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EFFECT OF U.S DOLLAR RATE SHOCKS ON TSE MAIN INDICES REACTION

Abstract: Evidence is presented that a change in the value of the Rial does not have a significant immediate nor lagged impact on the Iranian stock market as a whole. Using abnormal rates of return, Automobiles is the only industrial sector for which a two-year lagged relationship is confirmed. Overall, "the falling Rial" or the mighty Rial did not hurt the Iranian economy over the 2004-2014 period; it actually improved the stock market performance of several specific industries.
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Introduction

Globalization of the markets for capital, goods and services in combination with increased volatility in exchange rates has resulted in enhanced foreign exchange and competitive exposure for most firms. Corporate earnings and therefore their equity values are impacted by the economic exposure created by exchange rate movements. Even the purely domestic company may be affected by foreign exchange risk in a direct way if it faces foreign competition or indirectly because of the link between a change in the value of a country's currency and macro-economic variables such as aggregate demand, and through effects on the monetary base caused by foreign exchange intervention under managed (sometimes dirty) floating. Consequently, a country's economic performance can be influenced by changes in the external value of the domestic currency. The impact of foreign exchange exposure is expected to be especially high for those countries, which participate actively in foreign trade[1] and are major players in the international capital markets.

This study deals with Iran as a leading trading nation and with Tehran as a major international financial center. As for some other countries, the 1980's represented years of deregulation and liberalized capital markets[2] for Iran. We want to investigate the relationship between the external value of the RIAL and the economic performance of Corporate Iran as measured by the Tehran Stock Price Index. Usually we postulate a negative relation between stock market performance and currency appreciation. This is because a rise in the value of the home-currency is expected to result in a slowdown of the domestic economic activity due to reduced exports and a substitution of imports for domestically produced goods and services. However, the popular press[3] has recently reported that "the falling Rial" - or the falling Rial - has only forced Iranian manufacturers to grow more competitive while boosting the balance sheets of Iranian banks. In fact halving the dollar's value against the Rial since 2009 has had little effect on trade flows[4] while the Iranian stock market has been drifting upward despite "the falling Rial."

Literature

An early study on the effects of changing exchange rates on the stock prices of multinational firms was by Franck and Young (1972). They found no definite pattern of stock price reaction of multinational firms to exchange rate realignments. Ang and Ghallab (1976) examined the behavior of stock prices of 15 multinational companies to the U.S. dollar devaluations of August 1971 and March 1973. While prices did not reflect an anticipation of

the devaluations, they adjusted rapidly in conformity with market efficiency. Aggarwal (1981) first investigated the relationship between stock prices and the floating value of the dollar. Using monthly U.S. stock price and currency value data for the period 1974 - 1978, he showed that the value of the U.S. dollar and U.S. stock prices are positively correlated and that the U.S. stock market is an efficient processor of information incorporated in exchange rates.

Levy (1987) examined the impact of changes in the U.S. dollar on real corporate profits before tax. His results indicate that real profits are negatively and significantly related to the U.S. dollar, but the impact varies substantially by industRial sector. The changes in U.S. dollar value have their largest impact on profits of durable goods manufacturers but have very little effect on profits in certain service industries. Employing monthly data, Solnik (1987) reports a weak positive correlation between real stock market return differentials and real exchange rates for eight advanced countries. In contrast, Soenen and Hennigar (1988) find a strong negative correlation between U.S. market indexes and the effective exchange rate of the U.S. dollar weighted on 15 other major currencies.

Finally, Ma and Kao (1990) provide some insight into the reasons for these different correlations. They use monthly stock indexes and exchange rates of six industrial economies to investigate the impact of changes in currency values on stock prices. Their results suggest that currency appreciation has a negative effect on the stock market for an export-dominant economy, while currency appreciation boasts the stock market for an import-dominant economy. In addition to the studies briefly reviewed here, a multitude of articles have been published related to stock returns and exchange rates.5

The Statement of Purpose
Exchange rates have been very volatile since general floating in 1973. In addition, the spectacular growth of international trade has raised the exposure of firms to exchange risk. Uncertainty about the impact of unexpected changes in exchange rate on the firm's future cash flows exposes the firm to economic risk. Therefore, the stock price of a firm involved in international transactions or at least faces foreign competition is likely to be influenced by exchange rate fluctuations. Assuming efficient capital markets, stock prices are affected by changing exchange rates. Changes in stock prices are related to exchange rate changes because of their impact on the trade and capital account of a country's balance of payments. The exchange rate is the immediate link between the prices of domestic and foreign goods. A fall in the price of foreign exchange is the

same as an improvement in the home country's terms of trade and subsequently will impact corporate earnings and share prices. This paper is an attempt to empirically test whether the external value of the Iranian Rial has any explanatory value with regard to the performance of the Iranian stock market. We hypothesize a negative relationship between stock market returns (both overall and industry-wise) and the value of the Rial as measured against its major partner, the U.S. dollar. A decline in the value of the Rial is expected to stimulate domestic economic activities because of increased exports and domestic substitution for imported goods and services. Similarly, the effect of an appreciation of the Rial is expected to be a decline in stock prices.

Stock prices may react with a lag to exchange rate fluctuations because of the time it takes for capital flows and especially trade flows to reflect changes in the currency's strengths. Based on the J-curve effect in international economics, a sudden change in the external value of the domestic currency will have a lagged impact on the country's trade balance, and thus on stock market returns. Therefore, we test the hypothesis that changes in the value of the Rial have a lagged impact on Iranian stock market returns.

Furthermore, the presumed influence of the value of the Rial on the domestic stock market may be different depending on the size of the company and the type of industry. It is our assumption that large companies are less sensitive to the external value of the Rial than small companies since they usually have a more diversified portfolio of international activities. Moreover, industries, which largely depend on import and/or export transactions, are assumed to be more impacted by the international value of the Rial. Finally, in accordance with portfolio theory, we investigate whether abnormal rates of return for specific industries show a more significant relationship with the external value of the Rial.

Research Hypothesis
Four different measures of Iranian stock market prices were used: the Stock Average Index (Top 50 Index) and the Tehran Stock Exchange Price Index (Tepix) by size (Overall, Large, and Small)6. The exchange rates for the Rial against the U.S. dollar (i.e., number of RIALs per U.S. dollar) were gathered from International Financial Statistics published by the IMF. End-of-month values for the stock market indexes and Rial/dollar exchange rate were collected for the period August 2004 - December 2014. This nine year period contains a cycle of weak Rial (August 2004 to August 2009) followed by a cycle of strong Rial (September 2009 to December 2014). Figure 1 illustrates the Rial/dollar exchange rate .

In addition, 15 industry-specific indexes were obtained from Telecom. These are Air Transport, Automobiles, Chemicals, Communications, Electric Machinery (e.g., computer, audio/video equipment, etc.), General Machinery (e.g., sewing machines, typewriters, pump, piston, etc.), Iron and Steel, Oil Products, Pharmaceuticals, Precision Machinery (e.g., cameras, copiers, optical equipment, watches, etc.), Real Estate, Ship Building, Textiles, Trading, Transport Equipment (other than automobiles, e.g., aircraft, motorcycles, forklifts, etc.). All these industries, with the exception of real estate, are involved in a great number of import and/or export transactions. Similar to the four stock market indexes, a total of 113 monthly index values were collected for each of the 15 industries listed above covering the same period.

We basically used regression analysis to examine the relationship between the Tehran stock market returns and value of the Rial. To reduce spurious effects during the analysis, original data were transformed into monthly percentage changes in each stock index, industry index, and exchange rate of the Iranian Rial to the U.S. dollar. The percentage changes of each stock market index were first regressed against the concurrent percentage changes of the Rial value for the entire period. The same regression analysis was repeated for the two sub periods corresponding to a strengthening Rial and a weakening Rial. This allows us to determine if the relative strength of the Rial alters the presumed relationship between the stock market return and Rial/dollar value. To identify the J-curve effect, we regressed the percentage changes in the stock market indexes with time lags of respectively 12, 18, 24 and 36 months against the percentage changes in the value of the Rial.

An analysis by industry is useful because exchange rate changes may affect industries differently, either because some industries are more exposed to exchange risk than others do or because industries react differently to exchange risk (Maskus, 1986). Furthermore, many more factors than the external value of the domestic currency determine the stock market performance of an industry. Changes in the industry-indexes7 were regressed on the changes in the U.S. dollar value of the Rial for the entire period. The contemporaneous relationship

is tested first, and then the same time lags are tested as for the Tehran Stock Exchange indexes.

Since price movements in the overall stock market are a major determinant of the fluctuations in the stock indexes for different industries, we adjust the industries' price movements during the period considered. We determined the abnormal rate of return on an industry index by computing the difference between the industry's actual rate of return and its expected rate of return based upon the industry's relationship with the market (its beta). We regress these abnormal returns for the 15 industries on the percentage change in the value of the Rial.

Results and Discussion

Stock Market Indexes. Monthly percentage changes in each of the three stock indexes were regressed against the concurrent changes in the value of the Rial. The regression models were tested for the entire period studied and for the two sub periods corresponding to a weak Rial and a strong Rial. The results of these regressions are summarized in Table 1.

Most of the regressions were not significant at the 0.1 level. Two significant models were concerning the Tepix free float index during the entire period and the sub period of a weak Rial. The third significant model was with respect to the Tepix Overall index during the weak Rial period. This indicates that a change in the relative strength of the Rial is very unlikely to result in a change in the Iranian stock prices. Among the four stock indexes, Tepix free float is the most likely candidate to be influenced by a change in the Rial value. Interestingly enough is that the regression slopes for Top 50 Index, Tepix Overall, and Tepix free float are Consistently negative but small for the three periods. In contrast, the regression slope for the Tepix industry is negative for the period of a weak Rial but positive for the period of a strong Rial. This implies that an appreciation of the Rial is associated with a contemporaneous drop in the average stock price of small companies but a rise in those of the large companies and the entire stock market. Nevertheless, since all the regression slopes in Table 1 are small and not highly significant, we may conclude that a change in the value of the Rial does not have a significant immediate impact on the stock market performance in Iran.

Table 1

Regressions of stock exchange index on the value of iranian rial during different periods.

Tepix Overall	0.601	-0.229	2.502	110	.117	2.22%
Tepix Free Float	0.643	-0.290	3.544	110	**.062**#	3.12%
Tepix Industry	0.703	0.039	0.055	110	.815	0.05%
September 2004 To August 2009 (Weak Rial)						
Tepix Overall	1.700	-0.556	4.187	22	**.053**#	15.99%

Tepix Free Float	1.988	-0.664	4.119	22	.055#	15.77%
Tepix Industry	1.284	-0.364	1.338	22	.260	5.73%
September 2009 To December 2014 (Strong Rial)						
Tepix Overall	0.303	-0.209	1.602	86	.209	1.83%
Tepix Free Float	0.277	-0.268	2.394	86	.126	2.71%
Tepix Industry	0.553	0.074	0.151	86	.699	0.18%
Significant At P < 0.1.						

Industry Indexes. Following the above process, the changes of the 15 industry indexes were regressed one by one against changes in the Rial value, first without any time lags and then with the time lags of 1, 1.5, 2, and 3 years. Table 2 summarizes the results of the significant regression models.

Table 2

Significant Regression Of Industry Stock Index On Exchange Rate With Time Lags.

				F	n	p	R^2
No Lag							
Electric Machinery	0.408	0.523		4.585	110	**.035***	4.00%
Oil Products		0.446	-0.764	9.281	110	**.003****	7.78%
Real Estate	0.779	-0.742		5.223	110	**.024***	4.53%
Ship Building		0.931	-0.783	6.367	110	**.013***	5.47%
2-Year Lag							
Automobiles		-0.019	-0.690	12.240	86	**.001@**	12.46%
Chemicals	0.076	-0.555		4.889	86	**.031***	5.38%
Communications		-0.568	-0.517	4.490	86	**.037***	4.96%
Electric Machinery	-0.104		-0.608	5.059	86	**.027***	5.56%
General Machinery	0.109	-0.583		5.680	86	**.019***	6.20%
Iron & Steel		0.396	-0.482	3.534	86	**.064#**	3.95%
Pharmaceutical	-0.259	-0.387		2.942	86	**.090#**	3.31%
Precision Machin.	-0.251	-0.712		8.588	86	**.004****	9.08%
Textiles	0.076	-0.493		4.231	86	**.043***	4.69%
Trading	-0.011	-0.590		6.261	86	**.014***	6.79%
Transport Equip.		0.370	-0.495	3.052	86	**.084#**	3.43%

\#   Significant at $p < 0.1$.
*   Significant at $p < 0.05$.
**   Significant at $p < 0.01$.
@   Significant at $p < 0.001$.

All 15 industries except one, that is Air Transport, show a significant negative association between the Rial/$ value and stock market returns. The fact that international airfares are set by international agreement within the International Air Transport Association (IATA) makes the industry less sensitive to exchange rate fluctuations.

In general, the two-year lag impact of a change in the external value of the Rial is more significant than its immediate impact on domestic stock market performance. The Iranian stock market shows a clear J-curve effect with a two-year time lag; not all other time lags (i.e., 1, 1.5, 3 years) produced any statistical significant results. Only four industries, i.e., Electric Machinery, Oil Products, Real Estate, and Ship Building, show an immediate impact of the Rial value on their stock market returns. For these industries, with the exception of Electric Machinery, a strengthening of the Rial versus the U.S. dollar resulted in a higher stock market index.

For most industries, actually 11 out of 15, an appreciation of the Rial against the U.S. dollar resulted in a higher stock market return with a time lag of two years. These results are contrary to the hypothesized negative relationship between the external value of the domestic currency and industry performance. They imply that a strong Rial is good for Corporate Iran but the positive impact is seen in the stock market with a two-year time lag. The results are, however, in line with those reported by Aggarwal (1981) with regard to the U.S. and are in agreement with the theories of exchange rate determination, which call for a positive association between economic activity and the exchange rate8.

The strongest positive association between the value of the Rial and stock market return was found for Automobiles. This industry is clearly extremely export oriented, with the U.S. as its major export

market, and therefore expectedly very sensitive to changes in the Rial/$ exchange rate. The second strongest and significant relationship between the Rial value and stock market return was for Precision Machinery (i.e., cameras, copiers, optical equipment, etc.), which is another industry characterized by global competition.

There are several possible explanations for the positive association between a strong Rial and (mostly lagged) increased stock market returns. For example, a strong Rial makes it cheaper to invest in Asia, where many currencies track the U.S. dollar. In addition, the Asian markets (e.g., ASEAN) show a much faster growth than those of North America and Europe. A higher Rial also lowers the import bill for these

industries that depend on foreign sourcing. Finally, "the falling Rial" forced Iranian manufacturers to grow more competitive through fierce cost cutting and increased operational efficiency.

Abnormal Rates of Return.

In order to determine the abnormal rates of return, percent changes of the 15 industry indexes (dependent variables) were regressed one by one against percent changes of the Top 50 Index index (independent variable). The results of these regressions are reported in Table 3. All regression slopes are positive and significant at the 0.001 level. Each of these slopes is then used to calculate the abnormal return of the specific industry.

Table 3

Regression Of Industry Stock Index On   225 Index.

Air Transport		0.691	0.831	47.286	110	.000@	30.06%
Automobiles	-0.066	0.678	112.005	110		.000@	50.45%
Chemicals	-0.300	1.025	381.171	110		.000@	77.61%
Communications		-0.247	0.937	117.250	110	.000@	51.60%
Electric Machinery		-0.415	0.708	45.053	110	.000@	29.06%
General Machinery		-0.314	0.928	187.785	110	.000@	63.06%
Iron & Steel	0.129	0.966	199.252	110		.000@	64.43%
Oil Products	0.155	0.957	103.303	110		.000@	48.43%
Pharmaceutical		-0.155	0.787	95.481	110	.000@	46.47%
Precision Machin.		-0.390	0.780	77.249	110	.000@	41.26%
Real Estate	0.203	1.320	145.424	110		.000@	56.93%
Ship Building		0.445	1.232	127.103	110	.000@	53.61%
Textiles	0.098	0.970	317.499	110		.000@	74.27%
Trading	-0.453	0.919	196.721	110		.000@	64.14%
Transport Equipm.		0.048	0.986	148.146	110	.000@	57.39%
@ Significant at $p < 0.001$.							

As anticipated, the variability in the aggregate stock market return is a major determinant of the variability in the returns of specific industries. The results of Table 3 show that the overall stock market return explained a substantial percentage (above 74 percent) of the returns for the Chemicals and Textiles industries, while only a relative small fraction (less than 31 percent) for Air Transport and Electric Machinery.

Subsequently, we regressed the abnormal returns for each industry against the percent changes in the value of the Rial without any time lag. Table 4 discloses that 8 of the 15 industries' abnormal returns are significant at the 0.1 level. These industries are Automobiles ($p = 0.0325$), Chemicals ($p = 0.0663$), Electric Machinery ($p = 0.0005$), Oil Products ($p = 0.0062$), Pharmaceutical ($p = 0.0679$), Precision Machinery ($p = 0.0018$), Real Estate ($p = 0.0753$), and Ship Building ($p = 0.0365$).

Using abnormal rates of return, the regression results of Table 4 confirm the results reported in Table 2.A significant positive relationship between changes in the Rial/U.S. dollar exchange rate is found for Electric Machinery, while a negative association is found for Oil Products, Real Estate and Ship Building. In addition, four other industries, Automobiles, Chemicals, Pharmaceuticals and Precision Machinery, show a contemporaneous positive association (i.e., an appreciation of the Rial against the U.S. dollar results in a drop in the abnormal return for the industry). Table 4 also reveals the regression results for those industries having statistically significant relationships between changes in abnormal returns and changes in value of the Rial. The impact of changes in the Rial/Dollar value with a lag of 2 years on both the stock index (see Table 2) and the abnormal return of an industry is only confirmed for Automobiles.

Table 4

Significant Regression Of Industry Abnormal Return On Exchange Rate With Time Lags.

No Lag							
Automobiles	0.085	0.271	4.689	110	.033*	4.09%	
Chemicals	-0.194	0.191	3.442	110	.066#	3.03%	
Electric Machinery		-0.016	0.714	12.916	110	.001@	10.51%
Oil Products	-0.127	-0.506	7.792	110	.006**	6.62%	
Pharmaceutical		0.008	0.291	3.399	110	.068#	3.00%
Precision Machin.		-0.088	0.540	10.210	110	.002**	8.49%
Real Estate	-0.012	-0.386	3.223	110	.075#	2.85%	
Ship Building		0.193	-0.451	4.481	110	.037*	3.91%
1-Year Lag							
Communications		-0.374	0.270	2.767	98	.099#	2.75%
Transport Equipm.		0.464	0.405	6.220	98	.014*	5.97%
1.5-Year Lag							
Iron & Steel	-0.122	-0.308	4.386	92	.039*	4.55%	
Ship Building		0.597	-0.626	7.580	92	.007**	7.61%
2-Year Lag							
Automobiles	-0.180	-0.344	5.900	86	.017*	6.42%	
3-Year Lag							
Chemicals	0.142	0.291	4.993	74	.029*	6.32%	
Ship Building		0.606	-0.439	3.132	74	.081#	4.06%
# Significant at $p < 0.1$.		*	Significant at $p < 0.05$.		**	Significant at $p < 0.01$.	

Conclusion and Implications

This study extends earlier research into the stock market and exchange rate relationship in Iran. The contribution of the paper includes the use of different stock market indexes and the analysis of several specific industries over the most recent sample space. Although the Tehran Stock Exchange as a whole did not show any significant contemporaneous or lagged reaction to the value of the Rial against the U.S. dollar during the 2004-2014 period, this was not always the case at the individual industry level. For 11 of the 15 industries considered, an appreciation of the Rial resulted in a higher stock market return with a time lag of two years. The strongest positive association was found for Automobiles and Precision Machinery. The result for the Automobiles industry was confirmed through regressing abnormal industry rates of return on the external value of the Rial. The empirical evidence is, in general, in support of the classic theory of exchange rate determination, i.e., a positive association between economic activity and the exchange rate of the domestic currency.

The main policy implication of this study is that an appreciating Rial does not really hurt the Iranian economy. On the contrary, a soaring Rial seems to improve the performance of several industries with a time lag of two years. Notwithstanding "the falling Rial" since late 2009, Iran doesn't seem to be suffering from it. Fierce cost cutting, continued improvements in operational efficiency, relocation of business operations abroad, and its unassailable position in the world's fastest growing market Asia, just to mention a few reasons, made Corporate Iran almost immune to the dramatic changes in the external value of its currency.

Figure 1 - EXCHANGE RATE OF IRANIAN RIAL TO U.S. DOLLAR.

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