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Survey of Money- Output Causality: Case Study of Iran, Based on Vector Error Correction Model (VECM)

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Abstract

This study investigated the dynamic relationship between money, prices and output in a multivariate structure of casualty analysis in Iran for the two period of 1969 to 2012 (entire period) and 1989 to 2012 (sub-period). This statistical framework has been projected for situations where causal links may have changed over the sample period. Results of a three-variable Vector Error Correction Model (VECM) analysis were indicative for existence of one co-integrated relationship between money supply, price and real output at both periods. Although there was a long run relationship between money, output and prices for both periods, direction of casualty has changed for sub-period. Also error correction terms showed that short run adjustment toward long run equilibrium was faster and stranger at sub-period, when Central Bank of Iran (CBI) adopted expansionary monetary policy and consequently rapid increase in liquidity. Finally money- output causality was not confirmed in this method and presence of correlation (not causality) between variables may just resulted from some other variables in economy as source of changes.

Keywords: Monetary Policy, Error Correction Model, Granger Causality, Variance Decomposition, Money-Output Relationship

1- Introduction

Causality between money and output is one of the most important issues in macroeconomic policy and large literature has examined the relationships between monetary variables and output. Various economic assumptions about money –output relationship, essentially lead to different

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macroeconomic paradigms. This relationship are historically associated with the quantity theory of money and according to the classical doctrine. They believe that an increase in money supply result only in a relative increase in price in the long-run, on the other hand money is neutral to output. The Keynesians believed that a positive monetary shock would increase both economic activity and price level through the interest rate and investment variables. The Monetarists argue that the Keynesian transmission channel is valid only in the short run, but in the long run classical opinion is valid. The new classical argue that only unanticipated monetary expansion would result in an increase in output. According to the new Keynesians, money is non-neutral at least in the short run, because of rigidities in prices and wages, and market failures and imperfections. The theory of Real Business Cycle (RBC) presume that the money supply is determined endogenously by the circumstances of the economy, not by the central bank and also output is determined exogenously by technology. They argue that money supply endogenously responding to an increase in output, thus monetary expansion will have no positive effect on output and will only raise interest rates and the price level [1]. It is important to mention that, if there is a positive correlation exists between nominal money and real output but as a general rule, correlation is frequently taken to imply causality [2].Then issue implied above by the existing macroeconomic paradigms is still an empirical one.

This paper contributes to the literature based on previous applied studies such Fahlino [3].Our study has been fallowed in a multivariate framework and within the environment of vector error-correction model (VECM).This method was employed to determine the Granger causality among variables to indicate the direction of causality. Since the result of causality tests seem to be sensitive with respect to the sample period, we intend to apply a method of analyzing these causal relatives for Iranian economy in two periods. This viewpoint is considered for the first time between money-output Causality. For this purpose we introduce two different sample, the entire period of 1969-2012 and sub-period or after war period of 1989- 2012, at which central bank`s monetary policy has changed. In this new viewpoint by applying data from central bank of Iran for two period, sensitivity of results with respect to change in sample period is examined.

This article is divided into the 6 sections. Section 2 reviews some literature review on money, price and output relationship in Iran and

discusses the empirical-based studies available on the relationship between these variables. Section 3 provides a brief history of monetary policy in Iran. In section4, we explain the methodology and data. Section 5 is devoted to the estimation results. Final section presents some concluding remarks.

2- Money, Price and Output Relationship: Literature Review

Iran has a history of relatively high inflation since the 1979 revolution and there are strong empirical evidences of a direct relation between inflation and money-supply growth, at least for rapid increases in the amount of money in the economy. In order to show some empirical studies in this issue, this section summarizes the evidences collected in the literature on Granger-causality and relationship between money, price and output in Iran.

Abrishamy uses cointegration techniques to test the neutrality of money by using data for three variables of money supply ,output and prices [4].By appling seasonal data and estimating cointegration relationship between variables,the results show that money is nutral in the long run .Results postolate that changes in the quantity of money will not have any impact on real variables and will only produce nominal macroeconomic chganges .This study offers only some evidence in support of super- nutrality of money in Iran and it sugest that the inflationary model of monetarist school which asumes long run neutrality of money is appropriate for projeting the real and nominal effects of monetary policy and shocks in Iran.

Kabir Hassan using VECM Granger causality tests shows that money is not nutral in the short run in Iran ,which is consistent with Keynesian and Monetarists Macroeconomic paradigms. Monetary policy can contribute to the price stability in Iran beacause variations in price level is mainly caused by its own innovations, and not from real output or money supply[5].This results suggest that money matters,but monetary policy by itself is not effective unless there is a co-ordination of fiscal,exchange rate and trade policies.

Leo Bonato looks at the determinants of inflation in Iran, both in the short run and in the long run. Using a parsimonious error correction model is estimated for the period of 1988/89–2005/06, shows that the problems encountered in adhering to the monetary targets are the main reasons for the persistence of double-digit inflation in Iran [6]. These results suggest that controlling money growth is a key to the success of the disinflation effort in

Iran. The stability of the relationship between money and inflation also seems to indicate that money growth can be a useful intermediate target. Money growth drives inflation even in the short-run, with lags of up to four quarters. There is no evidence of a structural change in the relationship between money and inflation.

Hayo based on Sims and King&Plosser outcomes, reveals that statistical significance of the effect of money on output will be lower when including other variables in a multivariate test.Also use of narrow money is less likely to support Granger-causality from money to output than broad money [7].

Helmut Herwartz & Hans-Eggert Reimers used the P-star model and framework of the quantity theory of money to analyze the change of prices in 110 macro economies, including Iran. Results reveal that central banks need to monitor the development of monetary aggregate to control the price level in the long run [8].This finding is cornerstone for achieving price stability and sustainable growth.

3- Monetary Policy in Iran

After the 1980 war with Iraq and according to objective of economic growth, the central bank of Iran (CBI) started to adopt expansionary monetary policy. With this development viewpoint and considering the inflationary effect of this policy, it would be important to reexamine the causal relationship among money, prices and output in Iran.

For more than 35 years, Iranian economy has practiced frequent events and shocks such as revolution at 1978 and the war with Iraq. These events at early 1980's had a significant impact on the performance of main macroeconomic variables in Iran. For instance, widespread government intervention in the economy was raised, after the Islamic revolution at 1979 and due to the eruption of war with Iraq. This involvement which resulted in spending from oil revenues by government, also subsequent money creation was the main basis for increasing liquidity after war period. Consequently, economy experienced a high inflation for more than two decades as result of rapid growth in broad money (Figure 1).

The basic objective of Iran post war medium-term plans have been to reduce inflation, raise real GDP growth, create job opportunities and enhance financial stability. Thus, ending of the war in august 1988, was a

beginning of a new period in Iranian economic policy and following rise in inflation rate that stimulated by government activities [9].

The success in reducing the rate of inflation has been largely based on government subsidies and central bank`s controls on liquidity. This controls even if feasible politically can have harmful consequences for financial development and growth in the long run. Also, because of these controls and government subsidies, formal inflation rate is likely to underestimate its true rate.

On the other hand, despite increasing volume of liquidity in the past two decades, producers have been complaining about reluctance of banks to grant them facilities. With presence of a soft budget constraint, effectiveness of monetary policy is questionable. At this circumstance firms have no incentive to respond monetary restraint properly [10].Totally, because of dependence of central bank`s monetary policy to government, liquidity is still rising in Iran and policies adopted to restrain its growth have been only relatively successful. Figure 2 shows money supply (M2) and the Consumer Prices Index (CPI) average annual growth rates.

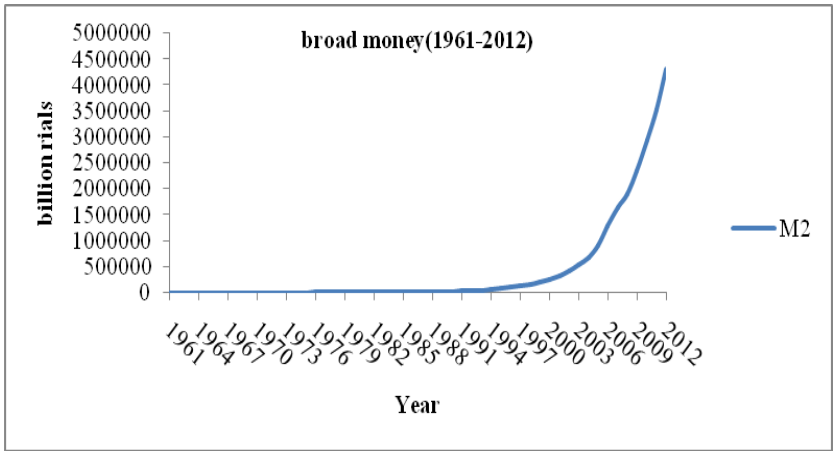

Figure 1: Broad money (M2) in Iran (1961-2012)

Source: Central Bank of Iran, annual data before and after the revolution and post-war period.

According to the framework of monetary policies in the Five-Year Development Plans in Iran, the main goals of central bank of Iran were controlling the liquidity and curbing the inflation. According to Shariah rules in Islamic economic framework, it is not allowed to use interest based

instruments for monetary policy. Therefore some Islamic scholars believe that, we should confine ourselves only on the monetary aggregates [11]. Some of these instruments like credit ceiling are substitute for interest based instruments. It should be mentioned that, since liquidity growth has been the main factor in rising of inflation rate, the main target in Iranian economic policy has been control of liquidity. Also due to the foreign exchange unification, we should consider to money supply as proper instrument for government to pursuit monetary policy and macroeconomic objectives [9].

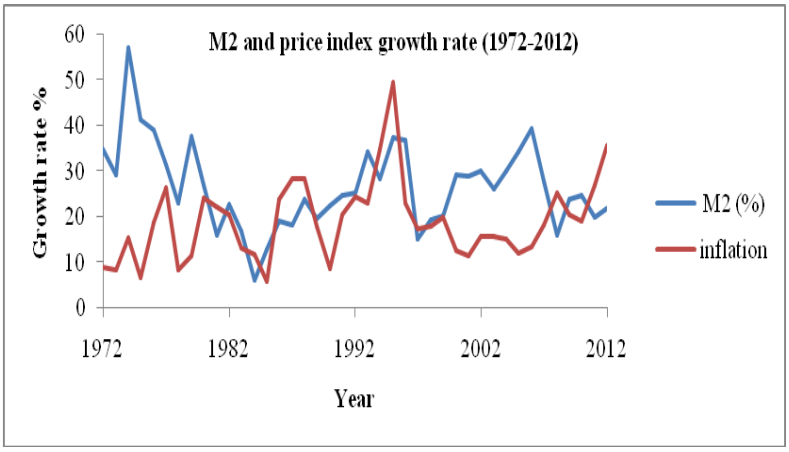

Figure 2: Broad money (M2) growth and inflation rate in Iran (1972-2012)

Source: Central Bank of Iran, annual data after the revolution and post-war period.

4. Methodology and Data

This paper contributes to the literature based on previous applied studies such Levent,& Saatçioğlu [12],Fahlino [2]and Nwosa , & Oseni [13].we apply the methodology of VECM to examine the dynamic causal chain among real output, money and prices for two period. For this purpose a dynamic macroeconomic model was applied for the entire period (1969-2012) & sub-period (1989-2012) or post-war period to analyze the relationship between variables.We believe that this method possibly will show some details around direction of causality between variables when the sample period changes. It should be mentioned that the choice of the entire period is based on the availability of time series data for variables from the

year 1969. The period under investigation also contains the interval of after war period or sub-period (1989-2012) during which CBI planned to arrange some specific policies, such as macroeconomic strategies for economic growth and subsequent expansionary monetary policy.

There are three variables included in this analysis: the nominal money supply, measured by broad money (M2), real output, measured by real GDP (fixed price of 1997) and price measured by consumer price index (CPI). All of these series have been log-transformed. Data and the information of variables were obtained from various issues of economic reports and balance sheets of Central bank of Iran (CBI) and database on the CBI website [14] Data for 2010- 2012 are estimation amount [15].

5- Estimation Results

As noted above, this paper employs a multivariate co-integration analysis and the Granger causality test within the VECM model to analyze causal relationships among these macroeconomic variables in Iran in two periods. Our main purpose is to confine recent development in the monetary policy in Iran and answer the question of whether money and prices have been predictive elements for output.

In order to have a valid inference for the possible existence of unit root and cointegration, first step is to examine time series properties of the variables. The necessary but not sufficient condition for existence of co-integration relationship all the variables should be integrated of the same order or have a deterministic trend [16].In this section, numbers of set for unit root tests were applied to test the order of integration for three variables.

5-1- Unit Root Tests

Results of ADF [17] and Phillips-Peron unit root tests [18] (with trend and without trend) are presented in Table1.Table shows these results for all series in levels, first and second differences for two sample periods. The null hypothesis of these tests is that series have a unit root or are non-stationary (table 1).

Result of tests in Table 1 shows that for period one (1969-2012), the series: real output(LGDP), money(LM2) and price(LCPI) are integrated of order one I(1), one I(1), and two I(2) respectively, confirming that they are non-stationary at levels, but stationary after first ,first and second

differencing respectively. Table 1 also shows that the unit root tests for those series in sub-sample period (1989-2012) has the same results as total period. The variable are integrated of order one I (1), two I (1), and two I (2) respectively.

Table 1: Unit Root Tests

Period	Variables	ADF- Test		PP - Test		result
		Constant	Constant with trend	Constant	Constant with trend	
	level s:					
	LGDP	-1.672551	-2.328932	-2.002826	-2.158799	-
	LCPI	-0.867955	-2.983728	-1.435077	-2.493604	-
	LM2	0.535593	-2.738614	0.668802	-2.2848	-
(1969-2012)	First Differences:					
	LGDP	-3.889386*	-3.963027**	-3.889386*	3.963027**	I(1)
	LCPI	-2.54154	-2.944867	-2.470437	-2.944867	-
	LM2	-3.793282**	-3.833976	-3.757977**	-3.884516**	I(1)
	second Differences:					
	LCPI	-7.275035*	-7.199687*	-8.106824*	-8.027160*	I(2)
	level s:					-
	LGDP	-0.650513	-4.174333**	-1.316974	-2.396168	-
	LCPI	-0.392667	-1.985274	-1.065712	-1.511453	-
	LM2	0.093376	-3.486812**	0.093376	-2.596914	
(1989-2012).	First Differences:					
	LGDP	-7.357426*	-6.883413*	-4.228037*	-4.217954**	I(1)
	LCPI	-2.138924	-1.94834	-2.258515	-2.099642	-
	LM2	-3.792573*	-3.709803**	-3.800547*	-3.720279**	I(1)
	Second Differences:					
	LCPI	-4.836694*	-4.877807*	4.768342*	-4.832763*	I(2)

The critical values for models with a linear trend, at a significant level of *1%, **5%, *** 10% are:
Period (1) -4.144584, -3.498692, -3.178578 respectively. Period (2)-4.39430-3.612199-3.243079 respectively.
The critical values for models without a linear trend at a significant level of 1%, 5%, and 10% are:
Period (1) -3.562669,-2.91877,-2.597285 respectively. Period (2) -3.737853, -2.991878, -2.635542 respectively.

5-2- Cointegration TESTS

After testing for order of integration in the variables, we conduct a co-integration test to examine existence of linear combination between variables. If any co-integration vector there exists, then correct specification

of the dynamic system should be a vector error correction model (VECM) [16].

Since the results of the co-integration test often depend on the number of lags, we used some appropriate VAR lag order selection tests such as likelihood ratio (LR), Akaike Information Criterion (AIC), Schwartz information criterion (SC), the Hannan-Quinn Information criterion (HQ), and Final prediction error (FPE) and to determine the proper lag length. Results signify two lags as a suitable lag length for two periods (Table 2).

Table 2: VAR Lag Order Selection test

Period	Lag	Log L	LR	FPE	AIC	SC	HQ
(1969-2012)		185.1914	536.2116	1.08e-07	-7.530059	-7.053023	-7.351359
		213.7886	48.49091*	4.63e08*	-8.38211*	-7.54729*	-8.06938*
		220.4903	10.48962	5.19e-08	-8.282186	-7.089593	-7.835433
(1989-2012)	0	0.348481	NA	0.000258	0.252526	0.401743	0.28491
	1	107.0364	172.7327	2.39E-08	-9.051081	-8.454211	-8.921545
	2	134.9613	37.23321*	4.20e09*	-10.85345*	-9.808930*	-10.62676*

Notes: * indicates lag order selected by the criterion.

5-2-1- Johansen's Co integration Test

In order to test whether a long run co-integration relationship between money supply, prices and, output exists, we should conduct a co-integration test. By conducting Johansen (1988) and Johansen and Juselius (1990) co-integration test, we could find number of co-integrating vectors in the series and estimate maximum likelihood of these vectors[16].According to trace & maximum Eigen value co integration tests, presence of more than zero significant co-integrating vectors, means that variables have at least one long-run equilibrium relationship. Tables 3&4, present the results of trace & maximum Eigen value co integration tests for two periods.

Table 3: Unrestricted Co-integration Rank Test (Trace)

Period	Null	Eigenvalue	Trace Statistic	5% critical value	Prob **
(1989-2012)	r=0*	0.780399	51.51769	29.79707	0
	r≤1	0.435885	15.13505	15.49471	0.0566
	r≤2	0.056473	1.395116	3.841466	0.2375
(1969-2012)	r=0*	0.428798	34.88178	29.79707	0.0119
	r≤1	0.138077	7.441201	15.49471	0.5269
	r≤2	0.003267	0.160351	3.841466	0.6888

Notes:Trace test indicate 1 co integrating vector at 5% level 1 co integrating vector for two periods.
*denotes rejection of the hypothesis at %5 level. **MacKinnon-Haug-Michelis (1999) p-values

Table 4: Unrestricted Co integration Rank Test (Maximum Eigen value)

Period	**Null**	**Eigenvalue**	**Max-Eigen Statistic**	**5% critical value**	**Prob****
(1989-2012)	r=0*	0.780399	36.38264	21.13162	0.0002
	r≤1	0.435885	13.73993	14.2646	0.0604
	r≤2	0.056473	1.395116	3.841466	0.2375
(1969-2012)	r=0*	0.428798	27.44058	21.13162	0.0057
	r≤1	0.138077	7.28085	14.2646	0.4565
	r≤2	0.003267	0.160351	3.841466	0.6888

Max-eigenvalue test indicate 1 co integrating vectors at 5% level 1 co integrating vector for two periods.
*denotes rejection of the hypothesis at %5 level. **MacKinnon-Haug-Michelis (1999) p-values.

According to the results of Trace and Max-Eigen value test (tables 3& 4), the null hypothesis of having no co-integrating vector has rejected at the five percent significance level, suggesting that there exists one co-integrating vector and one long run relationship between money supply, price and output for two periods.

Equilibrium theories involving non stationary variables require the existence of a combination of variables that are stationary. Within any equilibrium framework the deviations from equilibrium must be temporary. If the system is to return to the long -run equilibrium, the movements of at

least one of the variables must respond to the magnitude of the disequilibrium. Therefore a vector error correction model (VECM) should be applied as a correct specification of model.

5-3- VECM: Estimated Vectors

By applying a three-variable VECM model with one cointegrating vector, we have examined Granger causality among the variables. Absence of Granger –Causality for cointegrated variables requires the additional condition that speed of adjustment coefficient be equal to zero. Lagged error-correction term, however, is a short-term adjustment coefficient and represents the long-term imbalance in the dependent variable that is being corrected in each period.

It should be noted that the number of cointegrating vectors indicates that there is consequent number of residual series as error-correction terms (ECTs). This term is a short–run adjustment parameter or speed of adjustment in estimated vector error-correction model (VECM).Error-correction terms (ECTs), can be represented as exogenous variables in vector error-correction model (VECM). Absence of significant coefficients for lagged variables show that there is no short run causality between variables in long run ECM models. The larger the error-correction term is the grater the response of subsequent variable to the previous period's deviation from long –run equilibrium. At the opposite extreme, very small values of this term for each variable imply that it is unresponsive to last period`s equilibrium error.

Despite of direction of causality, results reveal that there is a long run relationship between money, price and output in two sample period (Table 5). All the estimated coefficients have the expected signs and are statistically significant. Significance of coefficients of all variables and lagged error-correction term indicates presence of long-term causal relationship in two periods. Results of VECM estimation show that money supply (M2) and price (CPI) are econometrically exogenous in sample period (1969-2012). Long run relationship in this period reveals that direction of causality is from money supply (M2) and price (CPI) to output (GDP).But the relationship in sample period (1989-2012) is completely different as direction of causality, from output (GDP) and price (CPI) to money supply (M2).

Table 5: Cointegration Relationship between Money, Price and Output in two Period

Variables	Sub-Period (1989-2012)	Total Period (1969-2012)
LGDP(-1)	1	-3.034863
		-0.25647
		[-11.8333]
LM2(-1)	-0.235433	1
	-0.0085	
	[-27.7103]	
LCPI(-1)	0.080222	-0.806191
	-0.01297	-0.06062
	[6.18540]	[-13.2980]
c	-10.30035	31.24169
ECTs	-0.642754	-0.09671
(Error-correction terms)	-0.14914	-0.02839
	[-4.30985]	[-3.40624]

Assumption: Linear trend in data .Standard errors in ( ) & t-statistics in [ ].
Source: Estimated VECM Models.

Results also show that error-correction term or speed of adjustment in second period is higher (-0.64), than the first period ones (-0.09), indicating faster short run adjustment to the long run equilibrium in this period. This important deference for sub-period, during which the substantial increasing of liquidity (m2) had been carried out by central bank of Iran, is a key point for analyzing relationship between these variables and finding leading variables in this package to adopt proper economic policies in Iran.

5-4- Granger Causality Tests Based on the VECM

The basic principle of Granger causality analysis is to test whether past values of monetary variables would help to explain current values of output [19].By applying a three-variable VECM model with one cointegrating vector; we have examined Granger causality among the variables. These tests are carried out in the environment of VECM to test erogeneity specification of endogenous variable .Granger causality tests based on the ECM would be known as within-sample causality tests since they signify Granger causality relationship within the sample period [9]. As these results are based on Granger-causality relationship, they are sensitive to the choice of sample period.

Table 6: Granger Causality Tests Based on the VECM -Period (1989-2012) and Period (1969-2012)(VEC and Granger Causality/Block Erogeneity Wald Test)

Period	Independent variable		ΔLGDP	ΔLCPI	ΔLM2	All	Error correction term
			χ 2-sq Prop in()				t-statistics in [ ]
(1989-2012)	Dependent variable	ΔLGDP	-	0.995045 (0.6080)	1.644508 (0.4394)	2.417635 (0.6594)	-0.642754 * [-4.30985]
		ΔLCPI	0.387723 (0.8238)	-	0.472968 (0.7894)	0.745950 (0.9455)	0.879868 [1.39653]
		ΔLM2	2.404766 (0.3005)	1.932974 (0.3804)	-	3.066668 (0.5467)	0.723512 [1.32070]
(1969-2012)		ΔLGDP	-	0.522043 (0.7703)	2.167505 (0.3383)	6.375525 -0.1728	0.059872 [2.26016]
		ΔLCPI	2.938701 (0.2301)	-	0.118087 (0.9427)	3.287544 (0.5109)	-0.026896 [-0.93502]
		ΔLM2	2.405491 (0.3004)	1.054352 (0.5903)	-	2.464426 (0.6510)	-0.096710 * [-3.40624]

Assumption:Linear trand in data .Source of coefficient and t-statistics: estimated VECM models (table 5).

Notes: A significant statistic implies that the independent variable Granger cause the dependent variable.

The χ 2 statistic tests the joint significance of each of the other lagged endogenous variables in the equation.

Results of estimated VECM model (table 5) signify that there is a long run causal relationship between money supply, output and price in two periods. But existence of long run relationships is against with causality in short time (table 6). Absence of short run Granger causality between variables (money, price and output) in 2 periods suggests that exogenous monetary policy shocks weren't key sources of output and price variability for two periods in Iran.

5-5- Variance decomposition:

In order to analyze dynamic properties of system beyond the sample periods, forecast error variance decomposition was computed .This way enables us to estimate relative contribution of each explanatory variable in explaining variation of dependent variable. Table 7&8 shows these contributions for two ECM models.

In period (1989-2012) at 9 year time horizon for GDP: GDP explains most of its own forecast error variance at first year (100%), this contribution decrease to 42% at year 5 and to 23% at year 9,contribution of CPI increase from 0% to 60% at the end.M2 explains 10% of GDP variance at year 3 , this contribution increase up t0 18% at year 5 and decrease to 15% at the end .For CPI: Only CPI explains most of the own forecast error variance at all years. Contribution of M2 from 0 at first to less than 1% ,and GDP from 0 up to 2% at the end of time horizon .For M2 : CPI explains 1.8% at first up to 14.7%at the end ,M2 explains 52.9% of the own forecast error variance at first but this Contribution decrease to 36.8% at the end year . Contribution of GDP to explain M2 forecast error variance increase from 45.2 to 51.4 at the year 7 and decrease to 48.3% at the end. Outcomes show that CPI has role of leading variable in this period (Table 7).

Table 7-Variance Decomposition period (1989-2012)

Variance in:	time horizon	S.E	LGDP	LCPI	LM2
LGDP	1	0.016773	100	0	0
	3	0.032989	85.64679	3.994948	10.35826
	5	0.048524	42.83762	38.51966	18.64272
	7	0.063392	27.24777	56.51591	16.23633
	9	0.073001	23.68443	60.88393	15.43164
LCPI	1	0.070858	0.042242	99.95776	0.000000
	3	0.217267	0.454956	99.03792	0.507124
	5	0.350002	1.628779	97.56076	0.810463
	7	0.460348	2.196193	96.92273	0.881082
	9	0.547784	2.326680	96.81611	0.857208
LM2	1	0.061612	45.20121	1.898516	52.90028
	3	0.110098	46.23636	6.317588	47.44605
	5	0.142058	50.48544	10.22807	39.28649
	7	0.168400	51.41152	11.18556	37.40292
	9	0.191677	49.00436	13.70149	37.29416

Cholesky Orering: LGDP LCPI LM2

In period (1969 – 2012) at 9 year time horizon: variance decomposition For M2: M2 explains 100% of the own forecast error variance at first but this Contribution decrease to 67.7% at the end year, Contribution of CPI explains less than from 0% to1%at time horizon, Contribution of GDP to explain M2 forecast error variance increase from 0% to 31.6% at the end year. for GDP: GDP explains most of its own forecast error variance at first

year (79.5%), this contribution decrease to 51.7% at year 9, contribution of CPI increase from 0% to 15.8% at the end.M2 explains 20.4% of GDP variance at first year, this contribution increase up t0 32.3% at the end .For CPI: Only CPI explains most of the own forecast error variance at all years of time in horizon (85.9-89%). Contribution of M2 to explain M2 forecast error variance only (0.8-0.11%) at all years, and Contribution of GDP decrease from 13.2% to 10.5% at the end of time horizon. Outcomes in this section confirm the last result that CPI has role of leading variable for this period (Table 8).

Table 8: Variance Decomposition Period (1969 – 2012)

Variance in:	time horizon	S.E	LGDP	LCPI	LM2
LGDP	1	0.056353	20.48500	79.51500	0.000000
	3	0.136856	24.19892	73.70384	2.097241
	5	0.196537	30.97364	63.37973	5.646630
	7	0.234227	32.88355	57.00433	10.11212
	9	0.260618	32.65622	53.16314	14.18063
LCPI	1	0.061193	0.832387	13.22510	85.94251
	3	0.187112	0.587773	13.54106	85.87117
	5	0.296429	0.291896	15.76781	83.94030
	7	0.386073	0.175086	14.34097	85.48395
	9	0.461999	0.214905	11.69915	88.08594
LM2	1	0.060399	100.0000	0.000000	0.000000
	3	0.124978	97.81577	2.145912	0.038313
	5	0.185347	86.34016	13.41640	0.243440
	7	0.263497	74.54588	24.94035	0.513768
	9	0.344725	69.13557	30.31284	0.551592

Cholesky Orering: LM2 LGDP LCPI

Also correlation tests (not reported) show that there are high levels of correlation between variables. This means that presence of correlation between variables may just resulted from some other variables in economy as source of changes and initial receptors of shocks and makes the causality relationship to have ambiguous results. Therefore, result of causal chain implied by estimated VECM long run relationship between money, price and output in Iran could be resulted from correlation not from causality between variables.

6- Conclusion

In this paper we reexamined the causal relationship between money, prices and output in Iran. We applied multivariate Granger-causality tests in a vector error correction model (VECM).The method applied here, highlights the fact that Granger causality may hold only in parts of the sample. Results were indicative of a co-integrated relationship between variables during the base sample period (1969 – 2012) and sub- sample (1989-2012).But direction of causality is deferent for period two. Although significant link between money, price and output was illustrated in co-integrated relationship at sub period (1989-2012), results of short run granger causality tests were contrast with them. Totally, the results of a three-variable vector error correction model (VECM) analysis was indicative for existence of one co-integrated relationship between money supply, price and real output in two period, but Granger-causality and variance decomposition tests didn't confirm that money supply plays an important role in explaining real output fluctuations in Iran. This survey confirms the results of previous studies, which there was no causality link from money to output in Iran. This means monetary policy shocks weren't sufficiently frequent and large to be statistically significant over sample period, or liquidity is not channeled toward production. It is very important to consider that long run relationship could come from correlation not causality. These results lead to other future surveys by using common variables that possibly will explain these relationships. Since the issue of money-output causality in Iran by applying econometrics estimation has been unresolved, so policymakers ought to adopt them with caution.

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