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The Impact of Exchange Rates on the Turkish Economy※

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Abstract

The Turkish lira depreciated by 200% against the U.S. dollar and the euro between 2012 and 2022. We investigate how depreciations affect Turkish imports, exports, and stock prices. We find that depreciations cause large decreases in imports but do not stimulate exports. We also find that they decrease stock prices for most sectors of the Turkish economy. In spite of the weak currency, economic growth in Turkey has remained resilient during the COVID-19 pandemic and the beginning of the Russia-Ukraine war. A stronger lira can strengthen this resilience by increasing the purchasing power of Turkish residents and the profitability of Turkish firms.

Keywords: Turkey; Exports and Imports; Exchange rate elasticities; Exchange rate exposures; COVID-19 pandemic

JEL classification: F14, F10

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1. Introduction

Turkey has chosen a new economic model, keeping interest rates low as inflation rises. According to Cemil Ertem,Turkey's chief economic advisor in 2021, this approach will weaken the Turkish lira, making Turkish exports more competitive and producing a current account surplus.[1] The Turkish lira has depreciated, falling logarithmially by more than 200% against the U.S. dollar and the euro between 1 January 2012 and 1 August 2022. The CPI-deflated real effective exchange rate fell by 70% over this period. This paper investigates how these exchange rate changes have affected Turkey's exports, imports, and economy. Also, as exchange rate depreciations have accelerated recently, it considers how the Turkish economy has fared since 2020.

In theory exchange rate depreciations should increase the price competitiveness and thus the volume of exports (see, e.g., Rose, 1991). They should also decrease the purchasing power of domestic agents and thus the volume of imports. The magnitude of these effects is an empirical question.

Karamelikli (2016) investigated whether a depreciation would improve Turkey's trade balance with Germany, France, the U.K., and the U.S. (i.e., whether the Marshall-Lerner condition holds). He employed autoregressive distributed lag (ARDL) models and monthly data on the bilateral trade balance, the consumer price index- (CPI) deflated real exchange, and real incomes over the January 2000 to May 2015 period. He found that the Marshall-Lerner condition holds in the long run for Turkey's trade with Germany and the U.S. but not for trade with France and the U.S.

[1] See Soylu (2021).

Toraganli and Yalcin (2016) examined how exchange rates affect Turkish manufacturing exports. They considered how depreciations impact exports by affecting price competitiveness, the cost of imported inputs, and the balance sheets of firms with net foreign exchange liabilities. Using difference generalized methods of moments techniques and annual data on 3,860 firms over the 2002-2010 period, they reported in their baseline model that a 10% depreciation reduces exports by 3%. They found that the effect is less for firms making intensive use of imported inputs and for those with low foreign exchange debt to export ratios.

Kaya (2021) investigated how bilateral real exchange rates and GDP affect bilateral trade balances between Turkey and its 25 main trading partners. Employing Mean Group, Common Correlated Effects Mean Group, and Augmented Mean Group estimators and quarterly data over the 1996:Q1-2015:Q2 period, they reported that a 1% lira depreciation would improve the trade balance by about 0.4%. They also reported that a 1% increase in trading partner GDP would improve the trade balance by between 1.5% and 2.8% and that a 1% increase in Turkish GDP would decrease the trade balance by between 0.8% and 1.4%.

Kopuk and Beşer (2020) employed ARDL techniques and quarterly data over the 1998Q1-2018Q4 period to investigate whether the Marshall-Lerner condition holds in the long run. They reported that a 1% lira depreciation reduces the manufacturing trade balance by 0.14% in the short run and by 0.24% in the long run. Thus their findings indicate that the Marshall-Lerner condition does not hold.

Halicioglu (2008) employed bounds testing and quarterly data over the 1980-2005 period to test for the existence of a J-curve phenomenon. Their model included the trade balance, the real effective exchange rate, foreign income and domestic income. They found evidence supporting a J-curve effect in the short run but reported no long-run impact of a real devaluation on the trade balance.

Uz (2010) employed a variety of panel cointegration techniques and quarterly data over the 1982-2007 period to estimate bilateral trade elasticities for Turkey's trade with 13 countries. She found that the Marshall-Lerner condition is only satisfied for Turkey's trade with Canada, South Korea and the U.S.

Akal (2010) used Parks' (1967) method and annual data on Turkey's exports and imports with 28 OECD over the 1993-2007 period. He reported export elasticities for the Turkish terms of trade of between -0.18 and -0.49 and import elasticities of between -0.35 and -0.53. He argued that having the same sign for export and import elasticities implies that exports are dependent on imports. He also reported income elasticities of exports of between 1.90 and 1.99 and income elasticities of imports of between 2.24 and 2.71. He also found that that a one percent decrease in Turkish lira export prices increases exports by 0.41 percentage and a one percent decrease in lira import prices increases imports by 0.43.

Keskin (2019) investigated whether there is a J-curve effect for Turkey's trade with Germany and with 28 European Union (EU) countries together. She employed an ARDL model and quarterly data over the 1999:Q1-2018:Q4 period. The results provided some support for the J-curve hypothesis for Turkey's trade with Germany but not for Turkey's trade with the 28 EU countries together.

Ramzan (2021) investigated how bilateral real exchange rates affect Turkey's balance of trade with the U.S. at both the aggregate level and across 23 industries. Using ARDL techniques and annual data over the 1989-2017 period he found no support for a J-curve effect at the aggregate level but support for it in the transportation, textiles & clothing, and ores & metals industries. He also reported that a lira depreciation favorably impacts Turkey's trade with the U.S. in most industries.

The results reported above are mixed concerning how depreciations affect Turkey's trade. Since lira depreciation has been a long-term phenomenon in Turkey, we use long run models to investigate its impact. We employ Johansen maximum likelihood and dynamic ordinary least squares (DOLS) estimation and the most recent data available. The results provide no evidence that depreciations increase exports. On the other hand, they provide strong evidence that depreciations reduce imports. Given the important role that imported inputs play in Turkey's production structure, these results suggest that lira depreciations are harmful for Turkey's firms.

To further investigate this issue, we examine the exposure of Turkish stock returns to exchange rates. Theory indicates that stock prices equal the expected present value of future cash flows. Thus the way that exchange rates affect stock prices can shed light on how they impact Turkish firms.

In previous work Türsoy (2017) employed ARDL, Error Correction Models, and Granger Causality techniques over the January 2001 to September 2016 to investigate the relationship between the Turkish lira/U.S. dollar real exchange rate and Turkish aggregate stock prices. They reported that, in the short run, exchange rates Granger-cause stock prices but that stock prices do not Granger-cause exchange rates. ARDL results also indicate that in the long run a depreciation of the lira is associated with an increase in stock prices.

Erer et al. (2016) used daily data over the February 2002 to April 2015 period to investigate the relationship between Turkish aggregate stock returns, the U.S. dollar, and the euro. They found fractional integrated errors and employed Geweke and Porter-Hudak fractional cointegration techniques. They reported that depreciations of the lira relative to the dollar and euro are associated with increases in Turkish stock returns. They also found that exchange rate changes Granger-cause stock prices but that stock prices do not Granger-cause exchange rates.

Çakır (2021) investigated the impact of exchange rates on Turkey's BIST (Borsa Istanbul) All Shares, BIST National 100, and BIST National 30 indices. They employed linear and nonlinear ARDL models and monthly data over the January 2003 to December 2018 period. The results indicate that an appreciation of the lira increases stock prices in the long-run. The author says this is because Turkish firms depend on imported raw and intermediate goods. An appreciation reduces the lira cost of imported inputs and increases the profitability of Turkish firms.

Kasman et al. (2010) examined how the Turkish market index, the 2-year Turkish government bond yield, and an equally-weighted basket of the U.S. dollar and the euro against the lira affect Turkish banks' stock returns. They employed ordinary least squares and generalized autoregressive conditional heteroskedasticity estimation methods and daily data over the 27 July 1999 and 9 April 2009 period. Their results indicate that interest rate increases and depreciations tend to reduce bank stock returns.

Tirkayi at al. (2019), employing monthly data over the 1994:01–2017:05 and 2002:01–2017:05 periods, investigated how macroeconomic variables such as industrial production, the money supply, and the real effective exchange rates affect stock returns. They reported that a 1% depreciation of the real exchange rate increased the BIST100 by 1.47% over the longer sample and by 2.45% over the shorter sample.

We extend this work by disaggregating stock returns and investigating how exchange rates affect returns for 30 Turkish sectors. The evidence indicates that stock returns for most sectors fall when the lira depreciates. In addition, depreciations cause large decreases in the aggregate Turkish stock market. This indicates that depreciations harm the profitability of many firms in Turkey.

The next section presents trade elasticities for Turkey's exports and imports. Section 3 presents the exposure of sectoral stock returns to exchange rates. Section 4 examines the performance of Turkish exports, imports, stock prices, and other variables during the COVID-19 pandemic and the Russia-Ukraine War. Section 5 concludes.

2. Estimating Trade Elasticities

The imperfect substitutes model provides a framework for investigating trade elasticities. In this model imported and domestic goods are imperfect substitutes. Import demand can be represented as:

$$Im_t = \beta_0 + \beta_1 RPM_t + \beta_2 lnY_t \qquad (1),$$

where Im_t represents the domestic country's imports, RPM_t is the price of imports in the importing country's currency relative to the price of domestic goods and Y_t is domestic income (see Rose, 1991). The model posits that β_1 is negative and that β_2 is positive. Export supply can be represented as:

$$X*_t = \alpha_0 + \alpha_1 RPX*_t \qquad (2),$$

where $X*_t$ represents the foreign country's exports and $RPX*_t$ is the price of the foreign country's exports (the domestic country's imports) in the foreign currency relative to the price index for goods produced in the foreign country. The model posits that α_1 is positive. If RER_t is the real exchange rate (importing country's currency per unit of export country's currency), then

$RPX^*_t = RER_t^* RPM_t$ (see Rose). Equating (1) and (2) and using RER_t to relate prices in the two currencies yields the export function:

$$lnX_t = \beta_0 + \beta_1 lnRER_t + \beta_2 lnY *_t \qquad (3).$$

The coefficient β_1 is expected to be negative and the coefficient β_2 to be positive. A country's exports should decrease when its currency appreciates and increase when its trading partner's real GDP increases. Similarly, import functions in this framework can be represented as:

$$lnIm_t = \alpha_0 + \alpha_1 lnRER_t + \alpha_2 lnY_t \qquad (4),$$

The coefficient α_1 is expected to be positive and the coefficient α_2 to be positive. A country's imports should increase when its currency appreciates and when its real GDP increases.

Following Chinn (2005), we treat (3) and (4) as semi-reduced form equations. As Chinn noted, exchange rate changes tend to be more exogenous than the relative prices of exports and imports used to derive (3) and (4). Thus we follow Chinn in giving a structural interpretation to equations (3) and (4) and using them to investigate how exchange rate changes affect the volume of exports and imports.

Equation (4) can be written in vector error correction form as:

$$\Delta lnIM_t = \beta_{10} + \varphi_1(LnIM_{t-1} - \alpha_1 - \alpha_2 LnRER_{t-1} - \alpha_3 lnY_{t-1}) + \beta_{11}(L)\Delta lnIM_{t-1} + \beta_{12}(L)\Delta lnRER_{t-1} + \beta_{13}(L)\Delta lnY_{t-1} + \nu_{1t} \qquad (5a)$$

$$\Delta lnRER_t = \beta_{20} + \varphi_2(lnIM_{t-1} - \alpha_1 - \alpha_2 lnRER_{t-1} - \alpha_3 lnY_{t-1}) + \beta_{21}(L)\Delta lnIM_{t-1} + \beta_{22}(L)\Delta lnRER_{t-1} + \beta_{23}(L)\Delta lnY_{t-1} + \nu_{2t} \qquad (5b)$$

$$\Delta lnY_t = \beta_{30} + \varphi_3(lnIM_{t-1} - \alpha_1 - \alpha_2 lnRER_{t-1} - \alpha_3 lnY_{t-1}) + \beta_{31}(L)\Delta lnIm_{t-1} + \beta_{32}(L)\Delta lnRER_{t-1} + B_{33}(L)\Delta lnY_{t-1} + \nu_{3t} \ . \qquad (5c)$$

φ_1, φ_2, and φ_3 are error correction coefficients. They measure how quickly imports, the real exchange rate, and income, respectively, respond to disequilibria. If these endogenous variables move towards their equilibrium values, the corresponding correction coefficients will be negative and statistically significant. The L's represent polynomials in the lag operator. Equations (5a) – (5c) and the analogous equations for exports are estimated using Johansen maximum likelihood methods.

Quarterly data on the value of Turkey's goods imports and exports over the 1998-2021 period are obtained from the CEIC database. They are deflated using export and import unit value indices obtained from CEIC over the 2013-2021 period and from the World Bank before that.[2] Data on the producer price index- (PPI) and consumer price index- (CPI) deflated real effective exchange rates are obtained from CEIC. The PPI-deflated RER may be a better measure of price competitiveness than the CPI-deflated RER. Rest of the world income is represented by G20 real GDP. Data on G20 and Turkish GDP are obtained from the OECD.[3]

Augmented Dickey-Fuller tests indicate in almost every case that the series are integrated of order one. As reported in Tables 1 and 2, the trace statistic and the maximum eigenvalue statistic allow us to reject in three of the four specifications the null of no cointegrating relations against the alternative of one cointegrating relation.

Table 1 presents the results from estimating equations (5a) – (5c) with a linear trend in the data and an intercept and trend in the cointegrating equation. The exchange rate elasticities are statistically significant and of the expected sign. They equal 1.44 for the PPI-deflated exchange rate and 1.05 for the CPI-deflated exchange rate. These results indicate that a 10% appreciation of the PPI-deflated rate will increase imports by 14.4% and a 10% increase in the CPI-deflated rate by 10.5%. The GDP elasticities are statistically significant and close to unity

[2] The CEIC data are monthly and averaged to obtain quarterly data. The World Bank data are annual and linear interpolation is used to convert them to quarterly data. The website for CEIC is: www.ceicdata.com/en . The website for the World Bank is www.worldbank.org .
[3] The website for the OECD is www.oecd.org .

Table 1. Johansen MLE Estimates for Turkish Imports

	Number of cointe-grating vectors	Number of obser-vations	RER elasticity	GDP elasticity	Error correction coefficients		
					Imports	RER	GDP
Turkish Imports	1,1	94	1.44***	1.06***	-0.34***	0.24***	-0.03
			(0.12)	(0.25)	(0.12)	(0.07)	(0.04)
(PPI-deflated RER. Lags: 1; Sample: 1998:3-2021:4; Linear trend in the data, intercept and trend in the cointegrating equation)							
Turkish Imports	1,1	95	1.05***	1.00***	-0.27***	0.19**	-0.03
			(0.13)	(0.34)	(0.11)	(0.08)	(0.04)
(CPI-deflated RER. Lags: 0; Sample: 1998:2-2021:4; Linear trend in the data, intercept and trend in the cointegrating equation)							

Notes: Johansen maximum likelihood estimates. Lag length was selected based on the Akaike Criterion. Number of Cointegrating Vectors indicates the number of cointegrating relations according to the trace and maximum eigenvalue tests at the 5% level. PPI-deflated RER refers to the PPI-deflated real effective exchange rate and CPI-deflated RER refers to the CPI deflated real effective exchange rate. An increase in the RER implies an appreciation of the Turkish lira. The predicted signs of the RER coefficients are positive. GDP refers to Turkish real GDP. The predicted signs of the GDP coefficients are positive. Quarterly dummy variables and dummy variables for the COVID-19 period are also included.
Source: CEIC database, OECD database, and calculations by the authors.
*** (**) denotes significance at the 1% (5%) level.

in both cases. These findings indicate that a 10% increase in GDP would increase exports by 10%.

The error correction coefficients for imports are negative and statistically significant, indicating that imports return to their equilibrium values. The correction coefficients imply that the gap between the current value of imports and the equilibrium value closes at a rate of 34% per quarter using the PPI-deflated RER and 27% per quarter using the CPI-deflated RER. For the PPI-deflated rate this implies that 81% of the gap between actual and predicted exports will close within a year and for the CPI-deflated rate that 73% of the gap will close. The model estimated in Table 1 thus performs well.

Table 2 presents Johansen maximum likelihood estimates for Turkey's exports with a linear trend in the data and an intercept in the cointegrating equation. The exchange rate elasticities are statistically significant but not of the predicted sign. They equal 1.49 for the PPI-deflated exchange rate and 0.82 for the CPI-deflated exchange rate. These results indicate that a 10% appreciation of the PPI-deflated rate is associated with an increase in exports of 14.9% and a 10% increase in the CPI-deflated rate with an increase of 8.2%. The GDP elasticities are statistically significant and close to 2.5 in both cases. These findings indicate that a 10% increase in rest of the world GDP would increase Turkey's exports by 25%.

The error correction coefficients for exports are not statistically significant, indicating that exports do not return to their equilibrium values. This suggests that the model estimated in Table 2 does not perform well. Montalvo (1995) found that the DOLS estimator has smaller bias and root mean squared error than other cointegrating regression estimators such as the Johansen estimator when the sample size is too small to justify applying asymptotic theory.

Table 2. Johansen MLE Estimates for Turkish Exports

	Number of cointegrating vectors	Number of observations	RER elasticity	GDP elasticity	Error correction coefficients		
					Exports	RER	GDP
Turkish Exports	1,1	93	1.49***	2.51***	-0.04	0.25***	-0.01
			(0.23)	(0.11)	(0.06)	(0.04)	(0.01)
(PPI-deflated RER. Lags: 1; Sample: 1998:3-2021:3; Linear trend in the data, intercept in the cointegrating equation)							
Turkish Exports	0,0	94	0.82***	2.45***	-0.11	0.21***	-0.01
			(0.19)	(0.12)	(0.07)	(0.06)	(0.01)
(CPI-deflated RER. Lags: 0; Sample: 1998:2-2021:3; Linear trend in the data, intercept in the cointegrating equation)							

Notes: Johansen maximum likelihood estimates. Lag length was selected based on the Akaike Criterion. Number of Cointegrating Vectors indicates the number of cointegrating relations according to the trace and maximum eigenvalue tests at the 5% level. PPI-deflated RER refers to the PPI-deflated real effective exchange rate and CPI-deflated RER refers to the CPI deflated real effective exchange rate. An increase in the RER implies an appreciation of the Turkish lira. The predicted signs of the RER coefficients are negative. GDP refers to real GDP in the G20 countries. The predicted signs of the GDP coefficients are positive. Quarterly dummy variables and dummy variables for the COVID-19 period are also included.
Source: CEIC database, OECD database, and calculations by the authors.
*** denotes significance at the 1% level.

Import functions can be estimated via DOLS by the equation:

$$\ln IM_t = \alpha_0 + \alpha_1 \ln rer_t + \alpha_2 \ln y_t + \sum_{k=-K}^{K} \phi_{1,k} \Delta \ln rer_{t+k} + \sum_{k=-K}^{K} \phi_{2,k} \Delta \ln y_{t+k} + \varepsilon_t \qquad (6).$$

K represents the number of leads and lags of the first-differenced right-hand side variables and the other variables are defined above. Following Stock and Watson's (1993) recommendation, K is set at 1 and a time trend is included in the estimation. Export functions can be estimated using an analogous equation:

$$\ln X_t = \beta_0 + \beta_1 \ln rer_t + \beta_2 \ln y_t^* + \sum_{k=-K}^{K} \gamma_{1,k} \Delta \ln rer_{t+k} + \sum_{k=-K}^{K} \gamma_{2,k} \Delta \ln y_{t+k}^* + \varepsilon_t \qquad (7).$$

Table 3 presents the results. Columns (2) and (3) present the results for imports and columns (4) and (5) the results for exports. The findings in columns (2) and (3) are similar to the Johansen MLE estimates for imports in Table 1. For the PPI-deflated RER, a 10% appreciation would increase imports by 13.2%. For the CPI-deflated RER, a 10% appreciation would increase imports by 9.6%. The GDP elasticities in both cases are close to 1.2.

For exports the exchange rate elasticities are still not of the expected sign but are smaller than in Table 2. For the PPI-deflated RER, a 10 percent appreciation is associated with a 7.4% increase in exports and for the CPI-deflated RER a 10 percent appreciation is associated with a 5.1% increase in exports. As with Table 2, the GDP elasticities are large. The GDP elasticities in these two specifications are close to 3.2.

Table 3. Dynamic Ordinary Least Squares Estimates for Turkish Imports and Exports

(1)	(2)	(3)	(4)	(5)
	Imports		Exports	
PPI-Deflated Real Effective Exchange Rate	1.32*** (0.12)		0.74*** (0.13)	
CPI-Deflated Real		0.96***		0.51***

Effective Exchange Rate		(0.08)		(0.09)
Turkish GDP	1.23*** (0.23)	1.21*** (0.25)		
G20 GDP			3.18*** (1.12)	3.25*** (1.13)
COVID Dummy	0.02 (0.05)	0.11*** (0.04)	0.18** (0.08)	0.23*** (0.08)
Adjusted R-Squared	0.972	0.973	0.971	0.969
Standard Error of Regression	0.073	0.073	0.086	0.089
Sample Period	1998Q3-2021Q3	1998Q3-2021Q3	1998Q3-2021Q2	1998Q3-2021Q2
Number of Observations	93	93	92	92

Note: The table presents exchange rate and GDP elasticities from dynamic ordinary least squares (DOLS) estimates of import and export equations. For imports (columns (2) and (3)), the left-hand-side variable is Turkish real imports and the right-hand-side variables are Turkish real GDP and the PPI-deflated real effective exchange rate (column (2)) and the CPI-deflated real effective exchange rate (column (3)). The predicted signs of the exchange rate coefficients in columns (2) and (3) are positive. For exports (columns (4) and (5)), the left-hand-side variable is Turkish real exports and the right-hand-side are real GDP in G-20 countries and the PPI-deflated real effective exchange rate (column (4)) and the CPI-deflated real effective exchange rate (column (5)). The predicted signs of the exchange rate coefficients in columns (4) and (5) are negative. The predicted signs of the GDP coefficients in columns (2) through (5) are positive. One lag and one lead of the first difference of the right hand side variables, a linear time trend, quarterly dummy variables, and dummy variables for the COVID-19 period are included in the regressions. Heteroskedasticity and autocorrelation consistent standard errors are reported in parentheses.
Source: CEIC database, OECD database, and calculations by the authors.
*** denotes significance at the 1% level.

The results in Tables 1 through 3 provide no evidence that a lira depreciation increases net exports. It reduces imports which are crucial to the Turkish economy without stimulating exports.

3. Estimating Exchange Rate Exposures

Many papers have investigated firms' exposure to exchange rates (see. e.g., Ito et al., 2016, and Jayasinghe and Tsui, 2008). The methodology involves regressing stock returns on the change in the exchange rate. Ito et al. (2016) estimated both the total exchange rate exposure and the residual exchange rate exposure of Japanese firms to exchange rate changes. The total exposure comes from a regression of sectoral stock returns on the change in the exchange rate. The residual exposure comes from a regression of sectoral stock returns on the change in the exchange rate and on other control variables such as the return on the country's aggregate stock market. When estimating residual exposures we employ the return on the Turkish aggregate stock market, the change in the log of either the Turkish lira/U.S. dollar or Turkish lira/euro exchange rate, the return on the world aggregate stock market, the change in the log of the spot price of Dubai crude oil, the change in the central bank policy rate, a dummy variable that equals one on 21 December 2021 (when Turkey announced that it would compensate lira bank accounts to compensate for losses relative to the U.S. dollar) and zero otherwise, the change in the number of new COVID-19 cases in Turkey, and the change in the Oxford Coronavirus Government Response Tracker project measure of Turkey's policy strictness.[4]

Chen, Roll, and Ross (1986) noted that, while only supernovas and similar phenomena are truly exogenous, causality should flow from macroeconomic variables on the right-hand side of the regressions to individual portfolio returns on the left-hand-side and that any causality flowing in the other direction should be second order. Thus regressing sectoral stock returns on the exchange rate should produce consistent parameter estimates.

The models we estimate are:

$$\Delta R_{i,t} = \alpha_0 + \alpha_1 \Delta er_t \;, \tag{9}$$

and:

[4] Policy strictness is evaluated in nine areas: school closures; workplace closures; cancellation of public events; restrictions on public gatherings; closures of public transport; stay-at-home requirements; public information campaigns; restrictions on internal movements; and international travel controls. Stringency in each area on each day is rated between 0 and 100. The overall index is the simple average of the stringency values in each of the nine areas.

$$\Delta R_{i,t} = \alpha_0 + \alpha_1 \Delta R_{m,t} + \alpha_2 \Delta er_t + \alpha_3 \Delta R_{W,t} + \alpha_4 \Delta Crude_t + \alpha_5 \Delta CBRT_t + \alpha_6 Dumm_t + \alpha_7 \Delta Newcases_t + \alpha_8 \Delta Stringency_t \ , \tag{10}$$

where $\Delta R_{i,t}$ is the change in the log of the stock price index for sector i, Δer_t is the change in the log of either the Turkish lira/U.S. dollar exchange rate or the Turkish lira/euro exchange rate, $\Delta R_{m,t}$ is the change in the log of the price index for the Turkish aggregate stock market, $\Delta R_{W,t}$ is the change in the log of the price index for the world aggregate stock market, ΔCrude_t is the change in the log of the spot price index for Dubai crude oil, Dumm_t is a dummy variable that equals one on 21 December 2021 (when Turkey announced that it would compensate lira bank accounts to compensate for losses relative to the U.S. dollar) and zero otherwise, $\Delta \text{Newcases}_t$ is the change in the number of new COVID-19 cases, and $\Delta \text{Stringency}_t$ is the change in the Oxford Coronavirus Government Response Tracker project measure of Turkey's policy strictness. Heteroskedasticity and autocorrelation consistent standard errors are reported.

Data on the returns on 30 sectors, the Turkish lira/U.S. dollar and Turkish lira/euro exchange rates, the return on the Turkish and world aggregate stock markets, and the spot price of Dubai crude oil are obtained from the Datastream database. Data on the number of new COVID-19 cases and the policy strictness measure come from the Our World in Data website.[5] The data are daily. The sample period extends from 21 February 2002 to 22 April 2022. There are 5,260 observations.[6]

Table 4 presents the total exposures. Column (2) indicates that all of the exposures to the dollar are negative and column (4) indicates that all of the exposures to the euro are negative. This indicates that a depreciation of the lira against either the dollar or the euro harms Turkish firms.

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5 The URL for Our World in Data is https://ourworldindata.org .

6 In cases when stock return data are unavailable on 2 April 1999, the data are employed beginning on the first date they are available.

The lion's share of the negative coefficients is statistically significant. The top row of results indicates that the aggregate stock market is highly exposed to exchange rates. A 10% depreciation of the lira relative to the U.S. dollar reduces returns on the aggregate market by 4.9% and a 10% depreciation of the lira relative to the euro decreases returns by 3.9%. Banks, the financial sector, retailers, consumer electronics, food producers, electricity, automobiles, consumer discretionary, travel and leisure, and drug/grocery stores are especially harmed by a weaker lira.

Table 4. The Total Exposure of Turkish Stock Returns to the U.S. Dollar and the Euro

(1)	(2)	(3)	(4)	(5)
Sector	Exposure to U.S. Dollar	S.E.	Exposure to Euro	S.E.
Aggregate Turkish Stock Market	-0.490***	0.148	-0.392***	0.130
Automobiles	-0.429***	0.157	-0.341***	0.141
Automobiles & Parts	-0.421***	0.155	-0.341***	0.140
Banks	-0.682***	0.145	-0.555***	0.122
Basic Materials	-0.378***	0.145	-0.253**	0.121
Basic Resources	-0.398***	0.15	-0.263**	0.125
Beverages	-0.324**	0.138	-0.286**	0.132
Brewers	-0.275*	0.14	-0.240*	0.135
Consumer Discretionary	-0.413***	0.147	-0.335**	0.132
Consumer Staples	-0.379***	0.121	-0.328***	0.112
Chemicals	-0.388**	0.161	-0.300**	0.143
Construction	-0.260*	0.141	-0.165	0.122
Consumer Electronics	-0.480***	0.156	-0.403***	0.141
Diversified REITS	-0.096*	0.058	-0.084	0.057
Drug/Grocery Stores	-0.401***	0.128	-0.360***	0.122
Electricity	-0.460***	0.154	-0.384***	0.139
Financials	-0.670***	0.147	-0.543***	0.123
Food Producers	-0.471***	0.127	-0.380***	0.109
Glass	-0.357**	0.157	-0.280**	0.142
Gold Mining	-0.133	0.147	-0.022	0.121
Household Appliances	-0.417***	0.151	-0.327***	0.133
Industrial Transportation	-0.319*	0.165	-0.206	0.144
International Oil & Gas	-0.406***	0.149	-0.339***	0.137
Iron & Steel	-0.390***	0.149	-0.256**	0.123
Real Estate	-0.326***	0.111	-0.251***	0.091
Retailers	-0.604***	0.165	-0.522***	0.155
Soft Drinks	-0.318**	0.142	-0.274*	0.141
Telecommunications	-0.397***	0.141	-0.352***	0.134
Telecommunications Services	-0.299**	0.147	-0.229*	0.138
Textile Products	-0.271**	0.136	-0.229*	0.128
Travel & Leisure	-0.408***	0.142	-0.338***	0.130

Note: The table presents total exchange rate exposures for the sectors listed in column (1). Total exposures in column (2) come from a regression of sectoral stock returns on the nominal Turkish lira/U.S. dollar esxchange rate and total exposures is column (4) from a regression of sectoral stock returns on the nominal Turkish lira/euro exchange rate. S.E. in columns (3) and (5) are heteroskedasticity and autocorrelation consistent standard errors. The sample period extends from 21 February 2002 to 22 April. There are 5,260 observations. In cases where the data are unavailable starting on 2 April 1999, the regressions begin on the first date when

the data are available.
Source: Datastream database and calculations by the authors.
*** (**) [*] denotes significance at the 1% (5%) [10%] level

Table 5 presents the partial exposures together with exposures to the aggregate Turkish stock market. Column (2) reports exposures to the dollar, column (4) exposures to the aggregate Turkish market in the regression including the dollar, column (6) exposures to the euro, and column (8) exposures to the aggregate Turkish market in the regression including the euro. The top row of results indicates that the aggregate stock market is highly exposed to exchange rates. A 10% depreciation of the lira relative to the U.S. dollar reduces returns on the aggregate market by 4.4% and a 10% depreciation of the lira relative to the euro decreases returns by 4.0%.

In this specification reported in Table 5 as in the one reported in Table 4, retailers, food producers, and drug/grocery stores remain exposed to lira depreciations. Retailers such as Doğuş Oto import and distribute automobiles. A lira depreciation increases the lira cost of imported cars and thus reduces Doğuş Oto's profits. Food producers such as Kent Gida manufacture and sell products such as Toblerone, Milka, Ritz Crackers, and Triscuit. A lira depreciation increases the lira cost of importing intermediate and final products and thus reduces Kent Gida's profits. Drug/grocery stores such as BIM import food and consumer goods and sells them. Again a lira depreciation increases the lira cost of these imports and thus reduces BIM's lira profits.

Table 5. The Partial Exposure of Turkish Stock Returns to the U.S. Dollar, the Euro, and the Turkish Stock Market

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sector	Exposure to U.S. Dollar	S.E.	Exposure to Turkish Stock Market	S.E.	Exposure to Euro	S.E.	Exposure to Turkish Stock Market	S.E.
Aggregate Turkish Stock Market	-0.438***	0.066	NA	NA	-0.397***	0.059	-NA	NA
Automobiles	0	0.038	0.874***	0.022	-0.008	0.037	0.873***	0.022
Automobiles & Parts	-0.008	0.038	0.851***	0.02	-0.021	0.037	0.849***	0.02
Banks	-0.057	0.044	1.242***	0.018	-0.039	0.042	1.245***	0.017
Basic Materials	0.047	0.033	0.800***	0.018	0.079***	0.027	0.804***	0.018
Basic Resources	0.067*	0.038	0.879***	0.023	0.105***	0.034	0.884***	0.023
Beverages	-0.051	0.039	0.618***	0.021	-0.085**	0.042	0.613***	0.021
Brewers	0.006	0.051	0.611***	0.025	-0.033	0.053	0.606***	0.025

Consumer Discretionary	-0.012	0.025	0.846***	0.015	-0.022	0.024	0.844***	0.015
Consumer Staples	-0.094***	0.028	0.644***	0.018	-0.107***	0.028	0.643***	0.018
Chemicals	-0.001	0.073	0.779***	0.029	-0.001	0.073	0.779***	0.029
Construction	0.105**	0.05	0.682***	0.024	0.113**	0.048	0.682***	0.024
Consumer Electronics	-0.051	0.039	0.864***	0.024	-0.077**	0.033	0.861***	0.025
Diversified REITS	-0.114	0.097	0.624***	0.097	-0.112	0.1	0.627***	0.099
Drug/Grocery Stores	-0.109***	0.039	0.694***	0.026	-0.136***	0.037	0.691***	0.025
Electricity	-0.122***	0.043	0.705***	0.029	-0.133***	0.041	0.705***	0.029
Financials	-0.065*	0.038	1.205***	0.016	-0.044	0.037	1.208***	0.016
Food Producers	-0.165**	0.065	0.613***	0.038	-0.134**	0.061	0.618***	0.038
Glass	0.109**	0.045	0.899***	0.021	-0.134*	0.061	0.618***	0.038
Gold Mining	0.021	0.065	0.771***	0.055	0.071	0.065	0.775***	0.055
Household Appliances	-0.02	0.033	0.835***	0.019	-0.016	0.031	0.835***	0.019
Industrial Transportation	-0.008	0.06	0.743***	0.037	0.008	0.057	0.746***	0.037
International Oil & Gas	0.007	0.036	0.878***	0.022	-0.018	0.036	0.875***	0.022
Iron & Steel	0.086**	0.039	0.885***	0.023	0.119***	0.035	0.889***	0.023
Real Estate	-0.114**	0.047	0.936***	0.037	-0.106**	0.048	0.938***	0.037
Retailers	-0.177***	0.052	0.943***	0.034	-0.207***	0.048	0.940***	0.034
Soft Drinks	-0.105***	0.037	0.633***	0.031	-0.133***	0.040	0.630***	0.03
Telecommunications	0.024	0.033	0.910***	0.025	-0.028	0.034	0.903***	0.024
Telecommunications Services	-0.116***	0.035	0.757***	0.028	-0.130***	0.030	0.760***	0.030***
Textile Products	0.118***	0.038	0.752***	0.024	0.06	0.04	0.740***	0.02
Travel & Leisure	0.049	0.032	0.932***	0.029	0.020	0.030	0.930***	0.030

Note: The table presents partial exposures to exchange rates and the return on the aggregate Turkish stock market for the sectors listed in column (1). Partial exposures in columns (2) and (4) come from regressions of sectoral stock returns on the nominal Turkish lira/U.S. dollar exchange rate (column (2)), the return on the aggregate Turkish stock market (column (4)), the return on the aggregate world stock market, the change in the log of the spot price of Dubai crude oil, the change in the central bank policy rate, a dummy variable that equals one on 21 December 2021 (when Turkey announced that it would compensate lira bank accounts to compensate for losses relative to the U.S. dollar) and zero otherwise, the change in the number of new COVID-19 cases in Turkey, and the change in the Oxford Coronavirus Government Response Tracker project measure of Turkey's policy strictness.. Partial exposures in column (6) and (8) come from regressions of sectoral stock returns on the same variables, except the nominal Turkish lira/U.S. dollar exchange rate is replaced by the nominal Turkish lira/euro exchange rate. S.E. in columns (3), (5), (7), and (9) are heteroskedasticity and autocorrelation consistent standard errors. The sample period extends from 21 February 2002 to 22 April. There are 5,260 observations. In cases where the data are unavailable starting on 2 April 1999, the regressions begin on the first date when the data are available.
Source: Datastream database and calculations by the authors.
*** (**) [*] denotes significance at the 1% (5%) [10%] level

The partial exposures of banks, the financial sector, automobiles, and travel & leisure to depreciations are small. However, their exposures to the overall Turkish stock market are large. A depreciation that harms the overall stock market thus exerts a negative impact on these sectors. That is why their total exposures in Table 4 indicate that they are harmed by depreciations. The sectors retail, food producers, and drug/grocery stores are very exposed to downturns in the overall Turkish market. Thus depreciations not only harm these sectors directly but also indirectly by reducing aggregate stock returns.

There are only four sectors that in column (2) and four sectors in column (4) that benefit from lira depreciations. These include iron & steel, construction, and textiles. Iron & steel is an intensely competitive sector. Steel is produced in more than 90 countries so importing countries have options to substitute domestic steel for foreign steel.[7] Lira depreciations that increase the price competitiveness of Turkish producers thus increase their profitability. Construction companies such as Enka İnşaat ve Sanayi engage in projects abroad, and lira depreciations enable them to either lower foreign currency prices and win more bids or to keep foreign currency prices constant and increase the lira value of repatriated profits. Textile companies such as Aksa Akrilik Kimya Sanayii also benefit because a lira depreciation increases the competitiveness of their exports.

The results in Tables 4 and 5 indicate that depreciations do more harm than good to many sectors. Not only is the aggregate stock market damaged by depreciations, but every sector in Table 4 has negative total exposures to depreciations. In Table 5, eight sectors have statistically significant negative partial exposures to the U.S. dollar, indicating that lira depreciations against the dollar harm them not only by lowering the aggregate Turkish stock market but also through other channels. Only four have significant positive partial exposures to the dollar. In addition, 11 have significant negative partial exposures to the euro and only four have significant positive exposures to the euro.

The important implications of the results in Tables 4 and 5 is that the overall impact of lira depreciations is to harm many stocks on the Borsa Istanbul. This indicates that a weak lira harms the profitability of many Turkish firms.

4. The COVID-19 Pandemic, the Ukraine War, and the Turkish Economy

The Turkish lira depreciated logarithmically against the U.S. dollar by 111% between 1 January 2020 and 5 August 2022. This section investigates how the Turkish economy has

[7] I am indebted to Dr. Anthony de Carvalho for this comment.

performed during this period. It focuses on how the COVID-19 pandemic and the Russia-Ukraine War has impacted the Turkish economy.

Figure 1 shows that after the initial COVID-19 case was reported on 11 March 2020, there were five waves of infections. The first wave peaked in April 2020 with under 5,000 new cases per day, the second wave peaked in December 2020 with 33,000 new cases, the third wave peaked in April 2021 with over 60,000 new cases, the fourth wave peaked in November 2021 with just over 30,000 new cases, and the fifth wave peaked in February 2022 with over 100,000 new cases. As of the end of April 2022 Turkey has suffered 1,149 deaths per million people. This is the 84th highest number out of 228 countries examined.[8]

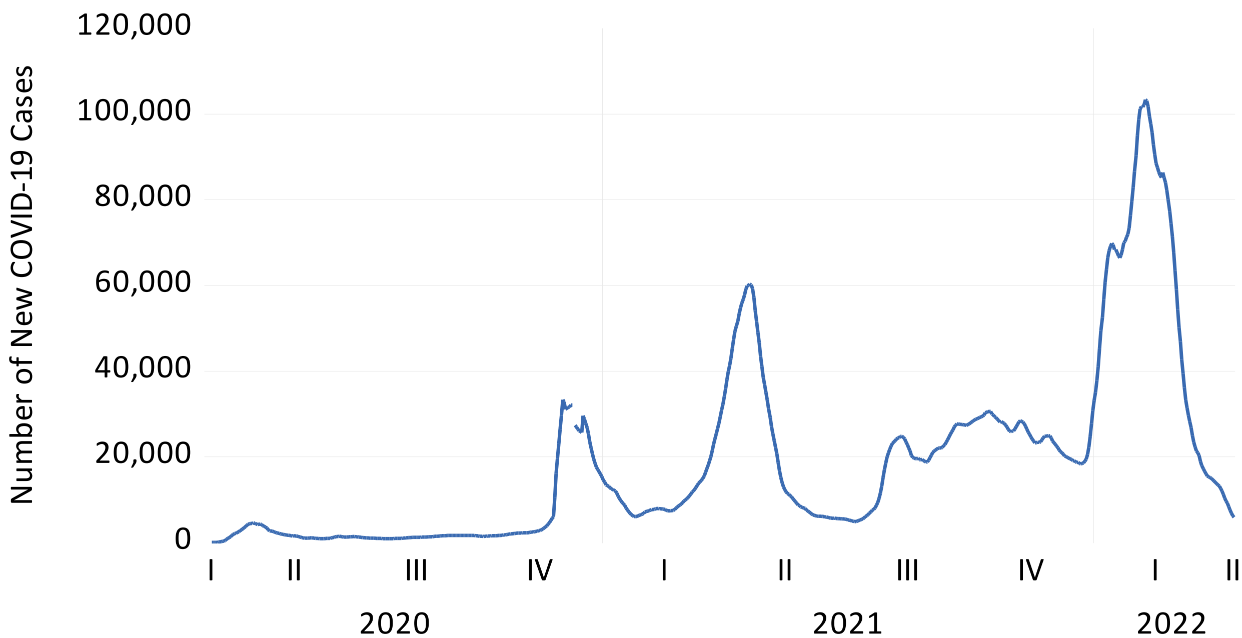

Figure 1. Number of New COVID-19 Cases in Turkey
Note: The data represent a 7-day rolling average of the number of new COVID-19 cases in Turkey
Source: https://ourworldindata.org/covid-cases .

[8] These data come from https://www.worldometers.info/coronavirus/ .

The Turkish government adopted a range of measures to slow the spread of COVID. It suspended domestic and international flights. It imposed curfews on citizens over the age of 65 and on others. It replaced face-to-face teaching with online teaching. It imposed work bans on sectors requiring close context such as hairdresser services, shopping malls, restaurants, cafes and tourist businesses.

Figure 2 shows how the stringency of Turkey's response to COVID-19 has varied over time and as the number of new cases has waxed and waned. The stringency index is calculated by the Oxford Coronavirus Government Response Tracker project. It evaluates policy strictness in nine areas: school closures; workplace closures; cancellation of public events; restrictions on public gatherings; closures of public transport; stay-at-home requirements; public information campaigns; restrictions on internal movements; and international travel controls. Stringency in each area on each day is rated between 0 and 100. The overall index is the simple average of the stringency values in each of the nine areas.

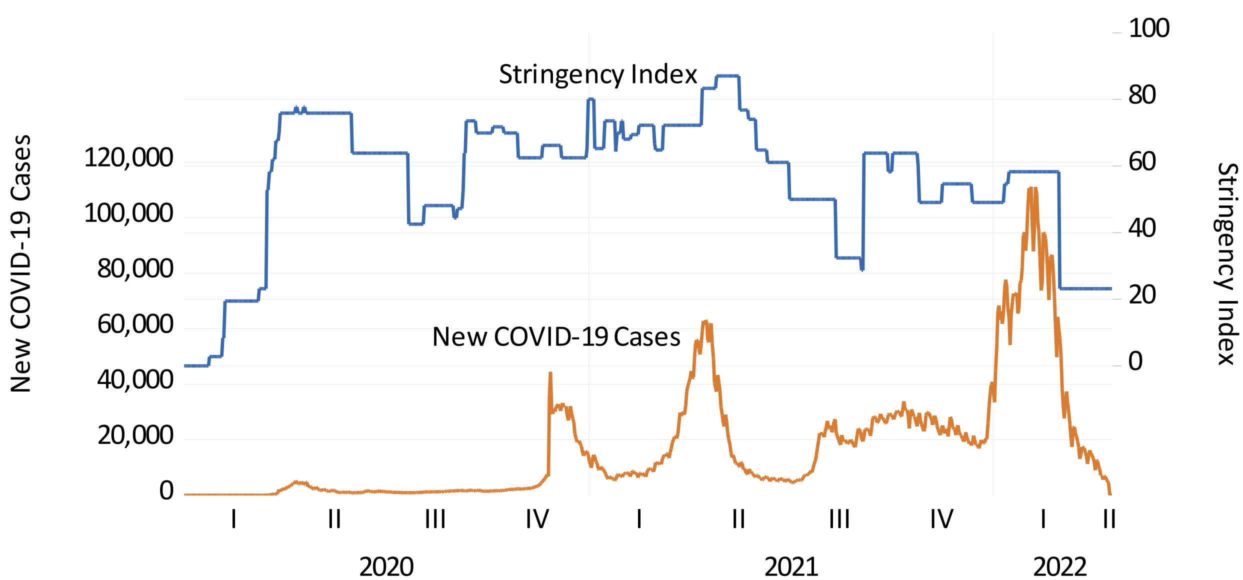

Figure 2. Index Measuring the Stringency of COVID-19 Restrictions and Number of New COVID-19 Cases in Turkey
Note: The stringency index is calculated by the Oxford Coronavirus Government Response Tracker project. It evaluates policy strictness in nine areas: school closures; workplace closures; cancellation of public events; restrictions on public gatherings;

closures of public transport; stay-at-home requirements; public information campaigns; restrictions on internal movements; and international travel controls. Stringency in each area on each day is rated between 0 and 100. The overall index is the simple average of the stringency values in each of the nine areas. The new COVID-19 cases represent the number of new cases recorded on that day in Turkey
Source: https://ourworldindata.org/metrics-explained-covid19-stringency-index and https://ourworldindata.org/covid-cases .

Figure 2 shows that immediately after the first coronavirus case was detected the government adopted strict measures. The stringency index in March 2020 rose from 19 to 76. The government eased restrictions starting in June 2020 but tightened them again in September and kept them tight during the second and third waves. As the third wave abated in May 2021 the government eased restrictions but tightened them again during the fourth and fifth waves. As the fifth wave passed, the government eased restrictions in March 2022.

To investigate the relative importance of stringent policies and new COVID-19 cases we include the changes in these variables in a regression to explain returns on the aggregate Turkish stock market. As with equation (10) we also include the following control variables: the return on the world aggregate stock market, the change in the log of the spot price of Dubai crude oil, the change in the log of the Turkish lira per dollar exchange rate, the change in the central bank policy rate, and a dummy variable that equals one on 21 December 2021 (when Turkey announced that it would compensate lira bank accounts to compensate for losses relative to the U.S. dollar) and zero otherwise. The sample period extends from 21 February 2002 to 22 April 2022.

Table 6 presents the results. The coefficient on the change in the stringency index is negative and significant while the coefficient on the change in the number of new cases is not statistically significant. The coefficient on the stringency index indicates that the increase in the index between January and March 2020 reduces aggregate stock returns by 3%. These results suggest that it is not the number of coronavirus cases itself but rather the government's response to the pandemic that suppressed economic activity in Turkey.

Table 6. Regression Estimates for Aggregate Turkish Stock Returns

(1)	(2)
Change in the Oxford Coronavirus Stringency Index for Turkey	-0.000393** (0.000153)
Change in the Number of New Coronavirus Cases in Turkey	0.000000332 (0.000000306)
Return on the World Stock Market	0.6233*** (0.0384)
Change in the Log of the Turkish Lira/U.S. Dollar Exchange Rate	-0.4381*** (0.0656)
Change in the Central Bank Policy Rate	-0.00127 (0.00090)
Change in the Log of the Spot Price of Dubai Crude Oil	0.0101 (0.0094)
Dummy Variable Equaling One on 21 December 2021 and Zero Otherwise	-0.2193*** (0.0190)
Adjusted R-Squared	0.2378
Standard Error of Regression	0.0149
Sample Period	21 February 2002 – 22 April 2022
Number of Observations	5,260

Note: The table presents regression coefficients from a regression of aggregate Turkish stock returns on the Oxford Coronavirus Government Response Tracker Project measure of the stringency of the Turkish government's response to COVID-19, the number of new COVID-19 cases in Turkey, the return on the world stock market, the change in the log of the Turkish lira/U.S. dollar nominal exchange rate, the change in the Central Bank of Turkey policy rate, the change in the log of the spot price of Dubai crude oil, and a dummy variable that equals one on 21 December 2021 (when Turkey announced that it would compensate lira bank accounts to compensate for losses relative to the U.S. dollar) and zero otherwise. Heteroskedasticity and autocorrelation consistent standard errors are in parentheses.
Source: CEIC database and calculations by the authors.
*** (**) denotes significance at the 1% (5%) level.

Turkey took several steps to lessen the economic hardship. It provided cash support to employees and businesses in order to alleviate these harsh measures taken for economic life. It banned dismissals by businesses whose activities were suspended, and granted short-time working allowances (Koşaroğlu et al., 2020:485). It reduced or postponed social security premiums and the rates of some taxes and payments for activities in the service sector, tourism and transportation. It postponed loan, principal and interest payments of companies whose cash flow had deteriorated and payments from farmers who leased land belonging to the Treasury. It increased the Credit Guarantee Fund limit from TL 25 billion to TL 50 billion and assigned priority to struggling firms and to those needing liquidity. It provided temporary and partial income support to workers in companies that were closed. The central bank reduced the policy rate from 10.75% in March 2020 to 8.25% in May 2020 to provide loanable funds and increase investment. Since inflation in 2021 equaled 12.3%, this implied a real interest rate of -4%.

The World Bank (2022a) reported that Turkey benefited from supply chain disruptions and high shipping costs in Asia. Multinational corporations relocated production to Turkey. To investigate how imports and exports performed during the pandemic we re-estimate equations (6) and (7) up to 2020q1 and then forecast imports and exports using actual out-of-sample values of the right-hand side variables after this. Figures 3 and 4 show forecasted imports and exports and actual values. Figure 3 shows that imports averaged 2% less than predicted over the 2020Q2-2021Q3 period and Figure 4 shows that exports averaged 18% more than predicted.

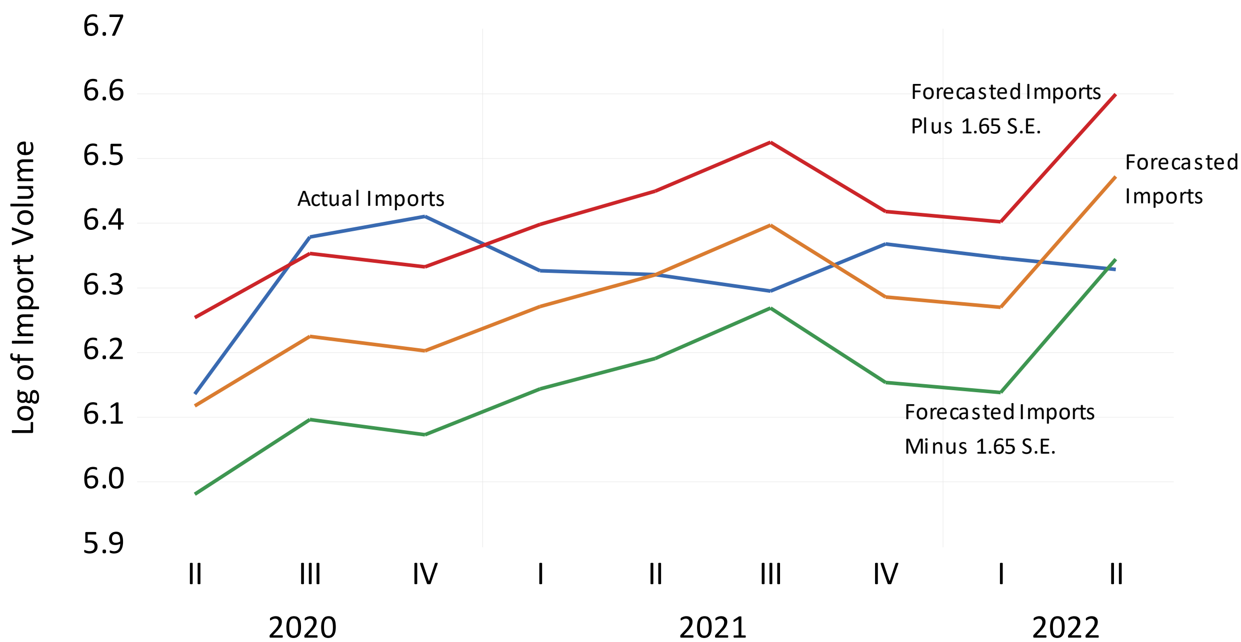

Figure 3. Actual and Forecasted Turkish Imports, 2020Q2-2022Q2
Note: The figure presents actual imports and imports forecasted from dynamic ordinary least squares (DOLS) estimates where the left-hand-side variable is Turkish real imports

and the right-hand-side variables are Turkish real GDP and the PPI-deflated real effective exchange rate. One lag and one lead of the first difference of the right hand side variables, a linear time trend, quarterly dummy variables, and dummy variables for the COVID-19 period are also included in the regressions. Imports are forecasted using coefficients estimated over the 1998Q3-2020Q1 period and actual out-of-sample values of the right-hand side variables. Forecasted Imports Plus 1.65 S.E. and Forecasted Imports Minus 1.65 S.E. represent 90% confidence interval bands around the forecasted imports. Coefficient uncertainty is included in the standard error calculations.
Source: CEIC database, OECD database, and calculations by the authors.

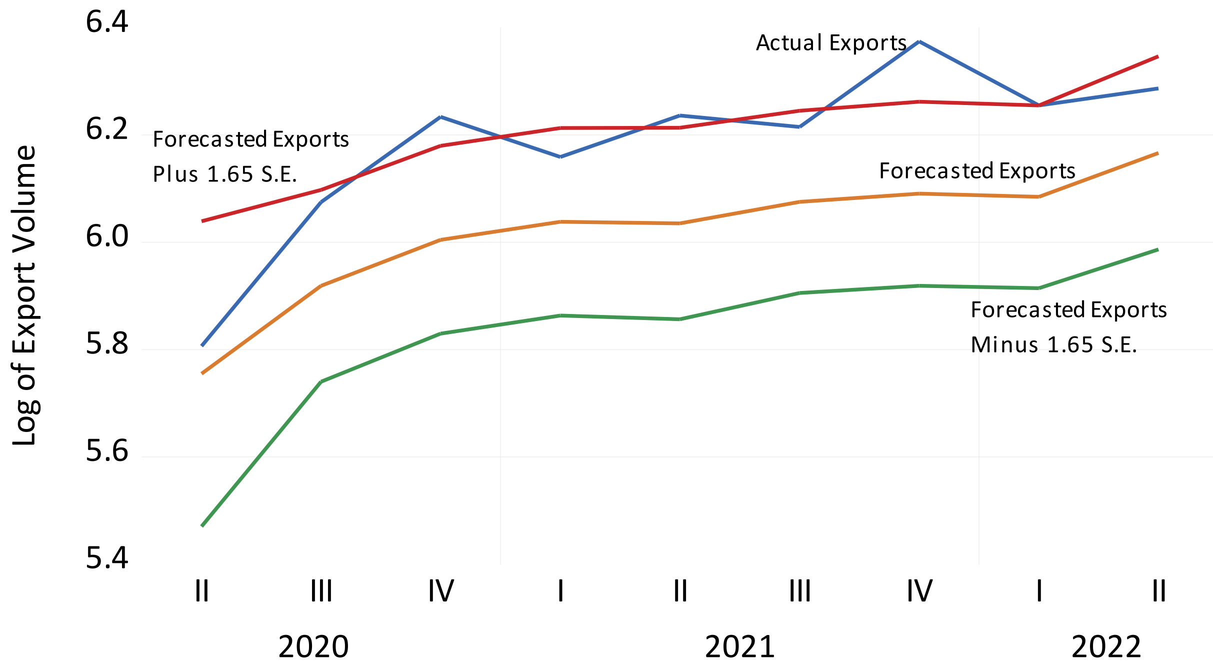

Figure 4. Actual and Forecasted Turkish Exports, 2020Q2-2022Q2
Note: The figure presents actual exports and exports forecasted from dynamic ordinary least squares (DOLS) estimates where the left-hand-side variable is Turkish real exports and the right-hand-side variables are G-20 GDP and the PPI-deflated real effective exchange rate. One lag and one lead of the first difference of the right hand side variables, a linear time trend, quarterly dummy variables, and dummy variables for the COVID-19 period are also included in the regressions. Exports are forecasted using coefficients estimated over the 1998Q3-2020Q1 period and actual out-of-sample values of the right-hand side variables. Forecasted Exports Plus 1.65 S.E. and Forecasted Exports Minus 1.65 S.E. represent 90% confidence interval bands around the forecasted exports. Coefficient uncertainty is included in the standard error calculations.
Source: CEIC database, OECD database, and calculations by the authors.

Strong export performance contributed to economic growth of 11% in 2021. This was the strongest among OECD countries. Turkey nevertheless faces serious challenges. The Turkish lira depreciated 90% against the dollar and euro between January 2020 and April 2022. This has stoked inflation of 12% in 2020 and 20% in 2021. [9] Inflation reached 80% in the summer of 2022. The depreciation also reduces the purchasing power of Turkish firms who depend on imported inputs and Turkish consumers who depend on imported consumption goods.

In spite of the headwinds from a depreciating lira and rising inflation, consumer spending has held up. Real private consumption increased by more than 15% in 2021 and is forecasted to fall by only 1.5% in 2022.[10] Credit card use and borrowing encouraged by negative real interest rates helped sustain consumption.

The Russia-Ukraine War that began on 24 February 2022 presents a new set of challenges. Turkey imports almost 80% of its wheat and sunflower oil from Russia and Ukraine. It receives almost 20% of its tourist arrivals from Russia and Ukraine. It also receives 40% of its natural gas and petroleum from Russia. Higher commodity prices arising from the war could stoke inflation. The headwinds that the war is causing in Europe could slow demand in a key export market.[11]

On the other hand, the war presents opportunities. President Erdoğan's efforts to broker peace raises Turkey's stature in the international community. Turkish drones have been successful against Russian weapons, increasing demand for Turkish defense products. The withdrawal of many companies from Russia opens opportunities for Turkish firms to expand in Russia.

To shed light on how the war is impacting Turkish businesses, we re-estimate the model for the Turkish aggregate stock market discussed above over the 21 February 2002 to 23 February 2022 period and then use actual out-of-sample values of the right-hand side variables to forecast returns over the first five and a half months of the war.[12] The results are presented in Figure 5.

[9] These data come from World Bank (2022b)
[10] These data come from World Bank (2022b).
[11] These data come from World Bank (2022b).
[12] The COVID data are only not available daily but only weekly for part of 2022. We thus do not include the change in the number of COVID-19 cases and the change in the Stringency Index in the regression.

After falling 8% the day the war started, the Turkish stock market then gained 34% up until 5 August 2022. After 7 April, its value was also above the 90% confidence interval for the forecasted value. Thus the overall Turkish stock market has done well during the first five and a half months of the war. Much of this performance is driven by industrial firms such as weapons manufacturers. In contrast, consumer-oriented stocks have performed badly.

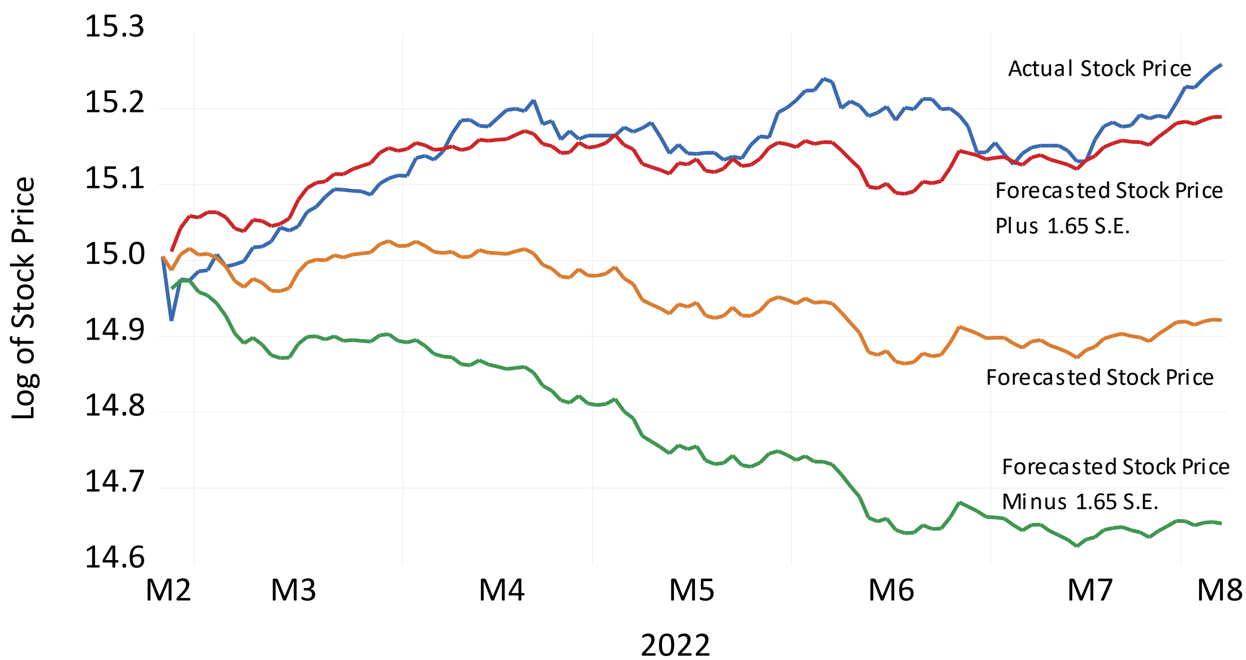

Figure 5. Actual and Forecasted Prices of the Aggregate Turkish Stock Market after Russia Invaded Turkey on 24 February 2022.

Note: The figure presents the actual price of the aggregate Turkish stock market and prices forecasted from a model with the return on the aggregate stock market on the left hand side and the return on the world aggregate stock market, the change in the log of the spot price of Dubai crude oil, the change in the log of the Turkish lira per dollar exchange rate, the change in the central bank policy rate, and a dummy variable equaling one on 21 December 2021 and zero otherwise on the right-hand side. The sample period extends from 21 February 2002 to 23 February 2022. Actual out-of-sample values of the right-hand side variables are used to forecast stock prices over the 24 February 2022 to 5 August 2022 period. Forecasted Stock Price Plus 1.65 S.E. and Forecasted Stock Prices Minus 1.65 S.E. represent 90% confidence interval bands around the forecasted stock prices. Coefficient uncertainty is included in the standard error calculations.
Source: CEIC database and calculations by the authors.

5. Conclusion

The Turkish lira depreciated logarithmically by more than 200% against the U.S. dollar and the euro from 1 January 2012 to 1 August 2022 and the CPI-deflated real effective exchange rate fell by 70% over this period. We investigate how exchange rates impact the imports, exports, and profitability of Turkey's firms. Previous findings on these effects are mixed. Results from Johansen maximum likelihood techniques and dynamic ordinary least squares estimation indicate that lira depreciations cause large falls in imports but do not increase exports. The results also indicate that stock prices for most Turkish sectors fall when the lira depreciates.

The Turkish economy has nonetheless remained resilient. During the COVID-19 pandemic, it has benefitted from a relocation of supply chains away from Asia. During the first six months of the Russia-Ukraine war, its stock market has done much better than would be predicted based on a forecasting equation. These successes, however, have come in spite of and not because of the weak lira. A stonger currency would increase the purchasing power of domestic firms and consumers. This is important when firms depend on imported inputs and when consumers purchase many imported goods such as food. A stronger currency would also not reduce exports. Rather than following a new economic model, policymakers should raise interest rates to strengthen the Turkish lira.

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