Journal of Economics and Development Studies
March 2016, Vol. 4, No. 1, pp. 103-108
ISSN: 2334-2382 (Print), 2334-2390 (Online)

Published by American Research Institute for Policy Development
DOI: 10.15640/jeds.v4n1a10
URL: http://dx.doi.org/10.15640/jeds.v4n1a10

Financial Development and Tax Revenue Nexus in Turkey

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Abstract

This study explores the nexus between financial development (banking and non-banking) and direct tax revenue in a multivariate framework in Turkey for the period 2006 to 2014, employing monthly data. We examined the long run equilibrium relationship between financial development and tax revenue using two different co-integration tests namely Johansen and Juselius (1990), and Hatemi-J (2008). The results of the co-integration tests indicate that direct tax revenue and financial development are co-integrated. The Vector Error Correction Model (VECM) used to investigate the short run and long-run dynamic relationship between financial development and direct tax revenue. The results reveal that banking and non-banking financial development Granger cause direct tax revenue in the long run. Only the banking sector Granger causes direct tax revenue in the short run.

Keywords: financial development; tax revenue; structural break; co-integration; causality; Turkey

JEL Classification: B26; C22; H71; O53

I. Introduction

In the last decade, Turkey has implemented a trade – oriented growth model, and has achieved considerable economic performance. Over the last ten years, macroeconomic stability has been secured, the inflation rate has reduced to a single-digit number, the interest rate has decreased significantly, public debt as a percentage of GDP has diminished, public balance has been achieved and a high primary surplus has been attained. At present, Turkey is in the top twenty largest economies in the world.

The strong economic growth has generated considerable government revenue. According to the World Bank (2014), between 2000 and 2012 general government revenues in Turkey increased from about 27 percent of GDP to almost 33 percent. In terms of tax revenues, between 2004 and 2012, direct tax revenue grew by 13.28 percent while, indirect tax revenue grew by 12.2 percent. The increase in tax revenue can be attributed to several factors including sound fiscal policy, economic growth and financial development.

There are three hypotheses about the linkage between financial development and economic growth in literature. First, the *supply-leading hypothesis* holds that by facilitating the allocation of resources, capital accumulation and diffusion of technology, financial development promotes long-run economic growth. Second, the *demand-pulling hypothesis* ascertains that economic growth causes financial development. Third, according to the *feedback hypothesis* financial development and economic growth mutually influence each other. In other words, they are complementary.

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The financial development may influence direct tax revenue in several ways. First, economic growth leads to an expansion of taxable economic activities, which in turn, increases direct tax revenue. Second, economic growth brings prosperity and boosts the demand for goods and services which raises new investments. As a result the income tax base will increase which contributes to direct tax revenues. Third, both financial development and economic growth might discourage the spread of shadow economy. Finally, financial development could directly increase tax revenues as it facilitates tracking and collection of taxes (see, Bose *et al.*, 2012 and Capasso and Jappeli, 2013).

The purpose of this study is to explore the co-integration and causality between financial development and total direct tax revenue in Turkey**.** Financial development is associated with different macroeconomic variables in many empirical studies. However, very few studies have examined co-integration and causal relationships between financial development and direct tax revenue. Looking at the tax revenue effects of the financial development is a relatively new idea. Taha *et al*. (2013) investigated the causal relationship between financial system activities and direct tax revenue for Malaysia and found that stock market activities Granger causes direct tax revenue. The contribution of this study is twofold. First, to our knowledge, this is the first attempt to probe co-integration and causal relationship between financial development and direct tax revenue in a multivariate framework in Turkey. Second, this study considers both linear and nonlinear co-integration tests. The rest of the study is outlined as follows. Section 2 presents model, data and methodology, Section 3 reports on empirical findings, and Section 4 concludes.

2. Model, data and methodology

Using the variables proposed by Taha et al. (2013) the following model[1,2] is exploited to investigate the causal relationship between direct tax revenue[3] and financial development.

$$lndt_t = f\,(lncb_t\,,\, lnbi_t\,,\, lnpb_t) \qquad (1)$$

where dt_t, cb_t, bi_t and pb_t represent the total direct tax revenue, the total value of credit provided by commercial banks to the private sector, Borsa Istanbul's stock market index (BIST 100), and outstanding private sector bonds market, respectively and ln denotes natural logarithm. In this study, financial development is decomposed into banking and non-banking financial activities. The total value of credit provided by commercial banks to the private sector is used as a proxy for banking sector financial development. The stock market index and the outstanding private sector bonds are used as proxies for nonbanking financial development.

Monthly time series data from January 2006 to December 2014, for a total of 108 observations are used in this study. Data availability forced us to choose this particular time period. All the series are in nominal Turkish Lira obtained from two sources. While direct tax, credits, and private sector bonds data taken from the Central Bank of Turkey's electronic data delivery system (EDDS) the data for the stock market index (BIST 100) is obtained from Borsa Istanbul's website (www.borsaistanbul.com). Prior to analysis, to reduce the problem of heteroscedasticity, all of the series are transformed into a natural logarithm scale. The data used in this paper is not seasonally adjusted for two reasons. First, seasonal adjustment entails the smoothing of data. Second, it has undesirable effects on procedures involving structural breaks.

Johansen and Juselius (JJ) (1990) and Hatemi-J (HJ) (2008) co-integration tests are used to determine the long-run equilibrium relationship among variables. While JJ test ignores structural breaks HJ assumes two structural break points. In the case of HJ procedure, structural points are not known in advance but their date is determined by data. The JJ test assumes that a long run equilibrium relationship is not influenced by the internal and external developments. The HJ co-integration test considers three models namely Level Shift (C), Level Shift and Trend (C/T) and Regime Shift (C/S).

The regime shift (C/S) version of the Hatemi J. test can be expressed as follows:

$$y_t = \alpha_0 + \alpha_1 D_{1t} + \beta_0^{'} x_t + \beta_1^{'} D_{1t} x_t + \varepsilon_t \qquad (2)$$

$$y_t = \alpha_0 + \alpha_1 D_{1t} + \alpha_2 D_{2t} + \beta_0^{'} x_t + \beta_1^{'} D_{1t} x_t + \beta_2^{'} D_{2t} x_t + \varepsilon_t \qquad (3)$$

In Eq. (2) and (3) D_{1t} and D_{2t} denote dummy variables defined as

$$D_{1t} = \begin{cases} 0 & \text{if } t \le [n\tau_1] \\ 1 & \text{if } t > [n\tau_1] \end{cases} \quad \text{and} \quad D_{2t} = \begin{cases} 0 & \text{if } t \le [n\tau_2] \\ 1 & \text{if } t > [n\tau_2] \end{cases}$$

here τ_1 and τ_2 represent unknown parameters belongs to set (0,1) indicating the relative timing of structural break points. The bracket signifies integer part. See Hatemi-J. (2008) for the detailed explanations regarding the estimation procedures.

To ascertain the direction of causality (short-run and long-run) between four variables, we use the vector error – correction model (VECM) specified in Eq.(4)

$$(1-L)\begin{bmatrix} \ln dt_t \\ \ln cb_t \\ \ln bi_t \\ \ln pb_t \end{bmatrix} = \begin{bmatrix} \phi_1 \\ \phi_2 \\ \phi_3 \\ \phi_4 \end{bmatrix} + \sum_{i=1}^{s} (1-L)\begin{bmatrix} \alpha_{11i} & \alpha_{12i} & \alpha_{13i} & \alpha_{14i} \\ \beta_{21i} & \beta_{22i} & \beta_{23i} & \beta_{24i} \\ \chi_{31i} & \chi_{32i} & \chi_{33i} & \chi_{34i} \\ \delta_{41i} & \delta_{42i} & \delta_{43i} & \delta_{44i} \end{bmatrix}\begin{bmatrix} \ln dt_{t-i} \\ \ln cb_{t-i} \\ \ln bi_{t-i} \\ \ln pb_{t-i} \end{bmatrix} + (ECT_{t-1})\begin{bmatrix} \pi_1 \\ \pi_2 \\ \pi_3 \\ \pi_4 \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \end{bmatrix} \qquad (4)$$

Where L is the lag operator and (1-L) is the difference operator, s is the lag length, ECT_{t-1} is the error correction term which represents disequilibrium between financial development and tax revenues, ε_{1t}, ε_{2t}, ε_{3t} and ε_{4t} are serially uncorrelated residuals. For instance, if the coefficient of the error term (π_1) is statistically significant in Eq. (4), one can conclude that the direction of causality is from *cb*, *bi*, and *pb* to *dt* in the long run. On the other hand, $a_{12i} \neq 0$, $a_{13i} \neq 0$, and $a_{14i} \neq 0$ indicate that *cb*, *bi*, and *pb* Granger cause *dt* in the short run.

3. Findings

The empirical analysis of the study contains three steps, namely unit root, co-integration and the Granger causality tests. Determining the integration order of variables is a prerequisite for the co-integration tests. For this purpose, ADF and Zivot–Andrews (ZA) unit root tests are used as the first step of the empirical verification procedure. The results of the ZA test show that structural breaks are mostly clustered around the year 2008 and 2009, which refers to global financial crisis of 2008. The results tabulated in Table 1 and Table 2 indicates that all the variables are stationary as of their first differences. Therefore, all of the series are integrated in an order of one, I(1).

Table 1: ADF unit root test results

Test	lndt	lncb	lnbi	lnpb
ADF	c&t	c&t	c&t	c
Level	-2.01(11)	-3.10(3)	-2.39(0)	-2.34(0)
First difference	-6.79(11)***	-3.42(2)**	-10.04(0)***	-9.63(0)***
Order of integration	I(1)	I(1)	I(1)	I(1)

Notes: *** and ** indicate significance at 1% and 5% levels respectively. c&t denotes constant and trend; c denotes constant. The lag lengths are given in parenthesis and based on SBC. EViews 9.0 was used for all computations.

Table 2: Zivot-Andrews test results

	lndt		lncb		lnbi		lnpb	
	c&t	Break Point	c&t	Break Point	c&t	Break Point	c	Break Point
Level	-3.18(12)	2009:02	-4.83(6)	2008:10	-5.45(3)	2009:11	-4.27(1)	2010:05
First difference	-7.65(11)***	2009:12	-5.79(3)***	2009:11	-10.81(0)***	2009:03	-10.05(0)***	2008:08
Order of integration	I(1)		I(1)		I(1)		I(1)	

Notes: Critical values at 1% and 5% significance level are −5.57 and −5.08 respectively (Zivot and Andrews, 1992). c&t denotes constant and trend, c denotes constant. The lag lengths are given in parenthesis. EViews 9.0 was used for all computations.

The existence of cointegration is investigated in the second step. The JJ and HJ co-integration tests require non-stationary series with identical orders of integration. To this end, JJ and HJ co-integration tests are used, and the results are reported in Table 3 and 4 respectively. The result of JJ test shows that all the series are co-integrated which means that there is a long run equilibrium relationship among the variables. In the case of HJ test, while Z_t^* and Z_a^* tests can reject the null hypothesis of no co-integration at a 1% level of significance for models C, C/T and C/S, but modified ADF test cannot reject the null hypothesis of no co-integration at 5% level of significance for all models in HJ procedure. Furthermore, the result of HJ test provides evidence of structural breaks vary between May 2007 and September 2011. Provided that all variables are I(1) and co-integrated, one can expect causality at least in one direction.

Table 3: JJ Cointegration test results

Hypothesis	Alternative	Trace Statistics	Critical Value 5%	Prob.	$\lambda - Max$ Statistics	Critical Value 5%	Prob.
r = 0	r=1	76.208***	47.856	0.000	42.427***	27.584	0.001
r ≤ 1	r=2	33.781**	29.797	0.016	22.428**	21.131	0.033
r ≤ 2	r=3	11.353	11.353	0.191	11.353	14.264	0.137
r ≤ 3	r=4	0.002	3.841	0.998	0.002	3.841	0.998

Notes: *** and ** indicate significance at 1% and 5%level respectively; r denotes number of co-integrating vectors. Optimal lag length is 2 determined by Schwarz Information Criterion (SIC). EViews 9.0 is used for all computations.

Table 4: Hatemi-J. cointegration test results

Models	ADF	TB_1 / TB_2	Z_t^*	TB_1 / TB_2	Z_a^*	TB_1 / TB_2
C	-3.188(11)	2009:10 / 2011:04	-26.523***	2007:05 / 2008:08	-125.139***	2009:07 / 2011:01
C/T	-3.721(11)	2008:12 / 2011:05	-26.257***	2007:05 / 2008:08	-126.679***	2008:06 / 2009:05
C/S	-5.070(12)	2009:06 / 2010:01	-28.607***	2007:12 / 2008:08	-126.748***	2008:02 / 2008:04

Notes: Critical values are available in Hatemi-J (2008:p501). TB denotes break point. *** implies significance at 1%. Gauss 10.0 is used for all computations.

Lastly, Granger causality test based on the VECM is conducted and short run and long run results are documented in Table 5. Of the four equations only the error correction terms ($ECT_{t-1,}$ ECT_{t-2}) in the direct tax-equation ($\Delta lndt_t$) are statistically significant. This result confirms unilateral causality running from banking and non – banking financial development to direct tax revenue in the long run. Contrary to the results of Taha *et al.* (2013), our results indicate that not only the stock market but also commercial bank credits to the private sector and private bond market influence direct tax revenue. Unidirectional causality running from banking, stock market and private sector bonds market to direct tax revenue in the long run indicates that banking and non-banking financial activities matter for direct tax revenue in Turkey. On the other hand, in the short run, bi-directional causality between direct tax revenue and the banking sector is also found. The unidirectional causality running from banking to tax revenue both in the short and the long run (strong causality) show that the banking sector promotes direct tax revenue.

Table 5: VECM results

Dependent variable	Sources of causation					
	Short run			Long run		
	$\Sigma\Delta lndt_t$	$\Sigma\Delta lncb_t$	$\Sigma\Delta lnbi_t$	$\Sigma\Delta lnpb_t$	$ECT_{1, t-1}$	$ECT_{2, t-1}$
$\Delta lndt_t$	-	5.45* [0.065]	3.82 [0.148]	3.79 [0.149]	-1.679*** (-6.31)	0.808*** (5.58)
$\Delta lncb_t$	5.26* [0.071]	-	0.53 [0.763]	1.63 [0.441]	-0.021 (-1.16)	-0.013 (-1.40)
$\Delta lnbi_t$	0.49 [0.783]	2.98 [0.224]	-	1.148 [0.563]	0.114 (0.94)	-0.032 (-0.49)
$\Delta lnpb_t$	2.89 [0.235]	1.43 [0.489]	0.240 [0.886]	-	0.233 (0.67)	0.040 (0.21)

Notes: ***, and * indicate significance at 1% and 10% levels respectively. Figures in parenthesis represent the *t*-statistics. Optimal lag length is 2 determined by Schwarz Information Criterion (SBC). The joint significance of the coefficients is ascertained by the Wald test. Figures in brackets represent p-value of the Chi-sq test. EViews 9.0 is used for all computations.

The stability in the coefficients of the estimated model ($\Delta lndt_t$) is checked using a cumulative sum (CUSUM) and a cumulative sum of squares (CUSUMQ) stability tests that employ recursive residuals. The plots of CUSUM and CUSUMQ statistics from the Eq.(4) for the dependent variable ($\Delta lndt_t$) are depicted in Figure 1. Since the two statistics are confined within the 5% critical bounds, the estimated coefficients in the error correction model are stable over the analysis period, and therefore results can be used for policy recommendations.

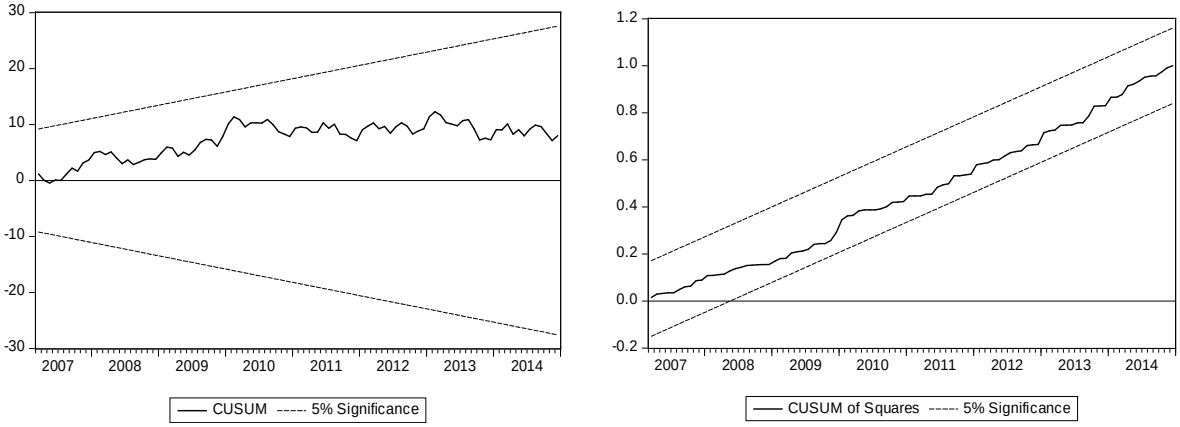

Figure 1: Plot of CUSUM and CUSUMQ: Dependent variable: $\Delta lndt_t$

4. Conclusion

Using monthly data from January 2006 to December 2014 as well as a multivariate model, this study examined the linear and nonlinear co-integration and causality between financial development (both banking and non-banking) and direct tax revenue in Turkey. The empirical findings of the study show that the financial market development and direct tax revenue are co-integrated. Furthermore, the Granger causality tests based on VECM confirmed that financial development Granger cause direct tax revenue in the long run. However, the short run causality test results show that only the banking sector Granger cause direct tax revenue. In summary, these results conclude that in the last decade, financial development has played an important role in the direct tax revenue collection in Turkey. From a policy point of view, findings of the study suggest that authorities in Turkey should continue policies that facilitate financial development.

Notes

[1] We include index of industrial production as a proxy of economic activity in the model, however, it is integrated order of two, I(2) and therefore this variable is excluded from the model.

[2] Due to the unavailable monthly GDP data we could not deflate each variable by GDP.

[3] We also tried to estimate the model when dependent variable is indirect tax revenue, however, it is found that indirect tax revenue series is integrated order of two, I(2) and therefore we cannot proceeded to analysis.

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