The Journal of Social Sciences Research
ISSN(e): 2411-9458, ISSN(p): 2413-6670
Vol. 4, Issue. 2, pp: 24-27, 2018
URL: http://arpgweb.com/?ic=journal&journal=7&info=aims

Academic Research Publishing Group

Original Research Open Access

Differences Between Prices of Goods and Services in China

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Abstract

Given a budget constraint, a family allocates its expenditures among food, clothing, and housing and transportation services based on their respective prices. This study tested for differences between these price components. Data were monthly changes for 1999-2017. Prices contained four components of CPI: Price indices of clothing, food, housing and transportation. Unit root tests include ADF, PP and DF-GLS. Cointegration tests include the Engle-Granger and Johansen tests. Four series variables contained a unit root but not cointegrated. A first-differenced VAR(k=3) was estimated. Major findings are that while housing prices grew by 1%, food prices reduced by -0.47% in two months. While clothing prices grew by 1%, food prices reduced by -0.77% in one month. While transportation prices grew by 1%, food prices reduced by -0.53% in one month. Hence, this paper suggests that an increase in expenditures on clothing, housing and transportation may be made at the cost of food consumption. However, an inconsistency of changes across various prices does not necessarily mean causal links between variables or exogeneity of a given variable.

Keywords: Clothing; Food; Housing; Price; Unit root.

1. Introduction

Given a budget constraint on expenditures, a family consumes clothing and housing probably at the cost of other goods and services such as food, and transportation services (Blundell *et al.*, 1993). Hence, growth in housing prices might restrain food prices (Campbell and Cocco, 2007). However, food prices are closely related to agricultural supply. Infrastructures and governmental subsides in general greatly would impact transportation service prices. This paper empirically tests for the amount effects between prices of clothing, food, housing and transportation services.

2. Methodology

Unit root tests included the augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1979; Dickey *et al.*, 1984). Also, they included the Dickey-Fuller GLS method (Carrion-I-Silvestre *et al.*, 2009; Elliott *et al.*, 1996; Elliott and Jansson, 2000; Ng and Perron, 1995;2001). The Phillips-Perron test (PP) (Park and Phillips, 1989; Phillips and Perron, 1988) was applied.

This study tried to construct a vector-autoregression model (VAR) in first differences or an error-correction model (ECM). A VAR was constructed for an $I(1)$ but not cointegrated variable set. An ECM was constructed for an $I(1)$ but cointegrated variable set (Engle and Granger, 1987). The Engle-Granger and Johansen trace tests will be conducted for cointegration test (Johansen S., 1988; Johansen Soren and Juselius, 1990; Johansen S., 1991; Lai and Lai, 1991).

3. Data

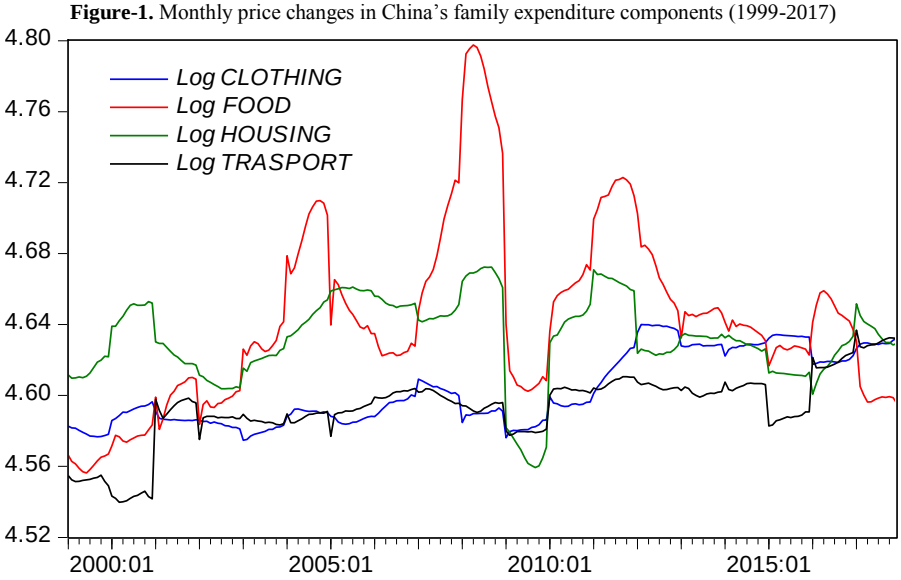
Data contained four monthly time series; they represent respective prices of four types of goods or services that a family must purchase: Clothing price index (*Clothing*), food price index (*Food*), housing price index (*Housing*), and transport price index (*Transport*). Data covered the period from 1999-2017. Price indices are components of national consumer price index (CPI). Data is available in the National Bureau of Statistics of China (NBSC, 2017). Table 1 gives some details of the data. Figure 1 plots the four series.

Table-1. Descriptive statistics

Definition	Clothing price index	Food price index	Housing price index	Transport price index
Variable	*Clothing*	*Food*	*Housing*	*Transport*
Mean	99.8	103.9	102.8	98.8
Median	99.0	103.3	102.8	99.1
Maximum	103.5	121.2	107.0	103.2
Minimum	97.0	95.2	95.5	93.7
Std. Dev.	2.0	5.4	2.4	2.0
Skewness	0.5	1.0	-0.7	-0.8
Kurtosis	1.7	4.2	3.8	4.0
Jarque-Bera	25.3	53.5	22.1	32.3
Probability	0.00	0.00	0.00	0.00

Note: Index changes as compared with the same period of the last year. Seasonally adjusted by the X13 (additive). Series variables were in log terms.

Figure-1. Monthly price changes in China's family expenditure components (1999-2017)



4. Empirical Results

The ADF, DF-GLS and PP tests consistently showed that four variables contained a unit root (Table 2). Both the Engle-Granger test and the Johansen test indicated no cointegration (Tables 3, 4). Hence, we estimated VARs in first differences (Table 5).

Table-2. The unit root tests

Log variable	Level	*k*	First difference	*k*
	ADF			
Clothing	-2.50	12	-4.62***	11
Food	-2.08	12	-6.45***	11
Housing	-2.84	12	-6.76***	11
Transport	-3.07	12	-5.77***	11
	DF-GLS			
Clothing	-1.13	0	-3.81***	8
Food	-1.31	0	-4.38***	5
Housing	-2.36	0	-5.33***	4
Transport	-2.62	1	-3.22**	10
	PP			
Clothing	-2.30	6	-14.22***	5
Food	-2.48	8	-12.38***	6
Housing	-3.34	7	-13.69***	6
Transport	-3.07	4	-17.10***	0

Notes: Lag *k* was chosen by *t*-Statistic for ADF tests (Ng and Perron, 2001), modified SIC for DF-GLS tests, and the Newey-West method for PP tests (Newey and West, 1987).

Figure 1 shows that series were mean nonzero and may contain a trend; hence, test equations contained the trend and constant (Hamilton, 1994; Hendry and Juselius, 2000).

**, ***denotes rejection of a unit root at the 5% and 1% levels, respectively.

Table-3. The Engle-Granger tests

Log dependent variable	z_α	*P*-value*
Clothing	-7.30	0.92
Food	-9.24	0.85
Housing	-13.24	0.64
Transport	-13.07	0.65

Notes: Test equations included the trend and constant.
Lag was decided using the modified AIC.
*denotes MacKinnon *P*-values (MacKinnon James G, 1996).

Table-4. The Johansen cointegration trace test

r	k	Trace	5% O-L*	P-value**
0	3	42.98	63.87	0.74
≤1		27.05	42.92	0.68
≤2		13.99	25.87	0.66
≤3		6.33	12.52	0.42

Notes: Hypothesis 4 in the Johansen test was used (Hendry and Juselius, 2001; Johansen Soren and Juselius, 1990)
k was chosen using AIC, while considering serial correlations. Portmanteau *Q* for up to lag 29=6.14 (*P* = 0.99).
*Osterwald-Lenum asymptotical critical values (Osterwald-Lenum, 1992).
**MacKinnon J. G. *et al.* (1999) *P*-values (MacKinnon J. G. *et al.*, 1999).

Table-5. Estimates of VARs in first differences

	Clothing	t-Statistic	Food	t-Statistic	Transport	t-Statistic	Housing	t-Statistic
Clothing(-1)	1.06*	13.91	-0.77*	-2.45	0.09	0.58	-0.04	-0.17
Clothing(-2)	0.04	0.35	0.72	1.53	-0.06	-0.26	-0.16	-0.49
Clothing(-3)	-0.12	-1.52	0.05	0.14	0.00	0.00	0.18	0.81
Food(-1)	0.02	1.06	1.18*	12.98	-0.04	-0.91	0.01	0.21
Food(-2)	-0.03	-0.78	-0.02	-0.11	0.04	0.59	0.06	0.57
Food(-3)	0.00	-0.05	-0.21*	-2.36	-0.01	-0.18	-0.07	-1.14
Housing(-1)	-0.04	-1.50	0.32*	2.62	0.08	1.27	1.04*	11.84
Housing(-2)	0.04	0.94	-0.47*	-2.70	-0.05	-0.55	-0.01	-0.11
Housing(-3)	0.01	0.29	0.14	1.09	-0.02	-0.40	-0.10	-1.13
Transport(-1)	-0.06	-1.42	-0.53*	-3.22	0.85*	10.74	-0.01	-0.05
Transport(-2)	0.08	1.44	0.33	1.41	0.03	0.29	-0.05	-0.30
Transport(-3)	0.00	-0.07	0.21	1.27	0.07	0.90	0.06	0.50
Error	-0.10	-0.08	5.18	0.95	1.69	0.65	8.93	2.32
R-Squared	0.98		0.96		0.92		0.90	
Adj. R-Squared	0.98		0.96		0.92		0.89	
Sum Sq. Resids	15.50		266.70		61.57		133.74	
S.E. Equation	0.27		1.12		0.54		0.79	
F-Statistic	1039.98		409.67		217.87		152.68	
Log Likelihood	-18.26		-338.39		-173.46		-260.74	
Akaike Aic	0.28		3.12		1.66		2.43	
Schwarz Sc	0.48		3.32		1.85		2.63	
Mean Dependent	99.83		104.05		98.90		102.79	
S.D. Dependent	2.04		5.37		1.91		2.40	

Notes: Lag *k* was chosen using AIC, while taking serial correlations into account.
*denotes statistically significant estimates.

5. Concluding Remarks

For a given disposable income, one family must plan its expenditures carefully. When a family spends too much on clothing and housing, it may have to cut food and transportation expenditures. Hence, there exists a difference of prices among housing, clothing, food and transportation.

The study estimated first-differenced VARs with a value of lag length (=3). Statistically significant estimates are as follows. A 1% increase in housing prices means the -0.47% change in food prices in two months. A 1% increase in clothing prices means the -0.77% change in food prices in one month. A 1% increase in transportation prices means the -0.53% change in food prices in one month. It is worthwhile noting that these differences between various prices do not necessarily imply a causal relationship between variables. Also, they do not necessarily imply the exogeneity of a variable relative to another variable.

References

Blundell, R., Browning, M. and Meghir, C. (1993). Consumer Demand and the Life-Cycle Allocation of Household Expenditures. *Review of Economic Studies*, 61(1): 57-80.

Campbell, J. Y. and Cocco, J. F. (2007). How do house prices affect consumption? Evidence from micro data. *Journal of Monetary Economics*, 54(3): 591-621.

Carrion-I-Silvestre, J. L., Kim, D. and Perron, P. (2009). GLS-Based Unit Root Tests with Multiple Structural Breaks under Both the Null and the Alternative Hypotheses. *Econometric Theory*, 25(6): 1754-92.

Dickey, D. A. and Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, 74(386): 427-31.

Dickey, D. A., Hasza, D. P. and Fuller, W. A. (1984). Testing for unit roots in seasonal time series. *Journal of the American Statistical Association*, 79(386): 355-65.

Elliott, G. and Jansson, M. (2000). Testing for unit roots with stationary covariates. *Journal of Econometrics*, 115(1): 75-89.

Elliott, G., Rothenberg, T. J. and Stock, J. H. (1996). Efficient tests for an autoregressive unit root. *Econometrica*, 64: 813-36. Available: https://ideas.repec.org/p/nbr/nberte/0130.html

Engle, R. F. and Granger, C. W. J. (1987). Cointegration and error correction: Representation, estimation and testing. *Econometrica*, 55(2): 251-76.

Hamilton, J. D. (1994). *Time series analysis*. Princeton University Press: Princeton, New Jersey.

Hendry, D. F. and Juselius, K. (2000). Explaining cointegration analysis: Part I. *Energy Journal*, 21(1): 1-42. Available: http://search.ebscohost.com/login.aspx?direct=true&db=a3h&AN=2692256&lang=zh-cn&site=ehost-live

Hendry, D. F. and Juselius, K. (2001). Explaining cointegration analysis: Part II. *Energy Journal*, 22(1): 75-120. Available: http://search.ebscohost.com/login.aspx?direct=true&db=a3h&AN=4016215&lang=zh-cn&site=ehost-live

Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of Economic Dynamics and Control*, 12(2-3): 231-54.

Johansen, S. (1991). Estimation and hypotheses testing of co-integration vectors in gaussian vector autoregressive models. *Econometrica*, 59(6): 1551-80.

Johansen, S. and Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration--with applications to the demand for money. *Oxford Bulletin of Economics and Statistics*, 52(2): 169-210. Available: http://search.ebscohost.com/login.aspx?direct=true&db=buh&AN=5182750&lang=zh-cn&site=ehost-live

Lai, K. S. and Lai, M. (1991). A Cointegration Test for Market Efficiency. *Journal of Futures Markets*, 11(5): 567-75. Available: http://search.ebscohost.com/login.aspx?direct=true&db=buh&AN=5915751&lang=zh-cn&site=ehost-live

MacKinnon, J. G. (1996). Numerical distribution functions for unit root and cointegration tests. *Journal of Applied Econometrics*, 11(6): 601-18.

MacKinnon, J. G., Haug, A. A. and Michelis, L. (1999). Numerical distribution functions of likelihood ratio tests for cointegration. *Journal of Applied Econometrics*, 14(5): 563-77.

NBSC (2017), 'Statistical data: Monthly statistics', <http://data.stats.gov.cn/easyquery.htm?cn=A01>, accessed 20 October.

Newey, W. K. and West, K. D. (1987). A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. *Econometrica*, 55(3): 703-08.

Ng, S. and Perron, P. (1995). Unit root tests in ARMA models with data dependent methods for the selection of the truncation lag. *Journal of the American Statistical Association*, 90(429): 268-81.

Ng, S. and Perron, P. (2001). Lag length selection and the construction of unit root tests with good size and power. *Econometrica*, 69(6): 1519-54. Available: https://ideas.repec.org/p/boc/bocoec/369.html

Osterwald-Lenum, M. (1992). A note with quantiles of the asymptotic distribution of the maximum likelihood cointegration rank test statistics. *Oxford Bulletin of Economics and Statistics*, 54(3): 461-72. Available: http://search.ebscohost.com/login.aspx?direct=true&db=buh&AN=5165068&lang=zh-cn&site=ehost-live

Park, J. Y. and Phillips, P. C. (1989). Statistical inference in regressions with integrated processes: Part 2. *Econometric Theory*, 5(01): 95-131.

Phillips, P. C. B. and Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika*, 75(2): 335-46.