Currency Exposure, Market Power, and the Equity Rate of Return: the Case of Iran

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1. Introduction

Exchange rate adjustment as a policy option for correcting current account imbalances and stimulating the aggregate demand and domestic production has been widely discussed on a macroeconomic level. Debates regarding the consequences of nominal devaluation in developing countries have often focused on its effect on the trade balance and whether it is contractionary (lowering output and income) or expansionary. On the latter point the standard result is, a nominal devaluation involves a positive demand effect and a negative supply effect if the Marshall-Lerner condition holds. There is also a substitution effect indicating that the higher (lower) is the elasticity of substitution between the imported and domestic inputs, the probability of an increase in the level of income is higher (lower).[1] The econometric evidence on the expansionary (contractionary) effects of devaluation at the aggregate level is mixed.[2] The aggregate level effect is the sum outcome of micro unit response to exchange rate movements. For industrialized countries a relatively voluminous literature on the sources of currency exposure--the effect of currency movements on the economic performance hence changes in valuation at the level of firms—is available. The market value of a firm depends on its discounted cash flows[3], which in turn is affected

[1]For more details see T. Gylfason and M. Schmid, "Does Devaluation Cause Stagflation?", Canadian Journal of Economics, 16, 1983, November, 641-54, and for a good survey see, P.R. Agenor and P.J. Montiel, Development Macroeconomics, Princeton University Press, 2nd Edition, Princeton: NJ, 1999.

[2]Edwards (1989) finds econometric evidence for contractionary effect in the short-run, expansionary effect in the medium term and neutrality in the long-run. Agenor (1991) distinguishes between expected and unexpected exchange rate movements concludes that unanticipated currency changes is expansionary and anticipated changes are contractionary.

[3]In the special case where the marginal-utility/lagrange multiplier for an investor maximizing expected utility subject to a wealth constraint is a known constant (implying constancy of marginal utility across different states or linear utility) then the fundamental price of a firm (not its bubble part) is equal to its discounted cash flows (HaLL 2001).

by the relative prices faced by a firm, e.g. the ratio of final product price to imported input price or the "real exchange rate." Currency depreciation may alter the real exchange rate facing a firm and therefore its profitability and market value.

The effect of exchange rate policy and currency movements at the level of firms has not received nearly as much attention for the developing countries, even less for MENA, countries mainly due to data limitations. Our objective in this paper is to examine the effect of currency depreciation on valuation and hence the equity rate of return for a sample of individual firms in Iran. In this paper we use a sample of forty-five industrial companies listed on the Tehran Stock Exchange and examine the effect of currency exposure on their market rate of return. We also test for currency exposure using a k-factor arbitrage-pricing model (Ross 1976, Bartov and Bodnar 1994, Jorion 1991, Williamson 2001). In the presence of devaluation-related risks, the equity price of the firms with a higher exchange rate exposure should react more than low exposure firms to exchange-rate shocks (Pettinen 2000). To test for this, we split the sample between the firms with significant exports and those with limited or no exports and conduct the same test.[4] We specify a simple partial-equilibrium, "two-country" model to determine the source of currency exposure that may effect profitability of a representative firm. Our analysis extends to situations where the representative firm has local market-power and enjoys trade protection. It will be shown that the effect of currency movements on the value of a firm depends on trade shares, price pass-through, and the market structure (hence price over cost markup) in which the firm operates. The commercial policy affecting

[4]Due to data limitations we could not classify firms according to their degree od dependence on imports.

import competing products can have a significant effect on the size of the markup. We use panel data method for our estimation. Our data is both semi-annual and annual and covers the IV Q 1995-II Q 2001 period.

2. Exchange Rate Exposure, Valuation, and Profitability

The exchange rate is a key price influencing profitability of a firm. It affects the relative prices facing the firm, e.g. the price of output relative to imported input or the firm's real exchange rate, and hence has significant short/intermediate term effects on output and profitability via the cost of intermediate goods. A higher exchange rate can also influence output and profitability through liquidity constraint. Credit constraint to finance working capital has been widely cited as a problem in the private Iranian manufacturing sector especially after sharp rises in the market exchange rate during the 1990s. A higher exchange rate (by raising the cost of imported intermediate inputs) can result in a larger volume of working capital requirement. In the presence of credit constraints this should result in lower output and profits, particularly if financing through internal fund is not possible due to lower profits caused by higher cost. The stock price and hence the rate of return on equities for a firm will reflect any changes in profitability. Market power by domestic firms and trade protection and possibilities for input substitution can mitigate the effect of imported input costs.

The effect of exchange rate movement on profitability and stock prices have been studied both at the industry level (Bodnar and Gentery 1993) for the banking sector (Chamberlin, Howe, and Propper 1997) and for individual firms (Choi and Prasad 1995, Jorion 1990, Booth and Rotenberg 1990). Firms with different exposure to foreign sales and the degree of dependence on imports of raw materials and technology are affected differently. International diversification reduces the degree of currency exposure; an appreciation of the domestic currency has little effect on the value of a firm that invests abroad and buys imported inputs at world prices. For our purposes in this paper we can distinguish three types of firms. The firms that do not use imported inputs and export their products. Those that have very limited exports but import a significant amount of their intermediate goods and raw materials. The last category includes the firms that use imported intermediate goods and export some fraction of their output. The traditional view is that devaluation should negatively affect those firms with a high degree of dependency on

imported inputs and very limited exports and should benefit domestic exporters. It can be shown that with free trade a higher exchange rate can (under fairly general conditions) result in higher output and profitability for an exporting firm.[5]

2.1. Market Power, Currency Movement and the Rate of Return

Data at four-digit ISIC indicates a high degree of concentration in the Iranian manufacturing sector (Salehi and Jafari 1999) and those companies listed in the stock exchange account for a sizable share of output in their industry group. Table (1) shows the index of concentration constructed for the Iranian manufacturing industry and presents the index for the two-digit level ISIC in a descending order. As indicated by the table, the degree of market power in modern industries like motor vehicles and electrical appliances and Tobacco (which is a state-owned

[5]Under free trade the domestic firms become price-taker internationally. Consequently, at world prices an exporting firm can sell as much output as it can, hence $P_d = P_w E$. Firms maximize the following profit function: $\pi = P_w Eq - \theta C(q) - (1-\theta)C(q)E \qquad (f1)$

Where q stands for non-joint output of the firm, α represents the share of output sold in domestic markets, $(1-\alpha)$ the share of foreign sales, $C(q)$ is a homogeneous of degree one cost function, E is the nominal exchange rate, θ and $(1-\theta)$ stand for domestic and imported inputs. The price of exported output is given by the world price, given the small country assumption. With a given E profit maximization is achieved by observing the first order condition, hence

$$\frac{\partial \pi}{\partial q} = P_w.E - \theta\frac{\partial C}{\partial q} - (1-\theta).\frac{\partial C}{\partial q}.E = 0 \quad (f2) \qquad \frac{\partial C}{\partial q^*} = \frac{P_w.E}{\theta + (1-\theta)E} \quad (f3)$$

The optimal level of output corresponding to the marginal condition can be written as (f4) indicating that profit-maximizing output is a function of world prices, the nominal exchange rate, and the share of domestic inputs: $q^* = (P_w, E, \theta) \qquad (f4)$

For determining the effect of changes in E on output we differentiate (f4) with respect to E

$$\frac{\partial q^*}{\partial E} = \frac{1}{\frac{\partial^2 C}{\partial q^2}} \cdot \frac{P_w \theta}{[\theta + (1-\theta).E]^2} > 0 \qquad (f5)$$

The above result indicates that the profit maximizing level of output of an internationally competitive firm will rise with E. To determine changes in profitability at q^* with respect to changes in E we make use of the envelope theorem. Therefore from the profit function specified for the optimal levels of the variables and indicated by an asterisk we obtain: $\frac{\partial \pi^*}{\partial E} = \frac{1}{q^*}\left(P_w - (1-\theta)\frac{C(q^*)}{q^*}\right) > 0 \quad (f6)$

For a firm operating at the profit-maximizing level of output (q*) the unit price should be greater than a fraction of unit cost, especially for firms with a bigger θ. In such a case, for a firm that sells its product at international prices, a higher exchange rate increases its profit.

monopoly) is quite high.[6] Much of the published work on currency exposure assumes competitive firms. Campa and Goldberg (1999) and Allayannis and Ihrig (2001) consider currency exposure in a model of imperfect competition. For a representative firm that uses imported inputs to produce (final) output (q) to sell both locally and abroad (q^*) profit is a function of its output, imported intermediate inputs, and its capital stock (K). Following Allayannis and Ihrig (2001), the firms' value function is

$$V(K_t, e_t, r_t)=\text{Max}\{pq(e_t, p_t)+ e_t\, p_t^* q_t^*(e_t, p_t^*) -r_t[K^{t+1} -(1\text{-}d)K_t] -p_{Mt}\, M_t(e_t, p_{Mt}) + \rho E[\, V(K^{t+1}, e^{t+1}, r^{t+1})|\, e_t, r_t]\} \qquad (1)$$

Where p is the price of output domestically, p^* is the price abroad, q^* is the quantity of output exported, e is the exchange rate, p is the domestic market price, q is the output sold in domestic markets, p_M is the price of imported inputs, r is the cost of capital, d the rate of depreciation, and ρ is the discount factor. Defining the rate of return (R_t) on a firm as the change in its present discounted value ($V_t - V_{t-1}/V_{t-1}$) and taking Taylor series expansion for this definition for the state variables around t-1 the following equation is obtained

$$R_t = \frac{(\partial V/\partial e)(e_t - e_{t-1})}{V_{t-1}} + \frac{(\partial V/\partial r)(r_t - r_{t-1}) + (\partial V/\partial K)(K_t - K_{t-1})}{V_{t-1}} \qquad (2)$$

Applying the envelope theorem to the value function and by iterative substitution (3) is obtained.

$$\frac{\partial V}{\partial e} = \frac{1}{1-\rho}\left(\frac{\rho q + e p^* q^*}{e}\right)\xi\theta + \frac{1}{1-\rho}\left(\frac{e p^* q^*}{e}\right)[1+\xi] - \frac{1}{1-\rho}\left(\frac{PM^M}{e}\right)\xi_M\theta_M \qquad (3)$$

Equation (3) shows the change in the value of a firm with respect to changes in e; it is related to the price elasticity of demand for the output of the firm, the price elasticity for imported intermediate input (ξ and ξ_M) and two price pass through terms (θ andθ_M).[7] From the combination of (2) and (3) and assuming that $R_{mt}=(\partial V/\partial r)(r_t\text{-}r_{t-1}) + (\partial V/\partial K)(K_t\text{-}K_{t-1})$, and noting that the markup for the output market ($u=1/\xi$) and the imported intermediate input market ($u_M=1/\xi_M$) are the inverse of the price elasticity of demand in these markets equation (4) is obtained

[6]The Tobacco monopoly is state owned and is not listed in the Tehran Stock Exchange and hence is not one of the companies in our sample.

[7]

$R_t = \beta_o + \beta_1 R^m_t + \beta_2(p_t q_t + e_t p^*_t q^*_t)/(V_{t-1})\ (1/u_t)\, e^{\cdot}_t + \beta_3\ (e_t p^*_t q_t^*/V_{t-1})\ (1+1/u_t)\, e^{\cdot}_t + \beta_4\ (p_{Mt} M_t/V_{t-1})(1/u_{Mt})\, e^{\cdot}_t \qquad (4)$

$\beta_2=(1/1-\rho)\theta>0$, $\beta_3=(1/1-\rho)>0$, $\beta_3=(1/1-\rho)\theta_M<0$, and $e^{\cdot}$ is the one-period currency rate of change. A firm's currency exposure is measured by $\beta_2(p_t q_t+e_t p^*_t q^*_t)/(V_{t-1})(1/u_t)+\beta_3(e_t p^*_t q_t^*/V_{t-1})(1+1/u_t)+\beta_4(p_{Mt} M_t/V_{t-1})(1/u_{Mt})$. This term reflects the elasticity of the value of a firm with respect to the exchange rate. There are three channels through which currency movements influence the rate of return on a firm's equity: the degree of competitiveness in the output market (or the size of the markup), trade shares, the share of imported inputs in production and the markup in the input market. The third RHS term reflects the interaction of the effect of domestic and foreign sales with the market structure of final output (as reflected by the inverse of the elasticity term or the markup), the fourth RHS term captures the interactive effect the export share of sales and the markup. These two terms are expected to have a positive effect on R. Moreover, the larger is the nominal value of exports the larger would be the positive effect of currency movement via this channel. The fifth RHS term measures the interactive effect of the share of imported input and the competitive structure of the imported input market and it is expected to be negative. Both the third and the fifth RHS terms involve price pass-through coefficients. If the pass-through coefficients are less than units, they dampen the effect of exchange rate shocks and if they are unity they transmit the full impact. A firm's exposure rises with lower price-over-cost markup. The currency exposure is the sum effect of the above mentioned channels. Equation (4) is amenable to empirical testing and will be discussed in section (3).

2.2. Quantitative Import Restriction, Devaluation, and Profitability

In the model of section (1) the effect of a change in the trade regime was not considered. Import restrictions caused by foreign exchange shortages may compensate for the negative supply effect of currency depreciation in the short/medium term. This is frequently done in those countries that have limited access to foreign capital and implement import substitution

$$\xi = \frac{p}{q}\frac{\partial q}{\partial p} \qquad \xi_M = \frac{p_M}{M}\frac{\partial M}{\partial pM} \qquad \theta = -\frac{e}{p}\frac{\partial p}{\partial e} \qquad \theta_M = -\frac{e}{p_M}\frac{\partial p_M}{\partial e}$$

measures to combat current account imbalances. As shown by figure (1) a domestic monopolist is forced to set world price for its output under free trade. An import quota raises domestic prices and thus the firms can maintain or even raise profitability by compensating higher import costs by charging higher prices in the domestic market. Devaluation in Iran

occurred during a period of declining oil revenues and large capital the outflow to repay and service foreign debt. For the period under the study pricing power of the domestic firms was enhanced by a comprehensive import compression policy. Total imports fell from more than 16 billion dollars in 1995 to less than 12.7 billion dollars in 1999. Due to a very tight foreign exchange supply not only the exchange rate was devalued and the black market rate depreciated sharply (figure 2) but the government also restricted imports. The average tariffs for manufactured goods in Iran is not high compared to the developing country standards and quantitative import restriction during the 1990s were the main instrument for controlling imports. We combine the effect of this policy in our analysis of currency exposure under a partial equilibrium setting for a representative local firm with market power. The assumption of imperfect competition can apply to both monopolies and oligopolistic markets with price leadership. We maintain the standard assumption of a small country for non-oil exports and while being price-takers globally the domestic firms are assumed to be price-makers in the local market. Our assumptions reflect the above mentioned conditions existing in the Iranian economy during the observation period. The analysis shows that for firms with market power and trade protection, currency devaluation may not necessarily reduce profitability even if the domestic firms are highly dependent on imported imports. We posit that demand for the local monopolist is equal to the total domestic demand less the import quota and in the protected market the domestic price (p_d) will be greater than the international price (as in figure 1). The profit function for the representative firm is

$$\pi = \alpha P_d [\alpha q + Q_{M(E)}]q + (1-\alpha)EP_w q - \theta(E)C(q) - [1-\theta(E)]C(q)E \quad (5)$$

The domestic price is a function of total demand, which is equal to domestic supply (αq) and imports, $Q_{M(E)}$ and the subscript E denotes that import is a function of the exchange rate. To relax the assumption of a fixed proportion of imported inputs in the cost function let θ be positively related to the exchange rate thus allowing for substitution between domestic and imported inputs. Utilizing the envelope theorem, profit for the representative firm at the initial optimal level of output (q^*) changes with the exchange rate movements according to

$$\frac{\partial \pi^*}{\partial E} = \alpha q^* P_d' \frac{\partial Q_M}{\partial E} + P_w(1-\alpha)q^* - \frac{\partial \theta(E)}{\partial E} C(q^*) + \frac{\partial \theta(E)}{\partial E} C(q^*)E - [1-\theta(E)]C(q^*) \quad (6)$$

simplifying (6) yields[8]

$$\frac{\partial \pi^*}{\partial E} = 1/\eta \alpha P_d \frac{\partial Q_M}{\partial E} + P_w(1-\alpha)q^* - \varepsilon_\theta C(q^*)\theta(E)\left[\frac{1}{E} - 1\right] - (1-\theta(E))C(q^*) > 0 \quad (7)$$

η is the domestic demand price elasticity and its absolute value is greater than unity.[9] In a competitive market $1/\eta \alpha P_d \frac{\partial Q_M}{\partial E}$ is zero. However, for a protected monopolist $1/\eta \alpha P_d \frac{\partial Q_M}{\partial E} > 0$, since η is negative and $\frac{\partial Q_M}{\partial E} < 0$.[10] Thus with a protected domestic market a higher E can results in higher profits for the domestic firms. The terms $P_w(1-\alpha)q$ is positive and since the elasticity of demand for imported inputs with respect to E is positive $(\varepsilon_\theta > 0)$[11] and $\left(\frac{1}{E} - 1\right) < 0$, therefore $[-\varepsilon_\theta c(q^*)\theta(E)(\frac{1}{E} - 1)] > 0$. Dividing $P_W(1-\alpha)q^* - (1-\theta)C(q^*)$ by $(1-\alpha)q^*$ we obtain $(1-\alpha)q^*\left[P_w - \frac{(1-\theta)}{(1-\alpha)}\frac{c(q^*)}{q^*}\right]$, which implies that this expression for a firm operating at q^* is positive, implying that $\frac{\partial \pi^*}{\partial E} > 0$ in (7). With the rise in E profits for the protected domestic firm will increase.

[8]By multiplying the first RHS expression by P_d/P_d, the third term by $\frac{E}{\theta(E)} \cdot \frac{\theta(E)}{E}$, and the fourth term by $\theta(E)/\theta(E)$, we obtain

$$\frac{\partial \pi^*}{\partial E} = 1/\eta \alpha P_d \frac{\partial Q_M}{\partial E} + P_w(1-\alpha)q^* - \varepsilon_\theta C(q^*)\frac{\theta(E)}{E} + \varepsilon_\theta C(q^*)\theta(E) - [1-\theta(E)]C(q^*))$$

[9]Since by assumption a monopolist operates in the region where MR>0.

[10] As was alluded to earlier, during a foreign exchange crisis devaluation and import compression are complementary policies.

[11]Thus a higher E, other things being equal, induces a reduction in the quantity of demand for imported inputs.

Furthermore, the change in profitability with respect to the change in the export share of output is given by

$$\frac{\partial\left(\frac{\partial \pi^*}{\partial E}\right)}{\partial \alpha} = {}^{1}\!/\!_{\eta} P_d \frac{\partial Q_M}{\partial E} - P_w q^* < 0 \qquad (8)$$

Since the monopolist operates in the region of the demand where ${}^{1}\!/\!_{\eta} > 1$ and since q* is a large number (8) is negative indicating that the profitability of firms due to changes in E will rise will be greater if they have a higher export share $(1-\alpha)$. Put simply, exporting firms will benefit more from a higher E than those with little or no exports. In the equity market the change in expected cash flows will be reflected on the stock price of the firms, hence the rate of return on its equity. Thus, as in the previous section, we should expect a positive relationship between exchange rate movements and the equity rate of return and this relationship should be stronger for those companies that export a significant fraction of their output.

We note that an import quota enhances the ability of the domestic firms to set prices above the world price of its output and maintain domestic final sales by limiting imports. These compensate for the effect of higher import costs due to currency depreciation. Therefore, instead of a reduction in output and lower profitability (the contractionary devaluation argument) the short-term result could be unchanged or even higher profits and higher domestic sales afforded by an enhanced market position and pricing power of the firms. The magnitude of the markup might change with change in import cost, business cycle, the market structure, and the trade regime. As was indicated in section 2.1 for firms with the ability to charge markup a higher cost structure can fully or partially be compensated. Moreover, for firms with a higher markup the

effect of currency exposure can be dampened. However, in competitive markets where the price is close to the marginal cost the currency exposure increases. There are significant income distribution implications to the above arguments. Aside from the more obvious income transfer between consumers and the firms, in those sectors where smugglers are active and enforcement of trade laws are difficult import restrictions may not be very effective in raising domestic prices. In this case some fraction of state revenue raised from import duties goes to smugglers. These issues are beyond the scope of this paper.

3. Empirical Test of the Hypothesis

In this section we examine the effect of the exchange rate via two different routes. First we convert equation (4) into an estimable form as in (5). With this specification we allow for measuring two sources of exposure separately. The coefficient b_1 measures the combined effect of exchange-rate movements on profitability via domestic and export market revenue and their interaction with the competitive structure of the markets where the final product is sold. The coefficient b_2 measures the (negative) effect of intermediate input cost. To test for these effects we need to have information on markups in the market for final output and for intermediate inputs. We do not have data to estimate markup estimates for intermediate inputs so we assumed that they are constant. We used accounting data on sales, inventors, payroll and cost of materials to estimate markup for the final output market for the sample of our firms. The price-cost markup (u) is given by the following ratio (Domowitz, Hubbard and Petersen 1986)

$$u = \frac{value\,of\ \ sales + \Delta inventories - payroll - \cos t\ of\ \ materials}{value\ \ of\ \ sales + \Delta inventories}$$

$$R_t = b_o + b_1 R^m_t + b_2 [(\psi_t + \upsilon_t) / u_t + \upsilon_t] e^{\cdot}_{t+} + b_3 (\mu / u_{Mt}) e^{\cdot}_t \qquad (5)$$

Where $\psi_t = (p_t q_t + e_t p^*_t q^*_t)/(V_{t-1})$, $\upsilon_t = e_t p^*_t q^*_t / V_{t-1}$ and $\mu_t = (p_{Mt} M_t / V_{t-1})$. The result of testing (5) is given in table (2). For the panel of exporting firms our estimates have the expected signs and while the estimates of b_1 and b_2 are significant at the 5 percent level the coefficient of b_3 is significant near the 10 percent level. The estimated value of b_2 exceeds that of b_3 indicating that the sum effect of exposure channels is positive, hence a positive relationship between currency movements and the rate of change in equity prices for the sample of our exporting firms. For non-exporters the estimated coefficients for currency exposure were not even significant at the 10 percent level and thus we cannot offer any generalization regarding the direction of the exposure. The results of our tests indicate that, at least for exporters, the firms are significantly exposed to exchange rate movements through at least one channel of exposure--the domestic and export revenue interacting with the final output market structure.

A number of empirical tests of currency exposure are based on tests of single or multi-factor models (Edrington 1979, Adler and Dumas 1984, Barter and Bernard 1994) to examine if the exchange rate risk is priced as implied by the arbitrage pricing theorem (Ross 1976). The APT suggests that if there are general factors that influence economic performance of individual firms the market will price these risk factors (e.g. inflation and the exchange rate risk). By defining the rates of return to be nominal returns over the risk-free rate a two-factor model can be expressed as a linear relationship between the expected return for the ith firm, $E(R_i)$, and the sensitivity to movements in the exchange rate and market.

$E(R_i)=\lambda_o + \delta_1\beta_i^m + \delta_2\,\beta_i^e$

Where $\delta_1$and δ_2 reflect the risk premium for the market and exchange rate factors. Assuming the return vectors have a joint normal distribution $\beta_i^m=Cov(R_i,\delta_1)/Var(\delta_1)$, $\beta_i^e=Cov(R_i,\delta_2)/Var(\delta_2)$, and that the covariance between market return and the exchange rate is assumed to be zero. For an empirical test we specify a two-factor arbitrage-pricing model (Chen, Roll, and Ross 1986, Bartov and Bodnar 1994, Jorion 1991, Williamson 2001). Thus, we test for the effect of the movements in the exchange rate (contemporaneous and lagged effects) on the equity rate of return for the firms (R_{it}) in our sample of listed companies in the Tehran Stock Exchange. Factor risks here are the market index (R_m) and the exchange rate (E), as shown below in (I). B_{oi} is the expected rate of return on the equity of the ith firm if the risk factors are zero, B_{1i}^{t-j} is the coefficient of the exchange rate risk factor for the ith firm and time lag j, and B_{2i} is the coefficient of the market risk factor.

$$R_{it} = B_{oi} + \sum_{j=0}^{n} B_{1i}^{t-j} E_{t-i} + B_{2i} R_{mt} + \varepsilon_{it} \qquad (I)$$

For our purposes we distinguish two sets of firms; those classified as non-export firms and those classified as "export firms", based on the definition used by the Iran Export Center.[12] Both groups are significant importers of equipment and intermediate goods. Our sample consists of the listed companies whose share has traded continuously during the 1994-2000 period. Since a number of companies have been taken off the board in this period and some currently listed companies have been added to it within the last two and half years, the number of companies qualifying for our restriction are 15 "exporter" and 30 non-exporting

[12]Companies that export alt least ten percent of their output are classified as "Export Companies".

companies. We calculated the total rate of return (capital gain plus dividend) on individual companies and the Tehran Stock Exchange Index for three and six month periods.[13] We test, using panel data, for the effect of (the rate of change) of the exchange rate on the market rate of return for the companies in our sample. We also test for the effect of the exchange rate for two distinct groups of companies: exporter and non-exporter. Tables 3 and 4 show the estimation results. They show the results of testing (I) for exporters and non-exporters separately. In both cases the one-period lagged exchange rate has a positive sign and while it is highly statistically significant for exporters it is not significant at the 10 percent level. Given the discussions in section 2.1 and 2.2 this indicates that the negative effect of intermediate input cost is outweighed by other factors. The magnitude of the coefficient of the exchange rate in the two regressions is substantially different. Based on our discussions in section 2.1, we expect currency depreciation to benefit movements be stronger for the exporting firms. To test for the differential impact of the exchange rate we use the following specification.

$$R_{it} = \beta_{0i} + \sum_{j=0}^{n} \beta_{i1}^{t-j} D_1 E_{t-j} + \sum_{j=0}^{n} \beta_{2i}^{t-j} D_2 E_{t-j} + \beta_{3i} R_{mt} + \varepsilon_{it} \qquad (II)$$

In the above regression β_{1i} is the coefficient for the exchange rate risk factor for exporting firms, β_{2i} is the coefficient for non-exporting firms, D_1 is a dummy whose value for the exporters is unity and for the other group zero, D_2 is a dummy whose value is zero for exporters and unity fo the other group, β_{3i} is the coefficient for the market index return for both type of companies, and β_{oi} has the same interpretation as was mentioned in conjunction with (I). We used restricted OLS for the estimation of II. The estimation matrix is shown below. In the first column the rate of return for the companies arranged such as to separate the two groups. In

[13]Market foreign exchange rate was calculated from the Central Bank data and PDS data bank.

the first column of the matrix of the variables the constant term is inserted. In the second column the exchange rate for exporting companies appears and for non-exporting firms there is a zero entry. The reverse is done in the third column.

$$\begin{bmatrix} R_{it} \\ . \\ . \\ . \\ . \\ . \\ R_{Kn} \end{bmatrix} = \begin{bmatrix} 1 & E_{it} & 0 & R_{mit} \\ 1 & . & . & . \\ 1 & E_{K'n} & 0 & . \\ 1 & 0 & E_{K'+i} & . \\ 1 & . & . & . \\ 1 & . & . & . \\ 1 & 0 & E_{K''n} & R_{mKn} \end{bmatrix} [\beta_{0i} \quad \beta_{1i} \quad \beta_2 \quad \beta_{3i}] + \varepsilon$$

The result of the test is shown in table (5). To test for the restriction that exporting firms have a higher exchange rate exposure (Pettinen 2000) we applied the Wald test. The value of F statistics is 3.75 and hence we reject the null hypothesis of no significant difference between the coefficient of the exchange rate risk-factor for the above-mentioned two categories of firms at the 5 percent level.[14]

4. Conclusion:

Research works on the economic effect of currency devaluation or depreciation in developing countries are mostly of macro modeling variety. There is very little published work on the effect of exchange rate policy on a micro level in MENA countries, mainly due to data limitations. The effect of currency movement on the economic performance of firms might be more complicated than is implied from the conventional macro models in this area. The effect of currency movements on output and profitability of individual firms depends on the market structure, the trade regime, and the degree of substitution between domestic and imported inputs. We discussed a model to identify various channels through which currency exposure influences the financial

[14]We also tested for the effect of currency movements on the gross profit rate (EBT/sales) margin for our sample of firms. We used a regression specification with the rate of change of the exchange rate for Rial as an explanatory variable and we used several control variables like the rate of change in real manufacturing sector value added and the rate of inflation as the control variables. Instead of the rate of return on equity as the dependent variable we used gross profit. For the exporters the coefficient of the rate of change of the exchange rate was positive but not significant at the 10 percent level. For non-exporters the coefficient of currency movement was highly insignificant. Running the same regression with the net profit ratio still gave an insignificant exchange rate coefficient. The finding that there is no significant relationship between gross profitability and currency movements but a positive relationship between currency movements and the equity rate of return could be consistent with the argument that the market value of a firm reflects economic profits not accounting profits.

performance of a representative firm. We also presented a simple model to analyze the effect of currency depreciation on profitability of a representative firm when we explicitly allow for market power and quantitative import restrictions.

We also empirically tested for the effect of currency movements on the rate of return for a selected sample of firms listed in the Tehran Stock Exchange. The results of our tests indicate that, at least for exporters, the firms are significantly exposed to exchange rate movements through at least one channel of exposure. Moreover, The results of our two-factor tests indicate that the exchange rate risk is priced in the stock market. Given very volatile conditions in the formal and informal currency markets in Iran during the period under the study and the fact that instruments of currency risk management are not actively traded in the Iranian financial market, the evidence obtained here is not surprising. The evidence produced in this paper is also consistent with the observation that, for our sample of firms and for the period under the study, currency depreciation did not have a negative effect on profitability. Partly because the local firms, protected by import restrictions, were able to pass on the additional costs to consumers.

References:

Allayannis, G. and J. Ihrig (2001), "Exposure and Markups," The Review of Financial Studies, Fall, Vol. 14, No. 3, pp. 805-835.

Bartov, E. and G. M. Bodnar, Firm Valuation, Earnings Expectations and the Exchange Rate Exposure Effect, The Journal of Finance, Vol. XLIV, No. 5, December 1994.

Chen, N.F., R. Roll, and S. Ross, "Economic Forces and the Stock Market," Journal of Business, 59, July 1986, pp. 383-404.

Campa, J. and Goldberg, L., "Investment, Pass-Through and Exchange Rates: A Cross-Country Comparison," International Economic Review, 40, No. 2, May 1999, pp. 287-314.

Domowitz, I. Hubbard, G., and Petersen B., "Business Cycles and the Relationship Between Concentration and Price-Cost Margins," Rand Journal of Economics, 17, Spring 1986, pp. 1-17.

Hall, Robert E (2001), "Struggling to Understand the Stock Market," American Economic Review, May, Vol. 91, No. 2, pp. 1-12.

Jalali-Naini, A. R. "Exchange Rate Unification in Iran," MBI, Central Bank of Iran, 2002.

Jorion, P. The Pricing of Exchange Rate Risk in the Stock Market, Journal of Financial and Quantitative Analysis, Vol. 26, No. 3, September 1991.

Penttinen, A. Devaluation-Risk-Related Peso Problems in Stock Returns, Journal of International Financial Markets, Institutions and Money, 10 (2000), 181-197.

Ross. S., The Arbitrage Theory of Capital Asset Pricing, Journal of Economic Theory, 13, December 1976, pp. 341-360.

Salehi H. and Jafari, A. "A review of the Structure of Markets in Iran," in the Iranian Economy, M. Tabibian (ed.), Tehran: IRPD, 1999.

Williamson, R. Exchange Rate Exposure and Competition: evidence from automotive industry, Journal of Financial Economics, 59 (2001), 441-475
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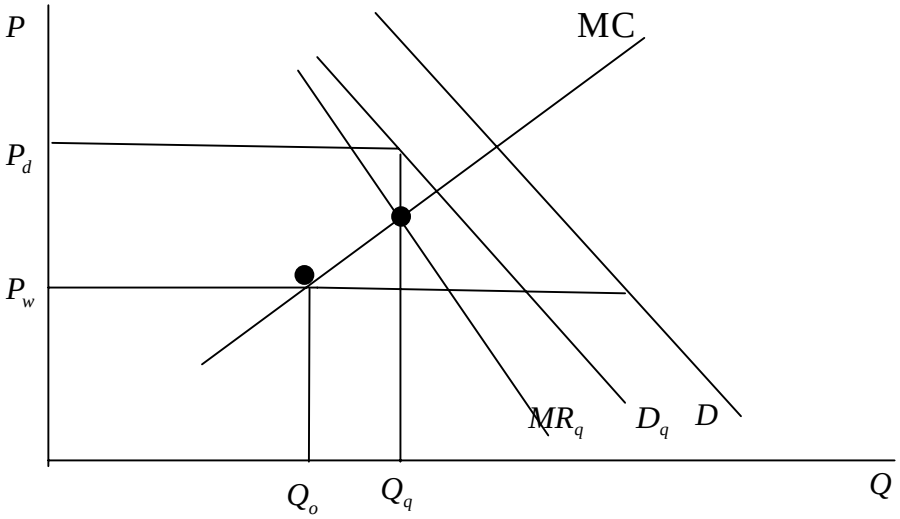

Figure 1. The Impact of a Quota on Domestic Price and Output

P_w=price under free trade, P_d=price after imposition of quota, D=total demand (sales) equal to the sum of imports and domestic output, D_q=total demand after imposition of import quota, Q_q=domestic output after quota, Q_o=domestic output before quota

Figure 2. The Market Exchange Rate

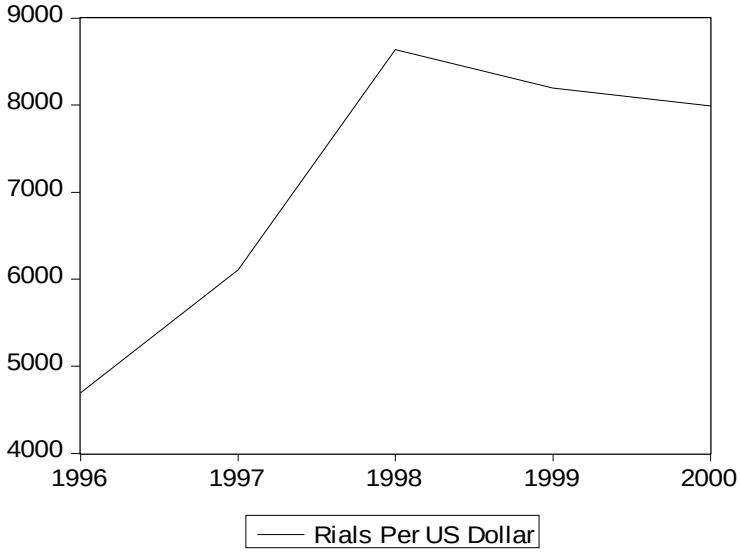

Table 1. Concentration Index in the Iranian Manufacturing Sector, two-Digit ISIC

ISIC classification	ISIC Code	Degree of Concentration
Tobacco products	16	100
Motor vehicles, trailers and semi-trailers	34	77.2
Transport equipment	35	74.3
Radio, television and communication equipment	32	72.3
Office and computing machines	30	69.6
Medical, precision and optical instruments	33	68.8
Chemicals and chemical products	24	67.6
Basic metals	27	67.4
Coke, refined petroleum products and nuclear fuel	23	67.2
Publishing, printing and reproduction of recorded media	22	66.1
Electrical machinery and apparatus n.e.c.	31	51.6
paper and paper products	21	50.7
Wood and of wood products	20	49.3
Manufacture of food products and beverages	15	44
Machinery and equipment n.e.c.	29	43.8
Fabricated metal products except machinery & equipment	28	43.3
Rubber and plastics products	25	41.5
Other non-metallic mineral products	26	31
Furniture; manufacturing n.e.c.	36	29.8
Wearing apparel, dressing and dyeing of fur	18	22.6
Leather and leather products	19	21.5
Textiles	17	11.8

Source: M. Tabibian (2002)

Table 2. Test of Equation 5

Dependent Variable: Rx				
Method: Pooled Least Squares Total panel (balanced) ob. 168				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.052806	0.027102	1.94841	0.0531
b1	1.212103	0.172909	7.01042	0
b2	0.457109	0.190525	2.399207	0.0031
b3	-0.213782	0.145091	-1.47133	0.1431
R-squared	0.257749	Mean dependent var		0.204405
Adjusted R-squared	0.248561	S.D. dependent var		0.360418
S.E. of regression	0.314223	Sum squared resid		16.10047
F-statistic	28.68826	Durbin-Watson stat		1.601003
Prob(F-statistic)	0			

Note: Rx is the equity Rate of Return on Exporting Firms

Table 3. Panel Test of Exchange Rate Exposure For Exporting-Firms

Dependent Variable: Rx				
Method: Pooled Least Squares				
Total panel (balanced) ob. 168				
Non-Weighted				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.061379	0.031502	1.94841	0.0531
FER(-1)	0.697109	0.227525	3.063875	0.0026
MI	1.222103	0.174073	7.02062	0
R-squared	0.258549	Mean dependent var		0.204405
Adjusted R-squared	0.249561	S.D. dependent var		0.360418
S.E. of regression	0.312223	Sum squared resid		16.08471
F-statistic	28.76826	Durbin-Watson stat		1.603003
Prob(F-statistic)	0			

Note: Rx=the equity rate of return on exporting firms, MI=the rate of return on the market index FER=the proportional one period currency rate of change

Test of Table 3 allowing for random effects

Dependent Variable: Rx
Method: GLS (Variance Components)
Total panel (balanced) observations 168

Variable	Coefficient	Std. Error	t-Statistic	
C	0.061379	0.028458	2.156841	
MI	1.222103	0.17615	6.937863	
FER(-1)	0.697109	0.230239	3.027759	
Random Effects				
KES--C	-0.00209			
KAL--C	-0.014062			
ALP--C	-0.012288			
MSB--C	0.035597			
KAR--C	-0.065494			
PAS--C	0.010768			
PAK--C	0.046682			
KAF--C	0.006334			
PAB--C	0.008108			
PFA--C	-0.022486			
NAB--C	-0.069485			
NAP--C	-0.002977			
SHA--C	0.03205			
NSH--C	0.049342			
GLS Transformed Regression				
R-squared	0.240755	Mean dependent var		0.204405
Adjusted R-squared	0.231552	S.D. dependent var		0.360418
S.E. of regression	0.315947	Sum squared resid		16.47072
Durbin-Watson stat	1.565434			
Unweighted Statistics including Random Effects				
R-squared	0.213493	Mean dependent var		0.204405
Adjusted R-squared	0.20396	S.D. dependent var		0.360418
S.E. of regression	0.321569	Sum squared resid		17.06212
Durbin-Watson stat	1.511174			

Table 4. Panel Test of Exchange Rate Exposure For non-Exporting-Firms

Sample: 1375:1 1380:2
Dependent Variable: Rn
Method: Pooled Least Squares
Total panel (balanced) observations 360

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.103066	0.026716	3.85783	0.0001
MI	1.283505	0.147626	8.694275	0
FER(-1)	0.299344	0.192957	1.551351	0.1217
R-squared	0.178013	Mean dependent var		0.226444
Adjusted R-squared	0.173408	S.D. dependent var		0.426331
S.E. of regression	0.387608	Sum squared resid		53.63567
F-statistic	38.65677	Durbin-Watson stat		1.726265
Prob(F-statistic)	0			

Note: Rn=the equity rate of return on non-exporting firms

Test of Table 4 Test Allowing For Random Effects

Dependent Variable: Rn
Method: GLS (Variance Components)
Sample: 1375:1 1380:2
Included observations: 12
Total panel (balanced) observations 360

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.103066	0.024097	4.27715	0
MI	1.283505	0.14967	8.575551	0
FER(-1)	0.299344	0.195629	1.530167	0.1269
Random Effects				
ABG--C	0.095499			
IRK--C	0.000801			
PAM--C	0.021126			
AMA--C	0.027593			
IRT--C	0.030365			
PIR--C	-0.013981			
SAB--C	0.028979			
PAP--C	0.067321			
JAB--C	-0.001047			
PAD--C	-0.0611			
RZK--C	-0.035693			
KAI--C	0.027131			
JAM--C	-0.000585			
SMT--C	-0.112837			
SIS--C	0.009578			
SEP--C	0.004034			
SMK--C	-0.049551			
SMM--C	-0.103136			
MAR--C	0.077021			
KIM--C	0.030365			
KAP--C	0.006806			
SID--C	-0.060176			
BAG--C	-0.015829			
LOB--C	0.050691			
KAM--C	-0.02322			
FKC--C	-0.0089			
MOT--C	0.060391			
LNT--C	0.016969			
LAS--C	-0.021373			
NAV--C	-0.047241			

GLS Transformed Regression

R-squared	0.155096	Mean dependent var	0.226444
Adjusted R-squared	0.150362	S.D. dependent var	0.426331
S.E. of regression	0.392974	Sum squared resid	55.13107
Durbin-Watson stat	1.679441		

Unweighted Statistics including Random Effects

R-squared	0.119474	Mean dependent var	0.226444
Adjusted R-squared	0.114541	S.D. dependent var	0.426331
S.E. of regression	0.401173	Sum squared resid	57.45542
Durbin-Watson stat	1.611499		

Table 5. Testing Equation II For Differences in Exposure of Exporting Firms

Variables	Coefficient	T-Stat
bo	0.00029	4.022
b1	0.849	3.68
b2	0.296	1.684
b3	1.3	11.68
R-Squared	**0.195**	
F	**42.3**	
D.W.	**1.85**	
Sample 1996-2001		

Notes: bo=Constant, b1=coefficient for exporting firms, b2=coefficient for non-exporting firms
b3=coefficient for the rate of return on the market index