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Financial Innovation and Role of Divisia, the Causal Relations among Money, Interest and Macroeconomic Indicators: Evidence from Pakistan

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Abstract: This study investigates the causal relations among money, interest rate, and key macroeconomic variables, based on annual data from 1980 to 2019 by using the Granger causality test. In this study, we have constructed Divisia Superlative weighted monetary Index for Pakistan's economy and investigated its causality with entire macroeconomic indicators. The outcomes of this research reveal that before financial innovation interest rate causes better compared to simple sum and superlative Divisia Sum, while, post reforms the causal performance of Superlative Divisia Sum is better compared to Simple Sum and rate of interest. Furthermore, the combined effect of both pre and post-reform Divisia Sum shows the best causality performance with key macroeconomic indicators as compared to its counterpart in case of macroeconomic stability. Policy implications that come out from this study that regulatory authorities may use these monetary aggregates (Divisia) targeting, which make a strong association among the money and key macroeconomic variables for sustainable development goals and best monetary policy implication. Therefore, it is concluded that, after financial innovation in Pakistan's role of divisia monetary aggregate shows strong relation with economic variables. Moreover, superlative monetary aggregates show better results in case of predictability, information content, and policy regime change. The divisia monetary aggregate is also supportive, which provides accurate information to policymakers about the movement of monetary policy shocks observers due to expansionary and constructional monetary policy shocks. So, properly measurable, monetary aggregates never lose their capability to describe fluctuation on aggregate bases, which indicates an important omission from standard model and best policy discussion. So, the latest policy adopts to increase the money growth instead of the conventional once (simple sum). This school of thought is very much supported by evidence, that properly measured money (Divisia Index), helps in forecasting the movement of Shocks observers (Macroeconomic Indicators).

Keywords: Divisia index, Simple sum, Interest rate, Granger causality test, Pakistan

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INTRODUCTION

There is a huge number of empirical and theoretical research works trying to expose the causation among the money and key macroeconomic indicators precisely the prices and economic growth (Singh, 2010). From the traditional point of view of economists, the performance of the monetary policy, is exogenous. Permitting them the monetary policy and its effects show natural behavior in the economic system (Sieroń, Arkadiusz, 2019). Hence, according to the classical point of view, the transmission mechanism of monetary policy works through directly and indirectly channels (Taghizadeh,et.al 2016). In the direct channel approach, the mechanism works through the long-run equilibrium approach of supply and demand of money while, in the indirect approach the money operates through the interest rate channel with a well-developed banking system (Shah et al., 2018). In Keynesian theoretical approach, the mechanism of monetary policy works indirectly like expansionary monetary policy affects the aggregate expenditure through the interest rate channel (Friedman, Benjamin M.2016). The Monetarism point of view, that the monetary policy impacts the key tangible macroeconomic indicators such as employment and growth in a short period, whereas the key nominal indicators like the rate of interest and the inflation rate over a long period of time, and concluded that in short-run money and only money matter (Ghalayini & Latifa, 2018; Waheed & Kaur; 2019). The anticipation approach changes the supply of money and shows a natural behavior, but

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in case of unanticipated money, supply plays an important role in determining the output growth rate and inflation (Cacnio, 2013).

The contradicting views compel the researchers to check the causal relationships among the money, growth rate, and inflation rate empirically. In point of view, Sims (1972) established the test of Granger approach based on Granger Causality approach and observed it on the United Stated data to check the causal relation between the monetary aggregates and growth rate. The results revealed that there is a unidirectional relationship between money and Gross domestic product, as appealed by the Monetarist's point of view.

Conversely, the succeeding analysis on the matter did not favor the Sim's judgments. For example, GRIN Verlag (2018) and Göçmen (2016), cities Sims technique in the U.K. originates unidirectional causality from income to money, which is, opposite to Sims' outcomes. Their finding also shows the unidirectional causality from monetary aggregates to the inflation rate. Likewise, (Roshan, 2014) repeated the Sims Causality in the case of Canada (Lee & Li, 1983; Rashid, Abdul, and Abdul Mansoor, 2018), investigating the test of causality among monetary aggregates, Growth rate and inflation rate in Indian and Singapore. 1 economy, correspondingly found the evidence of bi-directional causality between growth rate and supply of money. On the other hand, (e.g., Brillembourg & Khan, 2014; Abbas et al., 2017) used the data set and supported Sims' findings and found a unidirectional causality from money to income and prices in the U.S. (e.g. Sims, 1972, Brillembourg & Sultana et al., 2019) examined conflicting to Sim's findings for six technologically advanced countries, reveled bi-directional causality (Palamalai et al., 2016).

The above discussion clearly indicates that the empirical evidence regarding causal relations among, money, Growth rate and rate of inflation remains inconclusive. As an important innovation, our research adopts the Divisia monetary aggregate as an alternative to the policy indicator variable. The situation is not different in the case of Pakistan (e.g. Siddiqui & Khan, 1990; Khan and Sadaqat (1999) and Bengali (2000) found unidirectional causality from Gross domestic product to money and bi-directional between money and inflation rate. Qamber et al. (2012) analyzed the nexus of monetary policy, inflation, and growth in Pakistan. The results indicated that credit to the private sector, the variable of financial depth, real exchange rate, and budget deficit are found to be elastic and significant variables to influence the real GDP in Pakistan. The pair-wise Granger Causality results suggest that real GDP and real exchange rate are causing to each other bi-directionally.

The real GDP also causes financial depth (M2GD), domestic credit (CREDIT), and budget deficit (BDEF) uni-directionally. The real exchange rate is also causing the financial depth and budget deficit variables. The results are consistent with the empirical literature. So, Bernanke and Blinder (1992) argued that monetary aggregates (Simple Sum) play a cheap role in predicting the macroeconomic variables due to inaccurate measures of monetary aggregates given by Central Banks. The main objective of this paper is to examine the information content of the credit card-augmented Divisia monetary aggregates and credit card-augmented Divisia inside monetary aggregates. Credit card-augmented Divisia measures of money are more informative when predicting real economic activity than the conventional Divisia monetary aggregates (Liu, Jinan, Dery, & Serletis, 2020; Waheed, 2016). More recently, Barnett et al. (2016) and Barnett and Su (2016, 2017, 2018) has mentioned the credit card transaction in the superlative division index. In the gap of previous literature, our research question indicates that either money or interest rate effects on real economic activity.

There are two main objectives of monetary policy, one is price stability, and the second one is the growth of the economy (Adegoriola, 2018). There are five main channels in which monetary policy works in Financial markets, the interest rate channel, the exchange rate channel, which transmits into price level, economic growth, unemployment, consumption, and commodity prices (Adegoriola, 2019). The development of any economy depends on the well financial market, which performs a proper function, leads to rapid capital formulation, and enhances the rate of economic growth. Short and long-term rates of interest, management of credit cards, exchange rate, and asset prices are diverse channels of monetary policy transmission. The monetary aggregates transmission channel is the most important one that describes in what way accurate calculated monetary aggregates shows their best causal performance in monetary policy stance (Martins, Norberto et al., 2017). This paper is specially organized on monetary aggregates, the outcome of this paper revealed that the static analysis in favor of functional aggregates compared to Divisia Index in measuring the money (Serletis, Apostolos, & Libo Xu, 2020)

In the case of Pakistan, all these studies show the causation between the simple sum money and macroeconomic variables, but largely ignore the modified monetary aggregates Superlative Divisia Index's high power aggregation

level. The current study attempts a comprehensive investigation of the causal relations among money (e.g., Simple Sum and Divisia), interest rate and macroeconomic variables pre and post-financial reforms in Pakistan. Besides this inconsistent macroeconomic performance, Pakistan's economy also suffered from weak institutional setup and advancement in the financial sector of the economy, and technological development in mode of payment, which distorts the association among entire monetary aggregates and major macroeconomics indicators. For the achievement of major economic goals, these simple sum monetary aggregates may not be enough to predict the macroeconomic variables. Now it is essential to revision of these monetary bases in order to attain sustainable development goals. The strong association between the macroeconomic indicators and monetary aggregates is a good sign of the best policy implementation. The main objective of this paper is to examine the information content of the Divisia monetary aggregates and simple sum money on macroeconomic variables. This paper organizes as follows; Section 2 provides an overview of monetary policy effectiveness in Pakistan. Section 3 presents the data description and methodology. Section 4 of the study discusses empirical results. The final section summarizes the main findings and offers insights for further research.

OVERVIEW OF MONETARY POLICY AND ITS EFFECTIVENESS IN PAKISTAN

The economic development of a country depends upon well-functioning financial institutions. Formerly, 1990s, the performance of the financial sector in Pakistan was poor e.g., the credit rate ceiling, exceedingly regulator on lending and rate of deposit. The 93.8 percent share of aggregate resources was held by Nationalized financial institutions till the era of 1980s. These features generated, macroeconomic instability, distortions, and inefficiencies after the 1980s. To tackle these issues, the Pakistan Government started the progression of the development of the financial sector in overcome these problems; the Government of Pakistan initiated the process of financial sector development in primarily 1990s, custody in view an important part of achieving maintainable economic progress in the country. For this purpose, the agriculture development bank of Pakistan World Bank provided financial and technical support. Primarily, in the year, of 1990's, the State Bank of Pakistan updated her broad monetary base M2 through the inclusion of Residual Foreign Currency deposits (RFCD) as well as policy rate and six month T- Bill rate was introduced. Secondly, the Pakistani Government opens access to private and foreign banking industries to create efficiency and competition in financial sector markets. Thirdly, state-owned banking intuitions, like Muslim Commercial bank. Allied Bank Limited and Habib Bank were generally denationalized. The denationalization of financial intuitions raised greater transparency and competition amongst these organizations as well as the financial advancement in the monetary sector may increase like ATM cards, debit and credit cards raise the demand for money in a different dimension of the monetary market. Fourthly, a monetary policy used monetary aggregate targeting as a major instrument for the transmission mechanism of monetary policy (Ain, 2019; Ommer, 2009). Jangua (2005) examined that after financial advancement from 1990's distorted the association of the growth rate of money with GDP growth and the rate of inflation (CPI). Which showed the ineffectiveness of monetary aggregates (traditional sum), which were used as an intermediate target in monetary policy based on the assumption of perfect elastic. Aron and Muellbaued (2006) also found that the components of monetary aggregates whose elasticity of substitution is infinite, have unable to predict the entire potential macroeconomic indicators. So, in financial years of 1994-97 indicate that the State Bank of Pakistan (SBP) used the expansionary monetary policy to increase the component of the monetary base (Transaction Demand of money), creating a huge fluctuation. At that time, Pakistan's main earning institutes faced a crisis. To meet this crisis, they took a conditional loan from the financial institute SBP. So, the SBP realized the inflationary pressure in the market due to the volume of liquid money balance available in the market. So, the State Bank uses an open market channel to reduce the money supply from the market.

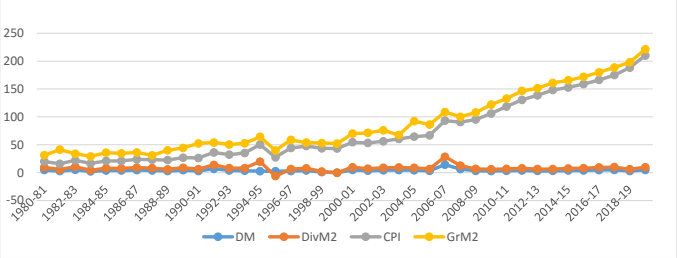

Figure 1: Trends of CPI, Monetary Aggregates (Simple Sum and Divisia Index) in Pakistan (Source: Growth Rate M2, CPI from SBP, and Divisia Superlative Sum M2 by Author's Calculation)

ANALYTICAL FRAMEWORK OF MONETARY AGGREGATES

Simple Sum Monetary Aggregates

Simple sum monetary aggregate comprises components such as cash at till, demand deposits, saving deposits, time deposits, and Resident Foreign Currency deposits without giving any weight.

$$M = \sum_{i=0}^{n} m_i$$

Where "*M*" is the monetary aggregate while "*m*" represents various components of monetary aggregates and "*i*" represents different cross-sectional units as 1, 2, 3, 4.....n.

Statistical Procedure of Divisia Index

To measure the Superlative Divisia Index (e.g., Barnett (1980), Serletis (1998)) methodology is used in this study:

$$\log M_t^D - \log M_{t-1}^D = \sum_{j=1}^{n} w_{jt} \left(\log x_{jt} - \log x_{jt-1}\right)$$

The above equation indicates that one side indicates the growth rate of the superlative sum index calculated with the chain base method. The growth rate of quantities of superlative components lies on the right-hand side of the equation. The weights are assigned according to the expenditure of share on the average periods.

$$w_{jt} = \frac{1}{2}\left(w_{jt} + w_{j,t-1}\right)$$

The "w" indicates the share of expenditure of "*j*" assets entire period of time "*t*", which is premeditated is as follows:

$$w_{jt} = \frac{p_{jt} \times x_{jt}}{\sum_{j=1}^{n} p_k \times x_k}$$

Where "*P_ jt*" represents "User Cost" of superlative sum Divisia Index aggregates, used the (Barnett W.A, 1978) as:

$$\mathrm{pjt} = \mathbf{p} \times \frac{\mathrm{Rt} - \mathrm{rit}}{1 + \mathrm{Rt}}$$

Put indicator of the user cost of monetary components at farm work time of *t*. *Rt* shows the fixed rate of return as a benchmark at time *t*. *Rit* is *i* assets rate of return at time frame *t*. *Pt* is the cost of living of consumers during the entire time period. The Treasury bill and yield of corporate bonds are used as benchmark rates of return (Drake and Fleising, 2004).

DATA DESCRIPTION AND METHODOLOGY

Data Description

This study uses the time series data set of monetary aggregates, rate of interest (money market rate), and six main macroeconomic variables (e.g., GDP, inflation (CPI), consumption, capacity utilization, employment, industrial production, wholesales, and unemployment rate) over the period of 1980-2019. Industrial production observation has been collected from "financial statement analysis of companies listed at Pakistan Stock Exchange", available by the SBP. Segments are designated on the basis of extensiveness and regularity in numbers sequence. The Financial markets and monetary aggregates data of the stock market and banking sector were collected from World Development Indicator (WDI). Further indicators of Gross domestic product, inflation, employment, and unemployment rate are also taken from WDI, the economic survey of Pakistan, and the Federal Reserve Bank.

The primary measure for capacity utilization is the ratio of asset value in an industry to the quantity of firms in an industry. The fixed assets data collected from the publication of SBP and the same source was helpful in finding the number of industries data. These types of indicators data are also easily available from the International Financial Statistics (IFS) on a quarterly and annually bases. To check out the overall performance of industries, the Industrial production index (IPI) is used. The industrial sector of the country lies in power, agriculture, power, and mining. The other main variables are used in this study, including other determinants of causal relations, e.g., inflation, consumption, employment, unemployment rate, and retail and wholesale. The whole sales index plays a crucial role in the manufacturing and services industries. The association of the superlative Divisia index with wholesale seemed to be robust in light of previous studies Blongia and Ireland (2015) used it as a macroeconomic indicator.

Methodology

Unit root test : The implementation of unit root tests in the Granger causality procedure is necessary to ensure that none of the variables is integrated at an order of I (2) or beyond. For this purpose, the study uses the conventional Augmented Dicky Fuller (ADF) tests. As evident from the results shown in Table 1 that all macro and monetary variables (e.g., interest rate (PR), Superlative Sum Divisia series, Simple Sum series. GDP, CPI, UEMP, IPI, IMP,

Table 1: Unit Root Test

Variables	ADF. Test			Philips-Parian. Test		
	t-state	*P*-value	Remarks	*t*-state	*P*-value	Remarks
Dm0	-8.570***	0.000	I(0)	-6.570***	0.000	I(0)
Dm1	-7.515***	0.000	I(0)	-6.561***	0.000	I(0)
Dm2	-7.253***	0.000	I(0)	-8.100***	0.000	I(0)
Sm0	-6.676***	0.000	I(0)	-8.408***	0.000	I(0)
Sm1	-6.940***	0.000	I(0)	-6.401***	0.000	I(0)
Sm2	-5.198***	0.000	I(0)	-10.138***	0.000	I(0)
WSI	-5.772***	0.000	I(0)	-9.333***	0.000	I(0)
CPU	-5.706***	0.000	I(0)	-4.019***	0.005	I(0)
CON	-5.145***	0.000	I(0)	-9.375***	0.000	I(0)
EMP	-5.163***	0.000	I(0)	-6.831***	0.000	I(0)
IPI	-2.974**	0.048	I(0)	-7.018***	0.000	I(0)
UEMP	-5.981***	0.000	I(0)	6.850***	0.000	I(0)
GDP	-3.681***	0.009	I(0)	-7.201***	0.000	I(0)
PR	-4.054***	0.004	I(0)	-4.377***	0.001	I(0)
CPI	-5.261***	0.000	I(0)	-6.959***	0.000	I(0)

CON, CPU, and WSI all significant at level

Note: ADF-test and PP-test (**), (*) & (***) show the Level of Significance at 5%, 10%, and 1% levels as above given GDP mean the Income of Country Domestically Earn and CPI mean Consumer, (PR) mean Interest Rate, UEMP Stand for the Unemployment Rate, Monetary Components (e.g., Demo, Dm1, Dm2 and Smo) mean Superlative Divisia Index and Simple Sum, CON mean Consumption, CPU mean Capacity Utilization and WSI mean Whole Sales. Source Calculation by Author it's Self

The granger causality test : Civil Granger (1969) introduced the test to check the causality among the money and macroeconomic indicators. This test plays an important role in finding the association between the monetary and macroeconomics variables on their present as well as lags values. So, the researcher may easily forecast and predict the macroeconomics variables with shocks of monetary indicators by using the knowledge of rational expectations. Civil Granger Causality Benchmark Model is given as follows:

$$Y_t = \beta_0 + \sum_{i=1}^{6} \beta_1 Y_{t-1} + \sum_{i=1}^{6} \beta_2 X_{t-1} + \sum_{i=1}^{6} \beta_3 P_{t-1} + \mu_t \tag{1}$$

Where Y_t is as measures the different real economic activities, X_t measures the monetary policy, Pt means the consumer price index (GGRPD), and β_s i = 1 ... 6 are regression coefficients. The capacity utilization, labor market, and retail sale use. In the above equation, "X" contains the value of the simple sum M1, M2, and fund (Bernanke & Blinder,1992). The current study measure moneys effect on the economic activities and influence the monetary aggregates and rate of interest on macroeconomic indicators. The original model of Bernanke and Blinder (1992) is replicated here by using the simple sum measure M1 and M2 by SBP, interest rate, and Superlative Sum Divisia Index. Model (2) is the same as Model (1), which is an extension with a new modification of monetary aggregates (Superlative Divisia Sum) used by (Blongia & Ireland, 2015) given as follows:

$$Y_t = \beta_0 + \sum_{i=1}^{6} \beta_1 Y_{t-1} + \sum_{i=1}^{6} \beta_2 X_{t-1} + \sum_{i=1}^{6} \beta_3 P_{t-1} + \mu_t \tag{2}$$

In Figure 1 compares the behavior of simple sum and Superlative Sum Divisia M2. The top panel of the figure shows the growth rate of both aggregates change from previous to current years, bottom panel represents the difference between these two aggregates' series

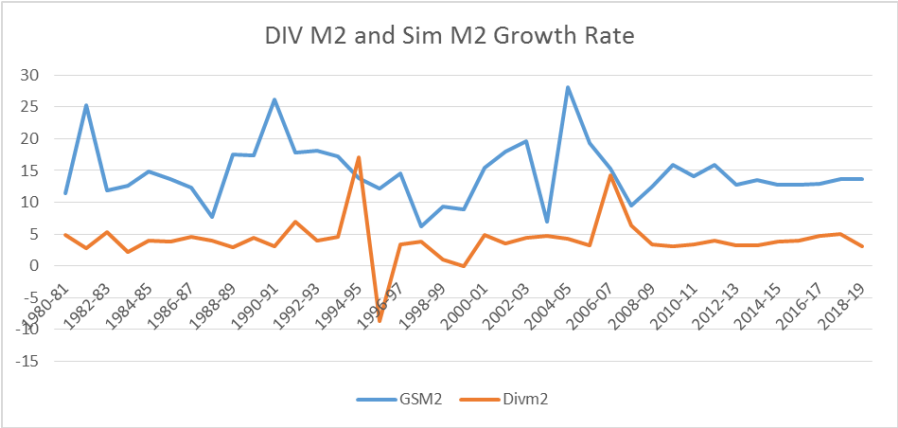

Figure 2: Growth Rate of Divisia M2 and Sim M2 of Monetary Aggregates in Pakistan (Source: Authors Calculation from Statistical Bulletin SBP, Handbook of SBP)

In this Figure 1 shows in 1995-99, the central bank of Pakistan used the expansionary monetary policy, in which one component that money in circulation increase from 184708 million to 515579 billion rupees Annual Report, (1994-97). The superlative sum Divisia monitor is accurately compared to the simple sum counterpart. The bellow figure represents the difference between the growth rate of weighted Divisia Sum and Simple Sum monetary aggregates. The Divisia Sum M2 contains the components having more interest-bearing assets compared to non-interest; behind of this reason, the Divisia Sum M2 growth rate is lesser compared to its counterpart.

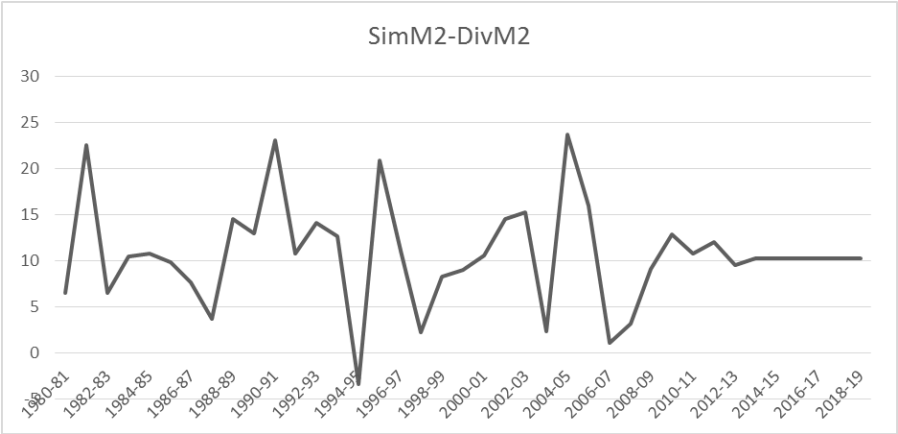

Figure 3: Growth Rate of Sim M2 Minus Div M2 of Monetary Aggregates in Pakistan (Source: Authors Calculation from Statistical Bulletin SBP, Handbook of SBP Figure 1 Superlative Index Vrsus Growth rate M2. The above Panel Shows the Growth Rate of the Money Supply of the Authors' Divisia M2 Aggregate (Green and Gray Solid Line) and the SBP's Ofcial Simple Sum M2 Aggregate (Blackline))

In Figure 1 shows the comprehensive comparison of the Superlative sum M2 and simple money growth rate. The above figures come out from 1980 to 2019. In the era of financial deregulation and disinflation, the division index shows the strong and accurate signals of contractionary monetary policy. At the same time, the simple sum monetary growth rate failed to provide an accurate single and true rate of money growth. The reason is that simple sum money failed to describe the internal portfolio effect e.g, an interest-bearing asset in money component, less liquid and more liquid, time deposit, and long-term deposit accounts. Superlative Sum M2 falls more compared to simple monetary Sum M2 growth during the rate of interest rise. The theoretical approach of the new Keynesian model indicated that there is an inverse association between the growth of money and the rate of interest in case of liquidity effects (Belongia & Ireland, 2012a). Outcomes of this research closely seem more clearly in Superlative Sum (Divisia Index) compare to money supply simple M2 counterparts.

EMPIRICAL RESULTS AND DISCUSSION

The empirical results are based on two main questions. Firstly, the influence of superlative sum and simple sum on macroeconomic indicators. Secondly, the effectiveness of these two sum of monetary aggregates on macroeconomics variables on entire regimes of Pakistan economy. Thirdly, to check the causal association among money, rate of interest, and entire macroeconomic variables on pre and post reforms of the Pakistan economy? This study is trying to reply to answers to these given questions with macroeconomic indicators of how monetary policy with Divisia Monetary Index inuence of real economic activity by using the Granger causality techniques.

Table 2: Causality Test among Money, Interest, and Macroeconomic Variables (1980-2000)

Forecasted Variable	Simple Sum Monetary Aggregate			Divisia Sum Monetary Aggregate			Policy Rate
	M0	M1	M2	M0	M1	M2	
CAPU	0.88	0.55	0.02	0.89	0.79	0.99	0.57
CON	0.35	0.30	0.11	0.74	0.90	0.21	0.31
EMP	0.94	0.65	0.84	0.97	0.50	0.73	0.55
IPI	0.53	0.01	0.91	0.22	0.01	0.16	0.08
WSI	0.13	0.96	0.32	0.78	0.65	0.89	0.07
UEMP	0.05	0.32	0.04	0.57	0.77	0.93	0.04

Note: Also, CAPU is Used for Capacity Utilization, CON is Used for Consumption, EMP is Used for Employment, IPI is Used for Industrial Production, WSI is Used for Whole Sales, and UEMP is Used for the Unemployment Rate. These Highlighted Values Show the Causality According to the *t*-statistics Criteria Source Author's Calculation.

Table 2 indicates that neither Divisia nor simple sum shows significant causation with six macroeconomic indicators except simple sum Mo and M2 with unemployment rate while simple sum M1 and Divisia M1 with industrial production. In comparison, the policy rate is associated to three out of six macroeconomic indicators. These results hardly can be interpreted as evidence that money lost its ability to explain aggregate uctuations after the 1980s before the financial innovation in Pakistan e.g., Ommer (2009) and Janjua (2005) stated that the monetary aggregate targeting strategy adopted by the Central bank of Pakistan in before and mid-1990, s, whereas the world faced the financial deregulations. The diminishing performance of Divisia stated by (Tariq and Mathew's,1997) study, was conducted in a period when the financial sector of Pakistan was not much developed. Suggested that in feature due to financial innovation in banking sector its shows greater performance than the counterpart. Similarly, outcomes for observations that be similar to most diligently those employed in the imaginative study of Bernanke and Blinder, 1992, and Blongia and Ireland (2013).

Table 3 presents results from the period of 1995 through 2014, which include the world financial crisis due to the 9/11 event. The effects of money become stronger still when the Divisia aggregates are used: Divisia M0 is signicantly associated with two variables, Divisia M1 and Divisia M2 with four out of six, while the Simple Sum causation two out of six and interest rate associate with two out of six macroeconomic variables. The simple sum M0 associates at (1%) and (10%) with capacity utilization (CU) and consumption. While M1 shows causal relation among the capacity use at (10%) as well as the consumption at one percent level. Simple sum M2 is also associated with employment and retail sales at a ten percent level. In the case of superlative sum, narrow money (Div M0) is associated with industrial production and wholesales at (10%) and (1%) respectably. Furthermore, the move from narrow to broad superlative weighted money Divisia M1 and Divisia M2 cause four macroeconomic indicators, respectively, employment, consumption, wholesales, and unemployment at one and ten present levels. The outcomes unearth that simple sum and policy rate less predictability power compared to Divisia weighted sum after the financial reforms in Pakistan. These results are purely related to Bernanke and Blinder (1992), Blongia and Ireland (2013), Blongia and Ireland (2015), and Tariq and Mathew (1997) that Divisia Superlative Index performs batter as compared to its counterpart.

Table 3: Causality Test among Money, Interest, and Macroeconomic Variables (2000-2019)

Forecasted Variable	Simple Sum Monetary Aggregate			Divisia Sum Monetary Aggregate			Policy Rate
	M0	M1	M2	M0	M1	M2	
CAPU	0.00	0.02	0.93	0.86	0.47	0.80	0.65
CON	0.01	0.00	0.11	0.25	0.00	0.00	0.15
EMP	0.98	0.83	0.03	0.55	0.09	0.07	0.18
IPI	0.09	0.16	1.00	0.08	0.34	0.61	0.00
WSI	0.11	0.00	0.09	0.01	0.00	0.00	0.02
UEMP	0.53	0.24	0.51	0.88	0.02	0.06	0.73

CAPU is Used for Capacity Utilization, CON is used for Consumption, EMP is Used for Employment, IPI is Used for Industrial Production, WSI is Used for Whole Sales, and UEMP is Used for Unemployment Rate. Source by Author's Calculations

Table 4 the policy rate shows a positive and significant behavior with four macro side indicators: wholesales, unemployment rate, and industrial production at (10%) level of significance. In comparison, the remaining three of them are statistically insignificant. On the other hand, Divisia M1 and DivM2 cause three out of six macroeconomic indicators.

Table 4: Causality Test among Money, Interest, and Macroeconomic Variables (1980-2019)

Forecasted Variable	Simple sum Monetary aggregate			Divisia Sum Monetary aggregate			Policy Rate
	M0	M1	M2	M0	M1	M2	
CAPU	0.11	0.11	0.33	0.89	0.54	0.52	0.60
CON	0.18	0.71	0.72	0.20	0.16	0.13	0.66
EMP	0.06	0.29	0.24	0.44	0.54	0.09	0.11
IPI	0.13	0.62	0.06	0.08	0.07	0.01	0.02
WSI	0.38	0.00	0.83	0.01	0.00	0.00	0.02
UEMP	0.11	0.77	0.06	0.97	0.02	0.06	0.00
CPI	0.35	0.70	0.90	0.70	0.73	0.03	0.96

CAPU is used for Capacity Utilization, CON is used for Consumption, EMP is used for Employment, IPI is used for Industrial Production, WSI is used for Whole Sales,and UEMP is used for Unemployment Rate, GDP stands for Gross Domestic Product. Source by author's calculation

The whole memorandum that the SBP adopted the flawed monetary aggregation (simple sum), which lost of the predictive power of money, looks like the results to be verified in the above table as well, previous once. The outcomes are also contemporaneous, as in (Belongia, 1996) and (Hendrickson, 2011), Bloangia and Ireland (2013), Gia and Ireland (2016). So overall, the results reveal that there is no evidence come to know the rate of interest prefer on money and vice versa.

CONCLUSION

This article investigates whether the monetary aggregates (e.g., Simple Sum, Divisia Index), and interest rate cause the macroeconomic variables? Outcomes of this study reveal that before the financial innovation, the role of monetary aggregates (Superlative Divisia Index) in predicting macroeconomic compare to the rate of interest and simple sum. Secondly, post-financial reforms, the Divisia Index performed better to cause the macroeconomic indicators as compared to its counterpart. Thirdly, the overall financial regimes the Divisia cause main macroeconomic variables than rate of interest and simple sum. Finally, the major contribution of this study is the construction of the Superlative Divisia weighted Index of monetary aggregates. The monetary aggregates and interest rates simultaneously play an important role in improving the performance of rules to predict the macroeconomic indicators. Policy implications that come out from this analysis are that regulatory authorities should closely observe the behavior of macroeconomic indicators through the use of correct monetary aggregates to ensure stability in prices and enhance economic growth more precisely. In addition, this study also suggests that SBP should replace her simple monetary base with a weighted Divisia Index and use it in the transmission mechanism of monetary policy in order to sustain economic growth and predict the macroeconomic indicators

performance in Pakistan. This research outcome also indicates the disengage between the modern model of New Keynesian, in which the money plays no distinctive role once the time path for a rate of interest is accounted intended for. To bridge this gap, we suspect t that scholars will be managed to reevaluate the questions raised by (Bernanke & Blinder, 1988) a few decades ago.

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