Comparing Equation of Exchange and Wage-Cost Mark-up Identity for Turkish Economy

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In economic literature, Monetarists have argued that money growth over transactions growth would exactly cause the same growth in the price level. In contrast, Weintraub, one of the leading economists of the Post Keynesian School has believed that the effect of the money supply on the price level is not direct. The aim of this study is to empirically investigate and to compare the arguments of Monetarists and Post Keynesians on the inflation for the case of Turkey. The data used in the study are annual and cover the period of 1990-2013. In this study, the equations implied by both Schools were compared to each other in terms of their predictive powers, their statistical robustness and the validity of the hypotheses provided by them. In a result, strong support was found for WCMI especially in terms of its predictive power.

Keywords: Equation of Exchange, Wage-Cost Mark-up Identity, Model Performances, Statistical Robustness

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1.INTRODUCTION

During the 1960's, when both high inflation unemployment existed in the U.S. economy, Sidney Weintraub (1959) has attacked the Equation of Exchange (EOE) of Monetarists by arguing that EOE is no longer useful theory to predict the price level. Weintraub's argument was related to the fact that the variables which were incorporated into EOE could not determine the price level since he believed that the effect of the money supply on the price level was not a direct one as Monetarists argued. Beside his criticism on EOE, in the same essay, "Forecasting the Price Level, Income Distribution, and Economic Growth", Weintraub (1959) developed and presented an alternative identity which so called Wage-Cost Mark-up Identity (WCMI) to predict the price level. According to his WCMI, prices are tied to money wages with a constant average mark-up factor both in the short run and in the long run, and the price level and unit labor costs will move in unison. On the other hand, according to Monetarists' EOE, prices are tied to money supply with a constant velocity at least in the short run (Friedman, 1989). Clearly, although the variables which are incorporated in both equations are different and WCMI tries to explain the price level on the supply side of the economy and EOE on the demand side of the economy, both approaches have some parallelism in explaining the price level. For example, both equations attempt to explain the price level with one major variable which is money wage growth above the productivity growth for WCMI and nominal money supply growth above the real output growth for EOE. Also, both have argued that one term in the equation is constant over time, it is average mark-up factor for WCMI equation and the velocity term for EOE. Now, question is, which equation is correct and useful in explaining the price level? WCMI or EOE?

Thus, the purpose of this paper is to investigate competing two equations of Weintraub and Monetarists, by estimating both equations separately on the aggregate Turkish data for the period of 1990 -2013. Moreover, we will test both equations in term of their predictive powers, their statistical robustness and the validity of the hypotheses provided by them. The plan of this study will be as follows. In section 2, we will briefly present both WCMI and EOE on the theoretical ground. Section 2 will be followed by the statistical formulation of the arguments, which come from both equations, and by the empirical methodology. In section 4, we will present and investigate the statistical results of both equations for Turkish economy. Finally, this study will end by giving summary and conclusion.

2.EQUATION OF EXCHANGE AND WAGE COST MARKUP IDENTITY

The most famous version of the equation of exchange is the following transactions version formulated by Simon Newcomb, popularized by Irving Fisher (1911) and later used by Monetarists.

$$MV=PT \qquad (1)$$

where M is the quantity of money, V is the velocity of circulation of money, P is the price level and T is the volume of transactions. In this identity, while M, P and T are directly measurable, V is implicitly defined. However, Monetarists add the key assumption that velocity, V, is determined by technological and/or institutional factors and is therefore relatively constant (Goldfeld, 1989). If we rewrite equation (1) in terms of the price, we obtain equation (2) as follows.

$$P=V\left(\frac{M}{T}\right) \qquad (2)$$

By using equation (2) and assuming that the velocity, V, is relatively constant, Monetarists have argued that money growth over transactions growth will exactly cause the growth in the price level. In fact, although this conclusion from the above equation is very natural, it rests on the two critical assumptions; 1. the constancy of velocity, 2. the exogeneity of money supply. If these two assumptions hold in reality, then it will be easy and useful to predict the price level by using the equation of exchange. Moreover, the velocity concept is not a quantity amenable to direct measurement. Indirect tests of the velocity suggest that it is frequently volatile over even fairly short periods of time. According to Weintraub (1961), a superior theory would discard a variable which is so elusive and unsteady for accurate price level forecasts. From this argument, Weintraub (1961) originates his WCMI to predict the price level as an alternative to the EOE. WCMI is defined from the statement that the sale proceeds are equal to some multiple of the money wage bills.

$$Z=k(WN) \tag{3}$$

where Z is equal to PQ, then

$$PQ=k(WN) \tag{4}$$

where $\frac{N}{Q}=\frac{1}{A}$

$$P=k(\frac{W}{A}) \tag{5}$$

where Z is the sale proceeds, N is the volume of employment, P is the price level, A is the average labor productivity, Q is the quantity of output and k is the average mark-up of prices over unit labor cost.

According to the WCMI, the price level cannot rise or fall unless *k*, *W* or *A* vary. Weintraub has argued that whole time series in economics show that the average mark-up mostly constant both in the short run and in the long run, and that annual fluctuations exceed one or two index points. In regard of productivity, *A*, he has argued that productivity of labor has risen by approximately 3 per cent per annum for U.S. Overall, from his identity, he concluded that prices have been closely tied to money wages, not to the amount of money in the economy. In next section, we will empirically specify two competing views in order to test each of them internally and to compare them on their predictive powers.

3.EMPIRICAL SPECIFICATION

Our primary goal in this section is to specify equations (2) and (5) in the form in which can be empirically estimated and tested. The following equations (6) and (7) will be separately estimated to EOE and WCMI respectively.

$$P_t = \beta_0 + \beta_1 M_t + \beta_2 Q_t + \varepsilon_{1,t} \tag{6}$$

$$P_t = \gamma_0 + \gamma_1 W_t + \gamma_2 A_t + \varepsilon_{2,t} \tag{7}$$

where *P* is the log value of consumer price index, *W* is the log value of money wage index, *Q* is the log value of real output index, *A* is the log value of productivity index and *M* is the log value of money supply.

In equations (6) and (7), the constant terms, β_0 and γ_0 are representing velocity and mark-up terms respectively since both equations imply that they are constant in some extent. Other β_s and γ_s are the coefficients of the right hand side variables. By taking account into the propositions of the EOE, we could set up the following hypotheses against alternatives.

$$H_0 : \beta_0 = 0 \text{ against } H_1 : \beta_0 \neq 0$$
$$H_0 : \beta_1 = 1 \text{ against } H_1 : \beta_1 \neq 1$$
$$H_0 : \beta_2 = -1 \text{ against } H_1 : \beta_2 \neq -1$$
$$H_0 : \beta_1 + \beta_2 = 0 \text{ against } H_1 : \beta_1 + \beta_2 \neq 0$$

If we take into account the proposition of the WCMI, then we could set up the following hypotheses against the alternatives.

$$H_0 : \gamma_0 = 0 \text{ against } H_1 : \gamma_0 \neq 0$$
$$H_0 : \gamma_1 = 1 \text{ against } H_1 : \gamma_1 \neq 1$$
$$H_0 : \gamma_2 = -1 \text{ against } H_1 : \gamma_2 \neq -1$$
$$H_0 : \gamma_1 + \gamma_2 = 0 \text{ against } H_1 : \gamma_1 + \gamma_2 \neq 0$$

In addition to the test of each of the above hypotheses, we will diagnostically check equations (6) and (7) in terms of their statistical robustness. Finally, we will compare both equations in terms of their prediction powers.

4. EMPIRICAL RESULTS AND DISCUSSION

Data used in this study come from "Electronic Data Delivery System, the Central Bank of the Republic of Turkey (TCMB_EVDS)" and "Turkish Statistical Institute (TUIK)". Data are annual and cover the period of 1990-2013. The econometric process used in this study is as follows: Firstly, we used unit root test procedures to determine the stationary characteristics of P, W, Q, A and M variables. For the unit root tests, we applied ADF, PP and KPSS approaches[4]. Then, by using

[4]ADF: Augmented Dickey-Fuller developed by Dickey and Fuller (1979), PP: Phillips-Perron developed by Phillips and Perron (1988), KPSS: Kwiatkowski–

Ordinary Least Squares (OLS) technique, we estimated equations (6) and (7) for whole period. After the OLS estimations of two regressions, we compared both equations in terms of their predictive powers and model performances.

The results of unit root tests (ADF, PP and KPSS) for the levels and first differences of all variables are summarized in Tables 1 and 2. According to the ADF test, all variables in both equations are stationary in their first differences. The calculated ADF test rejects the null hypothesis of a unit root in the series at the 1% level, indicating that all variables are stationary in their first differences. In addition, the findings of PP and KPSS tests mostly support the findings of ADF test.

Table 1
Unit Root Tests for EOE

	ADF			PP			KPSS	
	Intercept	Intercept-Trend	None	Intercept	Intercept-Trend	None	Intercept	Intercept-Trend
P	-3.34*** (2)	-2.19	-0.53	-4.86***	-0.38	2.49	0.65***	0.19***
⊿P	-0.57	-6.70*** (8)	-1.29	-0.56	-2.28	-1.28	0.59***	0.11***
M	-4.12*** (0)	0.20	6.51	-3.99***	0.22	3.86	0.69***	0.19***
⊿M	-2.56	-4.71*** (0)	-1.01	-2.44	-4.84*** (3)	-0.97	0.53***	0.09***
Q	-0.31	-2.91	2.93	-0.03	-2.97	5.25	0.70***	0.08***
⊿Q	-5.09*** (0)	-4.97*** (0)	-3.79*** (0)	-5.55***	-5.40***	-3.78***	0.13***	0.11***

Note: ***, ** and * denote statistical significance levels at 1%, 5% and 10%, respectively. Δ is first difference of the variable. () is optimal length.

Phillips–Schmidt–Shin developed by Kwiatkowski, Phillips, Schmidt and Shin (1992).

Table 2
Unit Root Tests for WCMI

	ADF			PP			KPSS	
	Intercept	Intercept-Trend	None	Intercept	Intercept-Trend	None	Intercept	Intercept-Trend
P	-3.34*** (2)	-2.19	-0.53	-4.86***	-0.38	2.49	0.65***	0.19***
ΔP	-0.57	-6.70*** (8)	-1.29	-0.56	-2.28	-1.28	0.59***	0.11***
W	-1.48	-10.98*** (9)	0.37	-5.75***	-1.37	1.55	0.66***	0.18***
ΔW	-10.71*** (9)	-2.22	-2.67** (0)	-2.02	-2.12	-2.59**	0.61***	0.09***
A	-2.51	-2.50	0.52	-2.51	-2.52	-0.23	0.71***	0.16***
ΔA	-5.12*** (0)	-5.47*** (0)	-3.33*** (0)	-5.29***	-5.74***	-3.33***	0.39***	0.07***

Note: ***, ** and * denote statistical significance levels at 1%, 5% and 10%, respectively. Δ is first difference of the variable. () is optimal length.

The regression results for EOE are reported in Table 3. As seen in Table 3, R-square value of EOE model is 0.99 and the estimated coefficients are statistically significant at 1% level for the model. In addition, the signs of all coefficients are as expected. Using Engle-Granger co-integration technique[5], we investigated long-run relationship among variables. As seen in Table 3, the residual term (ε_t) of the equation is stationary at 10% significance level. So, there is a long-run relationship among the variables. Therefore, EOE is estimated under levels of the variables. $F_{TEST\,1}$, $F_{TEST\,2}$, F_{TEST} and $F_{TEST\,4}$ which test the propositions of EOE are statistically significant at 1% level. The calculated F-statistics imply that all hypotheses, which are specified in Section 3, are rejected against alternatives at 1% significance level. The main hypothesis which is the first one is rejected at 1% significance level. This test implies that the unobserved velocity term in the series is not constant.

[5] For more information: Engle and Granger (1987, 251-276).

Table 3
Estimation of EOE

Independent Variables	Coefficient
Intercept	13.72***
M	1.17***
Q	-3.60***
R^2 0.99	
F-Statistic 1162.66***	
$F_{TEST\,1}$*(WALD)* 128.53***	
$F_{TEST\,2}$*(WALD)* 10.08***	
$F_{TEST\,3}$*(WALD)* 42.41***	
$F_{TEST\,4}$*(WALD)* 48.46***	
ε_t -3.85[c]	

Note: ***, ** and * denote the statistical significance levels at 1%, 5% and 10%, respectively. [c] denotes the statistical significance level at 10% for Engle-Yoo critical values. The results of the robustness tests of EOE are in appendix (Tables A1-A4).

The regression results for WCMI are reported in Table 4. As expected, the estimated OLS regression for WCMI fitted very well for whole period, with very high R-square value of 0.99. Also, the signs of all coefficients are as expected, positive coefficient for money wage growth and negative coefficient for productivity growth. The estimated coefficient of W is statistically significant at 1% level for the model. However, the estimated coefficient of A is not statistically significant. Using Engle-Granger co-integration technique, long-run relationship among variables was investigated. As seen in Table 4, the residual term (ε_t) of the equation is stationary at 10% significance level. So, there is a long-run relationship among the variables. Therefore, WCMI is estimated under levels of the variables. The statistics of $F_{TEST\ 1}$, $F_{TEST\ 2}$, $F_{TEST\ 3}$ and $F_{TEST\ 4}$ test the propositions of WCMI specified in section 3. $F_{TEST\ 1}$ and $F_{TEST\ 4}$ are statistically significant at 1% and 10% levels, respectively. $F_{TEST\ 2}$ and $F_{TEST\ 3}$ are not statistically significant. When we tested the specified hypotheses for WCMI, we found that the first hypothesis, which is $\gamma_0=0$ and implies the constancy of mark-up factor over time, could be rejected by data at 1%, the second and third hypotheses could not be rejected and finally, the fourth joint hypothesis could be rejected at 10% level. If we look at the coefficients of W and A, we can argue that the main reason of the rejecting the fourth hypothesis is the partial adjustment of productivity changes to the price changes. Whereas the adjustment from the nominal wage growth to price is complete under ceteris paribus, it is less than half from productivity to prices. Therefore, at least now we could reject the Weintraub's proposition, there is one to one relationship between prices and money wage growth above productivity growth in Turkey. However, we found one to one relationship from money wages to price level under constant productivity in Turkey.

Table 4
Estimation of WCMI

Independent Variables	Coefficient
Intercept	8.38***
W	1.08***
A	-0.50
R^2 0.99	
F-Statistic 5105.64***	
$F_{TEST\ 1}$*(WALD)* 1325.28***	
$F_{TEST\ 2}$*(WALD)* 2.41	
$F_{TEST\ 3}$*(WALD)* 1.90	
$F_{TEST\ 4}$*(WALD)* 3.49*	
ε_t -3.83[c]	

Note: ***, ** and * denote the statistical significance levels at 1%, 5% and 10%, respectively. [c] denotes the statistical significance level at 10% for Engle-Yoo critical values. The results of the robustness tests of WCMI are in appendix (Tables A5-A8).

Table 5 presents model performances for EOE and WCMI. If the model performances of EOE and WCMI are compared in terms of prediction, it is seen that the performance of WCMI is higher than that of EOE. Because, the value of performance criterions of WCMI is less than that of performance criterions of EOE as seen in Table 5.

Table 5
Model Performances

Performance Criterions	EOE	WCMI
RMSE	0.23	0.11
MAE	0.19	0.09
MAPE	1.34	0.72
Theil U	0.01	0.003

Note: RMSE: Root Mean Squared Error, MAE: Mean Absolute Error, MAPE: Mean Absolute Percent Error

CONCLUSION

In inflation literature, there are two competing equations: the Equation of Exchange of Monetarists and the Equation of Wage-Cost Mark-up of Weintraub. The Equation of Exchange implies that prices are tied to money supply with a constant velocity at least in the short run. According to the Equation of Wage-Cost Mark-up, prices are tied to money wages with a constant average mark-up factor both in the short run and in the long run. In this study, we empirically investigated these two competing equations in terms of their predictive powers and the validity of their propositions for the case of Turkey.

From our empirical results, we found strong support for the Equation of Wage-Cost Mark-up and weak support for the Equation of Exchange especially in terms of its predictive power: When we compared two equations with their prediction powers, we determined that the power of the Equation of Wage Cost Mark-up was much higher than that of the Equation of Exchange. On the other hand, when we tested the propositions, which are implied by equations, we found that the Equation of Exchange could not prove its propositions whereas the Equation of Wage Cost- Mark-up mostly provided its propositions. The estimated results of both equations imply that inflation actually originates from supply side of the economy in Turkey. Aggregate price level is especially tied to money wages with a non-constant average mark-up factor in the long run. We believe that the Equation of Exchange needs some transitory variables on the right hand side to accurately predict the price level in Turkey for the period of 1990-2013.

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APPENDIX

TABLE A1
Estimation of EOE

Dependent Variable: TUFE
Method: Least Squares
Date: 07/30/15 Time: 13:38
Sample: 1990 2013
Included observations: 24
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 3.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.72194	1.210344	11.33722	0.0000
M	1.165500	0.052132	22.35650	0.0000
Q	-3.599221	0.399108	-9.018168	0.0000

R-squared	0.991050	Mean dependent var	14.36154
Adjusted R-squared	0.990197	S.D. dependent var	2.462944
S.E. of regression	0.243851	Akaike info criterion	0.131952
Sum squared resid	1.248732	Schwarz criterion	0.279208
Log likelihood	1.416580	Hannan-Quinn criter.	0.171019
F-statistic	1162.659	Durbin-Watson stat	1.392391
Prob(F-statistic)	0.000000		

Note: The OLS result of the EOE reported in Table 3 suffers from the second degree autocorrelation problem. When we corrected the autocorrelation problem by including two lags of the dependent variable on the right-hand side, we found that the estimated results reported in Table 3 did not differ in terms of sign and significance level of the coefficients.

Table A2
Heteroskedasticity Test for Estimation of EOE

Heteroskedasticity Test: White

F-statistic	1.234509	Prob. F(5,18)	0.3339
Obs*R-squared	6.128484	Prob. Chi-Square(5)	0.2939
Scaled explained SS	3.463698	Prob. Chi-Square(5)	0.6289

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 12/11/15 Time: 00:12
Sample: 1990 2013
Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-30.89835	18.25342	-1.692743	0.1077
M	-0.843564	1.212057	-0.695977	0.4953
M^2	-0.000978	0.018076	-0.054100	0.9575
M*Q	0.180944	0.362638	0.498965	0.6238
Q	15.32744	11.01921	1.390974	0.1812
Q^2	-1.856559	1.686342	-1.100939	0.2854

R-squared	0.255354	Mean dependent var	0.052030
Adjusted R-squared	0.048507	S.D. dependent var	0.064580
S.E. of regression	0.062995	Akaike info criterion	-2.479220
Sum squared resid	0.071430	Schwarz criterion	-2.184707
Log likelihood	35.75064	Hannan-Quinn criter.	-2.401086
F-statistic	1.234509	Durbin-Watson stat	1.956399
Prob(F-statistic)	0.333863		

Table A3
Autocorrelation Test for Estimation of EOE

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.558357	Prob. F(7,14)	0.7773
Obs*R-squared	5.237957	Prob. Chi-Square(7)	0.6309

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 12/11/15 Time: 00:19
Sample: 1990 2013
Included observations: 24
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.667325	3.686947	-0.180997	0.8590
M	-0.012398	0.108909	-0.113836	0.9110
Q	0.177099	1.087920	0.162787	0.8730
RESID(-1)	0.294005	0.295481	0.995006	0.3366
RESID(-2)	-0.019907	0.299922	-0.066374	0.9480
RESID(-3)	-0.055596	0.312858	-0.177703	0.8615
RESID(-4)	0.323037	0.277278	1.165026	0.2635
RESID(-5)	-0.143508	0.324877	-0.441732	0.6654
RESID(-6)	-0.133992	0.343750	-0.389796	0.7026
RESID(-7)	-0.164606	0.317608	-0.518270	0.6124

R-squared	0.218248	Mean dependent var	-4.15E-15
Adjusted R-squared	-0.284306	S.D. dependent var	0.233008
S.E. of regression	0.264061	Akaike info criterion	0.469067
Sum squared resid	0.976198	Schwarz criterion	0.959923
Log likelihood	4.371196	Hannan-Quinn criter.	0.599291
F-statistic	0.434278	Durbin-Watson stat	1.851083
Prob(F-statistic)	0.894529		

Table A4
Normality Test for Estimation of EOE

Series: Residuals	
Sample 1990 2013	
Observations 24	
Mean	-4.15e-15
Median	0.029803
Maximum	0.442043
Minimum	-0.480839
Std. Dev.	0.233008
Skewness	-0.067524
Kurtosis	2.476389
Jarque-Bera	0.292407
Probability	0.863982

Table A5
Estimation of WCMI

Dependent Variable: TUFE
Method: Least Squares
Date: 07/30/15 Time: 13:36
Sample: 1990 2013
Included observations: 24
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 3.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.383068	0.230276	36.40439	0.0000
W	1.081690	0.052570	20.57602	0.0000
A	-0.500378	0.362067	-1.382002	0.1815

R-squared	0.997948	Mean dependent var	14.36154
Adjusted R-squared	0.997752	S.D. dependent var	2.462944
S.E. of regression	0.116770	Akaike info criterion	-1.340748
Sum squared resid	0.286341	Schwarz criterion	-1.193491
Log likelihood	19.08898	Hannan-Quinn criter.	-1.301681
F-statistic	5105.640	Durbin-Watson stat	0.829113
Prob(F-statistic)	0.000000		

Note: The OLS result of the WCMI reported in Table 4 suffers from the second degree autocorrelation problem. When we corrected the autocorrelation problem by including two lags of the dependent variable on the right-hand side, we found that the estimated results reported in Table 4 did not differ in terms of sign and significance level of the coefficients.

Table A6
Heteroskedasticity Test for Estimation of WCMI

Heteroskedasticity Test: White

F-statistic	1.826052	Prob. F(5,18)	0.1584
Obs*R-squared	8.076822	Prob. Chi-Square(5)	0.1521
Scaled explained SS	3.035681	Prob. Chi-Square(5)	0.6945

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 12/11/15 Time: 00:12
Sample: 1990 2013
Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.166667	0.131824	1.264308	0.2222
W	-0.072402	0.060758	-1.191649	0.2489
W^2	0.008232	0.006905	1.192153	0.2487
W*A	-0.108129	0.101179	-1.068688	0.2993
A	0.453894	0.439939	1.031721	0.3159
A^2	0.390166	0.386672	1.009037	0.3263

R-squared	0.336534	Mean dependent var	0.011931
Adjusted R-squared	0.152238	S.D. dependent var	0.012076
S.E. of regression	0.011119	Akaike info criterion	-5.948004
Sum squared resid	0.002225	Schwarz criterion	-5.653490
Log likelihood	77.37605	Hannan-Quinn criter.	-5.869869
F-statistic	1.826052	Durbin-Watson stat	2.054372
Prob(F-statistic)	0.158397		

Table A7
Autocorrelation Test for Estimation of WCMI

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.861115	Prob. F(7,14)	0.1528
Obs*R-squared	11.56836	Prob. Chi-Square(7)	0.1157

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 12/11/15 Time: 00:18
Sample: 1990 2013
Included observations: 24
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.068108	0.154821	0.439913	0.6667
W	-0.016091	0.035886	-0.448387	0.6607
A	0.151840	0.269445	0.563526	0.5820
RESID(-1)	0.443323	0.285798	1.551174	0.1432
RESID(-2)	-0.206845	0.307249	-0.673215	0.5118
RESID(-3)	-0.490491	0.318604	-1.539500	0.1460
RESID(-4)	-0.105086	0.332271	-0.316267	0.7565
RESID(-5)	-0.091555	0.317180	-0.288654	0.7771
RESID(-6)	-0.120495	0.307905	-0.391338	0.7014
RESID(-7)	-0.086146	0.288242	-0.298866	0.7694

R-squared	0.482015	Mean dependent var	5.13E-16
Adjusted R-squared	0.149024	S.D. dependent var	0.111578
S.E. of regression	0.102929	Akaike info criterion	-1.415224
Sum squared resid	0.148320	Schwarz criterion	-0.924368
Log likelihood	26.98268	Hannan-Quinn criter.	-1.284999
F-statistic	1.447534	Durbin-Watson stat	1.734358
Prob(F-statistic)	0.258037		

Table A8
Normality Test for Estimation of WCMI

Series: Residuals	
Sample 1990 2013	
Observations 24	
Mean	5.13e-16
Median	0.036164
Maximum	0.195664
Minimum	-0.183704
Std. Dev.	0.111578
Skewness	-0.307147
Kurtosis	1.981815
Jarque-Bera	1.414058
Probability	0.493107