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Full Length Research Paper

The real exchange rate and the employment market: Evidence for Turkey by panel cointegration analysis

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The purpose of this paper is to investigate the relationship between real exchange rate and the employment market by using the panel cointegration analysis with the data of Turkey which is adopting flexible exchange rate regime for the period the study was done. According to the FMOLS and DOLS panel results, there is a cointegration between RER (real exchange rate) and aggregate employment. The FMOLS individual results indicate that except for mining and finance, there is a cointegration between RER and employment. DOLS individual cointegration test results rejects null hypothesis of no cointegration for all the employment variables except for mining and electricity.

Key words: Employment, exchange rate, cointegration.

INTRODUCTION

Labour market is highly affected by the behavior of the certain economy-wide aggregates such as inflation, the employment may increase in the low inflation environment contrary to the classical Phillips curve, and the monetary authorities try to stabilize the inflation. When the labour demand increases wages may go up as suggested by the Lipsey's labour market model and also increase the inflation. It is also expected that the labour market is affected by the level of the exchange rate. Exchange rate is the price of foreign currency, and has important consequences over the aggregate economy. The possible channels of exchange rate affecting the overall economy are allocation of resources, wealth and income effects, competitiveness, foreign balance, and price dynamics. The study gives brief information about these channels while discussing the results.

This paper chose to analyze the nexus of exchange rate and the employment market in Turkey which is a small-open economy. Turkey is one of the countries owning a negative real interest rate as at July, 2010 with Chile, Thailand, Czech Republic and Korea. Besides, in Turkey the unemployment increased from 10.3-14.5% since at the beginning of Great Credit Crisis of 2008-2010. Turkey has started to adopt the flexible exchange rate regime since 2002. However, Turkey historically fixed the exchange rate at appreciated levels in the past (Berument, Coşkun and Şahin, 2007) and Central Bank of the Republic of Turkey (CBRT) had targeted the level of exchange rate for the pre-2001 crisis because exchange rate and so many goods in the inflation basket is dependent on the energy prices. During the recent Great Credit Crisis of 2008, Turkey had benefited from the flexibility of the exchange rate.

Theoretically, the central bank applying flexible exchange regime does not prefer to intervene to the level of exchange rate. However, the economic targets such as inflation stabilization or growth oriented sectors are all related with the exchange rate. For this purpose, during the post-2008 economic crisis, the actors in the market have started to mount pressure on the Central Bank of the Republic of Turkey (CBRT) to depreciate the price of foreign currency in terms of Turkish lira (TL). Considering its importance, the study tries to estimate the effect of exchange rate on the employment level.

The sectors may also be affected with a different degree from the exchange rate. For this purpose the study also considered the sub-components of employment market. The sectors considered are agriculture, mining, industry, electricity, construction, retail, transportation,

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finance and society. Some of the goods produced in these sectors are more tradable hence their prices are determined by the world demand and supply. According to Frenkel and Ros (2006), real exchange rate (RER) effects the capital accumulation in the traded sectors by influencing the profitability. However, the price of the non-tradable goods is determined by the domestic supply and demand conditions.

The paper aim to explore the effect of the RER on the employment, so the other possible determinants of the employment such as wage, output and cost of labour are considered under constant term. See for instance Klein (2003) for a typical estimation of the labor demand function. Most of these papers estimate their specifications for the developed countries, but less for the developing countries.

LITERATURE REVIEW

There are several papers considering the negative effects of the appreciation of exchange rate on employment. Edwards (1989) claims that an appreciation in RER decreases the employment in manufacturing sector. Burgess and Knetter (1998) find that the real appreciation leads to a decline in employment. According to Faria and Ledesma (2005), the long-run equilibrium effect of the RER on employment is through the openness channel. According to them, the appreciation of the real exchange rate leads to a decrease in employment with an elasticity of between -0.5 - -0.2. Fan and Song (2006) claims that the depreciation of exchange rate increases employment for China. An appreciation in renminbi decreases the manufacturing employment and depreciation of RER increases the employment. Hua (2007) mentions the effects of real appreciation on employment through the technology, export volume and efficiency channels and finds a negative effect of real appreciation of the renminbi on the manufacturing employment. Increasing (appreciating) RER can reduce the employment through decreasing export competitiveness or increasing import competition as mentioned by Demir (2010), Campa et al. (2001) and Klein et al. (2003). When RER appreciates the level of exports may diminish and the price of domestic goods becomes more expensive relative to the foreign goods. Oskooee et al. (2007) claims that the net effect of exchange rate appreciation on the employment level depends on the level of rigidity and the import dependency level of the country. According to them, RER has a short term effect on employment, but in the long-run the net effect is neutral.

Campa and Goldberg (2001) find that the depreciation of US dollar increases the employment in the manufacturing sector. According to Frenkel (2004), a depreciation of RER leads to a higher output through export channel. Filiztekin (2005) tells that the effect of the depreciation of foreign currency on employment is negative; moreover the devaluations diminish the employment. According to him, 10% depreciation of the TL results in 1.6% decline in the manufacturing employment.

Some papers considered the effects of employment volatility. Demir (2010) uses at the firm level panel data set for the period 1983-2005 to explore the effect of exchange at volatility on employment creation. One standard deviation appreciation in RER volatility reduces employment growth in the range of 1.4 - 2.1 percentage points.

Chen and Chen (2007) explores a negative relationship among the productivity differential between domestic and foreign productivity, and the exchange rate. Alexandre et al. (2010) shows that the open sectors owning a low level of technology and low labour rigidity are more sensitive to the exchange rate movements. High level of the labour adjustment costs and the productivity may reduce the sensitivity of exchange rate on the employment. Besides an increase in the openness level and the persistence of exchange rate increase the impact of the exchange rate on employment.

Some papers considered the sectoral diversifications. The appreciation of the US dollar diminishes the employment growth in construction and at the aggregate level, however, increases the employment growth in the mining sector according to Kandil and Mirzaie (2003). Ngandu (2009) analyses the effect of the exchange rate for South Africa employment figures, and finds that the appreciation of the rand on employment is negative for the tradable goods but not for the non-tradable goods.

According to Ngandu (2008), a reduction in RER increases the demand for machinery by importing and causes a reduction in employment in tradable sectors. When the foreign goods are defined in terms of RER, a change in RER in an open economy will change the relative prices of the interval goods and albeit the capital, the price of labour will change. In this sense, the change in RER from the equilibrium will change the behavior of the households. A diminish in the RER, if the other things being equal, will diminish the price of the imported goods and the capital goods in terms of domestic currency. Consequently the producers will substitute the labour force by the machinery. In this sense the employment level in tradable sectors diminishes because of the reduction in the imported interval goods prices. The shift of factor composite from the labour to the imported inputs will increase the labour productivity and the RER will affect the employment by the technology channel (Hua, 2007).

In an open economy, an increase in RER diminishes the domestic non-tradable goods and increases the profit margin and investment. Therefore, this may create an employment and increases the capacity usage by the export channel (Gala, 2008). However, according to Edwards (1989), an increase in the RER diminishes the wages and the output in the developing countries. Edwards claims that an increase in RER creates negative balance effect by the price mechanism and the output diminishes. Secondly, an increase in RER causes a transfer of

income from the people owning low marginal propensity to saving rates to high marginal propensity to saving rates. Thirdly, if the price elasticity of an export and an import is low, the trade balance will be worsened by the domestic currency and this may cause an economic recession. At the same time, an increase in RER will increase the price of the interval goods and the supply curve will shift to the left and the output will diminish (Fan and Song (2006).

Agenor (2007) claims that in the developing countries, most of the interval goods are imported. These interval goods are the capital goods. Consequently, an increase in RER may cause a contracting effect on the output by the increase in imported price of goods. In this context, there may be cost inflation. A diminish in the RER is not an increase in the domestic prices relative to the foreign prices. At the same time this is a change in the domestic price structure and an increase in the non-tradable goods price compared with the tradable goods (Jeanneney and Hua, 2010). A diminish in RER increases the real wages but this increase will be differential among the sectors. A diminish in RER will cause diminish in the prices of foreign imported capital and interval and technology goods. An increase in RER diminishes the relative price of the foreign goods, and the exports decrease and the competitiveness increase in the imported sectors. A diminish in RER increases the labour productivity and the input costs diminish. Over the given goods prices the wages increase. The relative wages affect the interval goods, technology and the prices of the capital according the interaction with the qualified and unqualified workers. The factor demand consequently the labor demand is a positive function of real output prices and the RER affects the wages. An exporter and the domestic producer diminish the nominal exchange rate and the prices of the foreign goods and make a production and sales plan. An increase in the prices of the foreign goods increases the demand for goods and assuming that the change in nominal exchange rate is fixed, increases the domestic good demand of the firms and this increase increases the relative prices of the domestic goods. Consequently, the factor demand curve is a negative function of the RER and the firms diminish their factor demand if the RER diminish and face with the import competitiveness (Robertson, 2003).

A diminish in RER decreases the cost of the imported interval goods and the inputs. The low cost of the foreign inputs cause an output effect and the demand for the other all production factors increase. Also depending on the substitution degree between the imported inputs and the domestic inputs, this will create a substitution effect. An increase in RER diminishes the domestic price level and the real wages increase because of the diminish in the overall prices. The effect of RER on the labour demand and wages will be determined according to the supplementary relationship between imported interval goods and the imported input and labour. The effect of the reduction in RER on the labour demand will be determined according to the prices of the domestic goods and supplementary relationship. A diminish in RER will decrease the imported prices of interval goods and this will marginal product value of the labor and consequently the labour demand (Kandil and Mirzaie, 2003). In this sense, RER effects the economic development. In a case of a diminish in RER effecting the real wages, the price of the non-tradable goods decrease and this causes a high real wages and low profit margin and high consumption and low investment (Gala, 2008).

RER affects the employment also in terms of the development. Balassa-Samuelson claims that the competitive RER promotes sales in the international markets (Juselius and Ordonez, 2009). Consequently firms make more investment and the economic growth sustains by the domestic labour. Kaldor (1978) claims that in an open economy, RER is an important variable effecting the development. According to him a reduction in RER stops the industrial activities in developing countries and it blocks the productivity channel. The resources in the economy shifts from the low productive labour intensive sectors to high productive sectors in the industry. Consequently, according to Kaldor, the industrial activities in the developing countries are not in a demanded level. In this situation, the excess labour force in the market cannot be absorbed. According to Williamson (2003), a competitive RER encourages the production of industrial goods and sustains development of the developing countries by the technology channel. According to Palma (2003), the learning by doing and cumulative technological development highly depends on the growth of the industry.

The supply and demand channels may work reverse of the employment market for a small-open economy concerning the effects of exchange rate. Supply side considers the production components, and costs such as wage and oil prices. However, the demand side is related with the foreign trade. Gylfason and Schmid (1983) constructs a macroeconomic model and claims that the devaluation affects the output by cost of imported oil (supply side) and foreign trade expenditures (demand side). They support the view that the devaluation has positive effects on production. Klein et al. (2003) decomposes the RER to trend and cyclical components. They find that the trend component does not have net employment growth effect but changes the allocation structure. An appreciation of the cyclical component of RER effects the net employment growth negatively.

MATERIALS AND METHODS

The study employs Turkish quarterly data for the period 2003: Q1 – 2009: Q4. All the data for the variables aggregate employment and the disaggregated employment for the agriculture, mining, industry, electricity, construction, retail, transportation, finance and society sectors, gross domestic product and the real exchange rate are obtained from the Central Bank of the Republic of Turkey Electronic Delivery System. All the variables are in logarithmic form.

The study preferred to use the real exchange rate (RER) rather than the nominal exchange rate.

The latter measures the units of a foreign currency can the one domestic currency buy. For some explanations we will use *e* = USD/TL parity for the bilateral nominal exchange rate. Therefore, nominal depreciation expresses an increase in the nominal exchange rate *e*. If *e* increases, the price of domestic goods becomes cheaper for the foreign consumers. By the nominal depreciation of nominal exchange rate, the price of domestic goods increases by the cost inflation and the real wages diminish.

On the other hand, the RER gives us unit of the foreign goods where a one unit of domestic good can buy. Simply it is the price of domestic goods relative to foreign goods.

The study uses the RER definition in equation 1 throughout the text. CBRT calculates RER index as the geometric mean of the ratio of Turkish aggregate price level to the aggregate price levels where Turkey has a trade relation.

$$RER = \prod_{i=1}^{N} \left[\frac{P_{TUR}}{P_i * e_{i,TUR}} \right]^{w_i} \quad (1)$$

Where, w_i represents weight of the the country *i*'s in Turkey's RER index. P_{TUR} is the price index of Turkey. P_{TUR} is the price index of the country *i*. $e_{i,TUR}$ is the exchange rate of the country i in terms of TL. N is the number of countries involved in the analysis. According to the equation (1), an increase in the RER indicates an real appreciation of TL, the price of the Turkish goods increase in terms of the price of the foreign goods (Saygili et al., 2010, p. 17). The domestic prices highly effects the value of the RER. For instance, according to Saygili et al. (2010, p. 21), when they decompose the RER index into its subcomponetns, they indicate that the appreciation had been caused by the domestic price movements. An increase in P_{TUR} contributes nearly 79% to the appreciation of RER. The foreign prices tend to diminish by 18%.

The integration of the variables is the first step in cointegration test. Since the study tries to obtain a stationary combination of several variables initially, panel unit root tests have been performed with the specifications of Levin et al. (LLC, 2002) and Im et al. (IPC).

The null hypothesis is the unit root and the alternative is the stationary of the data. Equation (2) is estimated for the Levin et al. (2002, LLC) panel unit root test. $\{y_{it}\}$ is a sequence and *i = 1... 10* is for the ten employment categories and the real exchange rate included in the model. *t* = 1... T is the number of observations.

$$\Delta y_{it} = \delta y_{it-1} + \sum_{L=1}^{p_i} \theta_{iL} \Delta y_{it-L} + \alpha_{mi} d_{mt} + \varepsilon_{it} \quad \text{, m=1,2,3.} \quad (2)$$

This test has similarities with the Augmented Dickey Fuller Test (ADF), which is implemented for each individual *i*. The lag order changes for each variable. The vector of deterministic variables is d_{mt} and the vector of coefficients for the deterministic model is α_{mi}. There are three possible deterministic terms: $d_{1t} = \varnothing$, $d_{2t} = \{1\}$, $d_{3t} = \{1, t\}$. The null hypothesis is $H_0 : \delta_1 = \delta_2 = \delta_3 = ... \delta_{11} = 0$ and the alternative hypothesis is $H_a : \delta_1 = \delta_2 = \delta_3 = ... = \delta_{11} \neq 0$ for LLC. LLC assumes that the unit root process is identical across cross sections of the data. If the study is not able to reject the null of a unit root which claims that each individual time series contains a unit root. In this case all individuals in the panel would be integrated.

Next Im et al. (2003, IPS) panel unit root test is applied to evaluate the robustness of the results with LLC. The main difference of IPS from LLC is that IPS allows varying coefficient for y_{it}. They simply take an average of *t*-statistics obtained from individual series. Again the null hypothesis is that panel data contains unit root $H_0 : \delta_1 = \delta_2 = \delta_3 = ... \delta_{11} = 0$. But the alternative is different, where some of the individual series contain unit root. So the study partially observes flexibility in IPS compared with LLC. Besides, according to Maddala and Shaowen (1999) for the research questions such as convergence of a dozen of countries in terms of economic growth, the null specification of LLC needs to be questioned. Similarly the heterogeneity across employment categories is valid. So assuming a common unit root process may be so strict for the data employing. Rather assuming an individual unit root tests process may be tested. Of course it is an economic question or depends on which school of thought you consider. For instance, according to the neoclassical view of growth, if the technological process is identical across countries, then they will converge. For the subject, it is clear that the growth rates of the employments are not the same. At least it is known from the agriculture and the government sector employment figures. The results of the panel unit root tests are presented in Table 1.

According to the results of LLC and IPS tests with individual intercept and trend, the study fails to reject the null of unit root and it is concluded that the panel data is integrated in order one. When the study takes the first difference of the variables, the study rejects the null of unit root. The study therefore, may examine the long-run relationship between ten employment categories and the exchange rate with panel cointegration analysis.

The hypothesis testing phase of the empirical economics is critical. This gives an opportunity to pre-evaluate the issue and get into details and the core subject. For an initial hypothesis making, the study estimated the Frenkel (2004) specification presented by equation 3. Audgmented Dickey Fuller test were used to determine the stationarity of the variables. The results are presented in appendix A in the appendix. It is concluded that the variables are integrated in order one.

$$Employment_t = \text{Constant} + \alpha_1 GDP_t + \sum_{i=0}^{4} \beta_i RER_{t-i} + \alpha_2 Trend + \alpha_3 \text{D1} + \alpha_4 \text{D2} + \alpha_5 \text{D3} + \varepsilon_t \quad (3)$$

GDP denotes for the real gross domestic product and the employment variable represents the aggregate employment and the nine employment categories the study employed. The results partially support the Frenkel (2004) whom claims that there is a negative relationship between unemployment and RER for Argentina, Brazil, Chile and Mexico. There is a simultaneous negative and significant relationship between RER and construction, transportation, finance and society. However, when the lagged values of the RER are considered, the real appreciation increases the total, construction and retail employment categories.

Table 1. LLC and IPS panel unit root tests estimation results.

Method	Individual intercept	Individual intercept and trend	None
Level			
Levin Lin and Chu	-2.0776* (0.018)	0.0883 (0.5352)	3.1941 (0.9993)
Im, Pesaran and Shin	-2.4454* (0.0073)	-0.7448 (0.2272)	
First difference			
Levin Lin and Chu	-4.0162* (0.0000)	-11.5336* (0.0000)	-11.1979* (0.0000)
Im, Pesaran and Shin	-9.4973* (0.0000)	-18.2040* (0.0000)	

P-values are reported in parenthesis. Schwarz Information Criteria (BIC) was used to select the information criteria. * Indicates the rejection of unit root.

The results presented in Table 2 for the specification 3 indicate that it is meaningful to search for a possible cointegrating vector with the RER and the employment categories. If the two time series are both non-stationary then it may be possible to create a linear combination of the two series which is stationary and which can be said to be cointegrated. The study uses fully modified ordinary squares (FMOLS) and dynamic ordinary least squares (DOLS) methods to search for a possible stationary combination. FMOLS is suggested by Pedroni (1996) and its critical values can be found in Pedroni (1999). Petroni (2001) and Pedroni (2004) are good sources for the details of the test. DOLS is suggested by Kao and Chiang (1997) and Mark and Sul (1999) and it is proposed in their paper that it has the same asymptotic distribution as the panel FMOLS estimator. The basic panel cointegration is based on the equation (4) and has a null hypothesis of no cointegration.

$$Employment_{it} = \text{Constant}_i + \beta_i RER_{it} + \mu_{it} \quad (4)$$

Again for the employment variable, the aggregate employment and the nine sub-categories are employed to catch the possible heterogeneity, t= 1... T is the number of observations. The null hypothesis $H_0 : \beta_i = 1$ is for all i and i = 1... N is the total number of the horizontal cross-section in the panel. Common time dummies are not included into the specification because the non-invertible matrix would be obtained otherwise. These tests allow heterogeneity in the cointegrating vector.

Table 3 reports the results for the panel cointegration tests. Individual FMOLS and DOLS estimates and t statistics for $H_0 : \beta_i = 1$ are reported in the entries. At the bottom of the table the panel estimators results are reported.

According to the FMOLS and DOLS panel results, there is a cointegration between RER and overall employment. The FMOLS individual results indicate that except for mining and finance, there is a cointegration between RER and employment. DOLS individual cointegration test results rejects null hypothesis of no cointegration for all the employment variables except for mining and electricity.

As a robustness check for the cointegrating relationship between RER and employment, Johansen trace test is applied (Johansen, 1988 and 1991). They use maximum likelihood methodology to estimate the cointegrated vectors. The numbers of cointegrated vectors are given in Table 4. These cointegrated vectors are also the rank of the coefficient of the one lagged value of the dependent variable. If the rank of the matrices is zero than the study fail to reject the null of no cointegration and there is no stationary linear combination. The study also estimated with the different deterministic specifications. The details of the likelihood ratio test based Johansen trace statistics can be found briefly in Hjyalmarsson and Österholm (2007). According to the results of Johansen trace cointegration test, there is a cointegration between RER and the employment categories except for mining with quadratic trend and intercept. The results may change by the assumption for the trend and intercept.

RESULTS

When we considered the effects of real exchange rate on the employment by sector there is a distinction between tradable and non-tradable sectors. The results are not surprising: for most of the sectors GDP and trend are significant when regressed on employment. In half of the sectors RER is significant and surprisingly in non-tradable sectors like construction and transportation, RER is insignificant in several tradable sectors.

This paper represented an empirical examination of the relationship between real exchange rate and the employment in Turkey. The study employed panel unit root tests and panel cointegratoin using the data spans the period 2003:1 - 2009:4. The paper attemped to make a contribution to the vast literature of contractionary depreciation/ devaluation by offering insights Turkish sectoral data. The real exchange rate and the aggregate employment are cointegrated. When sectoral employment data is used, FMOLS shows cointegration between real exchange ratqes and all the sectors except mining and finance. Similary, DOLS reveals the presence of cointegration for all the sectors except in mining and electricity. This emprical estimation constitutes useful work that has

Table 2. The estimation results for Frenkel (2004).

Sector	Constant	GDP_t	RER_t	RER_{t-1}	RER_{t-2}	RER_{t-3}	RER_{t-4}	Trend	D1	D2	D3	R^2	BIC	DW
Total	6.1374*** [7.0359]	-0.2746** [-2.1644]	-0.1969 [-1.6432]	0.2969* [1.6602]	0.0159 [0.0852]	-0.2094 [-1.2129]	0.1928* [1.7686]	0.0008 [1.3563]	-0.0436*** [-4.4303]	-0.0047 [-0.5922]	0.0233*** [2.6454]	0.8074	-5.1614	1.3115
Agriculture	16.4685*** [5.3367]	-1.8175*** [-4.0489]	-0.4411 [-1.0403]	0.5928 [0.9369]	0.0794 [0.1205]	-0.4979 [-0.8153]	0.6074 [1.5750]	-0.0006 [-0.2834]	-0.1580*** [-4.5396]	-0.0201 [-0.7092]	0.1171*** [3.7563]	0.8247	-2.6344	1.2110
Mining	-10.7806*** [-6.4383]	1.7009*** [6.9833]	0.0259 [0.1125]	0.0198 [0.0575]	0.0024 [0.0067]	0.2743 [0.8277]	-0.1234 [-0.5896]	-0.0067*** [-5.8401]	0.0382** [2.0222]	0.0079 [0.5158]	-0.0676*** [-3.9942]	0.8683	-3.8572	1.7821
Industry	-0.6287 [-1.0955]	0.5940*** [7.1155]	-0.0035 [-0.0439]	0.0396 [0.3364]	-0.0399 [-0.3254]	-0.1212 [-1.0669]	0.0573 [0.7991]	-0.0005 [-1.1565]	0.0127* [1.9583]	-0.0031 [-0.5927]	-0.0252*** [-4.3491]	0.9018	-5.9987	1.0581
Electricity	-2.9309 [-0.8632]	0.2865 [0.5801]	0.3787 [0.8118]	0.3025 [0.4345]	-0.6003 [-0.8281]	0.8233 [1.2251]	0.4855 [1.1440]	-0.0052** [-2.2247]	0.0135 [0.3513]	0.0214 [0.6860]	0.0003 [0.0087]	0.6661	-2.4432	1.0268
Construction	-2.1946*** [-2.7804]	0.7582*** [6.6035]	-0.4814*** [-4.4387]	0.5003*** [3.0912]	0.0219 [0.1299]	-0.0903 [-0.5781]	-0.1262 [-1.2791]	0.0022*** [4.0332]	-0.0579*** [-6.5084]	0.0221*** [3.0509]	0.0020 [0.2498]	0.9855	-5.3613	2.3517
Retail	1.3350 [4.5720]	0.3100*** [7.2979]	-0.0486 [-1.2127]	0.1468** [2.4516]	-0.0952 [-1.5278]	0.0940 [1.6264]	-0.0910** [-2.4946]	0.0007*** [3.3409]	0.0057 [1.7391]	0.0081*** [3.0313]	0.0002 [0.0582]	0.9731	-7.3502	2.2205
Transportation	1.8655* [2.7972]	0.1561 [1.6089]	-0.2398*** [-2.6169]	0.1717 [1.2556]	0.2137 [1.5014]	-0.0535 [-0.4056]	-0.0721 [-0.8655]	-0.0007 [-1.4921]	-0.0096 [-1.2802]	-0.0020 [-0.3338]	-0.0058 [-0.8656]	0.8004	-5.6983	2.7621
Finance	2.6592*** [3.1902]	-0.0436 [-0.3593]	0.3208*** [2.8014]	0.0077 [0.0450]	0.0206 [0.1158]	-0.2104 [-1.2755]	0.0994 [0.9545]	0.0107*** [18.7592]	-0.0028 [-0.2943]	0.0120 [1.5684]	0.0167** [1.9868]	0.9893	-5.2523	1.8264
Society	2.6305*** [6.1338]	0.1352** [2.1675]	-0.1294** [-2.1958]	0.0818 [0.9305]	0.0468 [0.5111]	-0.0210 [-0.2479]	-0.0380 [-0.7100]	0.0025*** [8.6361]	0.0080* [1.6467]	0.0041 [1.0512]	-0.0261*** [-6.0219]	0.9608	-6.5814	1.1773

t- statistics are reported in brackets. ***, ** and * indicate significance at the 1, 5 and 10% level respectively.

a potential to inform exchange rate or industrial policy in the case of Turkey.

Our results are consistent with the findings of Frankel and Rose (2006), Riberto et al. (2004) and Galindo et al. (2007) claiming that an appreciation in RER may effect the employment creation negatively. There are several possible channels of RER affecting the employment figures. RER is a mechanism giving an opportunity to make decisions on the consumption and the resource allocation between tradable and non-tradable goods as mentioned by Dornbusch (1987).. Consequently RER has macroeconomic and microeconomic effects on the employment and production (Grubacic, 2000). It can be claimed

Table 3. Cointegration test results.

Sector	FMOLS	t-stat	DOLS	t-stat
Total	-0.0154	-13.2992**	-0.1359	-18.7228**
Agriculture	-1.0121	-5.1253**	-2.1229	-22.6444**
Mining	0.6112	-1.1049	0.8342	-1.1728
Industry	0.2509	-6.7583**	0.5895	-11.5497**
Electricity	0.2588	-2.1842*	0.7232	-1.3843
Construction	0.6062	-1.7920*	0.7129	-2.2324*
Retail	0.3170	-7.1089**	0.4798	-16.9371**
Transportation	0.0869	-13.3077**	0.0640	-30.5439**
Finance	1.5035	1.1969	2.3468	6.7071**
Society	0.3147	-6.1010**	0.6289	-5.2400**
Panel result	0.2921	-17.5774**	0.4121	-32.7992**

T-stats are for $H_0 : \beta_i = 1$. ***, ** and * indicate significance at the 1, 5 and 10% level respectively.

Table 4. Johansen cointegration test results.

Sector	None trend, no intercept, no trend	None trend, intercept, no trend	Linear trend, intercept, no trend	Linear trend, intercept, trend	Quadratic trend, intercept trend
Total	0	0	1	0	2
Agriculture	0	0	1	0	2
Mining	0	0	0	0	0
Industry	0	0	2	0	2
Electricity	0	0	2	1	2
Construction	1	1	1	1	2
Retail	0	0	2	0	2
Transportation	0	0	0	0	2
Finance	2	0	0	1	2
Society	0	0	0	1	2

Trace statistics are used to evaluate the results. Critical values based on MacKinnon-Haug-Michelis (1999)

that the relationship between RER and employment is indirect. Because RER initially effects the relative price structure. The changes in the relative price structure effect the production and consequently the employment. The competitiveness determines the basics of this relationship. Consequently RER affects the real wages by the price channel and it is one of the important determinants of the employment.

An increase in RER means that the prices of goods increase by the national currency. increase. After the economy opens its doors to the world, when it is assumed that the domestic prices is a function of RER, the domestic consumer will consume both domestic and foreign products and the ratio of the prices between these goods will determine the increase or decrease in the RER (Lindblad and Sellin, 2008). Consequently, the difference between the consumer and the producer prices can be expressed by:

$$P_C - P = (1-w)(1+p^*-p)$$

Where, P_C is the consumer prices, P is the producer prices, w is the weight of domestic good and service in the consumption basket. By the assumption that the prices and wages are rigid in downward, the increase in RER will increase the consumer prices and this will increase the nominal wage level. The real wages will increase and the labour demand will diminish. However, this is valid for the open economies and if the markets are not perfect. Because if the factor market is not perfect, the labour will not get a wage equals to the marginal product of labour and the wages will be determined by the bargaining by the labor unions and the employers (Layard and Nickell, 1999).

Conclusion

When the real exchange rate diminishes, Turkish Lira buys fewer units of foreign goods so called real depreciation. Price of domestic goods decrease when reel exchange rate diminishes (depreciation). When the price

of the domestic goods increase relative to foreign goods, reel exchange rate appreciates, increases and can buy more units of foreign goods. Therefore, an increase in real exchange rate in theory increases the competitiveness of the country. However, for the countries such as Turkey an increase in real exchange rate may diminish the net exports if the exports are dependent to the imports. So the appreciation of foreign currency may or may not hurt the exports of the country. Normally the study expects that if the Turkish lira buys more dollar than before (if the Turkish lira strengthens) US goods will become cheaper in terms of Turkish lira. Some of the papers call this as import oriented growth. Turkey mostly imports by using US dollar, however, a dense of its exports are to European Countries by Euro. This is similar but different explanation within J-curve. Besides, an increase in RER may decrease the availability of the technology. The price of machinery becomes much more expensive. Considering the convergence hypothesis, this may rebound to the growth figures negatively. Technology increases the human capacity, so the average labour productivity increases.

There are tradable and non-tradable sectors creating employment at different degree by their own differential persistency degrees. The tradable goods Turkey takes the prices at the market as given and they can be exported and imported. However, the non-tradable goods are consumed where they are produced. Agriculture, mining, industry, retail, finance are tradable sectors and the electricity, construction, transportation are non-tradable sectors.

An increase in investment and government expenditures shifts the total demand curve up. However, if the real wages diminish the supply curve shifts to the right. When the nominal wages are constant, if RER increases, the prices also go up and the real wages diminish. This means when the RER increases, the production level also stimulates. However, if the RER increases, the other production costs also increase consequently aggregate supply curve shifts to the left. The net effect of RER is for the countries like Turkey is that the aggregate supply curve shifts to the left and the production level diminishes. Because the import costs effect the export costs and these effects the volume of import and the cost inflation effects the employment negatively. When the wages increase, the profits of the firms diminish and the supply curve shifts to the left. This causes a close in inflationist gap in Keynesian economics. The long run aggregate supply curve and the short term equilibrium production intersect and the economy comes to the equilibrium level.

REFERENCES

Agenor PR (2007). Output, devaluation, and the real exchange rate in developing countries. Rev. World. Econ., 127(1): 18-41.

Alexandre F, Bacao P, Cerejeira J, Miguel P (2010). Employment, exchange rates and labour market rigidity. IZA DP. Paper. 4891(April): 1-34.

Berument H, Coskun N, Sahin A (2007). Day of the week effect on foreign exchange market volatility: Evidence from Turkey. Res. Int. Bus. Finan., 21(1): 87-97.

Burgess SM, Knetter MM (1998). An international comparison of employment adjustment to exchange rate fluctuations. Rev. Int. Econ., 6(1): 151-163.

Campa JM, Goldberg LS (2001). Employment versus wage adjustment and the US dollar. Rev. Econ. Stat., 83(3): 477-489.

Chen SS, Chen HC (2007). Oil prices and real exchange rates. Energy Econ., 29(3): 340-404.

Demir F (2010). Exchange rate volatility and employment growth in developing countries: Evidence from Turkey. World Dev., 38(8): 1127-1140.

Dornbusch (1987). Exchange rates and prices. Am. Econ. Rev., 77(1): 93-106.

Edwards S (1989). Real exchange rates, devaluation and adjustment: Exchange rate policy in developing countries. MIT press, Cambridge, M.A.

Fan Y, Song W (2006). The effect of changes in real exchange rates on employment: Evidence from manufacturing industries in China, 1980-2002. Front. Econ. China, 1(1): 126-139.

Faria JR, Ledesma ML (2005). Real exchange rate and employment performance in an open economy. Res. Econ., 59(1): 67-80.

Filiztekin A (2005). Exchange rate and employment in Turkish manufacturing. Sab. Un. DP. 0405: 1-24.

Frenkel R (2004). Real exchange rate and employment in Argentian, Brasil, Chile and Mexico. Mimeo. G24, CEDES, Buenos Aires.

Frenkel R, Ros J (2006). Unemployment and the real exchange rate in Latin America. World Dev., 34(4): 631-646.

Gala P (2008). Real exchange rate levels and economic development: Theoretical analysis and econometric evidence. Cam. J. Econ., 32(2): 273-288.

Grubacic S (2000). Real exchange rate determination in Eastearn Eur. Atl. Econ. J., 28(3): 346-363.

Gylfason T, Schmid M (1983). Does devaluation cause stagflation?. Can. J. Econ., 16(4): 641-654.

Hjalmarsson E, Osterholm P (2007). Testing for cointegration using the Johansen methodology when variables are near-integrated. IMF WP. 07/11: 1-21.

Hua P (2007). Real exchange rate and manufacturing employment in China. China Econ. Rev., 18(3): 335–353.

Hua P (2007). Real exchange rate and manufacturing in China. China Econ. Rev., 18(3): 335-253.

Im KS, Pesaran MH, Yongcheol S (2003). Testing for unit roots in heterogenous panels. J. Econom., 115(1): 53-74.

Jeanneney SG, Hua P (2010). How does real exchange rate influence labour productivity in China? China Economic Review, In press: corrected proof. DOI: 10.1016/j.chieco.2010.04.008.

Johansen S (1988). Statistical analysis of cointegration vectors. J. Econ. Dyn. Con., 12(2): 231–254.

Johansen S (1991). Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models. Econometric, 59(6): 1551-1580.

Juselius K, Ordonez J (2009). Balassa-Samuelson and wage, price and unemployment dynamics in the Spanish transition to EMU membership. Econ. Open Acc. Op. Assess., 3(March): 1-32.

Kaldor N (1978). Causes of the slow rate of growth of the United Kingdom. In: Further essays on economic theory. Duckworth, London, pp. 100-138.

Kandil M, Mirzaie IA (2003). The effects of dollar appreciation on sectoral labor market adjustments: Theory and evidence. Quar. Rev. Econ. Financ., 43(1): 89-117.

Kao C, Chiang MH (1997). On the estimation and inference of a cointegrated regression in panel data. Syracuse Univ. manuscript.

Klein MW, Schuh S, Tries TK (2003). Job creation, job destruction and the real exchange rate. J. Int. Econ., 59(2): 239-265.

Layard R, Nickell S (1999). Labour market institutions and economics performance. In: Ashenfelter O, Card D, (Eds.) Handbook of labour economics, 3(46), Amsterdam, North-Holland.

Levin A, Lin CF, Chia-Shang CJ (2002). Unit root tests in panel data: Asymptotic and finite-sample properties. J. Econom., 108(1): 1-24.

Lindblad H, Sellin P (2008). The equilibrium rate of unemployment and real exchange rate: An unobserved components system approach. Sve. Ris. Res. P. S. 52, November.
MacKinnon JG, Haug, AA, Michelis L (1999). Numerical distribution functions of likelihood ratio tests for cointegration. J. Appl. Econom., 14(5): 563-577.
Maddala GS, Shaowen W (1999). A comparative study of unit root tests with panel data and a new simple test. Oxf. Bull. Econ. Stat., 61(0): 631-652
Mark N, Sul D (1999). A computationally simple cointegration vector estimator for panel data. Ohio State University manuscript.
Ngandu S (2008). Exchange rates and employment. South. Afr. J. Econ., 76(S2): 205-221.
Ngandu S (2009). The impact of exchange rate movements on employment: The economy-wide effect of a rapid appreciation. Dev. South. Afr., 26(1): 111-130.
Oskooee BM, Mirzaie I, Miteza I (2007). Sectoral employment, wages and the exchange rate: Evidence from the US. East Econ. J., 33(1): 125-136.
Palma G (2003). Four sources of de-industrialization and a new concept of the Dutch disease. In: Ocampo, J (Ed.) New Challenges for Latin American Development, Eclac, World Bank.
Pedroni P (1999). Critical values for cointegration tests in hetereogenous panels with multiple repressors. Oxf. Bull. Econ. Stat., 61(0): 653-670.
Pedroni P (2001). Purchasing power parity tests in cointegrated panels. Rev. Econ. Stat., 83(4): 727-731.
Pedroni P (2004). Panel cointegration: Asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis. Econometric, 20(3): 597-625.
Robertson R (2003). Exchange rates and relative wages: Evidence from Mexico. North Ame. J. Econ. Financ., 14: 25-48.
Saygili H, Saygili M, Yilmaz G (2010). The new real effective exchange rate indices for Turkey (in Turkish). Cen. Bank Rep. Turkey DP 10(12): 1-30.
Williamson J (2003). Exchange rate policy of development. Initiative for Policy Dialogue Task Force on Macroeconomics, Colombia, New York.
Yanhui F, Wang S (2006). The effect of changes in real exchange rates on employment: Evidence from manufacturing industries in China, 1980-2002. Front. Econ. China, 1: 126-139.

APPENDIX

Appendix A. Stationary tests.

Variables	Constant	Constant, Linear trend	None
Total	-1.9755	-1.8641	0.2548
Agriculture	-2.0223	-1.3856	-0.4351
Mining	-2.3021	-2.4710	0.3093
Industry	-1.7087	-0.7928	0.9317
Electricity	-3.5668*	-3.7362**	-0.5279
Construction	-2.7635*	-1.7962	1.5123
Retail	-1.9814	0.5292	0.9809
Transportation	-2.8178*	-3.9625**	0.7126
Finance	0.4197	-2.3164	2.4342**
Society	0.2765	-1.3970	2.1706**
Rer	-2.2396	-3.3317*	0.2649
GDP	-1.7131	1.3861	0.6888

* implies that the variable is significant at 5% level. SBC criteria are used for the lag section.