DISAGGREGATED CAPITAL INFLOWS AND ASSET PRICES: EVIDENCE FROM TURKEY

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ABSTRACT

This paper considers the behavior of capital inflows (sum of debt-and equity-based inflows) in the push-pull framework and their effects on asset prices. First, we investigate the responses of disaggregated capital inflows to global push factor and country specific pull factor by estimating a VAR model for Turkey over the period between 2009:M1 and 2020:M4. Second, by using the same estimation technique, we test whether different forms of capital inflows have different impact on asset prices. We find that the total capital and debt inflows present similar responses to shocks to push and pull factors. An increase in both factors is followed by a decrease in capital inflows. Moreover, there is an immediate increase in asset prices when there is a shock to capital inflows. However, these significant responses become negative in the following period when there is a shock to capital inflows except for the equity inflows.

Keywords: Push-Pull Framework, Debt- and Equity-Based Capital Inflows, Asset Prices, Turkey

JEL Codes: C32, F32, G12.

AYRIŞTIRILMIŞ SERMAYE AKIMLARI VE VARLIK FİYATLARI: TÜRKİYE'DEN BULGULAR

ÖZET

Bu makale itme-çekme çerçevesindeki sermaye girişlerinin davranışını (borç ve öz kaynak bazlı girişlerin toplamı) ve bu girişlerin varlık fiyatları üzerindeki etkilerini ele almaktadır. İlk olarak, 2009: Ocak ve 2020: Nisan arasındaki dönemleri arasında Türkiye için bir vektör oto regresyon modeli tahmin ederek, ayrıştırılmış sermaye girişlerinin küresel itme faktörüne ve ülkeye özgü çekme faktörüne verdikleri tepkileri araştırıyoruz. İkinci olarak, aynı tahmin tekniğini kullanarak, farklı sermaye girişlerinin Türkiye'deki varlık fiyatları üzerinde farklı etkilerinin olup olmadığını değerlendiriyoruz. Toplam sermaye ve borç girişlerinin global oynaklık endeksi ve ülkeye özgü risk primine yönelik şoklara benzer tepkiler verdiğini görüyoruz. Her iki faktördeki artışı sermaye girişlerinde bir azalma izler. Ayrıca, sermaye girişlerinde bir şok olduğunda varlık fiyatlarında ani bir artış olur. Ancak, bu önemli

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tepkiler önümüzdeki dönemde öz sermaye girişleri dışında sermaye girişlerinde şok yaşandığı dönemde olumsuz yöne dönmektedir.

Anahtar Kelimeler: *İtme-Çekme Çerçevesi, Borç ve Öz Kaynak Temelli Sermaye Girişleri, Varlık Fiyatları, Türkiye*

JEL kodları: C32, F32, G12.

1. INTRODUCTION

Increasing integration across financial and capital markets have significant impacts especially on emerging market economies. On the one hand, global economic and financial conditions allow investors to diversify their asset holdings and provide opportunities to mitigate the risk of investment. On the other hand, such integration may have negative side effects such as propagation of a financial crisis stemming from a center economy on emerging economies. Both effects can be attributed to the synchronicity between the deep financial integration and surge in international capital flows (Cerutti, Claessens and Ratnovski, 2017).

It is commonly suggested that the push and pull framework determines capital flows in terms of composition, direction, and volume (Calvo, Leiderman and Reinhart, 1993; Fernandez-Arias, 1996). The push factor represents the global financial conditions such as monetary policy decisions in advanced economies, banking distress conditions, global risk conditions, which affect capital flows to peripheral economies. The pull factor determines the domestic conditions including risk premium, external debt levels, size and liquidity conditions in financial market, domestic asset prices, financial openness, institutionalization, which influence the attractiveness of investing in domestic economies (Kang and Kim, 2019).

Rey (2018) argues that the global risk factor drives liquidity conditions across economies. However, it cannot be always accepted that the common push factors are the only main drivers of capital flows (Fratzcher, 2012). Due to country specific characteristics, especially for emerging economies, evaluating the role of domestic pull factors on properties of capital inflows becomes important. The swings in capital flows have significant impacts on financial and economic performance of an economy (Lane and Miles-Ferretti, 2007). Therefore, it is also important to understand association between domestic pull factor, capital flows and their economics effects.

In this paper, we pose the following questions. In what extend do the push and pull factors affect capital inflows? Do the reactions of disaggregated flows differ in response to a shock on the same factor? What are the impacts of different forms of capital inflows on asset prices? To answer these questions, we estimate VAR models. Our interpretation of the estimation results relies on impulse response functions. The two main findings in this paper are as follows. First, debt-based inflows have significant impact on asset prices. However, equity-based inflows have limited impact on asset prices. Second, the

push and pull factors have different impacts on capital inflows. The former one matters more for the debt-based capital flows, while the latter one more strongly influences the equity-based capital inflows.

Motivated by Forbes and Warnock (2012) and Forbes and Warnock (2014), we consider different types of capital flows reported under financial account of balance of payment statistics[1] and test the role of each components separately. The financial account is comprised of Foreign Direct Investment (FDI), Portfolio Investment (PI), and Other Investment (OI). These three items can be constructed in the forms of debt-based and equity-based flows, as well. Davis (2015) tests whether debt-based inflows as the sum of portfolio debt and other investment liabilities, and equity-based-inflows as the sum of portfolio equity and FDI have different impacts on macroeconomic indicators including output gap, inflation, credit growth, stock prices by utilizing a structural VAR over the period between 2005Q1 and 2013Q4 for 30 countries. His findings suggest that the indicators are affected almost entirely by the debt inflows. Since the share of debt-based flows in emerging economies is larger than equity-based inflows, they are likely to have greater impact on macroeconomic and financial conditions. When compared to PI and OI, FDI is less volatile and therefore its reactions to a risk shock would be different. So, high level disaggregation of capital inflows is important because different components of financial account can be affected by different factors (Ibarra and Tellez-Leon, 2020). So, analyzing disaggregated capital inflows provides us with information about which form of capital inflows have the actual impact on asset prices.

Due to low interest rate environment and large-scale asset purchase programs followed by central banks in advanced economies, assets in emerging market economies have become more attractive for investors to get higher returns. So, emerging economies have experienced high volume of capital inflows. Our focus economy in this paper is Turkey. Studying the case of Turkey would be interesting for several reasons. First, massive capital inflows can be counted as one of most important drivers that fed the growth performance of Turkish economy (Yeldan and Ünüvar, 2015). Second, Turkish economy have promised high rates of interest return to attract capital inflows. This policy has led composition of inflows mainly to portfolio flows, which is a short-term, volatile, and risky form of inflows (Berument, Denaux and Emirmahmutoglu, 2015). Third, the Turkish economy has higher current account deficit when compared to other emerging economies. Fourth, external debt stock as a percentage of gross national income of Turkey has always been higher than to that of peer economies including Brazil, Russia, India, China, South Africa, and Indonesia. Overall, portfolio inflows and debt-based flows play major role in financing the current account deficit of Turkish economy.

Based on the above discussion, we test following hypotheses:

Hypothesis 1. There is an association between push and pull factor, and capital inflows. The association may differ with respect to disaggregated inflows.

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[1] See Table A1 and Figure A1 in Appendix.

Hypothesis 2. Disaggregated capital inflows have impact on asset prices. The impact may differ with respect to disaggregated inflows.

The remainder of this paper is as follows. Section 2 presents some stylized facts about capital inflows to Turkey. Section 3 introduces data and econometric model. Section 4 includes the estimation results. Finally, Section 5 concludes the paper.

2. SOME STYLIZED FACTS ABOUT CAPITAL INFLOWS

This section presents information about the time series behavior of push and pull factors used in this study. Moreover, some facts about the capital inflows to Turkey are also presented.

Figure 1 displays the time series behavior of CDS (a domestic pull factor) and VIX (a global push factor) in association with some recent events. CDS (VIX) values are shown on left (right) axis. The correlation between these two series is 0.32 over the whole horizon. However, for the subperiods, the correlation is 0.75 (20009M1-2013:M3) and 0.4 (2013:M4-2020:M4). Although global conditions display a more stable pattern during the latter period, Turkey has experienced political and financial turbulences, which increase country risk premium. Therefore, one may conclude that Turkey negatively differentiated due to its own characteristics. For example, U.S. sanctions in 2018 summer led to a depreciation of domestic currency, which results an increase in country risk premium up to 550 points. Moreover, conflict between Turkey and the US on issues of S-400 anti-aircraft system and F-35 jets drove CDS up, as well.

Figure 1. Time Series of CDS and VIX
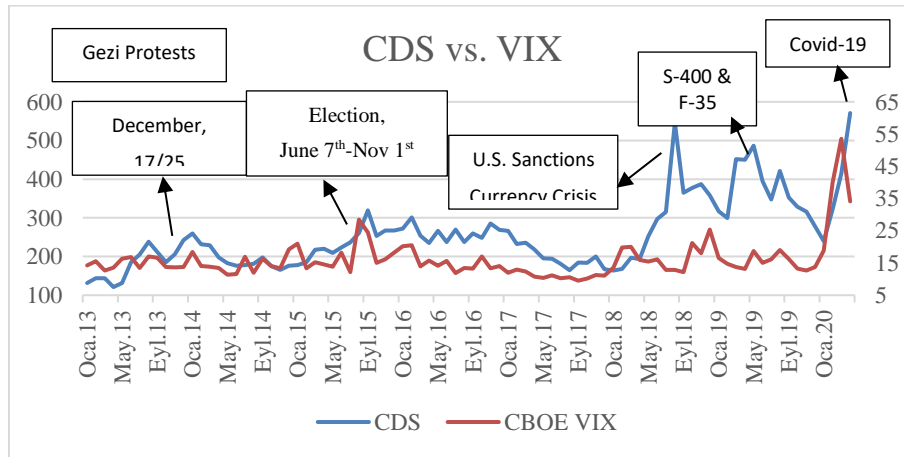
Source: Fred St. Louis Fed and Bloomberg

Figure 2. Time Series of CDS and capital inflows
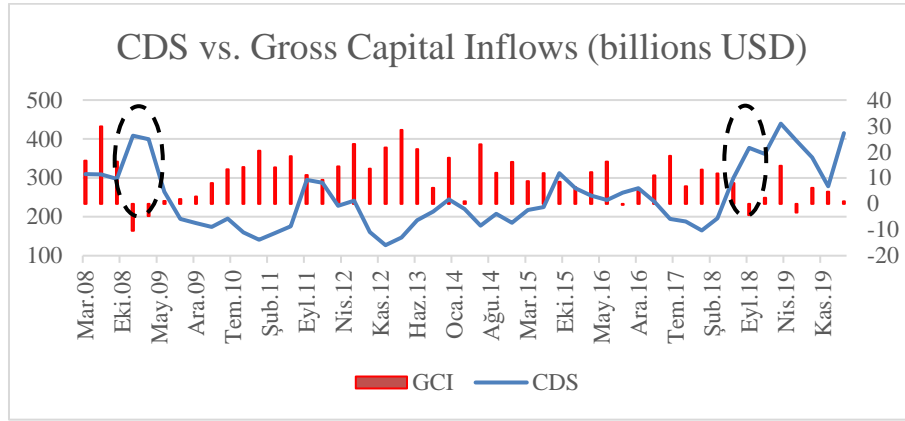
Source: Bloomberg and CBRT

Figure 2 exhibits the negative association between CDS and capital inflows, which is the sum of liabilities of FDI, PI, and OI. There are especially two periods, in which Turkey had hard time to attract capital flows. First, CDS value of Turkey reached its peak points in the last quarter of 2008, when the financial crisis hit the global economy and Turkey experienced capital outflows. Second, third quarter of 2018, when the U.S. imposed sanctions on Turkey and the value of the Lira, domestic currency depreciates.

Table 1 presents the composition and shares of each component of capital inflows. The capital inflows can also be expressed as the sum of equity-based flows (sum of PI equity and FDI) and debt-based inflows (sum of PI debt, bonds, and OI liabilities, loans, and trade credit). The composition indicates that 67% (33%) of capital inflows is composed of debt-based inflows (equity-based inflows). Debt-based inflows have larger volatility than equity-based inflows over time[2]. External debt induced financing creates financial instability in Turkey with chronic current account deficit.

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[2] See Figure A2 in Appendix.

Table 1. Share of Capital Inflows by Instruments and Sectors

Components	%	Instruments	%	Sectors	%
FDI	0.31				
		Equity	*0.66*		
		Other Capital	*0.07*		
		Real Estate	*0.27*		
PI	0.28				
		Equity	*0.11*		
				Banks	*0.23*
				Other Sectors	*0.77*
		Debt	*0.89*		
				CB	*-*
				Banks	*0.3*
				Gov	*0.6*
				Other Sectors	*0.1*
OI	0.41				
		Currency and Deposits	*0.36*		
		Loans	*0.41*		
		Trade Credit	*0.21*		
		Other Assets	*0.02*		

Source: CBRT and Author's own Calculation

3. DATA AND ECONOMETRIC MODEL

3.1. Data

In this study, we use monthly data over the period between 2009:M1 and 2020:M4 to investigate the impact of push and pull factors on capital inflows in both aggregated and disaggregated forms and the impact of capital inflows on asset prices. Our main data source for capital inflows is Balance of Payments Statistics (BOP) released by Central Bank of Republic of Turkey (CBRT). From the Financial Account (FA), we sum all liabilities of Foreign Direct Investment (FDI), Portfolio Investment (PI), and Other Investment (OI) to construct total capital inflows. Alternatively, we split capital inflows into equity-based inflows (sum of portfolio equity and FDI liabilities) and debt-based inflows (portfolio debt and OI liabilities). We normalize capital inflows by GDP. Since we do not have monthly data on GDP, we use Chow-Lin interpolation to convert quarterly data into monthly. As a proxy for the global push and country specific pull factor, we use CBOE VIX and credit default swap (CDS), respectively. The former one reflects global risk appetite and the latter one reflects the country risk premium. The time series of VIX is obtained from the Federal Reserve Economic Data of the Federal Reserve Bank of St. Louis (FRED). To assess the performance of financial dimension of the economy in response to shock on capital inflows, we use exchange rate and exchange traded funds as the assets. Construction of the variables with their sources are shown in Table 2.

Table 2. Construction and Source of the Variables

Variables	Construction	Source
VIX	Log of implied volatility in S&P 500 stock index option prices from CBOE	FRED
CDS	Log difference of country credit default swap	Bloomberg
GCI	Capital inflows as the sum of liabilities normalized by GDP	CBRT
DEBT-BASED	The sum of portfolio debt and other investment liabilities normalized by the GDP	CBRT
EQUITY-BASED	The sum of portfolio equity and FDI Liabilities normalized by GDP	CBRT
REER	Log difference of real effective exchange rate	CBRT
RETURN	Log difference of iShares MSCI Turkey ETF	Bloomberg

Table 3 presents descriptive statistics of the variables. Over the sample period, the average share of capital inflows in GDP is around 0.014. Debt-based capital inflows is 1,5 times higher than the equity-based capital inflows in the same period. However, these two forms of capital inflows significantly differ from each other with respect to their own volatility. Debt-based capital inflows are about six times as volatile as equity form. The table also shows that the average asset returns to investors are negative in the sample period.

Table 3. Summary Statistics of the Variables

Variables	Mean	Min	Max	Std. Dev.
VIX	2.86	2.25	3.98	0.34
CDS	0.002	-0.4	0.55	0.14
GCI	0.014	-0.08	0.67	0.02
DEBT-BASED	0.008	-0.07	0.05	0.02
EQUITY-BASED	0.005	-0.01	0.02	0.003
REER	-0.003	-0.15	0.11	0.03
RETURN	-0.001	-0.33	0.23	0.09

Table 4 displays correlation between variables. VIX and CDS are positively correlated, as expected. Capital inflows are negatively correlated with the push and pull factors. While debt-based capital inflows have higher correlation with the VIX, the equity-based inflows have higher correlation with the CDS. This indicates that the debt-based inflows are mainly driven by the global push factor, equity-based inflows are mainly driven by the country specific characteristics. Over the sample period, financial market performance is more likely to be associated with the country risk premium.

Table 4. Correlation between Variables

Variables	VIX	CDS	GCI	DEBT-BASED	EQUITY-BASED	REER	RETURN
VIX	1						
CDS	0.15	1					
GCI	-0.40	-0.25	1				
DEBT-BASED	-0.36	-0.19	0.98	1			
EQUITY-BASED	-0.30	-0.36	0.36	0.18	1		
REER	0.03	-0.41	0.25	0.23	0.18	1	
RETURN	-0.07	-0.75	0.24	0.19	0.29	0.45	1

3.1. Econometric Model

This paper follows VAR modelling approach to investigate dynamic interactions among variables. Whether selected variables are appropriate to conduct a VAR model, we first evaluate their level of stationarity through Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests.

Structural form VAR can be written as follows:

$$\mathbf{A}(L)\mathbf{y}(t) = \boldsymbol{\varepsilon}(t) \tag{1}$$

where $\mathbf{y}(t)$ is a vector of endogenous variables; $\mathbf{A}(L)$ is a non-singular matrix of polynomial with lag operator L and $\boldsymbol{\varepsilon}(t)$ is a vector of orthogonalized structural shocks. However, parameters of structural VAR cannot be estimated directly. Therefore, reduced form VAR should be obtained by multiplying above equation by inverse of $\mathbf{A}(L)$ from the left. Below is the reduced form VAR:

$$\mathbf{y}_t = \mathbf{A^{-1}}(L)\boldsymbol{\varepsilon}_t = \mathbf{u}_t \tag{2}$$

where $\mathbf{u}_t$ is the linear combination of the structural shocks. As it is a necessity, the identification scheme to recover the structural parameters is the Cholesky decomposition, which implies restrictions as lower triangular form in $\mathbf{A}(L)$. By doing so, we can achieve a recursive VAR. In this identification, the variable ordered first has contemporaneous effect on all variables ordered following it but not affected contemporaneously by the variables following it. Moreover, a shock to second variable affects the first variable with a lag. The degree of exogeneity is important for the ordering. For a 3 variable VAR, the matrix form of identification is as follows:

$$\begin{bmatrix} u_1 \\ u_2 \\ u_3 \end{bmatrix} = \begin{bmatrix} a_{11}(L) & 0 & 0 \\ a_{21}(L) & a_{22}(L) & 0 \\ a_{31}(L) & a_{32}(L) & a_{33}(L) \end{bmatrix} \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \end{bmatrix}$$

To identify the appropriate lag length of the VAR model, we follow formal lag selection information criteria. Majority of the selection criteria suggest one lag. We use Schwarz information criterion (SIC). However, we also estimate VAR models with two lags if residuals are lack of serial autocorrelation. We check whether eigenvalues lie in the unit circle and confirm the stability of models.

To estimate the impact of shocks stemming from the push and pull factors on capital inflows, the vector of endogenous variables we use are as follows: the $\mathbf{y}_t = [VIX, CDS, Capital\ Inflows]$. To analyse the response of different forms of capital inflows, we first use GCI and replace it with Debt-Based and Equity-Based inflows as separate variables. Moreover, to test for the impacts of different forms of capital inflows on asset prices, we again separate the total capital inflows into Debt- and Equity-Based flows and consider $\mathbf{y}_t = [Capital\ Inflows, REER, Return]$ as the vector of endogenous variables.

3. RESULTS

Table 5 displays the ADF and PP test results, which suggest that time series are stationary either at level or at first difference.

Table 5. Results of ADF and PP Unit Root Tests

| Variables | ADF | | | | PP | | | | Order of Integration |
| | Level | | 1st difference | | Level | | 1st difference | | |
	Prob.	t-Statistics	Prob.	t-Statistics	Prob.	t-Statistics	Prob.	t-Statistics	
VIX	0.00	-4.21	0.00	-13.78	0.00	-3.91	0.00	-16.29	I(0)
CDS	0.18	-2.25	0.00	-11.63	0.18	-2.25	0.00	-11.64	I(1)
GCI	0.00	-7.88	0.00	-19.08	0.00	-8.07	0.00	-23.09	I(0)
DEBT-BASED	0.00	-8.19	0.00	-19.59	0.00	-8.38	0.00	-24.00	I(0)
EQUITY-BASED	0.00	-9.13	0.00	-14.32	0.00	-9.37	0.00	-39.83	I(0)
REER	0.95	0.00	0.00	-9.03	0.94	-0.12	0.00	-8.26	I(1)
RETURN	0.60	-1.34	0.00	-10.44	0.55	-1.45	0.00	-10.44	I(1)

We now proceed with the VAR estimation. Impulse response functions obtained from the VAR model, in which we aim to observe the impacts of shocks to the push and pull factor on disaggregated capital inflows are displayed in Figure 3. In column A (B), the figures from the first- to third row display the impact of push factor, VIX, (pull factor, CDS) on total capital inflows, debt-, and equity-based capital inflows, respectively. Since we express inflows as a share of the GDP, the units of responses are in percentage points. Figures suggest that the dynamic interactions between shock variables and response variables are similar in terms of directions. Global volatility conditions and country risk premium have negative association with capital inflows. In column A, when there is a shock to the VIX index, the capital inflows to Turkey decrease. Regarding the responses of total capital inflows and debt-based inflows, we observe similar patterns that are statistically significant for seven periods. However, for the equity-based capital inflows we have limited significant evidence, which is in the third period only. Column B displays similar results. However, the responses of capital inflows to CDS shock are short-lived. Importantly, the response of equity-based inflows is more evident when there is a shock on CDS. Regarding the magnitudes, the CDS shock has higher impacts on each types of capital flows. On the other hand, the effect of VIX is more persistent than to that of CDS on capital inflows. Uncertainty leads a decrease in capital inflows. For the high volatile capital inflows, i.e., debt-based inflows (sum of portfolio debt liabilities and other investment liabilities) global conditions (push factor) are more effective whereas for the less volatile capital inflows, i.e., equity based-inflows (sum of FDI liabilities and portfolio equity liabilities) domestic conditions (pull factor) matter more.

Regarding the responses of asset prices, the change in the exchange rate and the change in stock prices to shocks on total and disaggregated capital inflows, the results are presented in Figure 4. The figures show that impulse response functions are similar for all cases. A one percentage increase in capital inflows leads to an immediate appreciation in real effective exchange rate. Then, the exchange

rate depreciates in the third period following a shock to total inflows and debt inflows. However, there is no significant depreciation when there is a debt-based inflow shock. Second row displays the performance of financial market performance, which is proxied by the ETFs, to shock to capital inflows. An increase in capital inflows leads to statistically significant increase in fund prices in the first period. However, the impact is short-lived and in the second period the response of fund return becomes negative to an exogenous shock to debt-based capital inflows. However, there is no significant and negative response to a shock on equity inflows. Given that the results we obtain, Hypothesis 1 and Hypothesis 2 hold.

Figure 3. IRFs of Inflows

A　　　　　　　　　　　　　　　　**B**
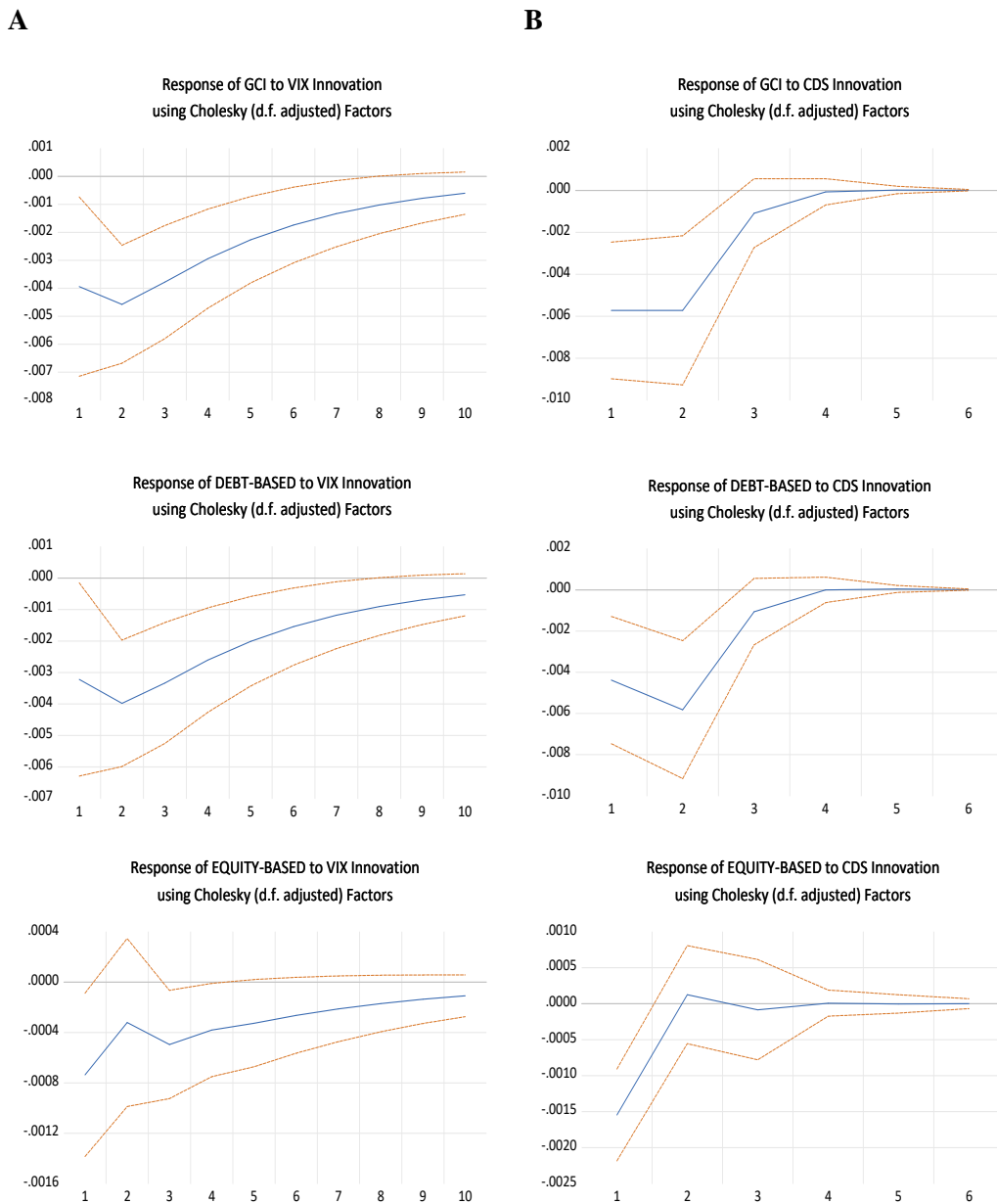
Figure 4. IRFs of Asset Prices
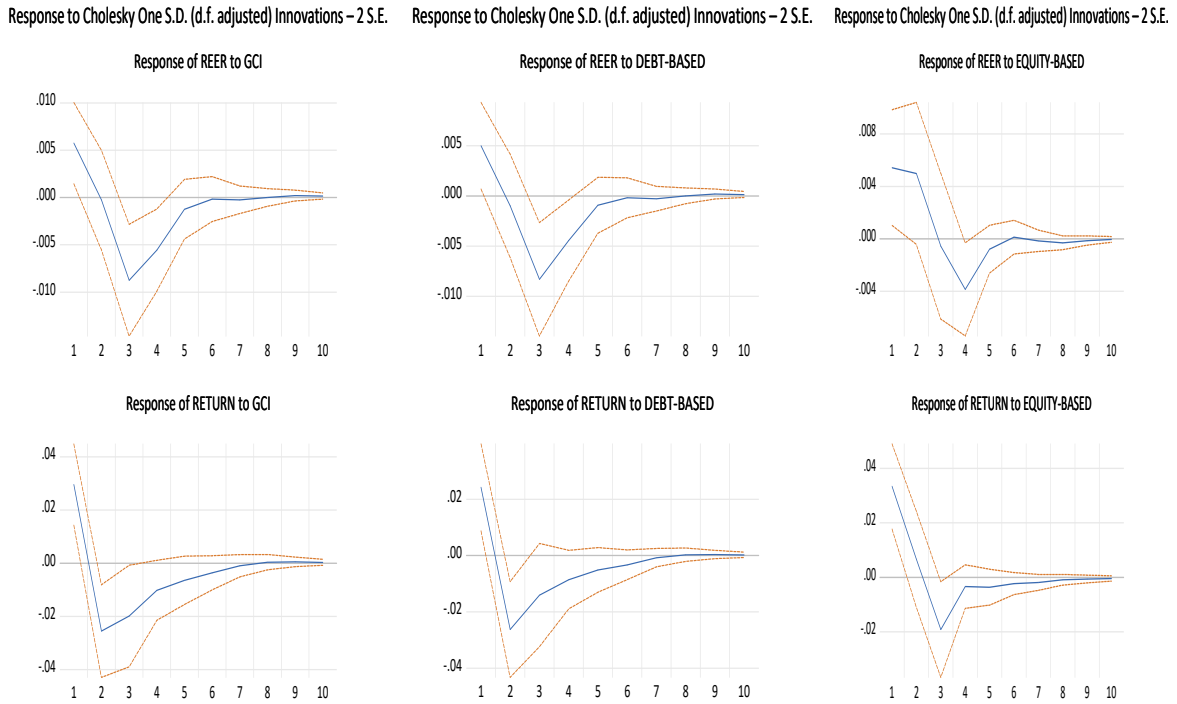
4. CONCLUSION

Both the advanced and emerging economies have experienced swings in capital inflows. Global push factors and country specific pull factors are at work as the drivers of these swings. Tracking disaggregated capital inflows have become more important because different components of capital inflows might have been affected by different factors or they may have different impacts in the economy.

This paper assesses the role of push and pull factors on disaggregated capital inflows to Turkey over the period between 2009:M1 and 2020:M4 by utilizing VAR model. In response to a shock either on VIX or CDS, capital inflows decrease. The impulse responses show that global push factor, VIX, has long-lasting effect on debt and equity-based inflows. Regarding the magnitudes of the responses, country specific pull factor, CDS, has higher impact on disaggregated inflows. This result is consistent with the findings of Fratzcher (2012), who suggests that pull factors can also be effective in attracting capital flows. Moreover, debt-based inflows are responsible for the immediate asset price appreciations. However, this is not case for the equity inflows. This finding highlights the role of debt flows on macroeconomic and financial factors in an economy as presented in Davis (2015).

From the viewpoint of policy makers, the results suggest that the country specific pull factor should be attractive for foreign direct investment. Given that the large share of capital inflows is composed of debt-based inflows, managing these types of capital inflows should be priority to achieve financial stability.

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APPENDIX

Table A1. Balance Sheet Items on Financial Account

Financial Account

- FDI
  - Assets
  - **Liabilities**
    - Equity
    - Other Capital
    - Real Estate
- Portfolio
  - Assets
  - **Liabilities**
    - Equity
      - Banks
      - Other Sectors
    - Debt
      - Central Bank
      - Banks
      - Government
      - Other Sectors
- Other Investment
  - Currency Deposits
    - Assets
    - **Liabilities**
    - Assets
      - Central Bank
      - Banks
  - Loans
    - **Liabilities**
      - Central Bank
      - Banks
      - Government
      - Other Sectors
  - Trade Credit
    - Assets
    - **Liabilities**
  - **Other Asset Liabilities**

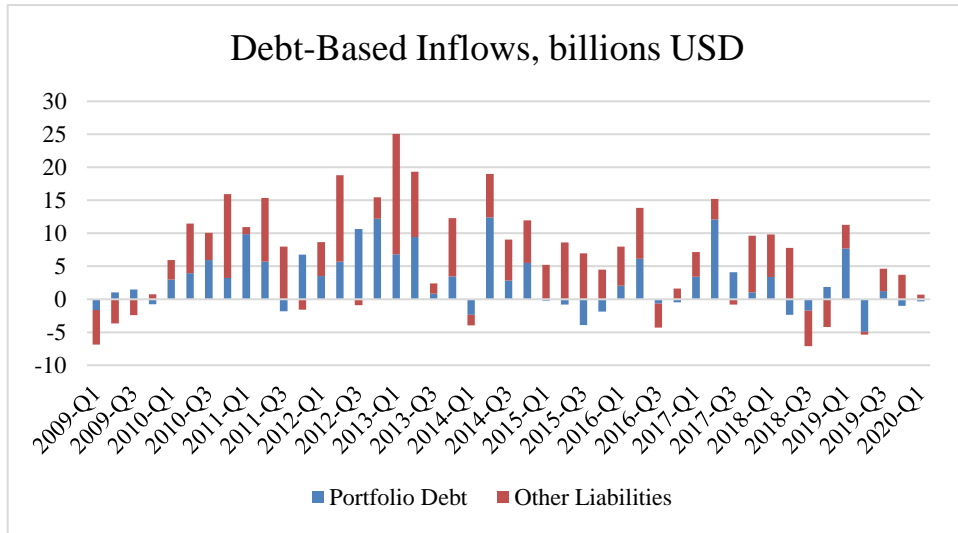**Figure A1. Liabilities of FDI, PI, and OI And Equity- and Debt-Based Capital Inflows**
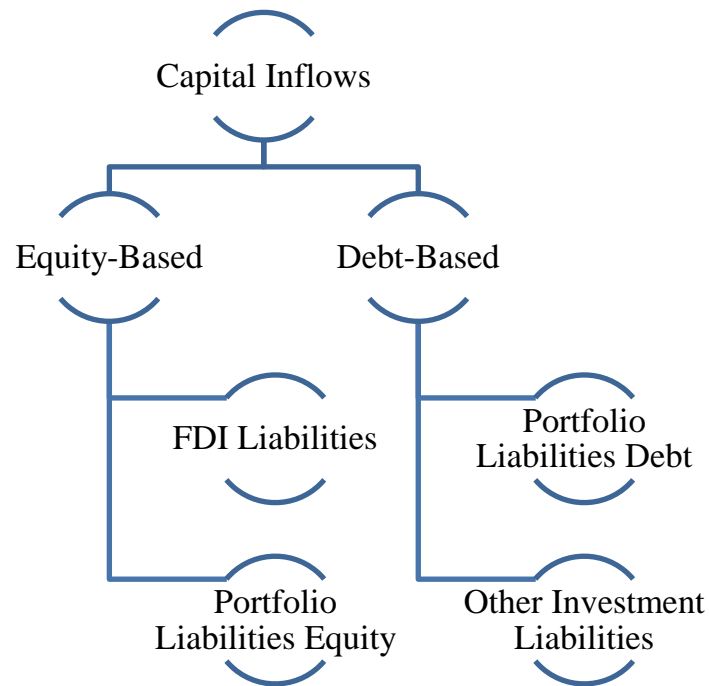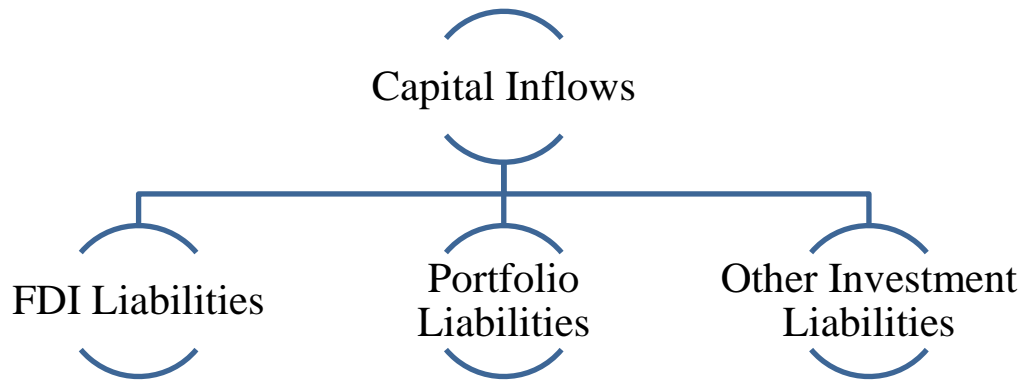
Figure A2. Total and Disaggregated (debt and equity) Capital Inflows
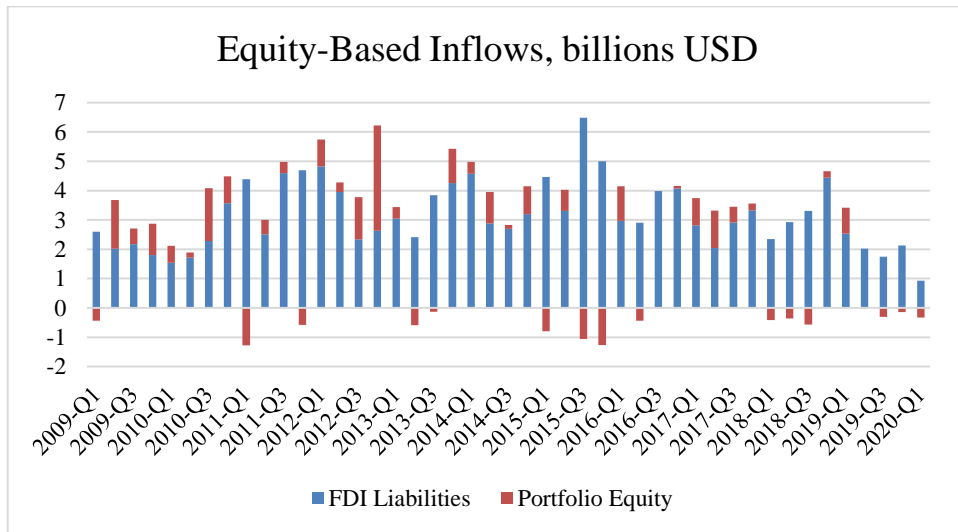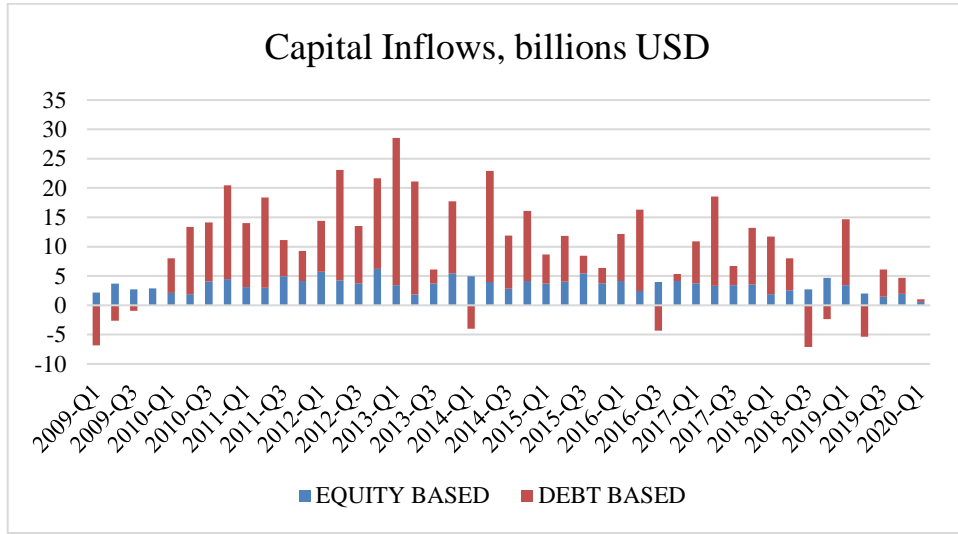
Source: CBRT and Author's Calculation