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INVESTIGATING THE RELATIONSHIP BETWEEN MONETARY POLICY UNCERATAINTY INDEX OF US AND THE DOLLAR INDEX

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ABSTRACT

In this paper, we investigate the effect of the monetary policy uncertainty index for the US on the dollar index. In other words, in this study, the relationship between the US MPU (USM) and the Dollar index (XD) was examined. We employ the Hatemi-J (2012) asymmetric causality test from the period January 1986 through August 2020 by using monthly data. The results of the empirical analysis prove a strong non-linear causal relationship between the variable MPU index and XD. The overall result ascertains a positive and negative bidirectional asymmetric and non-linear causality existing between the variables XD and USM index. The results of the empirical investigation endorse important policy inputs for the macroeconomic policy formulators.

Keywords: *Monetary Policy Uncertainty, US Dollar index, Hatemi-J (2012) Asymmetric Causality Test*

INTRODUCTION

The US dollar is the most convertible currency across the globe and one of the leading financial actors in the global markets. Therefore, the variables that affect the value of the dollar always fetch the attention of both investors, policymakers and academicians. In this study, we probe the impact of the monetary policy uncertainty index (henceforth MPU) for the US on the dollar value.

Because of uncertainty, it becomes cumbersome for the economic agents to predict the future trends of certain variables. Uncertainty can impact the variables such as the GDP growth rate, the growth rate of firms' investments, and non-economic macro phenomena such as war, and climate change to a large extent (Bloom, 2014). The crises that emerged in Europe, the 2008 global financial crisis in the US, and the aftermath brought the concept of uncertainty back to the agenda. According to the reports of the Federal Open Market Committee (2009) and IMF (2012), all current economic problems are associated with policy uncertainty. These reports stated that the uncertainties about fiscal, regulatory, and monetary policies in the USA and Europe caused a sharp economic decline during 2008-09 and a slow recovery afterward (Baker et al. 2016).

Several approaches to measuring the uncertainty gained importance only after the 2008 global crisis. Among these approaches include the economic policy uncertainty (EPU) index (Baker et al. 2016) which was created based on three components. These three components include news coverage on policy related to economic uncertainty, the number of tax regulations expiring, and disagreements among forecasters predicting about future economic uncertainties.

Baker et al. (2016), expanded this EPU index to measure economic uncertainty, in different ways in the following years. Baker et al. (2016) constructed the EPU index specifically for different categories and formed the general economic uncertainty (GEU) index. While creating the GEU, the principle of creating the EPU index was followed, and category-specific terms that appeared in the news were added.

We contribute to the literature on monetary economics in manifold directions. There are meagre studies exploring the role of the monetary policy uncertainty index (MPU). Among other indices, Baker et al. (2016) also device the MPU, using newspaper articles identifying the terms such as federal reserve,

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federal money supply, open market operations, quantitative easing, monetary policy, etc. The MPU index is a subset of the EPU index. Baker et al. (2016) created two variations of the MPU index specific to the US. The first criteria include all those specific terms incorporated in the hundreds of daily newspapers covered by the world news, and the second criteria include the specific terms used in 10 major different newspapers published in the US. In this study, we investigate the asymmetric nexus between the US dollar index and the MPU index. The US Dollar index measures the strength of the dollar against a basket of 6 major currencies namely the Euro, Japanese Yen, Sterling Pound, Canadian Dollar, Swedish Crowns, and Swiss Franc. The Dollar Index goes up as the US Dollar gains/strengthens (value) against other currencies. The Dollar value fluctuates against other 6 major currencies such as Euro (EUR) 57.6%, Japanese Yen (JPY) 13.6%, Pound sterling (GBP) 11.9%, Canadian dollar (CAD) 9.1%, Swedish crowns (SEK) 4.2%, Swiss Frank (CHF) 3.6% (https://tr.tradingview.com/symbols/TVC-DXY/). The increase in risk and uncertainty in a country affects all domestic and foreign investors' investments in the country and financial asset prices.often negatively impacted. Therefore, investors; different When considering establishing a company or becoming a partner in a company or investing in financial assets in countries, they first analyze the course of the country risk of the relevant country. This situation is also important in terms of money markets. accordingly, a possible risk and uncertainty situation in money markets will have an impact on the buying and selling of financial assets. Therefore, a perception of uncertainty in monetary policies is very important for a currency, such as the dollar index, which is the leading investment indicator in global markets (Gürsoy ve Kılıç, 2021: 1325)

The aim of this study is to determine the relationship between the US MPU (USM) and the Dollar index (XD). In the research, the data of the periods between 1986 and 2020 were used. Hatemi-J (2012) asymmetric causality test was used in the study. In addition, Zivot-Andrews unit root test was used to provide possible structural break in time series data. There are several factors discussed in the finance literature which affect the value of the dollar index. Departing from the previous studies, we investigate the relationship between the MPU index the and Dollar index and also test the possible symmetric and asymmetric causality between them. Second, our study has a methodological contribution. Therefore, this study will contribute to the expansion of the existing literature. We examine the non-linear relationship between the US dollar index and MPU index by employing Hatemi-J (2012) causality analysis. Finally, our study offers important policy prescriptions to the associated stakeholders.

The remainder paper is segregated into the following sections. In Section 2, we present an overview of the literature. In Section 3, we describe the econometric model and data. We discuss the empirical findings in Section 4 and conclude the paper in the final section.

Synthesizing the Literature

The monetary policy uncertainty (MPU) index is a newly created index and has recently fetched academic inter. Since it has been an unexplored topic of research, we aim to examine the impact of MPU on the Dollar index. Although most of the studies until now have explained the association between monetary policy and exchange rate, however, the use of the MPU index has started to attract attention among researchers in recent years. Few researchers find the evidence of MPU index impact on financial markets (Husted et al. 2020). Moreover, a plethora of studies explored the impact of the economic and political uncertainty index (EPU) on the selected exchange rate (see Balcılar et al. 2016; Beckmann and Czudaj 2017) other studies examined the impact of trade policy uncertainty on the selected exchange rate (Huynh et al. 2020).

Along similar lines, Balcılar et al. (2016) investigated whether (EPU) can predict the movements of macroeconomic and financial variables. By employing the nonparametric causality test, the study analyzed the predictability and volatility of the returns of the sixteen US dollar-based exchange rates (for both developed and developing countries) over the period from January 1999 through March 2012. The study evidenced that EPU uncertainties can significantly affect the exchange rates.

Bulut and Karasoy (2016) examined the change in policy decisions based on financial market conditions during periods of uncertainty. The study witnessed intriguing insights into the context of Turkey. The data is collected from June 2010 to January 2015 period. Using a case study approach the authors find that uncertainty regarding the monetary policy panders mismatch in the expectations among the participants measured through the CBRT Expectations Survey. Empirical findings of the study have shown that the transmission mechanism of monetary policy may be closely related to policy uncertainty.

During periods of low uncertainty, the positive monetary policy surprise is believed to affect long-term interest rates through inflation expectations.

Beckmann and Czudaj (2016) studied the effect of policy uncertainty on exchange rate expectations and the role of policy statements on financial market expectations from the period 1986 through 2014. The estimates of the VAR model suggest that expectations are influenced not only by announcements but also by the degree of uncertainty regarding the future stance of economic policy. Moreover, the study finds that prediction errors are greatly influenced by policy uncertainty in comparison to expectations. İn another study, Chadwick (2019) purports to show the dependence of the financial markets of some emerging market countries on US monetary policy and MPU. The author uses the time-varying copula models. The study investigated about those countries' financial markets which affect considerably due to quantitative easing or quantitative tightening policies. The author opined that the increased dependency during the period of stress should be considered a risk factor for policymakers who closely monitor financial markets in developing countries.

Similarly, Nilavongse et al. (2020) investigated the impact of EPU shocks on the UK economy. The results from the structural VAR model show that domestic industrial production declined following the shock of the EPU index in the USA. The historical divergence shows that the rise in the local EPU after the Brexit referendum was the major reason behind the significant depreciation of the British pound. In a recent study, Güney (2020) examined whether the economic policy uncertainty has any effect on the volatility in the USD / TL and EURO / TL rates. By using the ARDL approach, the study finds that the exchange rates can be affected by the economic conditions of the country as well as the policies of the countries with which they have economic and political relations. The author finds that economic policy uncertainty in the USA increased the volatility in the USD / TL exchange rate in the long term. Whereas, the volatility in the EURO / TL exchange rate is not affected by the economic policy uncertainty in Europe.

On the other hand, studies on global shocks on the dollar index were encountered. Akel and Gazel (2014) analyzed the relationship between the US dollar index, "BIST Industry index, real effective exchange rate and Euro/TL exchange rate". They applied the ARDL Boundary test in their studies between January 2005 and December 2013. As a result, it has been determined that there is a long-term significant relationship between the Industry index, the Dollar index (DXY) and the Euro/TL. According to the error correction model, they concluded that there is a positive relationship between the Industry index and other variables. (Essayad et al., 2010). In another study, the US dollar index of crude oil and financial (stock, gold and stock prices) markets A GJR-GARCH model was used to test these relationships between August 2010 and September 2016, and it was determined that Bitcoin gold and stock prices negatively and statistically affected the returns of the US dollar index. In his comprehensive test and analysis, Shen (2014) showed that the US dollar index fluctuations have the opposite effect on international gold prices, for example, he determined that when the US dollar index rises, gold prices decrease, and when the US dollar index decreases, gold prices increase. The author revealed that inflation and the decline in the stock market, which are among the factors affecting the volatility of gold prices, will also decrease the dollar index, as the US dollar index is one of the most important financial indices. In addition, compared to the period before and after the world financial crisis 2007, the gold prices before the financial crisis.

It was determined that the fluctuations were greatly affected by the change in the US dollar index. Many studies until recently have explored the possible relationship between economic policy uncertainty and exchange rates. There are seldom any studies that probe the nexus between the MPU index and the dollar index. Therefore, the current study tries to investigate this association by reducing the research gap.

RESEARCH METHOD

Data Description

We aim to explore the relationship between the MPU of the US (USM) and the Dollar index (XD). Husted, Rogers, and Sun construct a monthly index of Monetary Policy Uncertainty (MPU) by searching for keywords related to monetary policy uncertainty in the New York Times, Wall Street Journal and Washington Post. The data of the MPU index is sourced from policyuncertainty.com is collected. The US Dollar Index is an index that measures the value of the US dollar against a basket of 6 different

currencies from 6 different countries where the US carries out commercial activities. The data of the Dollar index is collected from investing.com. In the study, monthly data of 1986:1-2020:8 periods were used. We use Hatemi-J (2012) asymmetric causality test to investigate the possible non-linear causal relationship between US MPU and the Dollar index. Additionally, we use the Zivot-Andrews unit root test to ensure the possible structural break in the time series data.

Table 1 Data Description

Variable	**Variable Description**	**Time Period**	**The granularity of the data**	**Data source**
USM	US Monetary Policy Uncertainty index	January 1986-August 2020	Monthly	policyuncertainty.com
XD	Dollar index			www.investing.com

Sources: Author

Methodology

In asymmetric causality analysis tests, it is possible to find unrelated hidden relationships between two variables that are thought to be unrelated at first sight. Firstly, Granger and Yoon (2002) reported on the asymmetry in related the model, and further modified by Hatemi-J (2012). Hatemi-J (2012) asymmetric causality analysis, includes positive and negative components of the variables. This approach aims to find intriguing dynamics of the series and allow to forecast the pattern or movement of the variable (Bayraktaroğlu et.al, 2021: 10).

To test the possible causal relationship between two integrated variables y_{1t} and y_{2t} (Hatemi-J, 2012) proposed the following equation:

$$y_{1t} = y_{1t-1} + \varepsilon_{1t} = y_{10} + \sum_{i=1}^{t} \varepsilon_{1i} \quad ve \quad y_{2t} = y_{2t-1} + \varepsilon_{2t} = y_{20} + \sum_{i=1}^{t} \varepsilon_{2i} \tag{1}$$

where, $t = 1, 2, \dots T$, indicates the constant term, y_{1t} & y_{2t} shows initial value, $\varepsilon_{1i}\ and\ \varepsilon_{2i}$ indicate error terms of the equation. The positive-negative shocks of the series are expressed as,

$$\varepsilon_{1i}^{+} = \max(\varepsilon_{1i}, 0), \varepsilon_{2i}^{+} = \max(\varepsilon_{2i}, 0), \varepsilon_{1i}^{-} = \min(\varepsilon_{1i}, 0)\ ve\ \varepsilon_{2i}^{-} = \min(\varepsilon_{2i}, 0), \tag{2}$$

However, it is expressed as $\varepsilon_{1i} = \varepsilon_{1i}^{+} + \varepsilon_{1i}^{-}$ ve $\varepsilon_{2i} = \varepsilon_{2i}^{+} + \varepsilon_{2i}^{-}$

Equations(1),(2) are created accordingly;

$$y_{1t} = y_{1t-1} + \varepsilon_{1t} = y_{1,0} + \sum_{i=1}^{t} \varepsilon_{1i}^{+} + \sum_{i=1}^{t} \varepsilon_{1i}^{-}, \tag{3}$$

$$y_{2t} = y_{2t-1} + \varepsilon_{2t} = y_{2,0} + \sum_{i=1}^{t} \varepsilon_{2i}^{+} + \sum_{i=1}^{t} \varepsilon_{2i}^{-}. \tag{4}$$

lastly, the positive and negative shocks in each variable are expressed in cumulative form as

$$y_{1t}^{+} = \sum_{i=1}^{t} \varepsilon_{1i}^{+},\ y_{1t}^{-} = \sum_{i=1}^{t} \varepsilon_{1i}^{-},\ y_{2t}^{+} = \sum_{i=1}^{t} \varepsilon_{2i}^{+},\ y_{2t}^{-} = \sum_{i=1}^{t} \varepsilon_{2i}^{-}, \tag{5}$$

$$y_t^{+} = v + A_1 y_{t-1}^{+} + \cdots + A_p y_{t-1}^{+} + u_t^{+} \tag{6}$$

were, y_t^{+} indicates a variable vector of size 2x1, v shows constant variable vector of size 2x1.

$$HJC = \ln\left(\left|\widehat{\Omega}_j\right|\right) + j\left(\frac{n^2 lnT + 2n^2 \ln(\ln T)}{2T}\right), \quad j = 0, \dots, p \tag{7}$$

$\left(\left|\widehat{\Omega}_j\right|\right)$ shows *j* lag length of the estimated VAR model's, n indicate the numbers of equation in the VAR models, T indicate the numbers of observations.

$Y = DZ + \delta$ If the equation is expressed more clearly, it looks like this;

$Y: = (y_1^{+}, y_2^{+}, \dots, y_T^{+})$

$D: = (v, A_1, A_2, \dots, A_p)$

$$Z_t := \begin{bmatrix} 1 \\ y_t^+ \\ y_{t-1}^+ \\ \vdots \\ y_{t-p+1}^+ \end{bmatrix} \quad (8)$$

$Z := (Z_0, Z_1, \dots, Z_{T-1})$

$\delta := (u_1^+, u_2^+, \dots, u_T^+)$

Equation (8) represents matrixes of different sizes $Y: (n\ x\ T)$, $D: \big(n\ x\ (1 + np)\big)$, $Z_t: ((1 + np)\ x\ 1)$, $Z: ((1 + np)\ x\ T)$ and $\delta: (n\ x\ T)$.

The hypothesis of the $(H_0: C\beta = 0)$ shows no found Granger causality realation, and is analyzed using the Wald statistic which is estimated by the the following equation:

$$Wald = (C\beta)'[C((Z'Z)^{-1} \otimes S_U)C']^{-1}(C\beta) \quad (9)$$

Figure 1. *Charts of Series*

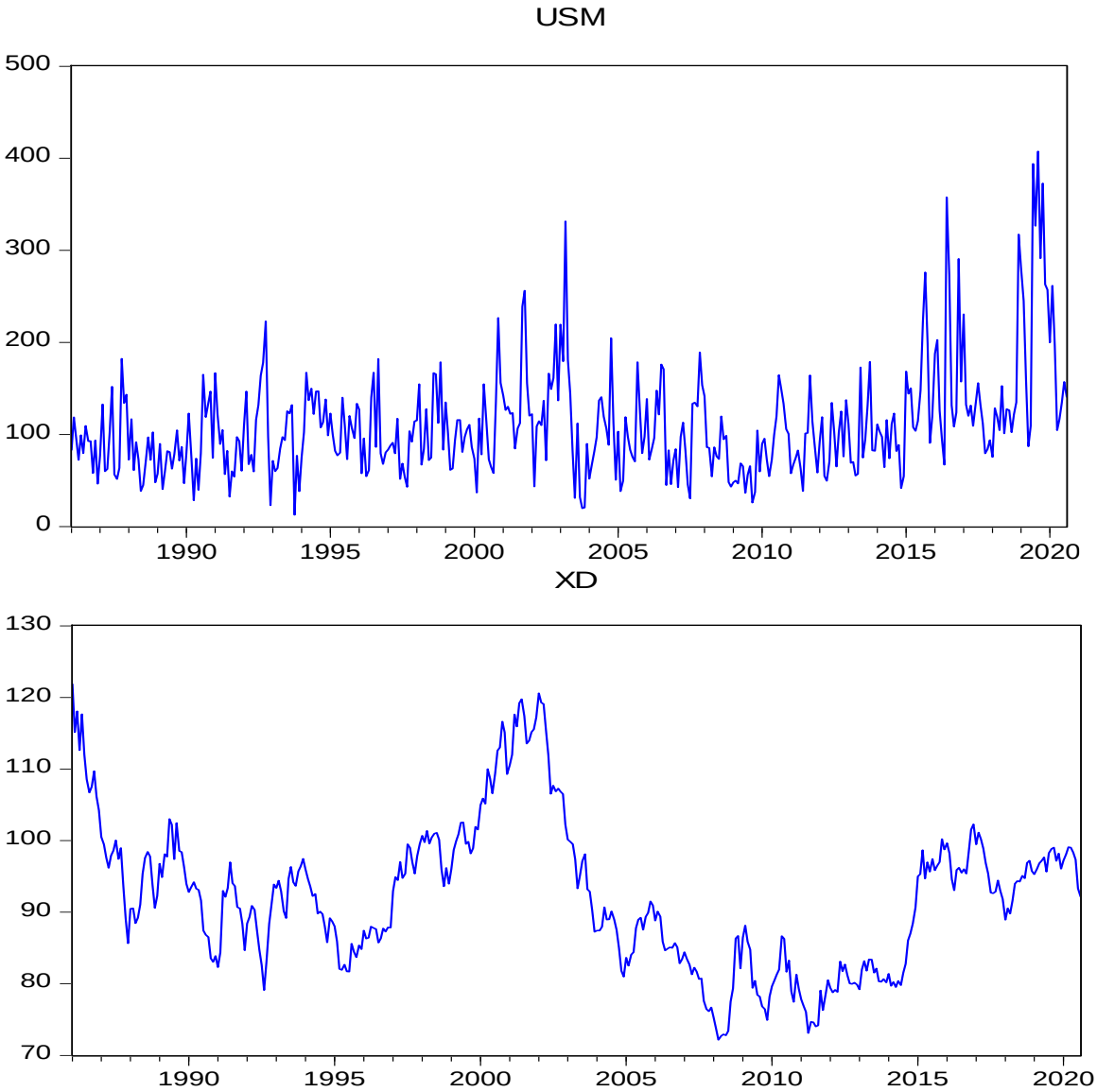

Figure 1 indicates a possibility of a causal relationship between USM and XD variables. It can be witnessed that both the variables abruptly move up together as evinced during the period between 2000 to 2005. This could be because of the dot com bubble burst post-crisis effect. Similar trends are also seen during the year 2020 because of the COVID-19 pandemic.

Results

In this section, we interpret the results of the empirical analysis. First, we conduct the Zivot Andrews test to examine the structural break in the data of the variables. The variable USM was found stationary in its level form while the variable XD was non-stationary. We transform the variable XD to its first difference and then apply the Zivot-Andrews test to gain insights into the structural break date (see Table 2).

Table 2 Zivot-Andrews unit root test results

Variable	Level	Level	Critical	Difference	Difference	Critical
	Test Statistics	Breaking Date	Value	Test Statistics	Breaking Date	Value
USM	-7.08**	February 2008	-5.08	-	-	-
XD	-4.38	December 2002	-5.08	-20.40**	February 2000	-5.08

** implies a 5% level of significance.

Sources: Author

After ascertaining the structural break in the series, we apply the causality test. furthermore, the findings related to the empirical analysis are presented in Table 3. however, both variables in the equations were tested as both independent – dependent.

Table 3 Results of the Hatemi-J asymmetric causality analysis

Directions	(T) Statistics	Bootstrap Critical Value		
		%1	%5	%10
USM> XD (+)	13.108 **	13.790	9.779	8.023
USM> XD (-)	19.482**	12.344	8.285	6.439
XD> USM (+)	15.300**	13.855	9.918	8.045
XD> USM (-)	28.802**	14.265	9.882	8.059

** It is significant at the 5% level.

Sources: Author

We report the results of the Hatemi-J asymmetric causality test in table 3. We show a bidirectional between USM and XD at the 5% significance level. The results from the first two rows of the tabletional causality relationship 3 show a positive and negative unidirectional causality between the variable USM index and XD. The null hypothesis is rejected in both cases suggesting the possibility of a positive and negative asymmetric causality between the variables of interest.

To examine the presence of a positive and negative unidirectional causality between the variable XD and USM index, the Hatemi-J asymmetric causality test was employed again (see the third and fourth row of Table 3). The results of the empirical analysis confirm the rejection of the null hypothesis indicating the asymmetric causality between the variable XD and the USM index. Hence, the overall result ascertains a positive and negative bidirectional asymmetric and non-linear causality existing between the variables XD and USM index. The results of the empirical investigation endorse important policy inputs for the macroeconomic policy formulators. In a nutshell, the results indicate that both variables are interrelated irrespective of the nature of the information or news.

CONCLUSION

Owing to rapid global financial momentum and technological progress, global markets have become increasingly integrated. Undoubtedly, a movement in the dollar in global markets or a sudden change in the value of the dollar affects all markets and eventually the value of other countries' currencies.

It is highly important to investigate the possible relationship between the monetary policies and abrupt movements in the country's currency because of their association. To explore the linkage, we collected the monthly data of the USM index and XD variable for 34 years and employ the Hatemi-J asymmetric causality test. Findings of the empirical analysis prove a strong nonlinear causal relationship

between the variable MPU index and XD. We find that the causal relationship is bilateral to both positive and negative shocks. Our results corroborate previous findings.

Based on our results and similar studies, it has been observed that a negative situation related to the US monetary policy uncertainty has significant effects on the value of the dollar and thus on the dollar index. Therefore, the policymakers must adopt suitable policy prescripts while dealing with these variables and investors can take appropriate actions while investing their capital. The findings of the study have important implications for policy makers and financial market participants. The findings obtained in the study reveal the necessity of policy makers to develop policies that are resistant to global uncertainties and shocks. It provides international investors with important information so that they can diversify their portfolios with suitable assets. In future studies, the effects of monetary policy uncertainties on the stock market indices of countries can be examined. Thus, positive/negative correlations between monetary policy uncertainty and stock market indices can be determined.

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