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Wealth Effects and Macroeconomic Dynamics

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Abstract

This study analyses the macroeconomic dynamics of wealth effects in India and examines the nexus between the changes in housing wealth, financial wealth, and consumer spending. I find a statistically significant and large effect of housing wealth on household consumption. The results show that (i) wealth effects are statistically significant and comparatively substantial in magnitude (ii) housing wealth effects tend to be greater while stock market wealth effects are considerable (iii) private consumption responses to the shocks to housing market wealth are relatively stronger than to the shocks in stock market wealth. There is a bidirectional causality running from private consumption to the two wealth forms and vice versa. Overall, the private consumption expenditure response to the changes in different wealth forms is observed to be substantial and significant.

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1. Introduction

Wealth is a key determinant in explaining consumption. Economists often mention the 'wealth effect' - denoting the association between the level of personal wealth and the decisions about spending or savings. The "wealth effect" is mostly based on the premise that consumers tend to spend more when there is a bull market in widely-held assets like real estate or stocks because rising asset prices make them feel wealthy. Intuitively, the notion that the wealth effect stimulates private consumption is logical. The wealth effect is a psychological phenomenon that causes people to spend more as the value of their assets rises. The premise is that when consumers' homes or investment portfolios increase in value, they feel more financially secure, motivating them to spend more.

The conventional wisdom on the wealth effects, informs that fluctuations in household wealth have driven major swings in economic activity. The topic of wealth effects has gained increased attention (see Sundaresan, 1989; Deaton, 1992; Muellbauer and Lattimore, 1995; Skinner, 1996; Rudd and Whelan, 2002) as the changes in stock and property prices become more important since the liberalization of financial markets and the deregulation of mortgage markets in the 1980s. Undeniably, the fall in wealth during the global financial crisis is often mentioned as an important contributing factor to the unusually slow economic recovery. This has brought new concerns about the response of consumer spending to the asset price shocks.

Theoretically, according to the '*life-cycle hypothesis*', an increase of stock or housing wealth should have the same effect on consumption as the marginal propensity to consume out of wealth is slightly bigger than the real interest rate in the long-run (Ando and Modigliani, 1963). According to Milton Friedman's '*permanent income hypothesis*', households consume a constant fraction of the present discounted value of their lifetime resources. Therefore, the changes in wealth that permanently alter households' resources should cause consumption to change in the same direction. Undoubtedly, the traditional macro-econometric models of wealth effects represent a workhorse tool for analysts seeking to gauge the influence of wealth on macroeconomic dynamics. Wealth effects literature also presents alternative views, challenging the life-cycle hypothesis (Mishkin, 2007).

Relying on aggregate data on consumer spending, financial wealth, and nonfinancial wealth, an early study by Elliott (1980) observed that the variations in wealth forms had no effect upon consumption. However, Elliot's findings were challenged by Peek (1983) and by Bhatia (1987) who questioned the methods used to estimate real non-financial wealth. Further, Case (1992) provided evidence of a substantial consumption effect during the real estate price boom in the late 1980s using aggregate data for New England. Likewise, Engelhardt (1996) provided a direct test of the link between house price appreciation and consumption and estimated that the marginal propensity to consume out of real capital gains in owner-occupied housing is about 0.3, but this arose from an asymmetry in behavioral response. Afonso and Sousa (2011) explore the data for OECD countries and show that when agents expect higher stock returns in the future, they tend to allow consumption to increase. Rocha Armada et al., provide a relationship between consumption growth, the consumption-wealth ratio, and its first-difference, and asset returns. Sousa (2010) shows from the consumer's budget constraint, that the residuals of the trend relationship between consumption, financial wealth, housing wealth and labor income better predict U.S. and U.K. quarterly stock market returns. On the other hand, using data from 16 Organization for Economic Co-operation and Development (OECD) countries, Sousa (2010) shows that when the wealth-to-income ratio falls, investors demand a higher stock risk premium. In the Indian context, Singh (2012) using a Bayesian VAR model shows that a 10% increase in the real stock wealth is associated with an increase in consumption of 0.3%. Peltonen et al. (2012) and Caporale et al., (2016) show the empirical evidence of wealth effects on consumption in emerging market economies. Caporale and Sousa (2016) and Caporale et al., (2016) use panel frameworks in establishing the relationship between consumption, asset wealth and labor income. Household consumption is affected not only by income, but also by wealth, such as property/house/real estate and stock ownership, but also has macroeconomic dynamics. The renewed interest in the topic has regained ground against the background of the current financial turmoil which has led to concerns by numerous academics, central banks, and governments about the potential macroeconomic implications of a downturn in housing and equity prices. Of late, emerging market economies are developing their access to financial assets and hence the possibility to extract equity from them has also risen, thus, increasing the potential macroeconomic impact of domestic asset price movements (Dorrucci et al, 2008). Most of the empirical evidence on the topic refers to advanced economies and more so to the United States and OECD countries. However, there is a need to extend the literature to study the macroeconomic dynamics of the wealth effects in emerging economies as these economies are becoming a key engine of growth in the world economy.

Providing comprehensive evidence of the dynamics of wealth effects is, therefore, of major relevance, and the main purpose of this study. First, I use quarterly data to obtain more precise estimates of the impact of wealth effects on private consumption. Second, I estimate the impact of wealth effects on the macroeconomic variables such as GDP, inflation, real exchange rate, and fiscal deficit. Of course, this analysis allows us to go beyond simple scatter diagrams, and to control for various factors as well as a test for significance. This paper's approach is eclectic; presents analyses in levels, first differences, and in error correction model (ECM) forms, and with alternative assumptions about lag lengths, about error terms, and fixed effects. To preview the results, I present evidence that consumption is impacted by wealth effects. Besides, wealth effects have a significant long-term relationship between consumption and other macroeconomic indicators. Financial wealth assets and housing wealth assets are found to have a significant association with consumption. Furthermore, I present suggestive evidence that the contribution to consumption from an increase in housing assets is stronger than that of stock market assets.

The remainder of the paper is as follows. Section 2 outlines the related literature on the theoretical underpinning for the analysis based on a rigorous review of wealth effects. Section 3 describes the data and empirical strategy. Section 4 presents the empirical evidence and finally, Section 5 concludes.

2. Data and Methodology

2.1 Data

I address the linkage between stock market wealth, housing wealth, and household consumption in the presence of control variables using a data set that contains time series (45 quarterly data points) from March 2005 to March 2016 in each of the variables. All variable data are sourced from the Reserve Bank of India database. I face some data limitations. First, data on housing and stock wealth are not available on a broad basis. I, therefore, use housing price index (HPINDEX) and stock market capitalization (MC) as the major proxies for these wealth components. This is in line with some of the studies such as; Miles (1992), Miles (1995), Girouard and Blöndal (2001), Aoki et al., (2002), Ludwig and Slok (2004), Labhard et al., (2005), Case et al., (2005) and Carrol et al., (2006), which used housing price indices as housing wealth proxy and studies like Romer (1990), Poterba and Samwick (1995), and Ludwig and

Slok (2004) which used stock market capitalisation in ascertaining the impact of stock market prices and housing price index on aggregate consumption. Second, since I consider the aggregate measure of per family consumption expenditure (*pfce*)[1], I am unable to distinguish between durable and non-durable consumptions. However, *pfce* relies upon consumption measures derived from national income accounts, not our imputations, and there is a reason to suspect that it is measured less accurately. Elliott (1980) also relied upon aggregate data on consumer spending, financial wealth, and nonfinancial wealth. Further, the consumption measure includes expenditures on housing services as well. I find support from Mehra (2001) in considering *pfce* as the variable of interest in assessing the consumption-wealth channel.

The description of variables and the summary statistics such as minimum, 25th percentile, mean, 50th percentile, 75th percentile, maximum and standard deviation are provided in Table 1. The correlations of the variables are reported in Table 2. A disadvantage of these data is that the stock market capitalization has trended upwards during most of the sample period, and the period may have been unusual. However, our sample period encompasses the home market boom in India during 2011–13. The data set contains substantial time series variation in cyclical activity and exhibits considerable variation in consumption and wealth accumulation.

2.2 Empirical Methodology

I use a vector autoregressive (VAR) approach coupled with vector error correction model (VECM) to estimate the wealth effect on consumption. In fact, Lettau and Ludvigson (2004) confirm that both consumption and wealth are endogenous, and the conventional way which implicitly treats wealth as an exogenous variable may be biased since wealth also responds to the underlying exogenous shocks. Lettau and Ludvigson (2001, 2004) argue that in order to detect the response of consumption to a shock, it is important to take into account all the variables in the system. For this reason, the system estimation is necessary. Furthermore, the VAR model has the benefit of obviously allowing for feedback effects from consumption to wealth or income, something that the single-equation approach cannot address. The VAR approach would be able to demonstrate how the response of consumption and wealth vary according to the nature of the shocks on them. Caporale and Sousa (2016) use a panel econometric framework to test the predictive ability of the transitory deviations of consumption from its common trend with aggregate wealth and labor income, for both future equity and housing risk premia in selected emerging market economies. In their study to know whether the consumption-wealth ratio predicts housing returns, using the cointegrating vector of consumption, aggregate wealth, and labor income, Caporale et al., (2016) provide evidence from OECD countries.

The estimation sample has been chosen using a VAR model. The mathematical representation of a VAR is:

$$y_t = A_1 y_{t-1} + \ldots\ldots + A_p y_{t-p} + BX_t + \epsilon_t \qquad \text{--- Eq (1)}$$

where y_t is k vector of endogenous variables, X_t is a k vector of exogenous variables, A_1, . . . …., A_p and B are matrices of coefficients to be estimated, and $\boldsymbol{\epsilon_t}$ is a vector of innovations that may be contemporaneously correlated but are uncorrelated with their own lagged values and uncorrelated with all of the right-hand side variables.

[1] PFCE refers to expenditure on final consumption of goods and services by resident households and non-profit institutions serving households.

Table 1: Variables and Descriptive Statistics

	Units	min	p25	mean	p50	p75	max	sd
Inflation	rate of change in index	3.70	5.61	7.93	7.20	10.10	15.30	2.83
GDP_growth	growth rate	0.16	6.33	7.64	7.43	9.25	13.70	2.42
GDP per capita	INR	11421.92	14118.66	16455.34	16561.91	18672.73	22186.04	3060.451
gold_price	INR per 10 grams	6134.23	10311.00	19265.94	19055.63	27427.40	31672.83	8684.83
Silver_Price	INR per 1000 grams	10820.60	19494.24	33666.07	32519.33	45349.81	62134.57	15879.15
Fiscal_Deficit	INR billion	-821.32	-154.85	3.55	15.60	186.96	985.04	402.29
Log of Market Capitalisation as % of GDP	in log	3.67	3.80	3.92	4.07	4.21	0.15	3.67
Household_final_consumption_expenditure	INR billion	4425.35	6518.74	11251.36	9759.48	15412.48	21478.14	5424.99
GDP@market_price	INR billion	7353.63	11393.13	19455.14	17004.87	27695.57	36768.32	9241.01
house_price_index	index	58.00	91.43	173.56	172.80	231.09	372.00	91.20
real_effective_exchange_rate	rate of change in index	84.31	92.02	94.63	93.96	98.08	102.88	4.72

Source: Reserve Bank of India database

Table 2: Correlations

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11
Inflation	(1)	1										
GDP_growth	(2)	-0.0988	1									
GDP per capita	(3)	-0.1718	0.6005*	1								
gold_price	(4)	0.3778*	-0.4001*	-0.158	1							
Silver_Price	(5)	0.4143*	-0.3191*	-0.0425	0.9500*	1						
Fiscal_Deficit	(6)	-0.0692	0.1608	0.2041	-0.1774	-0.1309	1					
Log of Market Capitalisation as % of GDP	(7)	-0.0442	-0.4168*	-0.3811*	0.7662*	0.5820*	-0.2323	1				
Household_final_consumption_expenditure	(8)	0.1446	-0.3403*	-0.1366	0.9434*	0.8341*	-0.2082	0.8902*	1			
GDP@market_price	(9)	0.1601	-0.3564*	-0.1359	0.9521*	0.8484*	-0.2192	0.8768*	0.9971*	1		
house_price_index	(10)	0.3244*	-0.2374	0.1529	0.8275*	0.8765*	-0.0226	0.4760*	0.7182*	0.7314*	1	
real_effective_exchange_rate	(11)	-0.1546	0.6130*	0.9974*	-0.1523	-0.0336	0.2058	-0.3813*	-0.1312	-0.1304	0.1529	1

Note: * Denotes significance at 5% level

Since only lagged values of the endogenous variables appear on the right-hand side of the equations, simultaneity is not an issue and OLS yields consistent estimates. Moreover, even though the innovations $\boldsymbol{\epsilon_t}$ may be contemporaneously correlated, OLS is efficient and equivalent to GLS since all equations have identical regressors. A recursive VAR constructs the error terms in each regression equation to be uncorrelated with the error in the preceding equations. This is done by judiciously including some contemporaneous values as regressors. Estimation of each equation by OLS produces residuals that are uncorrelated across equations. Seemingly, the result depends on the order of the variables: changing the order changes the VAR equations, coefficients, and residuals, and there are n! Recursive VARs, representing all possible orderings. In the recursive VAR model, the vector Z_t comprises the following variables:

$$Y_t = (log\_PFCE_t, HPINDEX_t, log\_MC_t, log\_GDPPC_t)$$

--- Eq (2)

where log_PFCE is the per family consumption expenditure, $HPINDEX_t$ is the housing price index[2], and log_MC_t is the stock market capitalization, and log_GDPPC_t is the per capita GDP.

3. Results and Discussion

In this section, I report the important results and related discussion of the study in six sub-sections. For brevity, the results of all the stages of the analyses are not reported. However, they are available for verification on request.

3.1 Wealth Effects on Consumption

I begin by testing for stationarity of the covariates employing the ADF test that includes a constant in the test regression and employs an automatic lag length selection using a Schwarz Information Criterion (BIC) and a maximum lag length of 4. The results of the unit root tests are provided in Table 3. I notice that the statistic t_α value is greater than the critical values so that I do not reject the null at conventional test sizes. With the ADF test, based on the results, I find that log_PFCE, HPINDEX, LNMC are stationary at the first difference level. I determine the number of lags p of the VAR (p) model. Within the four usual criteria: Final prediction error (FPE), Akaike (AIC), Schwartz (SC) and Hannan-Quinn (HQ), Liew (2004) report that AIC and FPE are recommended to estimate autoregression Lag length. Lag length criteria test and AR Root Graph suggest the lag length at 4.

Table 3: Unit root tests

We report the test statistics for the ADF, PP, and KPSS Test. ***, **, * indicate the significance of the result at 1%, 5%, and 10% respectively. For KPSS test results, asymptotic critical values are provided as per Kwiatkowski-Phillips-Schmidt-Shin (1992, Table1). PP test, ADF test (H0: series has a unit root).

	Test Statistic at the level form			Test Statistic at 1st diff.		
Variable	ADF Test	PP Test	KPSS Test	ADF Test	PP Test	KPSS Test
log_PFCE	0.83	0.84	0.85	-26.58***	-22.04***	0.1337
HPINDEX	-1.55	-1.55	0.55	-6.35***	-6.35***	0.0914
LNMC	-0.16	-0.32	0.75	-5.48***	-5.39***	0.1186

Source: author's calculations

[2] Where the drivers of house prices potentially influence wellbeing (i.e., house price capitalization of desirable area characteristics), house prices might provide a reflection of the benefits derived from living in better areas in addition to possible wealth shocks (Ratcliffe, 2015).

To examine how changes in the covariates affect another set of variables, block exogeneity test was performed with the first block as LNPFCE and the second block consisting of other variables (Table 4). VAR Granger Causality/Block Exogeneity Wald Tests carry out Pairwise Granger causality tests and ascertain whether an endogenous variable can be treated as exogenous. For each equation in the VAR, the output displays χ^2 (Wald) statistics for the joint significance of each of the other lagged endogenous variables in that equation. The statistic in the last row (All) is the χ^2 statistic for the joint significance of all other lagged endogenous variables in the equation. The results reported in Table 4 suggest a unidirectional causality running from changes in LNPFCE to another set of variables in view of the joint significance. In the case of HPINDEX, though there is the absence of joint significance, I notice one to one significance. In the case of LNMC, I notice a joint significance in the unidirectional causality running from changes in LNMC to another set of variables. The results thus confirm that perceptions of current and future financial well-being are correlated with house prices. The evidence presented is consistent with the wealth effect hypothesis. Peltonen et al., (2012) show that financial wealth effects are stronger when stock market capitalization is high.

Table 4: Granger Causality Tests

Panel A: VAR Granger Causality/Block Exogeneity Wald Tests

Dependent variable: LNPFCE			
Excluded	Chi-sq	df	Prob.
HPINDEX	4.3615	3	0.2250
LNMC	16.1075	3	0.0011
All	**42.1473**	**6**	**0.0000**
Dependent variable: HPINDEX			
Excluded	Chi-sq	df	Prob.
LNPFCE	5.8761	2	0.0530
LNMC	5.2169	2	0.0736
All	**7.0180**	**4**	**0.1349**
Dependent variable: LNMC			
Excluded	Chi-sq	df	Prob.
LNPFCE	15.5410	3	0.0014
HPINDEX	5.6303	3	0.1310
All	**29.8635**	**6**	**0.0000**

Panel B: Panel Granger causality test:

Null hypothesis	lags	Obs	F-Statistic	Prob.
LNPFCE does not Granger Cause LNMC	4	41	3.37208	0.0207
LNMC does not Granger Cause LNPFCE	4	41	7.55758	0.0002
LNPFCE does not Granger Cause HPINDEX	4	41	0.24141	0.0912
HPINDEX does not Granger Cause LNPFCE	4	41	5.06050	0.0028

Source: author's calculations

I estimate an unrestricted VAR model and apply Cholesky decomposition to the VAR specification. Table 5 presents the vector autoregression estimates. The results suggest the presence of significant impact of consumption on housing and financial assets. Wealth effects of housing are larger than that of financial assets in the 2nd, 3rd and 4th lags. I perform multivariate LM test to test the presence of the autocorrelations and the VAR residual portmanteau tests for autocorrelations to establish the residual autocorrelations. Further, I also perform the VAR Granger causality/block exogeneity Wald tests, residual normality tests, and VAR residual heteroscedasticity tests without cross terms. Panel Granger causality tests also provide evidence of bidirectional causality among the wealth effects and consumption.

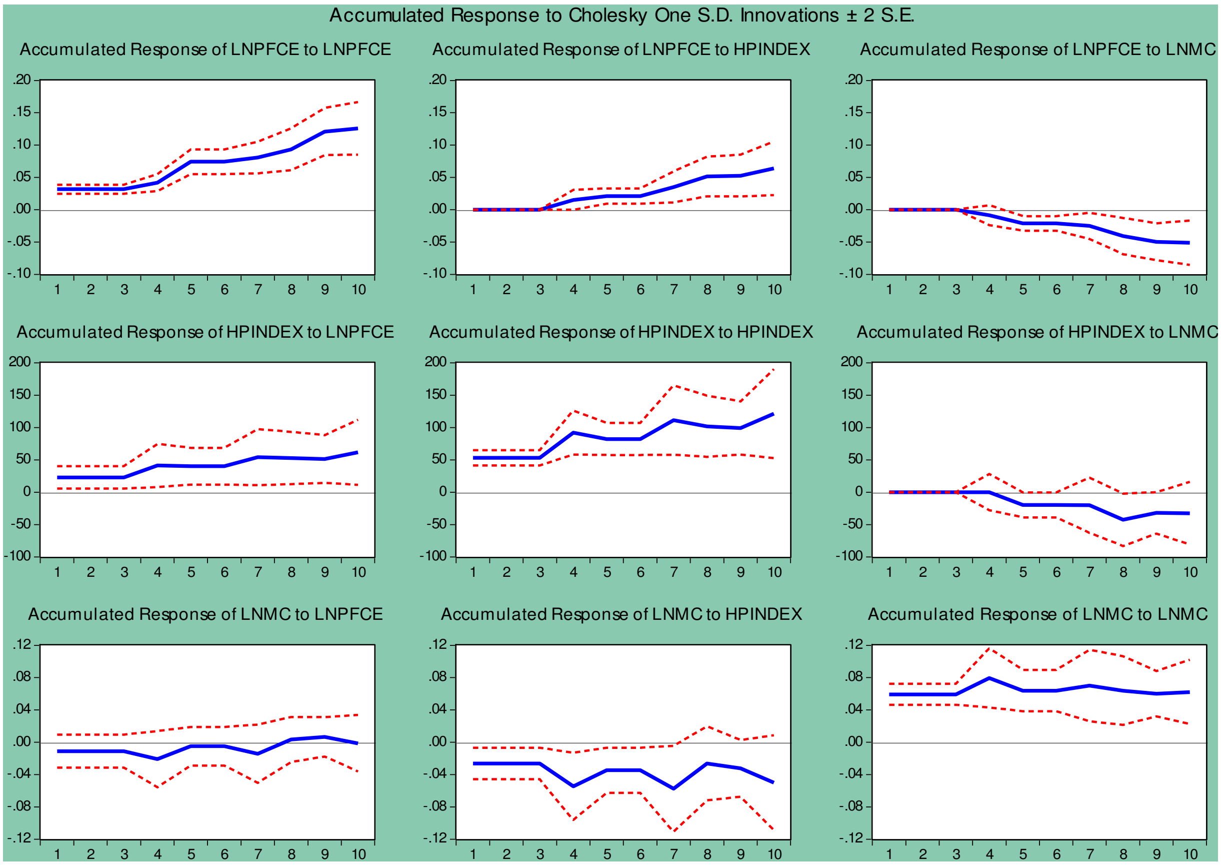
Table 5: Vector Autoregression Estimates

	LNPFCE	HPINDEX	LNMC
LNPFCE(-2)	0.096184	23.11440	0.080293
	(0.08425)	(138.808)	(0.14285)
	[1.14170]	[0.16652]	[0.56209]
LNPFCE(-3)	0.045688	33.37772	0.029591
	(0.09924)	(163.517)	(0.16827)
	[0.46037]	[0.20412]	[0.17585]
LNPFCE(-4)	0.925191	57.59968	0.155996
	(0.08432)	(138.935)	(0.14298)
	[10.9719]	[0.41458]	[1.09106]
HPINDEX(-2)	0.000104	0.810483	-0.000623
	(0.00016)	(0.27127)	(0.00028)
	[0.63256]	[2.98776]	[-2.23070]
HPINDEX(-3)	7.69E-05	-0.061846	0.000369
	(0.00021)	(0.34980)	(0.00036)
	[0.36232]	[-0.17680]	[1.02562]
HPINDEX(-4)	3.12E-05	-0.211469	6.66E-05
	(0.00015)	(0.25084)	(0.00026)
	[0.20506]	[-0.84303]	[0.25796]
LNMC(-2)	-0.089513	121.2401	0.595441
	(0.14359)	(236.589)	(0.24347)
	[-0.62338]	[0.51245]	[2.44563]
LNMC(-3)	-0.093240	-329.6984	-0.066466
	(0.20423)	(336.502)	(0.34629)
	[-0.45654]	[-0.97978]	[-0.19194]
LNMC(-4)	-0.197480	-34.59834	-0.310212
	(0.14642)	(241.244)	(0.24826)
	[-1.34875]	[-0.14342]	[-1.24954]
Intercept	0.966752	-11.20628	0.667335
	(0.16253)	(267.784)	(0.27557)
	[5.94830]	[-0.04185]	[2.42162]
R-squared	0.996298	0.725249	0.911030
Adj. R-squared	0.995223	0.645482	0.885200
F-statistic	926.8756	9.092156	35.27009
Log likelihood	88.77095	-214.9202	67.12223
Akaike AIC	-3.842485	10.97172	-2.786450
Schwarz SC	-3.424541	11.38966	-2.368506
Log likelihood		-53.33949	
Akaike information criterion		4.065341	
Schwarz criterion		5.319174	

Note: Standard errors in ( ) & t-statistics in [ ] Source: author's calculations

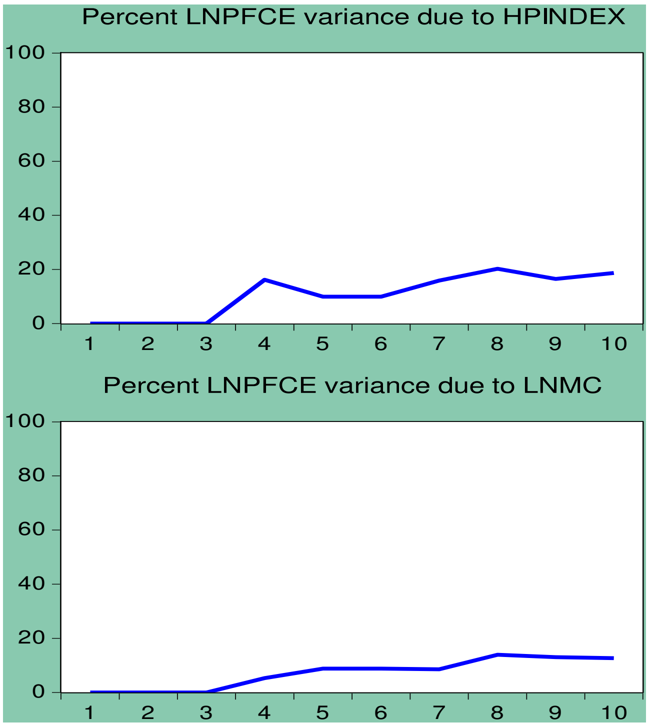
Any shocks to the ith variable not only directly affect the respective variable ith variable only, but also it would be transmitted to all of the endogenous variables in the model through the dynamic (lag) structure of VAR. An impulse response function traces the effect of a one-time shock to one of the innovations on current and future values of the endogenous variables. Figure 1 shows the accumulated response of consumption to wealth effects. The impulse responses show the effect of an unexpected 1 percentage point increase in PFCE on all other variables, as it works through the recursive VAR system with the coefficients estimated from actual data (Figure 1). The impulse responses (IRs) discover the effects of a shock to one and thereby transmitted to other endogenous variables in the VAR System. However, it is also required to know the magnitude of shocks in the system. To overcome this problem, the variance decomposition mechanism is applied to separate out the variation in an endogenous variable into the constituent shocks to the VAR system. Figure 2 shows the separate variance decomposition (Recursive VAR) for each endogenous variable. For example, the first-period decomposition for the first variable in the VAR ordering is completely due to its own innovation.

Figure 1: Impulse responses of Consumption



Source: Prepared by the author

Figure 2: Variance decomposition of Consumption



Source: Prepared by the author

Based on the lag length of 4, I test the models with the lag interval (1, 1) by employing the Johansen-Juselius (JJ) Cointegration test. In Table 6, the JJ Cointegration trace and Max test results of all the models of analysis are furnished. Both the test results indicate that there is evidence of Cointegration. The presence of a cointegrating vector implies that the covariates are related strongly in the long run.

Table 6: Johansen Cointegration Test Results

H_0	H_a	Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
Unrestricted Cointegration Rank Test (Trace)						
r =0	r >0	None *	0.2336	14.7776	29.7971	0.7943
r ≤1	r >1	At most 1 *	0.0974	4.1365	15.4947	0.8922
r ≤2	r >2	At most 2 *	0.0010	0.0393	3.8415	0.8429
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)						
r =0	r >0	None *	0.2336	10.6411	21.1316	0.6830
r ≤1	r >1	At most 1 *	0.0974	4.0973	14.2646	0.8489
r ≤2	r >2	At most 2 *	0.0010	0.0393	3.8415	0.8429
1 Cointegrating Equation(s):			Log likelihood =	-27.6741		
Normalized cointegrating coefficients (standard error in parentheses)						
		LNPFCE	HPINDEX	LNMC		
		1.0000	-0.0023	-1.9370		
			-0.0006	-0.3444		
2 Cointegrating Equation(s):			Log likelihood =	-25.6255		
Normalized cointegrating coefficients (standard error in parentheses)						
		LNPFCE	HPINDEX	LNMC		
		1.0000	0.0000	-2.8006		
				-0.6675		
		0.0000	1.0000	-383.3470		
				-281.9350		

Trace test indicates 2 cointegrating Eqn(s) at the 0.05 level; * denotes rejection of the hypothesis at the 0.05 level; **MacKinnon-Haug-Michelis (1999) p-values; Source: author's calculations

Table 7 reports the estimates of the vector error correction model. The error correction coefficient for LNPFCE was (-0.0131) and it measures the speed of adjustment of LNPFCE towards long-run equilibrium. The coefficient carries the expected negative sign, significant at 1% level and less than one which is appropriate. The coefficient indicates feedback of about 1.3% of the previous quarter's disequilibrium from the long run elasticity.

Table 7: Vector Error Correction Estimates

Cointegrating Eq:	CointEq1	CointEq2	
LNPFCE(-1)	1	0	
HPINDEX(-1)	0	1	
LNMC(-1)	-2.315895	-293.8386	
	(0.73683)	(310.516)	
	[-3.14305]	[-0.94629]	
Intercept	-0.175268	969.9960	
Error Correction:	D(LNPFCE)	D(HPINDEX)	D(LNMC)
CointEq1	-0.013149	3.832660	0.104100
	(0.03388)	(45.6272)	(0.04660)
	[-0.38813]	[0.08400]	[2.23373]
CointEq2	2.90E-05	-0.157529	-0.000149
	(9.1E-05)	(0.12269)	(0.00013)
	[0.31844]	[-1.28396]	[-1.18747]
D(LNPFCE(-3))	0.004968	9.206788	0.033132
	(0.07806)	(105.128)	(0.10738)
	[0.06365]	[0.08758]	[0.30855]

D(LNPFCE(-4))	0.860807	83.75092	0.212684
	(0.07845)	(105.662)	(0.10792)
	[10.9721]	[0.79263]	[1.97071]
D(HPINDEX(-3))	9.86E-05	0.123600	0.000257
	(0.00015)	(0.20271)	(0.00021)
	[0.65485]	[0.60975]	[1.23957]
D(HPINDEX(-4))	-2.47E-05	0.020390	1.16E-05
	(0.00014)	(0.18805)	(0.00019)
	[-0.17714]	[0.10843]	[0.06055]
D(LNMC(-3))	-0.094874	-4.984386	-0.049986
	(0.12277)	(165.344)	(0.16888)
	[-0.77279]	[-0.03015]	[-0.29598]
D(LNMC(-4))	-0.183564	-88.33056	-0.369698
	(0.12342)	(166.217)	(0.16977)
	[-1.48736]	[-0.53142]	[-2.17760]
Intercept	0.006856	0.885789	0.003999
	(0.00668)	(8.99875)	(0.00919)
	[1.02604]	[0.09843]	[0.43506]
R-squared	0.823350	0.104683	0.334937
Adj. R-squared	0.777763	-0.126366	0.163308
Sum sq. resids	0.028080	50933.79	0.053137
S.E. equation	0.030097	40.53425	0.041402
F-statistic	18.06103	0.453076	1.951517
Log likelihood	88.47380	-199.7456	75.71774
Akaike AIC	-3.973690	10.43728	-3.335887
Schwarz SC	-3.593692	10.81728	-2.955889
Mean dependent	0.036000	4.002250	0.010250
S.D. dependent	0.063843	38.19287	0.045262
Log likelihood		-32.50709	
Akaike information criterion		3.275355	
Schwarz criterion		4.668680	

Note: Standard errors in ( ) & t-statistics in [ ]
Source: author's calculations

3.2 Wealth Effects on Growth

In this section, I report the results of the analysis concerning the wealth effects on economic growth (log_GDP i.e. LNGDP). The VAR estimates and the Cointegration test results evidence the long run relationship. The impulse responses reported in Table 8 indicate that an unexpected rise in HPINDEX is associated with an increase in LNGDP by a minimum of around 1 percent in the 3rd period and a maximum of 14.90 percent in the 10th period. However, an unexpected rise in LNMC is associated with a relatively smaller impact on LNGDP by a minimum of around 1 percent in the 2nd period and a maximum of 4 percent in the 10th period (Figure 3). The coefficient carries the expected negative sign, significant at 1% level and less than one which is appropriate. The coefficient indicates feedback of about 1% of the previous quarter's disequilibrium from the long run elasticity. The dominant impact of house price effect suggests that housing wealth shocks might be relevant.

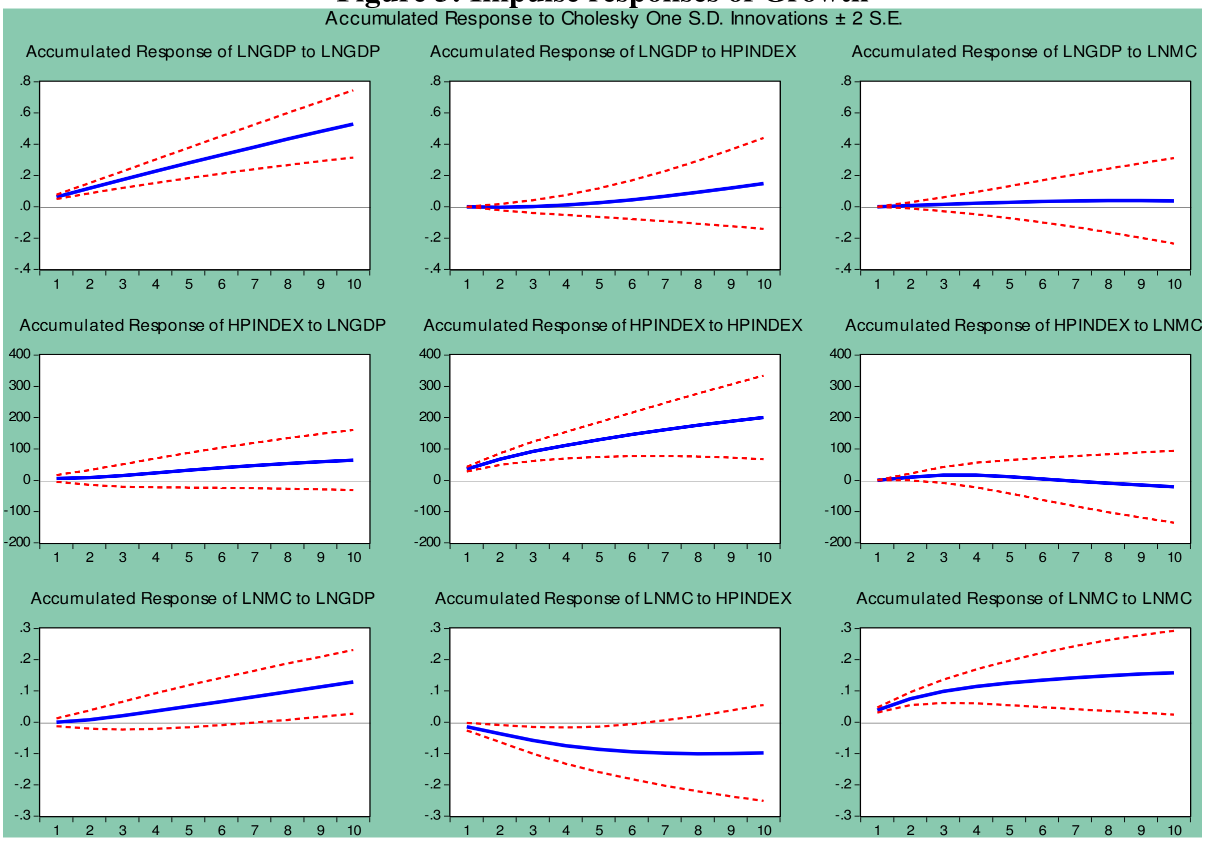
Table 8: Impulse Responses and Variance decomposition of Growth

	Accumulated Response of Growth			Variance decomposition of Growth			
Period	LNGDP	HPINDEX	LNMC	S.E.	LNGDP	HPINDEX	LNMC
1	0.063146 (0.00681)	0.000000 (0.00000)	0.000000 (0.00000)	0.063146	100.0000	0.000000	0.000000
2	0.117883 (0.01650)	-0.002803 (0.00990)	0.008379 (0.00989)	0.084033	98.89444	0.111269	0.994294
3	0.173091 (0.02657)	0.000733 (0.02023)	0.015532 (0.02190)	0.100862	98.60673	0.200171	1.193103

4	0.226800 (0.03748)	0.010557 (0.03208)	0.022467 (0.03565)	0.114902	97.83121	0.885135	1.283652
5	0.279484 (0.04857)	0.025569 (0.04597)	0.028843 (0.05094)	0.127452	96.59964	2.106810	1.293550
6	0.331311 (0.05988)	0.044657 (0.06210)	0.034028 (0.06729)	0.139001	95.11631	3.657062	1.226629
7	0.382320 (0.07141)	0.067064 (0.08039)	0.037525 (0.08424)	0.149792	93.50245	5.386752	1.110801
8	0.432424 (0.08321)	0.092238 (0.10059)	0.039194 (0.10153)	0.159952	91.81380	7.201145	0.985052
9	0.481504 (0.09531)	0.119707 (0.12247)	0.039139 (0.11911)	0.169552	90.08982	9.033513	0.876667
10	0.529453 (0.10773)	0.149034 (0.14578)	0.037570 (0.13693)	0.178632	88.36865	10.83383	0.797521

Source: author's calculations

Figure 3: Impulse responses of Growth



Source: Prepared by the author

3.3 Wealth Effects on Inflation

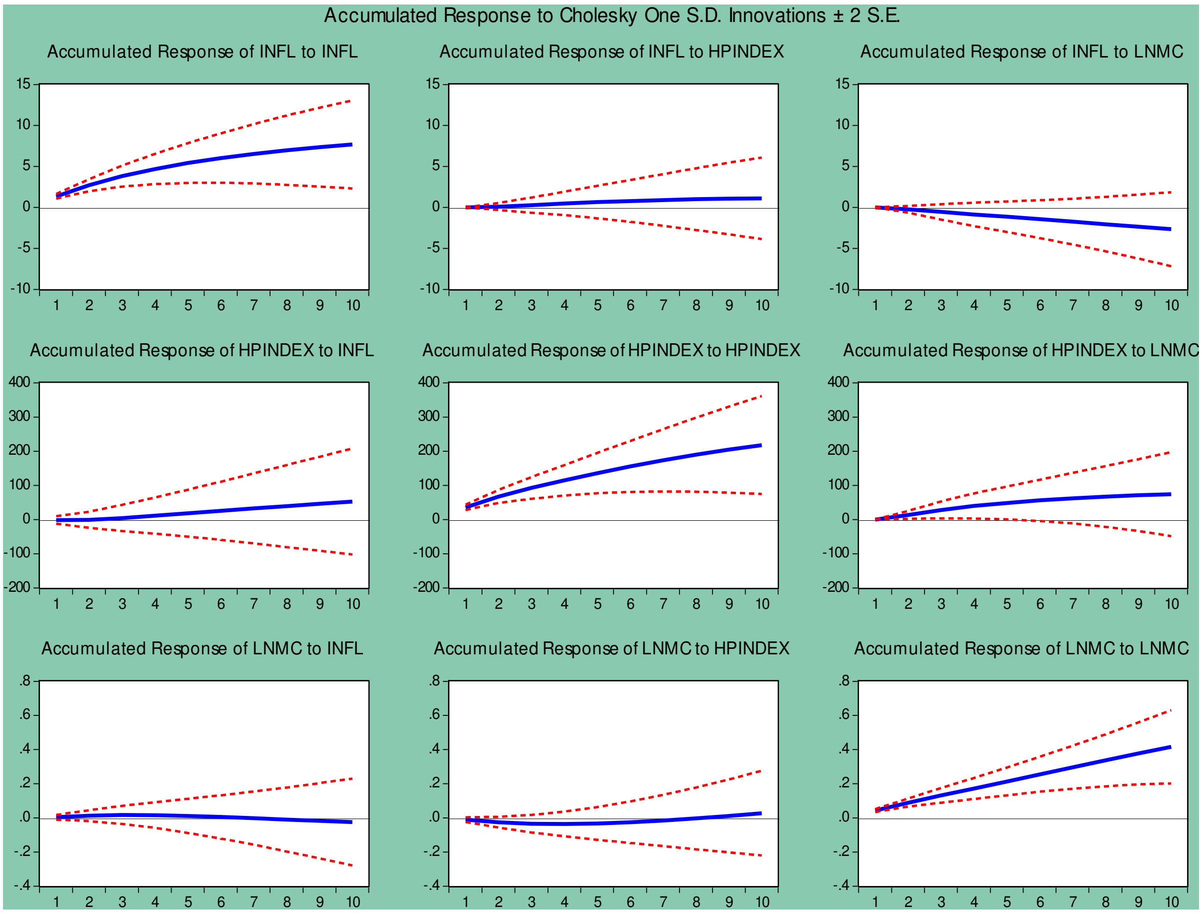
I find significant wealth effects on inflation as well. The VAR estimates and the Cointegration test results suggest the long run relationship. Table 9 reports the impulse responses and variance decomposition of inflation due to wealth effects. The coefficient indicates feedback of about 16% of the previous quarter's disequilibrium from the long run elasticity (Figure 4). The results suggest that the rise in the value of real assets creates an apparent increase in the wealth, which in turn motivates the people to spend more, even though there is no significant growth in their income.

Table 9: Impulse Responses and Variance decomposition of Inflation

	Accumulated Response of Inflation			Variance decomposition of Inflation			
Period	INFL	HPINDEX	LNMC	S.E.	INFL	HPINDEX	LNMC
1	1.352386 (0.14583)	-1.458117 (5.38854)	0.003622 (0.00674)	1.352386	100.0000	0.000000	0.000000
2	2.704798 (0.36691)	-1.170566 (11.8979)	0.011989 (0.01591)	1.929470	98.25708	0.226699	1.516218
3	3.800666 (0.64158)	4.000790 (19.1205)	0.016665 (0.02653)	2.248539	96.10289	0.814825	3.082283
4	4.680743 (0.92071)	11.15797 (26.4922)	0.015821 (0.03768)	2.441407	94.51317	1.322765	4.164062
5	5.408480 (1.20869)	18.37881 (34.3086)	0.011363 (0.04986)	2.569965	93.31250	1.638286	5.049209
6	6.019707 (1.50713)	25.38915 (42.6023)	0.005040 (0.06334)	2.661905	92.25051	1.822927	5.926559
7	6.535928 (1.81048)	32.31568 (51.2265)	-0.002236 (0.07799)	2.730676	91.23623	1.925129	6.838645
8	6.974406 (2.11216)	39.17444 (60.0109)	-0.009950 (0.09363)	2.783992	90.25578	1.968377	7.775845
9	7.349656 (2.40715)	45.90520 (68.8068)	-0.017717 (0.11010)	2.826791	89.30565	1.969545	8.724807
10	7.673169 (2.69229)	52.45408 (77.4939)	-0.025238 (0.12728)	2.862327	88.37938	1.944830	9.675794

Source: author's calculations

Figure 4: Impulse responses of Inflation



Source: Prepared by the author

3.4 Wealth Effects on the Real effective exchange rate

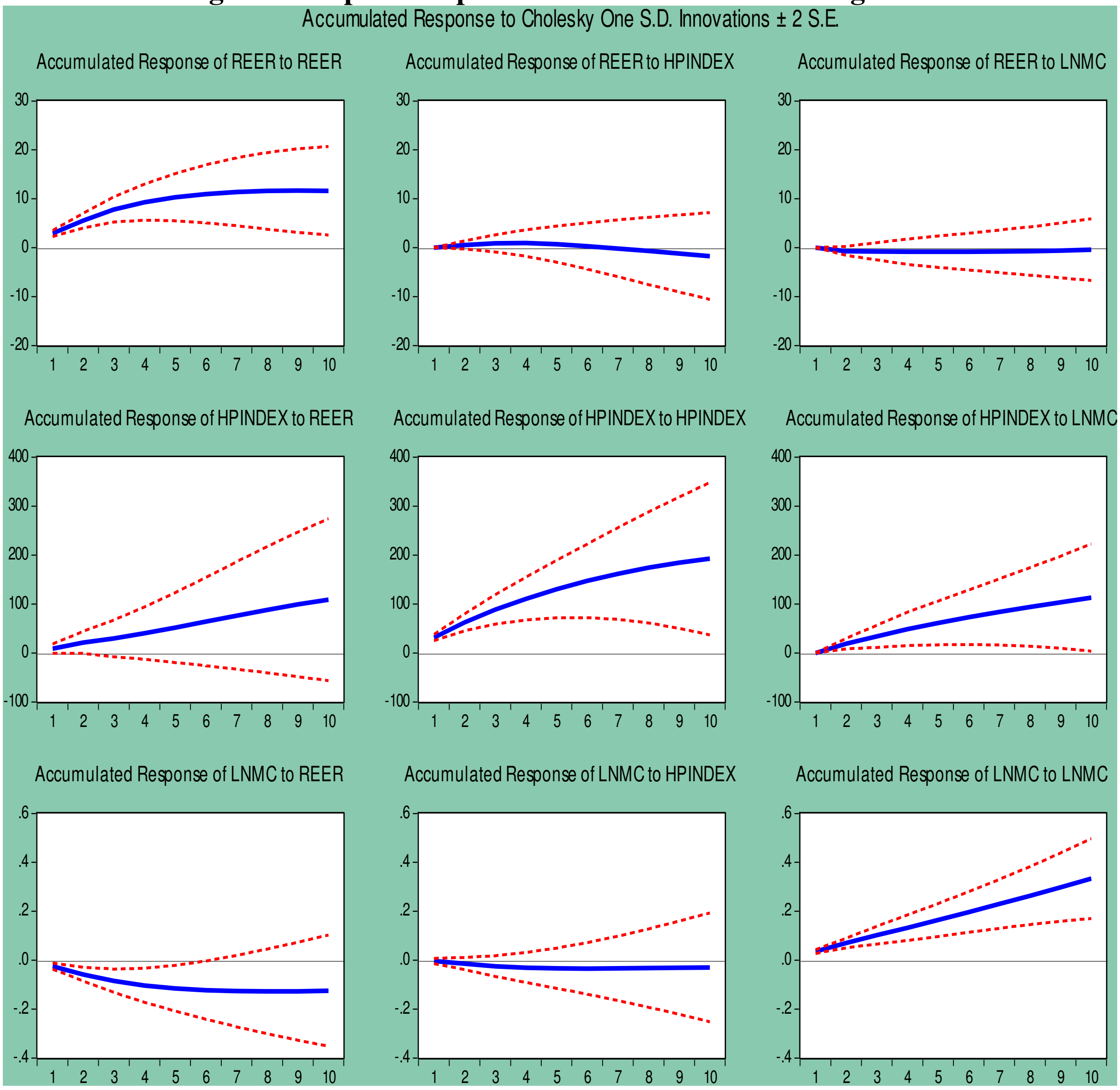
The estimations indicate significant wealth effects on the real effective exchange rate (REER). The VAR estimates and the Cointegration test results emphasize the existence of the long run relationship. Table 10 reports the impulse responses and variance decomposition of REER due to wealth effects. The impulse responses (Figure 5) indicate that an unexpected rise in HPINDEX is associated with an increase in REER by a minimum of around 8.58 percent in the 1st period and a maximum of 98.89 percent in the 9th period. The coefficient indicates feedback of about 31% of the previous quarter's disequilibrium from the long run elasticity. Our results find support from (Wang et al., 2016) who provide evidence for the significance of wealth effects in determining exchange rates.

Table 10: Impulse Responses and Variance decomposition of Real effective exchange rate

	Accumulated Response of REER			Variance decomposition of REER			
Period	REER	HPINDEX	LNMC	S.E.	REER	HPINDEX	LNMC
1	2.893863 (0.31205)	8.589981 (4.86721)	-0.024612 (0.00606)	2.893863	100.0000	0.000000	0.000000
2	5.513265 (0.75224)	21.24299 (11.2827)	-0.058153 (0.01416)	4.004126	95.02704	1.810469	3.162493
3	7.780909 (1.27770)	29.41973 (18.6818)	-0.084692 (0.02399)	4.614235	95.71069	1.897974	2.391332
4	9.272863 (1.84174)	39.93127 (26.8107)	-0.103277 (0.03490)	4.850526	96.07372	1.728364	2.197915
5	10.31510 (2.40468)	51.35673 (35.6399)	-0.115207 (0.04676)	4.966578	96.04007	1.861559	2.098367
6	10.97706 (2.96060)	63.84831 (45.0783)	-0.122631 (0.05956)	5.025367	95.54130	2.409134	2.049562
7	11.38840 (3.47145)	76.17152 (54.8258)	-0.126628 (0.07293)	5.064964	94.71284	3.262097	2.025067
8	11.59618 (3.91143)	87.98188 (64.5253)	-0.128034 (0.08656)	5.096067	93.72648	4.252985	2.020537
9	11.65846 (4.26836)	98.89109 (73.9002)	-0.127425 (0.10030)	5.125044	92.68436	5.266184	2.049455
10	11.61361 (4.54310)	108.7905 (82.7504)	-0.125323 (0.11409)	5.153476	91.67209	6.210533	2.117379

Source: author's calculations

Figure 5: Impulse responses of Real effective exchange rate



Source: Prepared by the author

3.5 Wealth Effects on Fiscal deficit

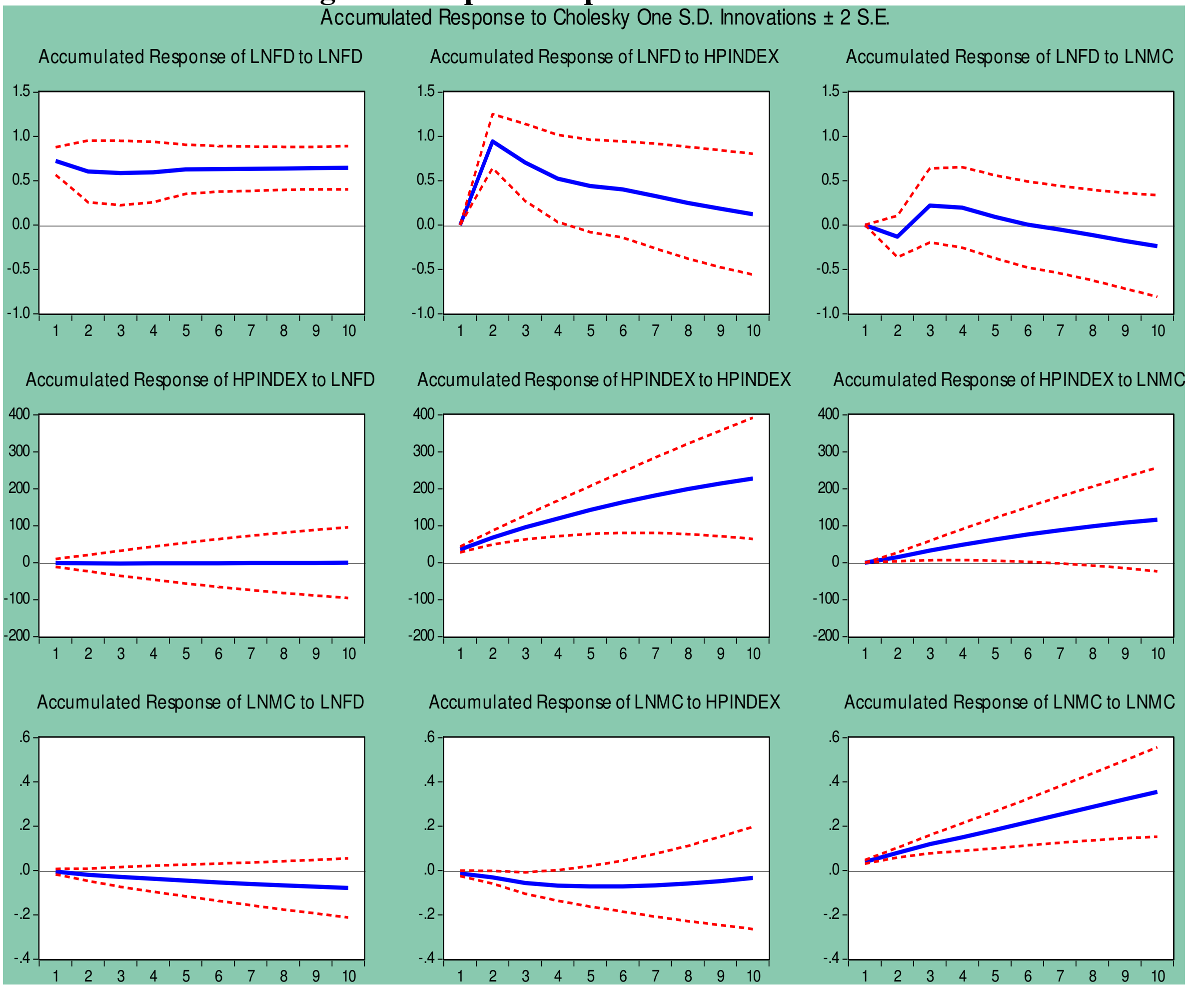
Wealth effects enlarge the response of the price level and of all the other variables to fiscal expansions. The extant literature shows the linkages between fiscal variables and the dynamics of the price level and illustrates the directions in which wealth effects work. In this backdrop, we investigate the wealth effects of fiscal deficit. The results indicate significant negative wealth effects on the fiscal deficit (LNFD). The VAR estimates and the Cointegration test results emphasize the existence of the long run relationship. Table 12 reports the impulse responses and variance decomposition of LNFD due to wealth effects. The impulse responses (Figure 6) indicate that an unexpected rise in HPINDEX is associated with a decline in LNFD by a maximum of around 2.24 percent in the 3rd period. The results emphasize the role of wealth effects particularly the financial wealth forms in the transmission mechanism from fiscal policy to price level dynamics.

Table 11: Impulse Responses and Variance decomposition of Fiscal deficit

	Accumulated Response of Fiscal deficit			Variance decomposition of Fiscal deficit			
Period	LNFD	HPINDEX	LNMC	S.E.	REER	HPINDEX	LNMC
1	0.723057 (0.07797)	-0.896130 (5.39263)	-0.005159 (0.00623)	0.723057	100.0000	0.000000	0.000000
2	0.604722 (0.17373)	-1.500428 (11.0633)	-0.019693 (0.01385)	1.203055	37.08971	61.71341	1.196881
3	0.586874 (0.18169)	-2.246061 (17.0081)	-0.029029 (0.02231)	1.275866	32.99684	58.36838	8.634784
4	0.597123 (0.17037)	-2.081906 (22.5072)	-0.037490 (0.02939)	1.289001	32.33412	59.17467	8.491213
5	0.628049 (0.13817)	-1.805180 (27.6278)	-0.045691 (0.03581)	1.296291	32.02836	58.93735	9.034297
6	0.632378 (0.12867)	-1.565994 (32.4000)	-0.053612 (0.04196)	1.299807	31.85642	58.70920	9.434386
7	0.634229 (0.12491)	-1.344406 (36.8186)	-0.060780 (0.04822)	1.303190	31.69144	58.72486	9.583698
8	0.638140 (0.12141)	-1.093745 (40.8303)	-0.067309 (0.05444)	1.306930	31.51120	58.73136	9.757435
9	0.642852 (0.11992)	-0.835905 (44.4722)	-0.073309 (0.06064)	1.310231	31.35392	58.70204	9.944043
10	0.646343 (0.12193)	-0.583684 (47.7995)	-0.078824 (0.06685)	1.312988	31.22310	58.67253	10.10436

Source: author's calculations

Figure 6: Impulse responses of Fiscal Deficit



Source: Prepared by the author

3.6. Wealth Effects on Bullion (Gold and Silver prices)

Table 12 reports the accumulated response and the variance decomposition of bullion to the wealth effects in a VAR model. The impulse responses (Figure 7) indicate that an unexpected rise in HPINDEX is associated with a rise in LNGOLD by a maximum of 23.51 percent in the 10th period (Table 12). The variance decomposition of LNGOLD shows that at the 10th period, 16.27 percent of the error in the forecast of LNGOLD is attributed to HPINDEX and 5.57 percent is attributed to LNMC shocks in the recursive VAR (Table 13). Our results show that housing wealth effects have a positive effect on gold and silver and on the other hand, financial wealth effects have a negative effect.

Table 12: Accumulated Response of Bullion to Wealth effects

	Accumulated Response of LNGOLD				Accumulated Response of LNSILVER			
Period	LNGOLD	LNSILVER	HPINDEX	LNMC	LNGOLD	LNSILVER	HPINDEX	LNMC
1	0.068327	0.000000	0.000000	0.000000	0.069581	0.088185	0.000000	0.000000
	(0.00737)	(0.00000)	(0.00000)	(0.00000)	(0.01540)	(0.00951)	(0.00000)	(0.00000)
2	0.125684	-0.014567	0.023492	-0.002117	0.142773	0.157475	0.044009	-0.018888
	(0.01833)	(0.01181)	(0.01108)	(0.01046)	(0.03507)	(0.02603)	(0.01857)	(0.01731)
3	0.182943	-0.025798	0.046114	-0.000669	0.215701	0.208891	0.107351	-0.035159
	(0.02988)	(0.02544)	(0.02317)	(0.02213)	(0.05579)	(0.04977)	(0.04020)	(0.03749)
4	0.237943	-0.035332	0.068106	-0.004157	0.283675	0.240854	0.172671	-0.051545
	(0.04195)	(0.04129)	(0.03810)	(0.03610)	(0.07601)	(0.07691)	(0.06611)	(0.06101)
5	0.291448	-0.040301	0.091309	-0.013266	0.345201	0.260333	0.233202	-0.072064
	(0.05382)	(0.05903)	(0.05494)	(0.05229)	(0.09451)	(0.10605)	(0.09409)	(0.08731)
6	0.344059	-0.040733	0.116671	-0.027119	0.401477	0.274704	0.287598	-0.098184
	(0.06593)	(0.07814)	(0.07316)	(0.07065)	(0.11201)	(0.13592)	(0.12281)	(0.11598)
7	0.395553	-0.038036	0.144347	-0.044700	0.453732	0.287931	0.336960	-0.129513
	(0.07857)	(0.09825)	(0.09273)	(0.09105)	(0.12929)	(0.16574)	(0.15202)	(0.14662)
8	0.445487	-0.033528	0.173814	-0.065143	0.502609	0.301231	0.382627	-0.164651
	(0.09178)	(0.11908)	(0.11373)	(0.11323)	(0.14675)	(0.19511)	(0.18197)	(0.17880)
9	0.493442	-0.028084	0.204308	-0.087846	0.548247	0.314431	0.425377	-0.202047
	(0.10546)	(0.14049)	(0.13611)	(0.13690)	(0.16443)	(0.22393)	(0.21284)	(0.21210)
10	0.539126	-0.022161	0.235119	-0.112364	0.590553	0.327009	0.465440	-0.240429
	(0.11946)	(0.16236)	(0.15969)	(0.16176)	(0.18216)	(0.25225)	(0.24454)	(0.24613)

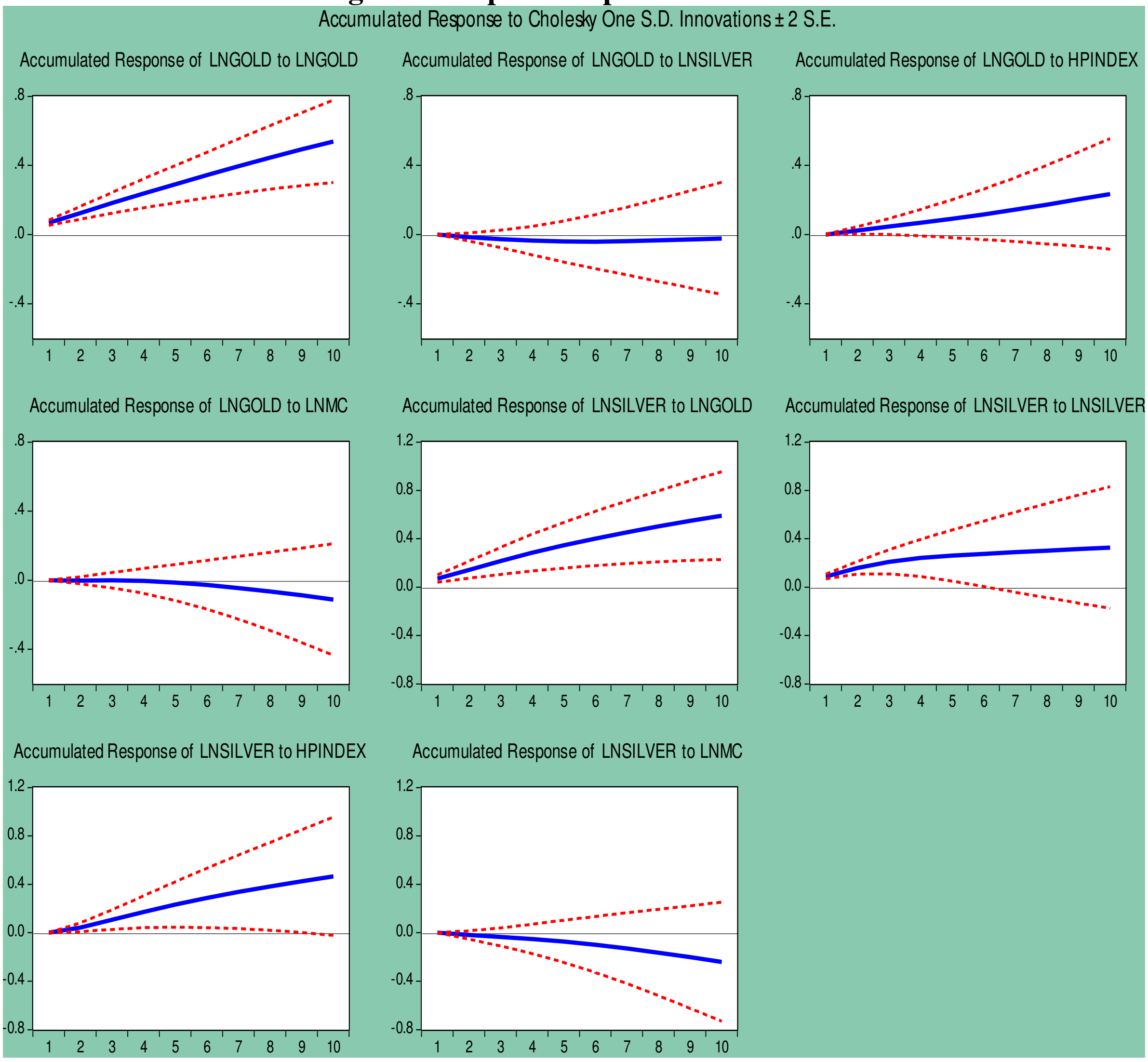
Source: author's calculations

Table 13: Variance decomposition of Bullion to Wealth effects

	Accumulated Response of LNGOLD					Accumulated Response of LNSILVER				
Period	S.E.	LNGOLD	LNSILVER	HPINDEX	LNMC	S.E.	LNGOLD	LNSILVER	HPINDEX	LNMC
1	0.068327	100.0000	0.000000	0.000000	0.000000	0.112331	38.36970	61.63030	0.000000	0.000000
2	0.093418	91.19327	2.431535	6.323830	0.051369	0.158334	40.68060	50.17069	7.725667	1.423040
3	0.112453	88.86117	2.675559	8.411225	0.052045	0.193155	41.59090	40.79804	15.94525	1.665800
4	0.127504	87.72693	2.640222	9.517516	0.115328	0.217913	42.40713	34.20559	21.51302	1.874268
5	0.140592	86.63726	2.296456	10.55168	0.514606	0.236085	42.92199	29.82332	24.90246	2.352226
6	0.152870	85.12310	1.943180	11.67722	1.256499	0.250501	43.17072	26.81858	26.83417	3.176525
7	0.164631	83.17940	1.702311	12.89455	2.223739	0.262820	43.17167	24.61668	27.90499	4.306658
8	0.175793	81.01976	1.558745	14.11875	3.302752	0.273789	42.96866	22.91974	28.49600	5.615603
9	0.186220	78.83251	1.474554	15.26344	4.429493	0.283626	42.62909	21.57411	28.82552	6.971290
10	0.195833	76.72524	1.424823	16.27715	5.572788	0.292352	42.21628	20.49049	29.00832	8.284909

Source: author's calculations

Figure 7: Impulse responses of Bullion



Source: Prepared by the author

The macro-econometric modeling in this study has thus provided useful guidance on the relationship between aggregate consumption and wealth. As suggested by Blundell et al., 1993, household wealth effect analysis using aggregate time series data can generate accurate estimates of the parameters under certain conditions (Cooper and Dynan, 2016).

4. Conclusion

To date, there has been much concerning research on and debate surrounding the influence of wealth effects on macroeconomic dynamics. Understanding wealth effects is crucial not only for forecasting consumption and broader economic growth well but also for estimating the risks to the economic outlook and determining suitable macroeconomic policy. Wealth effects research assumes greater significance particularly during the periods of large fluctuations in asset prices. This study has provided evidence of the wealth effects on private consumption and the related macroeconomic dynamics in the Indian economy. Employing a recursive VAR approach in estimating the wealth effects, it is evidenced that the net housing wealth effect is greater compared to the stock market wealth effect. This study observes a potential ratchet effect of housing wealth on consumption. The results show that the gain in housing wealth generates a higher and more enduring increase in consumer spending than the decline in consumption for a similar reduction in stock market wealth. Wealth effects on growth, inflation, real effective exchange rate, fiscal deficit, and bullion show that housing wealth has a greater impact than the stock market wealth. There is a bidirectional causality running from private consumption to stock prices and vice versa. Our results provide important policy implications. The existence of ratchet asset price effect on consumption implies that policy intervention is more necessitated by the rise of the asset price to obviate inflationary pressures than the decline in the asset price. Essentially, policymakers need to identify the asset bubble in the early stage to avoid much larger bubble burst in the future.

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