring expected exchange rate depreciation. Instead attention has focussed on the covered interest parity theory as the main test for capital market integration. The CIP test is precise. But it is also a narrower definition of capital market integration: it posits that international arbitrage is taking place to profit from virtually riskless profit opportunities (ignoring transaction costs). It is virtually riskless by definition: arbitrage on the differential between interest rates and the differential between the forward and spot rates. The failure of the CIP test would require stringent conditions not to hold: capital controls (i.e. severe restraints on private trading in foreign exchange), or high country risks (i.e. limited availability of foreign currency), or high transaction costs. There are additional problems with the CIP test in developing countries. The main difficulty is that most developing countries do not operate market- determined and floating spot exchange rate systems; instead exchange rates are mostly officially (although increasingly flexibly) managed. Consequently, forward exchange markets that have developed often have significant restrictions and regulations on access.[2] For example,

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[2] See IMF (1988) for a discussion of the issues and country survey of forward exchange markets and policies.

access to forward exchange markets may be limited to commercial transactions (e.g. as in Korea and Thailand) in an attempt to avoid speculative pressures. Second, official schemes are often present, where the forward rates are established by the central banks, typically on the basis of the CIP parity condition itself (e.g. as in Mexico, Philippines, and Indonesia). Third, official forward cover is also often present (e.g. in Indonesia, Korea, and Malaysia), reducing the scope for development of private forward exchange markets. Consequently, the CIP test poses some major difficulties.

15. A third approach is possible: that of real interest rate parity. The most important policy issue for capital market integration is whether real interest rates diverge in any country significantly from world real interest rates. Consequently, the test for capital market integration should be real interest parity. The real interest spread can be defined as follows:

$$r\text{-}r^* = (i - p) - (i^* - p^*) \text{ ---------- } (3)$$

or,

$$r\text{-}r^* = (i\text{-}i^*) - (p\text{-}p^*) \text{ -------- } (4)$$

where r and r* represents domestic and international real interest rates, and p and p* represents the domestic and international inflation rates.

By subtracting the term ep, or the expected rate of exchange rate depreciation, from both terms on the right-hand side of equation (4), the following result emerges:

$$r\text{-}r^* = (i - i^* - ep) - (p\text{-}p^*\text{-}ep) \text{ -------- } (5)$$

The first term on the right-hand side is the familiar UIP term, and the second term is the expected real exchange rate change (i.e. deviation from purchasing power parity, or PPP). Failure of real interest parity may, consequently, flow from the bonds market (i.e. the UIP term) or the goods market (i.e. the deviation from PPP).[3]

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[3] Following J. Frankel and A. MacArthur (1988), and W.H. Branson (1988).

16. What factors could cause a failure in the bonds market, or UIP term, assuming that exchange rate expectations were exactly observable? Country risk (CR) perceptions would be the principal factor. What factors could cause a deviation from PPP theory? In the short-run, this would be caused by expectations of real exchange rate change arising from non-monetary, real, disturbances affecting the equilibrium terms of trade.[4] The principal observable factor for such expectations would be the size and sign of the current account imbalance. Following Dornbusch and Fischer (1980), a current account surplus (or deficit) implies the accumulation or decumulation) of external assets; any increase in external assets raises real income, real money demand, and therefore, an increase in demand for domestic goods. To restore equilibrium in the goods market, the terms of trade must improve: consequently, a current account surplus (or deficit) must accompany an appreciating (or depreciating) exchange rate in the short-run, until a steady-state level of assets where the current account is in balance is achieved. How do exchange rate expectations affect the result? Under a rational expectations hypothesis, and perfect foresight, the anticipated rate of appreciation equals the actual rate---consequently, the actual current account balance remains a good indicator of the expected rate of exchange rate change. The only significant difference is that introducing expectations will speed the process of change (i.e. cause a larger change in real exchange rates and in the current account balance in the adjustment path than in the case where expectations are ignored). The size and sign of the current account balance thus provides a good indicator of expected real exchange rate change in a relatively open economy. Consequently, the following relationship emerges:

$$r-r^* = (i-i^*-ep) - (p-p^*-ep) = z.CAB+d.CR \text{ ------- } (6)$$

where z is a non-zero coefficient attached to the size of the current account balance (CAB), and d is a non-zero coefficient attached to a country-risk variable (CR).

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[4] R. Dornbusch and S. Fischer, Exchange Rates and The Current Account, American Economic Review, 1980.

17. Capital Market Integration Model. We now have the principal elements of our capital market integration model in place for the determination of domestic interest rates in relatively open economies: nominal interest rate differentials are explained by relative inflation differentials, plus an expected real exchange rate change which is proxied by the short-term current account balance (CAB), plus a country risk factor (CR):

$$(i-i^*-ep) = (p-p^*-ep) + z.CAB + d.CR \text{ ------- } (7)$$

or,

$$(i-i^*) = (p-p^*) + z.CAB + d.CR \text{ -------- } (8)$$

18. Adjustment For The Influence of Domestic Monetary Policies. If, on the other hand, capital market integration were weak, domestic monetary factors would be more important explanation for interest rate developments across countries. The most direct instrument of domestic monetary policy to influence domestic interest rates would be the setting of the central bank discount rate (CDR). Another instrument would be policies to indirectly influence domestic interest rates by targeting domestic credit growth (MPV). Consequently, the equation (8) is amended to include these two domestic monetary policy variables, the CDR and the MPV:

$$(i-i^*) = (p-p^*) + z.CAB + y.CDR + x.MPV + d.CR \text{ ----- } (9)$$

19. Real interest rate parity and capital market integration will hold strongly if inflation differentials entirely or largely explain observed nominal interest differentials. The coefficient of the term should be close to about 1 (ignoring transaction costs). The coefficient of the CAB term should be negative: i.e. a negative current account balance will lead to a positive interest differential, beyond that explained by inflation differentials, and the significance of the coefficient will capture the extent to which real exchange rate expectations influence real interest rates. The coefficient of the CDR term should be positive: the higher the domestic central bank discount rate, the higher domestic market interest rates (and vice-versa) and the significance and size of the coefficient will capture the extent to which domestic monetary policies directly influence real domestic interest rates. The sign of the

coefficient of MPV is normally expected to be negative: monetary policies that accommodate high rates of domestic credit growth should lead to lower domestic interest rates and vice-versa; however, if such accommodating monetary policies are perceived to eventually lead to higher future inflation or current account deficits (i.e. a lack of policy credibility that expansionary monetary policies are only temporary), the sign of the MPV term might be reversed. Finally, the existence of a country risk premium can be tested by the significance, if any, of the coefficient of a country-specific risk variable---in the model, this is approximated by a country-specific dummy variable with value 1 when present, and zero otherwise, in the absence of other indicators (see further analysis of country-risk in the concluding section discussing Indonesia).

The Data, and Results From a Cross-Country Test

20. The Data. Fifteen countries were chosen in the sample for the cross- country test, comprised of: (a) 6 industrial countries---the US, UK, Japan, Germany, France and Italy; and (b) 9 relatively open developing countries---Singapore, Thailand, Malaysia, Korea, Indonesia, and the Philippines in East Asia, and Chile, Mexico and Colombia in Latin America. The sample of countries is, thus, a broad one.

21. The domestic interest rate variable used, i, is the 3-month deposit rate, or a similar instrument with comparable maturity and risk and on which interest rates are flexibly determined. This is taken primarily from line 601 of the publication International Financial Statistics (IMF, 1992). The international interest rate variable used, i*, is the 3-month US Dollar LIBOR rate. The domestic inflation rate used, p, is the change in the CPI index, and the variable used for international inflation rate, p*, is the CPI change for the US (corresponding to the use of US Dollar LIBOR). The current account balance variable used, CAB, is from line 77 a.d from the IFS (IMF, 1992), expressed as a percentage of GDP. The central bank discount rate variable, CDR, is taken from line 60 in the IFS (or line 60b on money market rates, where the discount rate was unavailable in a few cases, expressed in real terms). The domestic credit variable, MPV, is taken from lines 32 (domestic credit) and 99b (nominal GDP) from the IFS, expressed as the difference between domestic credit

growth and nominal GDP growth. The country-specific risk variable used, CR, is a dummy variable as defined earlier, and discussed further below.

22. The Cross-Country Test and Results, Entire Sample. Equation (9) was estimated by ordinary least squares method for pooled cross-section and time data, for the 15 countries and the most recent six-year time period, 1985-90 for which complete data were available.[5] A positive country risk was assigned: (a) in the first instance to all developing countries in the sample (i.e. the dummy variable took the value of 1 for all developing countries, and zero for all industrial countries)---but this was not found significant in further testing, and the variable was dropped; and (b) to a smaller group of pre-selected countries---Chile, Indonesia, Mexico and the Philippines---where particular country circumstances suggested the possibility of differentiated country risks relative to other countries in the sample. The main results for the entire sample are reported in Table 1.

Table 1: Results of Interest Rate Parity Model for All Countries, When Pre-Selected Countries are Assigned Country Risk

Indep. Variable: Interest (i-i*)	CPI Diff. (p-p*)	Cur. A/c Balance (z)	C. Bank Dis. Rate (y)	Domestic Credit Policy (x)	Country Risk (d)	R2
	0.86	-0.21	0.13	0.067	3.13	0.90
	(17.90)***	(-2.02)**	(2.79)***	(2.13)**	(3.60)***	

Note: The values reported in parentheses are t-values; *** denotes significance at the 1% level or better; ** denotes significance at the 5% level or better; R2 is the coefficient of determination adjusted for degrees of freedom.

[5] The results shown subsequently in the paper exclude Mexico, because of very high rates of inflation and nominal interest rates, which may bias the results; however, including or excluding Mexico makes no significant difference to the findings.

23. The results of Table 1 are striking. First, the differences between domestic and world inflation rates appears to be highly significant in explaining cross-country differences between domestic interest rates and world interest rates. Further, the size of the coefficient is close to unity. Clearly, real interest parity and capital market integration held very strongly across the sample countries, and the real interest parity condition is the single-most important determinant of differences in interest rates across the sample countries. Second, the coefficient for the country risk variable, for Chile, Indonesia, Mexico and the Philippines, is also highly significant, and the second-most important influence. On average, real interest rates were pushed over 3 percentage points higher than in world markets because of the presence of such a country-risk factor. The results on the significance and expected signs of the other variables are largely as expected and are investigated further below.

24. Similarities and Differences: Industrial and Development Countries. Possible divergences in results for the group of industrial countries, versus that for the developing countries were investigated further, and the results are reported in Table 2.

Table 2: Results of Interest Rate Model, When Sample Countries Are Split Into Industrial and Developing Countries

Indep. Variable: Interest Differential (i-i*)	CPI Diff. (p-p*)	Cur. A/c Balance (z)	C. Bank Dis. Rate (y)	Domestic Credit Policy (x)	Country Risk (d)	R2
(a) Industrial Countries:						
	0.99	-0.44	0.03	-0.13	..	0.72
	(5.52)***	(-2.73)***	(0.34)	(-1.75)*		
(b) Developing Countries:						
	0.85	-0.10	.18	0.11	2.88	0.93
	(16.[illegible]***	[illegible].74)	(3.23)***	(2.95)***	(2.90)***	

Note: The values reported in parentheses are t-values; *** denotes significance at the 1% level or better; ** denotes significance at the 5% level or better; and * denotes significance at the 10% level or better; R2 is the coefficient of determination adjusted for degrees of freedom.

25. The re-estimated equation (9), with the sample countries divided between industrial and developing countries, indicate important similarities, as well as major differences. First, for both industrial and developing countries, the dominance of real interest parity theory is once again evident: the divergences in nominal interest rates from world interest rates are largely explained by differences in relative inflation rates, with the size of the coefficient close to unity in both cases. Second, the importance of country risk for the pre-selected group of developing countries is once again evident. However, there appear to be considerable differences between industrial and developing countries as regards the relative significance and role of the current account balance and domestic monetary policy variables in determining domestic interest rate differentials across the sample countries.

26. For the group of industrial countries, expectations of real exchange rate changes predicted from the size and sign of the current account balance is a very strong explanation of interest rate differentials: a 2 percentage points current account to GDP deficit is associated with a nearly 1 percentage point increase in domestic interest rates. The coefficient of the central bank discount rate is, in contrast, not significant. The primary influence of domestic monetary policies appears to be through their (weak) effects on domestic credit growth---lowering domestic interest rates when high rates of domestic credit expansion are accommodated, and vice-versa, as traditionally expected. For the group of developing countries, while the current account balance coefficient carries the right expected sign, it is not statistically significant. A more powerful explanation is domestic monetary policies: (a) the central bank discount rate now excercizes a significant (although quantitatively small) effect on domestic interest rates; and (b) domestic credit policies are also significant, but work in an opposite way to that traditionally expected: expansionary credit policies appear to raise domestic interest rates, rather than to lower them, suggesting policy uncertainty (and lack of credibility) with short-term monetary policies.

D. Interest Rates and Country-Risk: The Case of Indonesia

27. The findings so far in this paper support the hypothesis that nominal interest rate differentials across countries are largely explained by divergences in relative inflation rates, and

consequently, that real interest rate parity theory holds strongly in our diverse sample of relatively open industrial and developing countries---a validation of the underlying test for capital market integration. However, there are three important departures from interest rate parity. First, countries that run large current account imbalances evidently face higher real domestic interest rates. Second, domestic monetary policies do appear to have an impact on domestic interest rates---a traditional effect of lowering market interest rates in industrial countries, and an apparently opposite effect in the case of developing countries. Third, some relatively open developing countries evidently face large country-specific risk perceptions that may raise domestic interest rates well above that in world markets. Indonesia appears to be one of these countries.

28. What factors explain the apparently high "country-risks" for Indonesia? Despite generally sound macroeconomic policies---marked by a lowering of external and internal imbalances between 1983-90, and increasing integration of goods and assets markets (as measured by transactions volume) with the world economy---interest rates in Indonesia have remained persistently high. Real domestic interest rates (e.g. on 3 month deposits) have averaged about 10 percent annually between 1985-1990, and real lending rates several percentage points higher; during the same period, real interest, rates in world markets (e.g. 3-month LIBOR) have fallen from about 5 percent in 1985 to about 3 percent in 1990. The result has been a persistently large and widening interest rate differential between Indonesia and the rest of the world. The effect of the presence of the country-risk factor is estimated to have raised the level of real interest rates in Indonesia by about 5-6 percent points above the rates that should have prevailed otherwise.[6] In 1990, such a differential effectively raised the cost of borrowed capital to over double the average rate for all other developing countries in our sample---indicative of the large potential disadvantage in competitiveness of Indonesian firms that rely on borrowed capital, relative to competitors in other developing countries.

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[6] A more direct evidence of such risk would be if foreign currency deposits in local institutions carried much higher interest rates than in international financial markets for the same currency. In Indonesia, the interest rates on US Dollar deposits of comparable maturity are significantly greater than those for the same currency in Singapore, with a premium of about 4-5%.

29. Possible Sources of Country-Risk. There are several possible sources of a significant country-risk factor in developing countries such as Indonesia. A first factor would be large macroeconomic imbalances, but as shown earlier, these factors (e.g. domestic inflation or current account deficits), relative to the situation in other countries, evidently do not adequately explain Indonesia's high interest rates. A second factor would be the presence of or anticipated future capital controls. But they do not appear to be an important factor, since Indonesia has maintained an open capital account policy (that is considerably less restrictive than most other developing countries) for a very long period---since the early 1970s. We are left with two possible explanations: a relatively high exposure to external debt and payments risks; and (b) relatively higher financial sector risks than in other countries.

30. External Debt and Payment Risks. Indonesia obtained about 80% of its total export earnings from oil in the early 1980s. Since then, the country's dependence on oil exports has been reduced sharply---to about 45% of total exports---as a result of success in diversifying into non-oil exports. In addition to the oil factor, Indonesia is also exposed to significant currency risks, because a large part of its external debt is denominated in Japanese yen, whereas most of its export earnings and debt repayment capacity is in US Dollars. Underlying this, Indonesia's external debt burden, as measured by its debt-GDP ratio, has risen from about 28% in 1980, to over 70% in 1990. The cumulative effect of these factors could be expected to lead to a significant country "risk-premium", related to the size of its external debt, EDR, expressed as a share of GDP:

31. Domestic Financial Sector and Other Risks. Countries may also have relatively high risks present in the domestic financial (and in the real) sector. Since savers and investors rarely deal with each other directly, especially in cross-border transactions, financial market integration can be assumed to work well only when the institutional and supervisory framework assures savers that financial intermediaries (the savers' agents) act in the interest of the savers (the principals). In parallel, the financial sector can be expected to operate soundly, provided the real sectors of the economy present no unusual risks. Two institutional requirements are: (a) the presence of well functioning commercial law, accounting, and financial disclosure systems; and (b) a prudent level of leveraging by borrowers, i.e. prudent debt-to-equity profiles of investment. If commercial laws and accounting and financial disclosure systems are relatively weak, or if

investors typically practice high gearing in their investment activities, the risks in the real sectors, and hence to the financial sector, may be relatively large. During the 1980s, these sources of risk appear to have increased in the Indonesian economy, on account of rapid deregulation and growth in both the financial and real sectors, whereas changes in the framework of prudential regulations have been relatively slow to take place. In the presence of such risks, real domestic interest rates could be expected to be higher than otherwise. One test of this would be the sensitivity of domestic interest rates to the share of private banks' assets in total banking assets in the country, PBA---since arguably, private banks (and their depositors) are exposed to greater risks than in the case of the state-owned banks (because of implicit risk-bearing guarantee, and capacity to do so by the owners, the Government).

32. Testing for the Causes of High Interest Rates in Indonesia. We test for the above hypotheses, using annual data for the time-period 1983-92 (incorporating estimates for 1992), and within the same basic model presented earlier, but now including the new variables, EDR and PBA. We deviate slightly from the earlier testing framework: (a) instead of testing for the explanations of nominal interest differentials, we directly test for the determinants of real domestic interest rates; and (b) we also include a test for nominal interest rate determination, since it is the variable on which policy-makers make decisions. The following relationships were estimated by ordinary least squares, with variables as defined earlier:

$$r_{Ind.} = a.i^{*world} + z.CAB + y.CDR + x.MPV + n.EDR + m.PBA \text{ ----- } (10)$$

and,

$$i_{Ind.} = b.i^{*world} + z.CAB + y.CDR + x.MPV + n.EDR + m.PBA \text{ -----} (11)$$

33. The Result. The coefficients of neither the current account balance term, nor the external debt ratio were found to be significant, suggesting that exchange rate or debt repayment risks were evidently not the principal sources of high "country-risk" in Indonesia. All other variable turned out to be significant, as reported below in Table 3. (Table 3 reports results with the PBA term, but omits the EDR term, which was not significant). The results show that while the central bank discount rate and international interest rates are the more significant factors affecting domestic nominal and real interest rates; risks connected to domestic financial and real sectors (as proxied by the share of private banks in total assets of the banking system) also played

a major role. The quantitative effect of this factor, between 1983-91, was evidently to raise domestic interest rates by about 6 percentage points above what would have been predicted otherwise.

34. Policy Conclusions. Some countries, such as Indonesia, evidently face high "country-risk" perceptions in international financial markets, raising their domestic interest rates well above world market rates. It is evident that a reduction in domestic interest rates in Indonesia would benefit from efforts to strengthen the prudential regulatory framework, both in the financial and the real sectors of the economy. Their relative absence, or more accurately, perceptions of their relative absence, carries high costs. In the broader context of this paper, it is also evident that real interest parity holds strongly in a diverse sample of both industrial and developing countries. Consequently, the pursuit of independent domestic interest rate policies are increasingly limited. In industrial countries, this appears to be particularly the case. Policies that seek to ease domestic credit policies or to reduce domestic interest rates directly (through central

Table 3: Determinants of Interest Rates in Indonesia, 1983-92

Indep. Variable: Interest Rates)	World Int. Rate (a; b)	Cur. A/c Balance (z)	C. Bank Dis. Rate (y)	Domestic Credit Policy (x)	Share of Private Bank in Assets (m)	R2
(a) Real Domestic Interest Rates:						
	0.37	0.24	0.87	-0.04	0.24	0.99
	(1.82)*	(0.87)	(5.17)***	(-1.84)	(4.37)***	
(b) Nominal Domestic Interest Rates:						
	0.42	-0.01	0.78	-0.04	0.22	0.99
	(2.52)*	(-0.03)	(5.64)***	(-2.06)*	(6.47)***	

Note: The values reported in parentheses are t-values; *** denotes significance at the 1% level or better; * denotes significance at the 15% level or better; R2 is the coefficient of determination adjusted for degree of freedom.

bank discount rate instruments) appear to have very limited impact on domestic market rates, and instead may trigger exchange rate devaluation expectations through their impact on the current (and capital) accounts of the balance of payments. In the case of developing countries, there appears to be somewhat more room for independence in domestic interest rate policies. However, expansionary domestic credit policies also carries significant risks that they may raise, rather than lower domestic interest rates if the credibility attached to short-term monetary policies is low.

REFERENCES

S. Ahmed and B. Kapur, "How Indonesia's Monetary Policy Affects Key Variables," PRE Working Paper, World Bank, February 1990.

M. Blejer, " Interest Rate Differentials and Exchange Risk," IMF Staff Papers, June 1982.

W. H. Branson, " Comments," European Economic Review, 32, 1988.

R. Cumby and M. Obstfeld, "A Note on Exchange Rate Expectations and Nominal Interest Rate Differentials: A test of The Fisher Hypothesis," Journal of Finance, June 1981.

R. Cumby and M. Obstfeld, "International Interest Rates and Price Level Linkages under Flexible Exchange Rates," in J. Bilsen and R. Marston, eds., "Exchange Rate Theory and Practice," University of Chicago Press, 1984.

B. Das Gupta, "Determinants of Exports From Developing Countries: Exchange Rate Policy and Exports in The 199Os," in R. O'Brien and T. Datta eds., "International Economics and Financial Markets," Oxford University Press, 1989.

R. Dornbusch and S. Fischer, "Exchange Rates and The Current Account," American Economic Review, December 1980.

S. Edwards, "Money, The Rate of Devaluation, and Interest Rates in a Semi-Open Economy," Journal of Money, Credit and Banking, February 1985.

S. Edwards and M. Khan, "Interest Rate Determination in Developing Countries, IMF Staff Papers, December 1986.

I. Fisher, "The Theory of Interest Rates," New York, MacMillan, 1930.

J. Frankel and A. MacArthur, "Political us. Currency Premia in International Real Interest Differentials," European Economic Review, 32, 1988.

J.A. Frenkel and R.A. Levich, "Covered Interest Arbitrage: Unexploited Profits?," Journal of Political Economy, 83, 1975.

_____ , "Quantifying International Capital Mobility in The 1980s," in D. Bernheim and J. Shoven eds., "National Saving and Economic Performance," Chicago University Press, 1991.

J. Harris, F. Schianterelli, and M. Siregar, "Financial and Investment Behavior of The Indonesian Manufacturing Sector and The Effect of liberalization: Evidence From Panel Data, 1981- 88," Conference Paper on " The Impact of Financial Reform," World Bank, March 1992.

International Monetary Fund, "Determinants and Systemic Consequences of International Capital Flows," Occasional Paper 77, March 1991.

_____, International Financial Statistics, February 1992.

_____ , "Policies For Developing Forward Foreign Exchange Markets," Occasional Paper 60, June 1988.

J. M. Keynes, "A Tract on Monetary Reforms," London, MacMillan, 1923.

J. S. Lizondo, "Interest Differential and Covered Arbitrage"' in P. Armella, R. Dornbusch, and M. Obstfeld, eds., "Financial Policies and The World Capital Market," Chicago University Press, 1983.

P.D. McNelis and K. Schmidt-Hebbel, "Volatility Reversal From Interest Rates To The Real Exchange Rate--Financial Liberalization in Chile, 1975- 82," PRE Working Paper, World Bank 1991.

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