ECONOMIC RESEARCH FORUM
منتدى البحوث الاقتصادية
2008

working paper series

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Working Paper No. 381

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January 2008

The author is very grateful to Ryan Walker and Beth Colvin for their able research assistance. I also wish to thank Ghazi Boulila, Ibrahim Saif, and ERF Conference participants (December 2006, Kuwait) for their helpful comments.

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Abstract

This paper examines feedback causality between capital inflow components and currency black market premiums (BMP) in a panel of eight Middle Eastern and North African countries (MENA) over the period 1984-2004. MFR and average Wald statistics approaches were employed to test for causality. Both approaches gave similar results. Causality results and policy implications are different for middle income, low income, and oil and non-oil countries. Interactions of capital inflow components and BMP with openness and human capital may act as mitigating factors, offsetting some capital outflows associated with currency crises.

ملخص

تبحث هذه الورقة العلاقة السببية للتغذية العكسية بين عناصر التدفقات الرأسمالية وعائدات فروق الأسعار في السوق السوداء للعملة في مجموعة مكونة من تسع دول من منطقة الشرق الأوسط وشمال أفريقيا خلال الفترة 1984-2004. وقد استخدم في اختبار هذه العلاقة كل من متوسط إحصائيات والد والنموذج العشوائي الثابت المختلط. وقد تمخض كلا الأسلوبين عن نتائج متشابهة. كما اختلفت نتائج تلك العلاقة السببية ودلائل السياسة بالنسبة للدول متوسطة ومنخفضة الدخل والدول النفطية وغير النفطية. أما تفاعلات عناصر التدفقات الرأسمالية و عائدات فروق الأسعار في السوق السوداء مع الانفتاح ورأس المال البشري فتكون بمثابة عوامل مسكنة وتعوض خروج بعض رؤوس الأموال المرتبطة بأزمات العملة.

I. Introduction

The advent of globalization has ubiquitously enhanced global financial markets' integration through a surge in private capital inflows. Net private capital inflows increased from about fifty billion U.S. dollars each year during the 1987-89 period to over one hundred and fifty billion dollars a year in the 1995-97 period. The World Bank (1999) reports a change in the composition of capital inflows with foreign direct investment (FDI), constituting thirty-four percent of capital inflows and portfolio investment (equity and bonds), and accounting for twenty percent in the 1990's. Bank loans reached forty-eight percent of capital inflows in the 1970s and thirty percent in the 1980's.

The relationship between capital flow composition and the currency crisis has been recently reinforced by Latin American, East Asian, and Russian crises. In particular three composition scenarios have been associated with currency crises in the literature: (1) a low share of FDI in total capital inflows, (2) a high share of foreign currency dominated bank loans in a country's total borrowing, or (3) a low relative share of portfolio flows versus FDI. One possible explanation (Radelet and Sachs 1998; Wei and Wu 2001) of why a low FDI share in total capital flow is associated with a higher probability of crisis is that bank lending and other portfolio investment may be more sentiment driven than direct investment. As such, a small negative change in the recipient countries' fundamentals may cause a large outflow of portfolio capital. This can strain the recipient country's currency or financial system sufficiently to exacerbate or cause its collapse.

This paper distinguishes itself by studying the causal relationship between the three dimensions of capital composition and currency crisis. Changes in the currency black market premiums (BMP) are used as indicators of currency (financial) crisis. Given that the relationship between capital inflows and the black market premium may be heterogeneous across countries, this paper is skeptical about the potential for serious errors in the analysis of these causal relationships if unrealistic homogeneity assumptions are imposed in the economic modeling.

The paper examines the causal relationship between the three components of capital inflows and currency black market premiums (BMP) in a panel of eight MENA countries over the period 1984-2004, and finds that heterogeneity is a serious issue.[1] Thus, following Nair-Reichert and Weinhold (2001), henceforth NW, the paper adopts a mixed, fixed, and random (MFR) coefficient approach as an alternative estimation method that allows for heterogeneity in the causal relationship between capital inflow and currency black markets. For robustness, the study will also utilize the Hurlin (2004) causality method to generate average Wald statistics based on fixed effects heterogeneous panel data.

The remainder of the paper is organized as follows. Section II reviews relevant literature on the relationship between capital inflows and currency black markets. Section III presents the data and methodology for causality testing. Section IV discusses the MFR and Wald statistics causality results. Section V offers some concluding remarks and policy implications.

II. Relevant Literature

The deterioration of bank lending in the 1980s resulting from an abysmal third world debt crisis, spurred the proclivity of many MENA countries toward more capital inflows (especially FDI) and openness. These policies have also been driven by the failure of import-

1 Initially, twenty-three MENA countries were included. Because of significant missing data, some countries were omitted.

competing policies in MENA countries, and the success of export-promoting in the Asian Newly Industrialized Countries. Several MENA countries, such as Algeria, Egypt, Morocco, Turkey, and Tunisia, have therefore introduced in the 1980s and 1990s, legislation that advocates for more capital inflow. According to the UNCTAD report (2003), the average FDI flow in Egypt during the period 1990-2002 was 821 million U.S. dollars, while the average for Morocco was 755 million U.S. dollars. Among the MENA countries, Israel and Turkey attracted the highest levels of FDI, averaging 2287 and 1123 million U.S. dollars respectively, between 1990-2002.

Prasad and Wei (2005), Kregel (2004), and Krugman (2001), among others, have demonstrated that FDI amplifies business cycles through its high mobility and contributes to financial crises by exacerbating balance of payments (BOPs) imbalances. Even though FDI may quickly return after a crisis to replenish the foreign exchanges, it is obtained at prohibitively high costs. Transnational investors demand high compensations in the forms of profits and dividends, royalties and license fees, management fees and employees' salaries, and interest paid on net loans from parent companies to subsidiaries. Moreover, empirical evidence shows that high import propensity of FDI-related trade generates additional foreign exchange obligation for the host economies. Thus, FDI has not been borne out by the evidence as a low-cost, risk-free and risk-reducing financing source.

The emerging markets' financial crises of the 1990s, gave way to the debate among emerging market economies, not on whether capital movement needs to be controlled, but on the desirable composition of foreign capital (Prasad and Wei 2005). Foreign direct investors are engaged in long-term productions. They are attracted to the developing host economies for the cheap inputs (the so-called efficiency FDI) or the actual and potential markets (the market-seeking FDI). As a result, FDI is concerned with the market fundamentals. Moreover, FDI transforms itself into real production which, once constructed, cannot easily escape the country. Therefore, FDI is likely to be stable and permanent. However, two critical questions remain to be answered, first, whether all FDI is long-term production oriented and second, whether FDI loses mobility once it goes into investment projects. To answer the first question, one should note that the borderline between FDI and portfolio investment is rather arbitrary. FDI investment garners investors a commensurate stake in management. In quantitative terms, this means foreign investors have to acquire more than ten percent of equity, which is considered as representing lasting interest and control. However, this classification does not guarantee that FDI has to build production facilities or augment production capacity. Nor does it rule that FDI must gain steady income streams from real productions. For instance, foreign investors can acquire domestic assets through merger acquisition (M&A) without establishing new production facilities. In fact, the rise of FDI in the 1990s has been largely driven by privatization and corporate restructuring in the emerging market economies.

Importantly, FDI obtained after M&A adjustment, and in particular efficiency-seeking FDI, is likely to be long-term production oriented and behaves counter-cyclically, because an economic downtown means more attractive production opportunities. By contrast, market-seeking FDI, and especially M&A FDI with the goal of realizing quick capital gains, tend to be pro-cyclical and volatile. A dominant share of such FDI in an emerging market economy is highly destabilizing. This is because affiliates of the transnational corporations (TNCs) are relatively large in their size. Moreover, FDI has much more mobility than domestic capital and domestic policies are less effective in steering the foreign-invested businesses. As discussed in the Trade and Development Report (UNCTAD 1995), not only did financial de-regulation in the Southeast Asian countries engender harmful boom-bust cycles, but the crowding of FDI into certain sectors worsened the intensity of the cycle.

The view that FDI goes into production and capital formation fundamentally confuses the type of assets FDI invests and the ways by which FDI finances its investment. The reinvested portion of the retained earnings constitutes the major component of FDI in many countries. But retained earnings are extremely mobile under the control of foreign investors (Singh 2001). A country with a large stock of FDI and a high rate of return on investment may face BOP difficulty if foreign investors decide to repatriate profits when anticipating a drying up of liquidity.

Foreign investors can not only move retained earnings freely in and out of the country but also use the earnings for non-direct investment projects. As Kregel (1996) notes, although reinvested profits are recorded as FDI, they may in fact take the form of short-term portfolio investments in both fact and intention. Existing statistical measures may not disentangle the use of retained earnings to acquire financial assets, such as government bonds, from re-investment in capital assets. The former investment can be reversed. In addition, the foreign subsidiary can borrow against its collateral domestically and lend the money abroad to the parent company. As Claessens et al. (1993) point out, a direct investor can borrow in order to export capital, and thereby generate rapid capital outflows. Likewise, intra-company loans are also a major source of FDI, as parent companies can recall this debt on short notice (Razin, 2002). This illustrates that even though FDI's tangible assets are erected in immobile production, its financing might be in the form of temporary mobile intangible assets.

As Kregel (1996) succinctly explains, even if investors commit to financing long-term investment, recent innovations in financial markets have gone a long way towards eliminating the concept of a permanent investment in plant and equipment in much the same way that they have eliminated the concept of the maturity of a financial investment. Futures and options contracts allow investors to hold long maturity assets without being trapped into permanency. Classens et al (1993) and Kregel (1996) point out that with all the financial innovations, the edge between FDI and portfolio flows is increasingly blurred. Hence long-term flows are often as volatile as short-term flows, and the time it takes for an unexpected shock to a flow to die out is similar across flows. However, Singh (2001) suggests that this flexibility for TNC's imposes potential hazards on host economies and that FDI may have both short and longer-term structural influence on the composition of a country's external payment flows in the sense that unfettered FDI may create a time profile of foreign exchange outflows in the form of dividend payments or profits repatriation and new inflows which may be time inconsistent. Experience shows that such incompatibility, even in the short run, may easily produce a liquidity crisis which could degenerate into a solvency crisis with serious adverse consequences for economic development.

Clasessens et al. (1995) show that the characterization of FDI as "cold" capital flows and foreign portfolio investment as "hot" is not consistent with empirical data. The Asian financial crisis illustrates that the stability of FDI depends on the entry mode and the nature of FDI. As shown by UNCTAD's (1998) surveys, efficiency-seeking, export-oriented FDI is not deterred by the crisis; rather, the parent corporations maintain and even expand their investment in the affiliates to take advantage of the low-cost capital acquisition and production. For market-seeking FDI, a less rosy economy due to the BOP problem and the financial disorder would discourage foreign investors (unless productions can be rapidly re-oriented to exporting).Critics of FDI financing argue that Malaysia and Thailand, once touted as FDI-led miracles in East Asia, were not saved by FDI during the Asian crisis. In fact, Woodward (2001) contends that Malaysia may also have experienced the first FDI-led financial crisis, and that Thailand had the second crisis in which FDI significantly contributed.

It can be problematic to sever FDI from other types of capital because capital inflows are typically interrelated. First, if FDI-driven capital outflows exceed the FDI inflows there will be a need to secure financing from other sources, such as, bank loans or foreign portfolio investment. Other forms of foreign capital flows will rise to finance the current account deficit generated by FDI. Second, direct investment by foreign investors would certainly give rise to related financial activities and transactions. Kregel (1996) has argued that FDI is exposed to currency risks and will almost always require the financial intermediary to cover the risks. To the extent that risks are covered, they will produce cross-border flows that put pressure on the foreign exchange market or the domestic money market, which may reinforce the destabilizing elements. The World Bank (1996) has also acknowledged that, during a crisis, direct investors may contribute to capital withdrawals by accelerating profit remittances or reducing the liabilities of affiliates toward their mother companies. While these are non-FDI flows, they result from decisions by foreign investors. It is difficult to determine the extent to which foreigners involved in direct investment took out capital through non-FDI flows during the financial crisis because the data are available only with considerable delay. The same World Bank report reveals that the return of FDI after the Asian financial crisis entails an increase in portfolio investment, for example, currency hedging, in order to ward off exchange rate fluctuations and other risks. The inflow of FDI may lead to a higher level of inflow and outflow of other capital. This explains why the U.S. and other developed economies attempt to include portfolio investment in the formation of the Multilateral Agreement on Investment (MAI) because, as shown in WTO's-United States Report (2002), an agreement limited to FDI denies the benefit of a portfolio operation within a direct investment and thus will act to discourage FDI. Hu (2001) suggests that the surge in FDI flows in China will tremendously increase the attendant cross-border financial transactions such as equity and debt financing, interest and currency swaps, which allows TNC's to hedge risks and repatriate earnings, dividends, interest income, capital gains, and principles. Krugman (2001) enunciates that what induces FDI inflows are the falling asset prices and the opportunities of participating in corporate restructuring through M&A's. Aguiar and Gopinath (2004) find that the surge in M&A's in the crisis-wrecked Asian countries can be explained by the decline in the median value of offer price relative to book value in 1998 as a result of domestic cash-strapped firms selling their assets at a steep discount. Foreign investors were able to acquire these undervalued capital assets and sell them later when the economy picked up from the trough. Woodward (2001) argues that short-term foreign exchange benefits of the returned FDI are unlikely to be substantial, because the main price paid by foreign investors for taking over bankrupt business is taking over their debts. Therefore, the initial capital injected is limited. Also for domestic firms, selling off these productive assets at a steeply discounted rate leads to capital losses and degeneration of production capacity. On the other hand, when the capital markets recover and asset prices climb, foreign investors have a much larger claim on the host economy than what they paid for.

III. Data and Methodology

In this paper a panel of eight Middle Eastern and North African countries (MENA) over the period 1984-2004 is used to analyze the dynamic relationship between capital inflows and currency black market premiums (BMP). Capital inflow components are FDI, bank loans, and portfolio investment (equity and bonds). Bivariate Granger causality relationships between the four variables are consecutively investigated. The model controls for gross domestic investment, economic growth, real exchange rate, interest rate differential, taxes, aid, political instability, openness to trade (proxied by the ratio of exports and imports to GDP), and human capital (proxied by the adult literacy rate). Political instability is included

to control for the negative influence of institutional factors on currency crisis and capital inflows. Openness also acts as a proxy for tariffs. Changes in the real exchange rate and interest rate differentials are also emblematic of changes in the BOP. The list of countries and definitions of the data and their sources are included in Table 1.

In many developing countries, because of excess demand for foreign currency, governments impose controls on trade and capital flows to suppress demand. When controls are imposed, central banks also set the exchange rate at an officially fixed level and require that all market participants trade at those fixed rates. In addition, they introduce guidelines for allocating their limited amount of foreign exchange. Thus, those in need of foreign exchange whose demands are not met have no choice but to engage in the black market (illegal) or parallel market activity (legal), though at a rate much higher than the official exchange rate set by the government. The percentage difference between the black market and the official rate constitutes the black market premium (BMP). What macro factors determine the premium? On the supply side, a few studies such as Sheikh (1976), Martin and Panagaria (1984), and McDormott (1989), have emphasized the role of smuggling, under-invoicing of exports, and resale of officially allocated foreign exchange as the main sources of supply. On the demand side, de Macedo (1987) argues that in some countries the tariff rate on importation of some commodities is so high that it pays to smuggle the goods and finance them through the black market. Thus, a high tariff rate is identified as a major factor for increased demand for foreign exchange in the black market. Others (Dornbusch et al. 1983, Agenor 1992, and Bahmani-Oskooee 2005) have identified portfolio diversification as a major component of the demand for foreign exchange in the black market. Such models argue that the loss of confidence in domestic currency, fear of inflation, increasing taxation, and low real domestic interest rates contribute to an increased demand for foreign exchange.

All variables (defined in Table 1) are expressed in natural logarithmic forms except inflation (which is already in a percentage form) and negative variables. As our interest lies more in the causal relationship between the variables over time in a particular country, this allows us to explore whether currency crises are causally associated with a low share of FDI in total capital inflows, a high share of foreign bank loans in total borrowing, and high share of portfolio versus FDI after controlling for time-invariant country-specific characteristics and for other dynamic control variables. Modeling capital inflows (currency black markets) as a function of the growth of currency black markets (capital inflows) and the control variables offers a more rigorous method ensuring that the results from a panel of countries applies as much as possible to individual countries. Growth rates are predictive of variables' changes (improvement) than their levels. Another advantage of using growth rates of the independent variables is that the variables are much more likely to be stationary, which is a prerequisite for causality testing.[2]

An example of traditional panel data causality testing is Holtz-Eaken et al. (1988) represented as:

$$Y_{it} = \alpha_0 + \sum_{j=1}^{m} \alpha_j Y_{it-1} + \sum_{j=1}^{m} \delta_j X_{it-1} + f_i + u_{it} \qquad (1)$$

where i = 1, . . . N. In order to eliminate the fixed effects, f_i, NW suggest differencing the data so that:

$$Y_{it} - Y_{it} = \sum_{j=1}^{m} \alpha_j \left(Y_{it-j} - Y_{it-j-1}\right) + \sum_{j=1}^{m} \delta_j \left(X_{it-j} - X_{it-j-1}\right) + \left(u_{it} - u_{it-1}\right) \qquad (2)$$

This specification introduces a problem of simultaneity because the error term is correlated with the regressor $Y_{it-j} - Y_{it-j-1}$. Therefore, a GMM instrumental variables (IV) procedure with a time-varying set of instruments is used to estimate the model. Following Arellano and Bond (1991) and Frydenberg (2003), lagged values of the explanatory variables (predetermined variables rather than strictly exogenous) are used as instruments.[3] Unfortunately, as pointed out by NW, it may be difficult to find an appropriate instrumentation strategy for the model and the chosen instrument set may introduce new problems into the estimation. Particularly in the case of small *T*, Kiviet (1995) has demonstrated the poor finite sample efficiency and the bias of IV-panel data models. Another important consideration in the estimation of equation (1) is the potential bias introduced by the heterogeneity of the cross sectional unit. Equation (1) amounts to assuming that the coefficients on the lagged dependent variable are constant across the individuals. As Pesaran and Smith (1995) and NW describe, in the presence of the characteristic heterogeneity of macroeconomic data, this assumption can result in significant bias. Some authors (for example, NW) tested causality of *x* on *y* with a test (similar to a Granger F-test) of the joint hypothesis: $\delta_1 = \delta_2 = \ldots \delta_m = 0$. Thus, they assume that the coefficients on the explanatory variables are equal across units in the panel. This restriction of a single coefficient on the causal variable for all the units saves the most degrees of freedom, but at the cost of the unlikely assumption that either causality occurs everywhere, or it occurs nowhere in the panel. Yet, given the cross-sectional heterogeneity present in many panel data sets, even with a correctly specified model, it could be expected that one variable may help predict another for most but not all of the cross-section units. Further, in a heterogeneous data set it is possible that the mean coefficient could take statistically significant (or insignificant) values of either sign without reflecting much underlying economic meaning. We should, therefore, be wary of judging the degree of causality by how significant the test statistic is. To mitigate these problems, this paper is unique in utilizing two approaches for causality testing:

(a) The first is the mixed fixed and random (MFR) Model suggested by Hsiao (1989) and applied by NW (2001), among others, in a dynamic panel model. Unlike traditional panel fixed effects estimators (FEE), the MFR estimation allows for heterogeneous dynamics and thus avoids the serious Pesaran-type (2003) biases induced by imposing unrealistic homogeneity conditions on coefficients of the lagged dependent variables.[4]

(b) The second is Granger-causality testing using average Wald statistics. Recent theoretical developments in Granger causality methods have made tests using short time series possible through the use of panel data (Larrain et al, 1997; Hurlin and Venet (HV), 2003; and Hurlin, 2004).[5] This study employs bi-variate Granger causality tests on capital inflows and currency black markets using Hurlin's (2004) methodology.

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2 Unit root tests using the Im-Pesaran-Shin (2002) test has been performed. Results are available upon request.

3 The results for Holtz-Eakin et al (1988) –type model using GMM are not displayed in this paper to save on space. They are available upon request.

4 Pesaran (1992, 1995) argues that the imposition of homogeneity assumptions on the coefficients of lagged dependent variables when in fact the dynamics are heterogeneous across the panel can lead to serious biases that cannot be corrected with instrumental variables estimation.

5 Coondoo and Dinda (2002) used panel data Granger causality to test for causality between pollution and per capita GDP.

In this paper the main emphasis is on exploring causal relationships rather than contemporaneous correlations.[6] Thus following the two approaches outlined above, the basic MFR model is:

$$\begin{aligned} gFDI_{it} &= \alpha i + \gamma gFDI_{t-1} + \beta_1 gBMP_{t-1} + \beta_2 gGDP_{t-1} + \beta_3 gGDI_{t-1} + \beta_4 grer_{t-1} \\ &+ \beta_5 g(i^* + d - i)_{t-1} + \beta_6 gtaxes_{t-1} + \beta_7 gaid_{t-1} + \beta_8 gopenness_{t-1} + \beta_9 gIMK_{t-1} \\ &+ \beta_{10} gHK.BMP_{t-1} + \beta_{11} gOP.BMP_{t-1} + \varepsilon_{t-1} \end{aligned} \quad (3)$$

Similar equations are set for bank loans, portfolio investment, and currency black market premiums (BMP) consecutively. Besides the dynamic effect of growth, the lagged dependent variable provides an excellent proxy for many omitted variables. The mixed, fixed, random effects causality models allow for heterogeneous dynamics across countries and for a distribution over the coefficients on the explanatory variables. The MFR estimated coefficients, standard errors, and variance of the indicated causal variables are reported in Tables 11 - 40. These tables present the results from an MFR estimation of the basic models (stated above the respective tables) in which the coefficients on the lagged dependent variables are country-specific (fixed effects) and the coefficients of the explanatory variables can have standard asymptotic distributions (random effects), resulting in a mixed, fixed and random (MFR) model. NW (2001) demonstrate that this specification allows for heterogeneity in both the exogenous and endogenous variables without introducing simultaneity. With Monte Carlo simulations the authors also show that MFR tends to be less biased compared to instrumental variables estimators. In comparing MFR with alternative panels, NW show that MFR allows for complete heterogeneity and, hence, avoids the Pesaran-type biases by not imposing unrealistic homogeneity conditions on the coefficients of lagged variables.[7] MFR uses information on the distribution of the estimates on the lagged exogenous variable to get the required information, thus MFR is much less sensitive to outliers. As an added feature, in the course of its estimation, MFR also provides important panel diagnostics. In particular, the variance of the coefficients on the x(i) provides an important indicator of heterogeneity in the panel. Where these variances are large compared to their respective coefficient the researcher must treat the causality estimates from any estimation procedure as highly suspect.[8]

For robustness, this study envisages causation by using both mixed fixed random effects (MFR) (NW 2001) and heterogeneous fixed effects panel data estimation (Hurlin 2004). This enables practitioners to control for country-specific, time-invariant, fixed effects, and include dynamic, lagged dependent variables which can also control for omitted variable bias. The ability to lag explanatory variables may also help control for endogeneity bias; with the usual caveat that in the case where the relationship is driven by forward-looking expectations, then these expectations should be modeled within the framework of the analysis.

Hurlin (2004) adopted a simple Granger (1969) causality test in heterogeneous panel data models with fixed coefficients. Granger (1969) posits that for each individual (firm) the variable *x* is causing *y* if we are better able to predict *y* using all available information than if we exclude *x*. Hurlin (2004), thus, contends that if *x* and *y* are observed on *N* firms, we should be able to determine the optimal information set used to forecast *y*. The basic idea is

6 To save on space the results from contemporaneous correlations or the Holtz-Eakin type of dynamic panel (based on one lag and no differencing) will be reported. However, the model is the first difference of the one-lag model. Using two lags did not change the results.

7 See Pesaran (1992) and Pesaran and Smith (1995).

8 Following NW, the RHS variables are orthogonalized. As explained by NW, MFR is achieved through a transformation formula developed by Hsia (1989). To do this transformation, we used a modified version of the code available on Weinhold's (1996) website.

to assume that there exists a minimal statistical representation common to *x* and *y* for at least a subgroup of firms. Granger (1969) causality applies to homogenous time series when *N* causality relationships exist and when the individual predictors of *y* obtained conditionally to the past values of *y* and *x* are identical. Heterogeneity exists when individual predictors of *y* are not the same, such as might be the case when variables from different countries are included in a panel.

Hurlin (2004), Nair-Reichert and Weinhold (2001), and Holtz-Eakin et al. (1988) followed a framework of a linear autoregressive data to extend the Granger-type causality tests for panel data which requires testing cross-sectional linear restrictions on the coefficients of the model. Along the same lines, in many performance formulations, it is likely that if a causal relationship exists for a country, it may exist for some other countries. Thus, causality can be tested with more efficiency in a panel framework with *NT* observations. Hurlin (2004) and Hurlin and Venet (2001) incorporated Granger causality between individuals *y* and *x*, taking into account cross-sectional heterogeneity in panel data by distinguishing between heterogeneity of the causal relationship, between two variables, *x* and *y*, and the heterogeneity of the data generating process (DGP). This is done by distinguishing between heterogeneous non-causality (HENC) hypothesis and homogenous non-causality (HNC) hypothesis adopted by Holtz-Eakin et al. (1988). In a two-subgroup context, HENC, there may exist a causal relationship between two variables (not necessarily with the same DGP), and another subgroup relationship between the same two variables. Hence, the test applies for heterogeneous panel data with fixed coefficients.

Following Hurlin (2004), a Granger non-causality test statistic based on averaging standard individual Wald statistics is generated. Under a very general setting, individual Wald statistics are independently distributed with finite second order moments as soon as $T > 5 + 2K$, where *K* denotes the number of linear restrictions. For a fixed *T*, the Lyapunov central limit theorem is sufficient to get the distribution of the standardized average Wald statistic when *N* tends to infinity. The two first moments of this normal semi-asymptotic distribution are consistent with the empirical mean of the corresponding theoretical moments of the individual Wald statistic. Thus, Hurlin (2004) proposes an approximation of the first two moments of standard Wald statistics for small *T* sample. This is based on the exact moments of the ratio of quadratic forms in normal variables derived from the Magnus (1986) theorem for a fixed *T* sample, with $T > 5 + 2K$. Hurlin (2004) asserts that Monte Carlo experiments show these formulas are excellent approximations to the true moments. Thus, as approximated standardized average Wald statistic to test the heterogeneous non-causality hypothesis (HNC) for small *T* and *N* sample is proposed. Hurlin's (2004) model is:

$$y_{it} = \alpha_i + \sum_{K=1}^{K} \gamma_i^{(K)} y_{it,t-K} + \sum_{K=1}^{K} \beta_i^{(K)} x_{i,t-K} + \varepsilon_{i,t} \qquad (4)$$

where $\varepsilon_{i,t}$ are iid with $E(\varepsilon_{i,t}) = 0$ and finite heterogeneous variances $E(\varepsilon_{i,t}^2) = \sigma_{\varepsilon,t}^2$. x and y, observed on T periods and N individuals (firms) are covariance stationary variables. α_i are assumed to be fixed. Lag orders K are identical for all cross-section units of the panel and the panel is balanced. Autoregressive parameters $\gamma_i^{(K)}$ of the lagged dependent variables and $\beta_i^{(K)}$ regression coefficients of the explanatory variables are different across groups. Importantly, unlike Weinhold (1999) and Nair-Reichert and Weinhold (2001), parameters $\gamma_i^{(K)}$ and $\beta_i^{(K)}$ are both constant, not random. That is, the model has fixed coefficients with fixed individual effects. Unlike Holtz-Eakin et al (1988), Hurlin's (2004) causality is more general where non-causality may exist for $N_1 < N$ individual processes with no causality

from x to y, while causality may be there for $N_1+1, N_1+2 \ldots N$. If $N_1=0$, then the results are homogenous Granger caused y for all the individuals, irrespective of the homogeneity (or lack thereof) of the data generating process. Likewise, if $N_1>0$, then the causality relationship is heterogeneous. To allow for the possibility of non-causality in a subgroup N1 and possible causality in other subgroups $N_1+1, N_1+2 \ldots N$, Hurlin (2004) proposed using the average of individual Wald statistics to test the homogeneous non-causality hypothesis (HNC) for groups (industries). $i=1,\ldots N$, such that:

$$W_{N,T}=\frac{1}{N}\sum_{i=1}^{N}W_{i,T}\ ^{9} \tag{5}$$

IV. Causality Results

MFR results are displayed in Tables 11 – 40. Wald statistics are shown in Table 41. A summary of the causality results is included in Tables 5 –10. The two approaches yielded similar causality results. This enhances the reliability of the results and their policy implications. The two approaches also supplement each other, each providing a different set of useful information about the data. Specifically, Wald statistics show causality results that are based on dynamic fixed effects heterogeneous panel data. MFR results are dynamic, mixed, fixed, and random effects panel data analyses displaying signs and variance of the coefficients. The results show relatively high coefficient variances, indicating the presence of a significant heterogeneity across MENA countries. Thus causality approaches such as Holtz-Eakin et al. (1988) that do not account for heterogeneity are flawed. To mitigate heterogeneity, the sample countries have been subdivided into low income and middle income countries, and for comparative purposes the results for the entire sample have also been produced. Further subdivision into oil (OPEC members of MENA) and non-oil has also been done.

Tables 3 – 4 summarize the descriptive statistics. For the entire sample of MENA countries, the volatility of FDI relative to total capital inflow (FDI/capital) and portfolio investment relative to FDI is substantially lower than that of bank loans as a ratio of FDI. It is clear that the mean of bank loans ratio is very high compared to that of FDI and portfolio investment. The tables also show that, on average, low income countries are less open and receive more aid than middle income countries. Table 4 shows that MENA countries mainly depend on bank loans. FDI net flows are very low and portfolio investment is mostly negative.

Frankel and Rose (1996) find that a low ratio of FDI to debt is associated with a higher likelihood of a currency crisis based on an empirical test of over 100 emerging market economies during 1971-1992. Moreover, a decline in FDI inflows by one percent of external debt is correlated with an increase in the probability of currency crisis by 0.3 percent. Calvo et al. (1996) also suggest that for the particular countries and time period which Frankel and

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9Wi are generated as summation of the F-statistic, $\frac{K}{N}\sum_{i=1}^{W}F_i$, where:

$$F_{K,df_u-df_r}=\frac{(RSS_{r,i}-RSS_{u,i})/K}{RSS_{u,i}/df_u-df_r} \tag{6}$$

where RSSr = restricted sum of squared residual and RSSu = unrestricted sum of squared residuals computed from equation (1); K = number of lags or number of parameters $\beta_i^{(K)}$; dfu and dfr are the degrees of freedom of unrestricted and restricted regressions, respectively; $df_u-df_r=T-2K-1$; and T = number of years.

Rose (1996) examined, portfolio investment displayed significantly higher volatility than FDI flows.

As mentioned in Section I, the three hypotheses associated with currency crises in the literature are: (1) a low share of FDI in total capital inflows, (2) a high share of foreign currency dominated bank loans in a country's total borrowing, or (3) a low relative share of portfolio flows versus FDI. In testing the three hypotheses, we are concerned about possible endogeneity of capital inflows on BMP. Hence, we test for Granger causality rather than perform correlation-based regressions, using Hurlin's (2004) (Table 41) approach as well as MFR (Tables 11-40). Overall and especially in middle income countries, there is clearly two-way causality between the currency black market premiums and two capital inflows (bank loans and portfolio) in MENA countries. An exception is the negative unidirectional causality going from the black market premiums to FDI. That is, an increase in the premium causes a decrease in FDI flow. Bank loans and portfolio investment cause the black market premium to increase. The induced increase in the premium will simultaneously stimulate capital outflows by exerting a dampening effect on FDI and bank loans, and a positive effect on portfolio investments. Tables 17 and 23 display respectively, that a 1 percent increase in black market premiums causes a .7 percent decrease in FDI in low-income countries and a .68 percent fall in FDI in middle-income countries. Given that MENA countries are, for the most part, capital-poor and technology deficient, FDI-related trade will likely have high import propensity generating higher demand for foreign exchange. Seabria et al. (2006) empirically supported this argument. The negative causal impact of currency black market premiums on FDI and loans has been explained by Jansen (1995) and Seabria et al. (2006). In response to capital outflows, foreign direct investors demand high compensation in the form of dividends on equity and interest paid on net loans. Furthermore, as discussed in Section II, capital outflows can exacerbate balance of payments problems and accelerate financial crises. However, the interaction of the black market premiums with openness causes an increase in FDI, and hence neutralizes the negative causality running from BMP and FDI. Thus, openness insulates FDI against negative causal responses to black market premium increases. FDI to stay as black market neutral, openness and human capital development are crucial. The inflationary effect of the increase in the premiums increases the real exchange rate (and domestic interest rates), making portfolio investment attractive to investors. As Classens et al. (1993) and Kregel (1996) point out the edge between FDI and portfolios is increasingly blurred. Notice that the results show that an increase in the real exchange rate significantly decreases FDI. The simultaneous negative causative effects of the premiums on FDI and loans and the positive response of portfolio investment may not be coincidental as FDI and loan holders hedge against inflation by acquiring variable-value portfolios. This is consistent with Dooley's et al. (1994) result that changes in FDI are associated with greater rather than lower variability in capital flows, causing a negative change in bank loans (negative increase in FDI). Openness also causes a negative change in portfolio.

In middle-income countries the interactions of the three capital inflow measures with human capital and openness are independent of changes in BMP. They do not causally impinge on the black market premium. The interaction of human capital and openness with the black market, however, Granger-causes a negative change in bank loans. Human capital development and openness discourage bank loans. Openness also causes a negative change in portfolio. Note that bank loans and portfolio are represented by their respective ratios to FDI. That is, the negative changes in bank loans and portfolio indicate a relative increase in FDI.

Likewise, the absence of causality between the black market currency premium and portfolio investment in low income countries is intuitively appealing given the rudimentary nature of

financial markets in poor MENA countries. The dormancy of financial markets in low income countries partly explains the positive, one-way causation going from FDI to the premium, and the negative bidirectional causality between bank loans and the premium. In this regard, although human capital has a significant positive impact on FDI, and no impact on bank loans, its interaction with currency black markets causes a negative effect on FDI and bank loans. This may be a result of the inflationary effect of the premium. On the other hand, the interaction of human capital with loans causes a decrease in the premium, while the interaction of loans with openness causes an increase in the premium.

Similarly in the OPEC group of MENA there is a positive unidirectional causality from FDI to the currency black market premium. However, in the one-way causality existing between bank loans and the premium, bank loans cause a negative effect on the premium. Moreover, even though there is no causality between portfolio investment and the premium, openness interacts with portfolio investment to increase currency black markets which simultaneously encourages portfolio outflows because the interaction of openness with the black market premium increases portfolio investment. To summarize, the expansion of currency black markets resulting from higher FDI and portfolios (with openness acting as a catalyst to portfolios), is partly offset by the negative causal impact of bank loans on the premium.

The situation in the non-OPEC group of MENA is similar to that of the middle income group in terms of the negative one-way causality between FDI and loans and the currency black market premium. An exception is that the non-OPEC group's (including both poor and some middle income countries) currency black market premiums and portfolio investment are independent, with no causality in both directions, mainly because financial markets in this group are rather dormant. When human capital interacts with bank loans and portfolio inflows, it induces positive causation on currency black market premiums, but the concomitant interaction of the premium with human capital puts a dampening effect on the interaction of human capital with bank loans and portfolio capital inflows.

V. Conclusions and Policy Implications

This paper examined causality (as opposed to correlation) between capital inflows and currency black market premiums in a panel of eight Middle Eastern and North African countries (MENA**)**, over the period 1984-2004. For robustness two approaches have been used to test for causality: mixed, fixed, and random (MFR, Tables 5-40) and average Wald statistics (Table 41). To mitigate heterogeneity, the sample countries have been subdivided into low-income and middle-income countries. Another subdivision distinguished oil-producing (OPEC members) and non-oil countries.

For the entire sample of countries and the middle-income countries of MENA, the two capital inflow measures (bank loans and portfolio investment) exhibit bidirectional (feedback) causality with the currency black market premium. There is also a unidirectional causality going from the premium to FDI. However, the interaction of the premium with openness insulates FDI against negative causal responses to black market premium increases (currency crises). An important policy implication is, therefore, for middle-income MENA countries to break the negative feedback from currency black markets and avoid financial crises, they must develop their human capital and open the economy sufficiently to maintain sustainable levels of capital inflows. By slowing down a relative change (volatility) in bank loans and portfolio, openness and human capital help FDI in exerting its cushioning effect on the economy.

In low-income countries, FDI accelerates the currency crisis which may be alleviated through the negative feedback causality between bank loans and currency black market premiums.

The interaction of human capital with loans, however, causes a decrease in the premium. The absence of causality between the premiums and portfolio investment indicates the rudimentary nature of financial markets in poor countries. This implies that development of financial markets and human capital in low-income MENA countries is crucial to mobilize savings and pave the way for more and diversified capital inflows.

In the OPEC group of MENA countries, with openness acting as a catalyst, the positive causal effect of portfolio investments is offset by a simultaneous negative effect of openness interacting with the premium on portfolio outflows. The results also show that FDI causes currency black markets, but bank loans may dampen the black markets. So, for OPEC countries openness is a mitigating factor. Hence, institutions that spur trade, financial liberalization, and privatization are important conditions for capital inflows.

The non-OPEC countries are a mixture of some middle-income and low-income countries. The results, therefore, are a combination of the results for the two groups discussed above, and to that extent they might not bear any useful policy implications.

It is also abundantly clear from Tables 3-4 and the causality results that MENA countries have relatively lower FDI and portfolio investment and higher foreign bank loans. Such a composition of capital inflow has been identified as being associated with a higher incidence of currency crises (Radelet and Sach 1998; and Wei and Wu 2001).

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