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ARTICLE

ASSET PRICE BUBBLES WITH SPECIFIC FOCUS ON STOCK PRICES IN PAKISTAN

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Abstract

This research paper is an attempt to investigate Asset Price Bubbles (APB) with reference to Pakistan stock market. The analysis of time series graph shows a linear trend between Consumer Price Index (CPI) and Money Supply Index (M_2I) whereas a nonlinear trend with stock prices. Moreover, the graph also shows an unequal spread with the stock prices, which indicate Heteroskedasticity. Then, descriptive statistics test shows high Standard Deviations for stock prices compared with CPI and M_2I, which indicate a higher volatility in stock prices. Finally, the hypothesis test for equality of variance concluded the presence of Asset Price Bubbles by rejecting null hypothesis of equal volatility against the alternative hypothesis of greater volatility in stock prices.

Keywords: Asset Price Bubbles; Stock Prices; Consumer Price Index; Heteroskedasticity; volatility

Introduction

A stock market bubble is a type of economic bubble taking place in stock markets when price of stocks rise and become overvalued by any measure of stock valuation. The existence of stock market bubbles is at odds with the assumptions of efficient market theory which assumes rational investor behavior. Behavioral finance theory attribute stock market bubbles to cognitive biases that lead to groupthink and herd behavior. Bubbles occur not only in real-world markets, with their inherent uncertainty and noise, but also in highly predictable experimental markets.

Investing in real estate and stocks

Investing in real estate and stock market has become a national preoccupation in Pakistan in the recent past. This has become a speculatory opening at the cost of industrialization. This is mainly because of unattractive rate of return on deposits. Moreover, rates of real estate in different sectors of federal capital have increased by over 500 percent in the last seven years. In principle, property's value is determined on the basis of returns it generates. The property is over-valued if its return is below than alternative investments. Here, the real estate price bubble arises.

Monetarists' Theory

Modern monetary economics was developed after World war two by Chicago's Milton Friedman (1969) and his numerous colleagues and followers. Under Friedman's leadership, monetarists challenged the Keynesian approach to macroeconomics and emphasized the importance of monetary policy in macroeconomic stabilization [1].

In principle, a monetarist might recommend using monetary policy line to fine-tune the economy. But monetarist has taken a different track, arguing that the private economy is stable and that the government tends to destabilize the economy. Moreover, monetarists believe that money affects output only after long and variable lags, so the design of effective stabilization policies is a formidable task [1].

How Monetary Policy Can Make A Bubble More Likely

Some economists have proposed that a monetary policy regime that targets low and stable inflation can increase the probability of asset-price bubbles forming because the stability associated with inflation targeting can fuel excessive optimism about the future profit potential of new technology. Other economists think that an inflation-targeting regime reduces the likelihood of asset-price bubbles, but that inappropriate implementation of monetary policy within that regime can contribute to the formation of a bubble. These suppositions have arisen in part because of evidence that asset-price swings have been greater in recent business cycles than in previous business cycles, despite the success of many countries in attaining a low-inflation environment [2].

Asset prices are less volatile in stable monetary regimes, such as those that target inflation, and hence the probability of a bubble in those regimes is lower. The increase in asset price misalignments in low inflation countries in recent years may therefore be the result of positive technology (rather than monetary) shocks, which, because of their uneven and uncertain effect on production possibilities, have an effect on revenue streams that is difficult for investors to predict [3]. So, what do economists exactly mean by "bubbles"? There is no simple answer. From a research point of view, the exact definition varies from one model to another. Rather than to adopt one particular model, this paper uses a reduced-form approach that incorporates salient features of bubbles shared by many important models in the literature.

According to Jean Claude [4] in the development of asset price boom, there are two important factors, developments in the monetary aggregates and credit, which play a pivot role. Although the issue of empirical causality between asset prices on one hand and money and credit developments on the other is a complicated one, the potential role of credit and money in driving asset prices is straightforward. A bubble is more likely to develop when investors can leverage their positions by investing borrowed funds. One would expect to see similar developments in credit and money as credit is the main counterpart of money [5]. So far the issue of imperical causality is concern, according to Ahmad, Nawaz there is a uni-causal relationship runs from money supply to stock prices in Pakistan scenario [6].

Froot and Obstfeld [7] introduced the notion of an intrinsic asset price bubble. The bubble generates highly persistent overvaluations and undervaluation due to excessive reactions to fundamentals. Authors argue that linking, albeit incompletely, asset price bubbles to fundamentals provides a more realistic specification of a bubble. One branch of theory posits that investors acting on irrational or erroneous beliefs can cause bubbles. These beliefs

are owing to fads or overly optimistic agents. In this framework, an asset-price bubble could occur because of exaggerated confidence in the fundamentals underlying the asset (a new technology or organizational structure, for example) to generate future earnings. [8].

According to Kindleberger [9], asset price bubbles were permanent features of the economic environment that arose because of the nature of human behavior. He bases his understanding of bubbles on Minsky's model of financial imbalances rather than on the constraints imposed by the assumption of perfectly rational, far-sighted investors. In Minsky's model [10], a speculative bubble arises from an exogenous factor - possibly a new invention, a political outcome, a financial liberalization, etc - that presents new profit opportunities. If the future looks sufficiently bright for a large enough group of consumers and investors, the boom becomes self-sustaining and possibly self-reinforcing. Real-side developments may then interact with the financial intermediation sector, which, through an elastic credit creation process, stokes the flames of optimism. "Irrational exuberance" is responsible for the rise in equity prices in the United States in the second half of the 1990s. This explanation emphasizes the excessive optimism stemming from positive developments in the real side of the economy that contribute to the underestimation of risk and the overextension of credit [11].

According to Shiratsuka [12] Japan's experience since the late 1980s where economic fluctuations were led by the emergence and bursting of the bubbles which show a close relation between both, financial and macroeconomic instability, and large fluctuations in asset prices. The study characterized such bubble by *euphoria*, that is, excessively optimistic expectations with respect to future economic fundamentals, which lasted for several years and then burst. Kindleberger [13] employs the concept of *euphoria* to describe financial history of major asset price bubbles. Shiller [14] terms the same concept as "irrational exuberance". Andrew Filardo [15] raised a critical issue about the causal versus predictive role of asset prices. This distinction highlights the need to differentiate between macroeconomic asset price bubbles and general asset price movements, especially when examining the challenges facing monetary authorities. Put bluntly, in a causal sense, macroeconomic asset price bubbles matter and the fundamental component of asset prices does not.

Ahmed and Rosser [16] studied Pakistani market for speculative bubbles. They studied exchange rates and both stock market indices. Their results were consistent with the impression of great volatility and unpredictability. They found strong evidence of presence of speculative bubbles in Pakistani market. The reason most frequently cited for not responding to asset-price bubbles is the difficulty of identifying bubbles, such difficulty arises in large part because, as Richards [17] points out, any operational definition of an asset-price bubble is highly subjective. The subjectivity arises largely from two sources. First, an asset price bubble is often defined as a major deviation of an asset price from its fundamental value, and there are many different yet legitimate ways to think about fundamental value. Second, how far and how long an asset price must move away from its fundamental value before it is considered a bubble is also highly subjective.

Material And Methods

The main concern of this study is to develop a statistical framework of analysis to identify whether there are asset price bubbles or simply a swing in the prices. In the first phase of analysis, time series graphs are sketched which show an overall trend. In second

phase of analysis, descriptive statistics are calculated. Since asset price bubbles are the result of abrupt fluctuations and high volatility in asset prices that is why a special attention is given to *Standard Deviation* – a measure of volatility in a data set. In third phase of analysis, applying equality of variance test using F – Statistics with the following hypothesis, further validates the results of descriptive statistics:

$$H_{01}: \sigma_{KSE\ 100} = \sigma_{M2I}\ ; \qquad H_{a1}: \sigma_{KSE\ 100} > \sigma_{M2I}$$
$$H_{02}: \sigma_{SBGI} = \sigma_{M2I}\ ; \qquad H_{a2}: \sigma_{SBGI} > \sigma_{M2I}$$
$$H_{03}: \sigma_{KSE\ 100} = \sigma_{CPI}\ ; \qquad H_{a3}: \sigma_{KSE\ 100} > \sigma_{CPI}$$
$$H_{04}: \sigma_{SBGI} = \sigma_{CPI}\ ; \qquad H_{a4}: \sigma_{SBGI} > \sigma_{CPI}$$

We assume that macroeconomic fundamentals i.e. Money supply index (M_2I) and Consumer price index (CPI), and Stock prices i.e. Karachi stock exchange 100 index (KSE 100) and State bank general price index (SBGI) are equally volatile against the alternative hypothesis of greater volatility in stock prices.

Data Sources

Data has been collected from secondary sources; our measure on the stance of monetary policy in Pakistan is the Money Supply (M_2). House rent price index (HRPI) represents monthly index of house rentals. State bank turnover index of stock (SBTIS) represents monthly index of shares turnover at Karachi stock exchange. Since M_2 is available in absolute terms, it has been converted into index form and Money Supply Index (M_2I) is obtained so that apples could be matched with apples. This data has been obtained from different issues of Statistical bulletins published by State bank of Pakistan.

Monthly data on all share index i.e., State Bank General Index (SBGI) have been obtained from the State Bank while the data on Karachi Stock Exchange 100 Index (KSE I00) has been obtained from Karachi Stock Exchange (KSE). The price level is given by the Consumer Price Index (CPI), which is gathered from Federal Bureau of Statistics (FBS). All data consists of monthly observations started from July 2001 to May 2007 except SBTIS, which was available up to June 2006.

A broader range of assets e.g. real estate – commercial and residential – may be included to cover the wealth effects, however, due to data limitations, we used stock market equity, keeping in mind that these may serve as a proxy for broader range of assets as well. Typically, peaks in equity prices tend to lead those in real estate prices. However, the relationship is somewhat less clear-cut around troughs.

Statistical Model

The modal applied is Standard Deviation – a measure of volatility, which is further validated by applying equality of variance test using F – Statistics. Computer aided packages executed the model. Apart from MS Excel, Mega Stat and PH Stat were used.

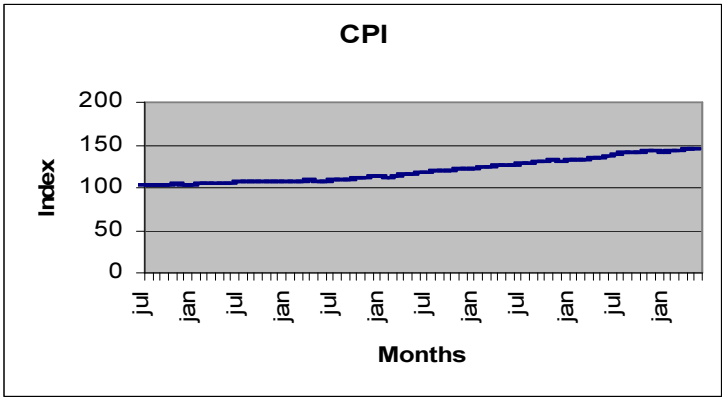
Results And Discussion

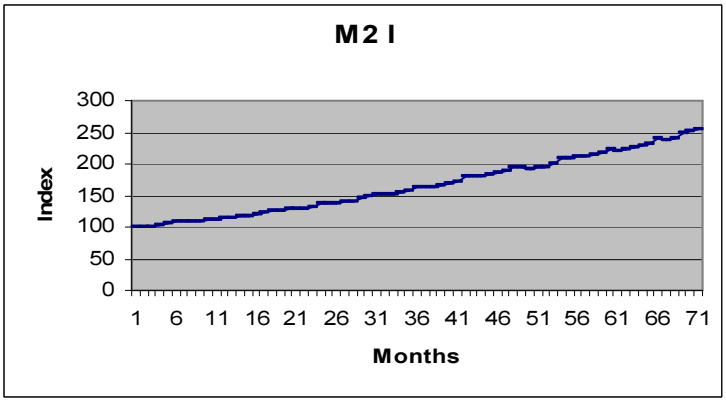
Time Series Graphs

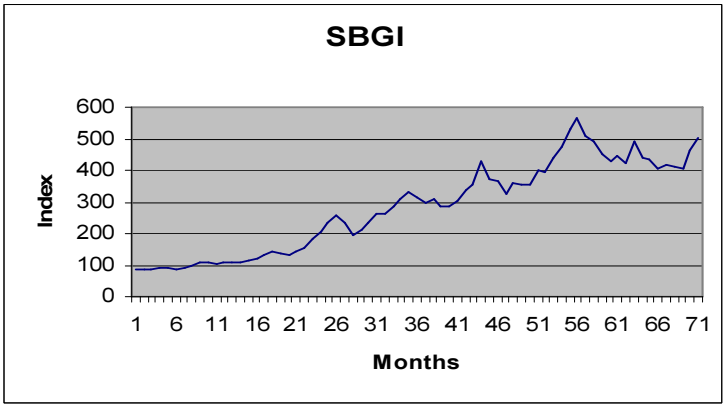
In the first step of analysis, we sketched time series graphs. All the graphs show increasing trend. CPI and M_2I graphs show a smoother trend with less volatility compared with KSE 100 and SBGI which show some abrupt movements, first in 2003-04, and then in early 2005, third in the end of 2005 and the beginning of 2006 were observed. Such

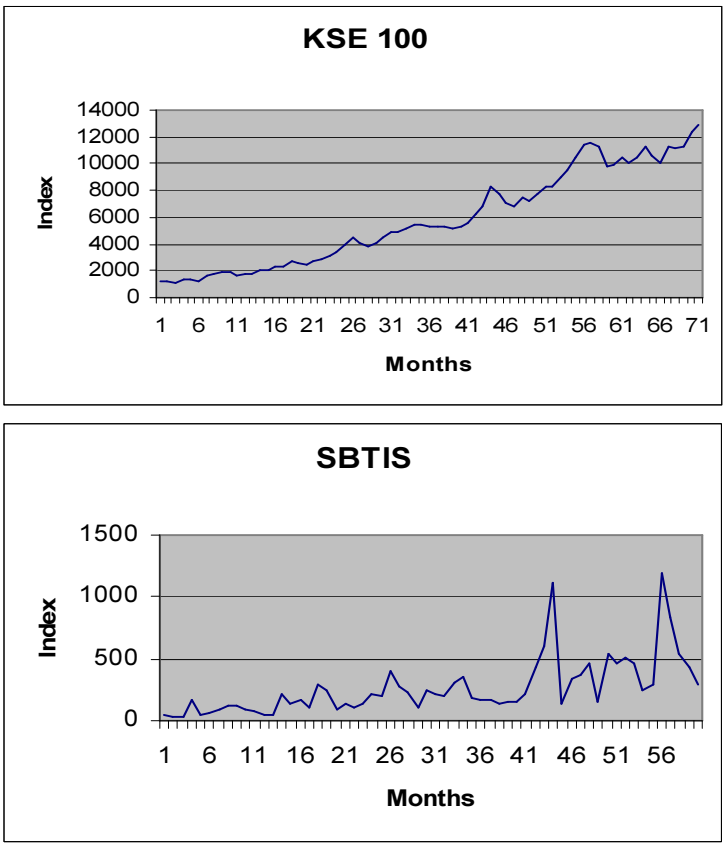
movements describe high volatility. Interestingly, SBTIS, apart from small fluctuations show two big fluctuations, one between Oct 2004 and Jan 2005 then in early 2006. The fluctuations in stock turnover are purely speculative.

(Graphical Presentations)









(Source: Undertaken Study)

Descriptive Statistics

In second step of analysis, the said volatility has been measured through descriptive statistics by using Standard Deviation – a measure of dispersion. It is calculated in two phases: for overall tenure i.e. from July 2001 to May 2007 and secondly the data has been divided into six parts, each consists of 12 observations except the last which consists of 11, so that we could have a year to year cross-sectional analysis. In overall descriptive statistics, standard deviations of stock prices and stock turnover index are substantially greater than that of CPI and M_2I.

Table 1: Descriptive Statistics

Variables	Standard Deviation
CPI	13.7735
M2I	45.78
KSE 100	3587.5635
SBGI	142.8099
HRPI	14.8708
SBTIS	233.3328

Cross Sectional Analysis

So far the cross-sectional analysis is concern, it shows the trend – volatility of the said variables has been observed over the tenure on yearly basis. KSE 100 Index, SBGI, M2I reflect highly volatile trends, and SBTI compared with CPI and M2I.

Table 2: Cross Sectional Analysis

sd\ year	1	2	3	4	5	6
KSE 100	273.2259	480.8718	608.0445	1,081.3387	1,483.8296	912.633
SBGI	9.148049	28.5702	42.50773	42.75661402	67.84188453	33.58653
CPI	1.063266	0.397648	2.56443	3.171833424	2.597071194	2.003213
M_2I	5.170032	6.706848	8.341543	10.28202056	10.78023123	11.627
SBTIS	42.83442	71.5059	82.63825	282.672362	281.4866842	–

(Source: Undertaken Study)

Equality of Variance Test

In third step of analysis, the results of descriptive statistics (except for SBTI, which is not available for complete tenure) are further validated by applying equality of variance test by using F – Statistics with the following hypothesis:

$$H_{01}: \sigma_{KSE\ 100} = \sigma_{M2I}\ ; \qquad H_{a1}: \sigma_{KSE\ 100} > \sigma_{M2I}$$
$$H_{02}: \sigma_{SBGI} = \sigma_{M2I}\ ; \qquad H_{a2}: \sigma_{SBGI} > \sigma_{M2I}$$

Alternate hypothesis that KSE 100 index and SBGI are more volatile than Money supply index against the null hypotheses of equal volatility are taken. Significance level is taken as 5% and the model was run, which rejected null hypotheses of equal volatility and proved that volatility in stock prices is statistically significantly greater than that of in money supply index. The results are given in table 2:

Table 3: Variance-KSE 100 and M2I

Level of Significance	0.05
Population 1 Sample	
Sample Size	71
Sample Standard Deviation	3587.564
Population 2 Sample	
Sample Size	71
Sample Standard Deviation	45.78

Table 4: F-Test Statistics- KSE 100 and M2I

F-Test Statistic	6141.12
Population 1 Sample Degrees of Freedom	70
Population 2 Sample Degrees of Freedom	70

Table 5: Probability- KSE 100 and M2I

Upper-Tail Test	
Upper Critical Value	1.485688
p-Value	1.4E-113
Reject the null hypothesis	

Table 6: Variance-SBGI and M2I

Level of Significance	0.05
Population 1 Sample	
Sample Size	71
Sample Standard Deviation	142.8099
Population 2 Sample	
Sample Size	71
Sample Standard Deviation	45.78

Table 7: F-Test Statistics- SBGI and M2I

F-Test Statistic	9.73117
Population 1 Sample Degrees of Freedom	70
Population 2 Sample Degrees of Freedom	70

Table 8: Probability- SBGI and M2I

Upper-Tail Test	
Upper Critical Value	1.485688
p-Value	1.89E-18
Reject the null hypothesis	

Alternate hypothesis that KSE 100 index and SBGI are more volatile than Consumer Price index against the null hypotheses of equal volatility are taken.

$$H_{03}: \sigma_{KSE\ 100} = \sigma_{CPI}\ ; \qquad H_{a3}: \sigma_{KSE\ 100} > \sigma_{CPI}$$
$$H_{04}: \sigma_{SBGI} = \sigma_{CPI}\ ; \qquad H_{a4}: \sigma_{SBGI} > \sigma_{CPI}$$

A 5% significance level, the model was run, which rejected null hypotheses of equal volatility and proved that volatility in stock prices is statistically significantly greater than that of in consumer price index. The results are given below:

Table 9: Variance-KSE 100 and CPI

Level of Significance	0.05
Population 1 Sample	
Sample Size	71
Sample Standard Deviation	3587.564
Population 2 Sample	
Sample Size	71
Sample Standard Deviation	13.7735

Table 10: F-Statistics- KSE 100 and CPI

F-Test Statistic	67843.86
Population 1 Sample Degrees of Freedom	70
Population 2 Sample Degrees of Freedom	70

Table 11: Probability- KSE 100 and CPI

Upper-Tail Test	
Upper Critical Value	1.485688
p-Value	4.4E-150
Reject the null hypothesis	

Table 12: Variance: SBGI and CPI

Level of Significance	0.05
Population 1 Sample	
Sample Size	71
Sample Standard Deviation	142.8099
Population 2 Sample	
Sample Size	71
Sample Standard Deviation	13.7735

Table 13: F-Statistics- SBGI and CPI

F-Test Statistic	107.5048
Population 1 Sample Degrees of Freedom	70
Population 2 Sample Degrees of Freedom	70

Table 14: Probability- SBGI and CPI

Upper-Tail Test	
Upper Critical Value	1.485688
p-Value	2.37E-52
Reject the null hypothesis	

CONCLUSION

The objective of the research paper was an attempt to investigate Asset Price Bubbles (APB) with reference to Pakistan stock market. In this context, monthly data on KSE 100, SBGI, CPI and M_2I from July 2001 to May 2007 and for SBTIS from July 2001 to June 2001 were used. The time series graph showed a linear trend in CPI and M_2I whereas a nonlinear trend in stock prices. Moreover, the graph also showed an unequal spread in both the stock prices, which indicated *Heteroskedasticity.* Then, descriptive statistics test showed high Standard Deviations for stock prices compared with CPI and M_2I, which indicated a higher volatility in stock prices. Finally, hypothesis test for equality of variance concluded the presence of Asset Price Bubbles by rejecting null hypothesis of equal volatility against the alternative hypothesis of greater volatility in stock prices.

Areas of further Research

Further research could take place by incorporating more macroeconomic indicators based on availability of data and time. Further research could be taken place by applying econometric models like VAR, ARIMA, GARCH, etc.

References

Friedman, Milton, (1969), "Money and Business Cycles", The Optimum Quantity of Money and Other Essays, Chicago: Aldine, 189-235

Borio, C. and W. White, 2004, "Whither Monetary and Financial Stability? The Implications of Evolving Policy Regimes," BIS Working Paper No. 147

Jack Selody & Carolyn Wilkins, 2004. "Asset Prices and Monetary Policy: A Canadian Perspective on the Issues," Bank of Canada Review, Bank of Canada, vol. 2004(Autumn), pages 3-14.

Trichet, J.C., 2005, Asset price bubbles and the monetary policy, speech delivered in Monetary Authority of Singapore, Singapore, 8 June 2005.

European Central Bank, 2005, "Asset Price Bubbles and Monetary Policy," ECB Monthly Bulletin, April, pp. 47-60.

Ahmad N, Husain F (2007). The Relation between Stock Prices and Money Supply in Pakistan: An Investigation, J. Indepen. Stud. Res. 5(2): pp. 30-32.

Froot, Kenneth A & Obstfeld, Maurice, 1991. "Intrinsic Bubbles: The Case of Stock Prices," American Economic Review, American Economic Association, vol. 81(5), pages 1189-214, December.

Meltzer, A. H., 2003, Rational and Nonrational bubbles. Chapter 3, pp. 23-33, in Asset Price Bubbles. The Implications for Monetary, Regulatory and International Policies, edited by Hunter, W., Kaufman, G., and M. Pomerleano. MIT Press, Cambridge, Massachussetts.

Kindleberger, Charles, P., 1995, "Asset inflation and monetary policy", BNL Quarterly Review, no 192, pp. 17-37.

Minsky, H., 1982, Can 'It' Happen Again?: Essays on Instability and Finance, Armonk: M.E. Sharpe.

Greenspan, A., 1996, "The challenge of central banking in a democratic society, "Remarks to the annual dinner and Francis Boyer Lecture of the American Enterprise Institute for Public Policy Research, Washington, DC, 5 December.

Shiratsuka, S., 1999, "Asset price fluctuations and price indices", Federal Reserve Bank of Chicago working paper, 99-9, June.

Kindleberger, Charles P., Manias, Panics, and Crashes, 1996, A History of Financial Crises, 3rd edition, New York: Wiley.

Shiller, Robert, 2000, Irrational Exuberance. Princeton, NJ: Princeton University Press.

Filardo, A., 2001, "Should Monetary Policy Respond to Asset Price Bubbles? Some Experimental Results." In Asset Price Bubbles: Implications for Monetary and Regulatory

Policies, 99–123. Vol. 13 of Research in Financial Services: Private and Public Policy. Edited by G. Kaufman. Oxford: Elsevier Science.

Ahmed, Ehsan and Rosser, J.B., Jr, 1995, Nonlinear Speculative. Bubbles in the Pakistani Stock Market. The Pakistan Development Review, 34, 25-41.

Richards, A., 2003. "Introduction." In Asset Prices and Monetary Policy. Proceedings of a conference held at the H.C. Coombs Centre for Financial Studies, Kirribilli, on 18–19 August, 1–7. Edited by A. Richards and T. Robinson. Reserve Bank of Australia.

Wonders are many, but none, None is more wondrous than man. Man mover over the grey sea, Using the wind and the storm, Daring the depths and surges. Even the eldest of all the gods –Earth, inexhaustible Earth – Man masters her With yearly ploughs that turn and return And the steady step of the horse. Language and thought Light and rapid as wind, Man has taught himself these, and has learnt The ways of living in town and city, Shelter from inhospitable frost, Escape from arrows of rain.

Cunning, cunning is man. Wise though his plans are, Artful beyond all dreaming, They carry him both to evil and to good.

GilberHighet