

Working Paper

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**LINKAGE BETWEEN FOOD PRICE
INFLATION AND RURAL WAGE
DYNAMICS**

Atulan Guha and Ashutosh Kumar Tripathi

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LINKAGE BETWEEN FOOD PRICE INFLATION AND RURAL WAGE DYNAMICS¹

Atulan Guha² and Ashutosh Kumar Tripathi³

Abstract

This paper attempts to explore the linkages between food price inflation and increasing rural real wages. In more concrete terms, paper first explores the dynamic relations between different rural wages and second the relationship these wages share with increasing food prices. While doing so, the paper enquires about the possibilities of any Lewisian transformation causing the increase in real rural wages. The result of the analysis suggest that increase in real rural wages is not because of Lewisian transformation but because of increasing bargaining power due to public works programmes, which employ the unskilled rural workers while food price inflation induces them to bargain for higher wages. These two together may be the causes behind higher real wages of unskilled rural labour.

Key Words: *Food Prices; Agricultural wages, Inflation*

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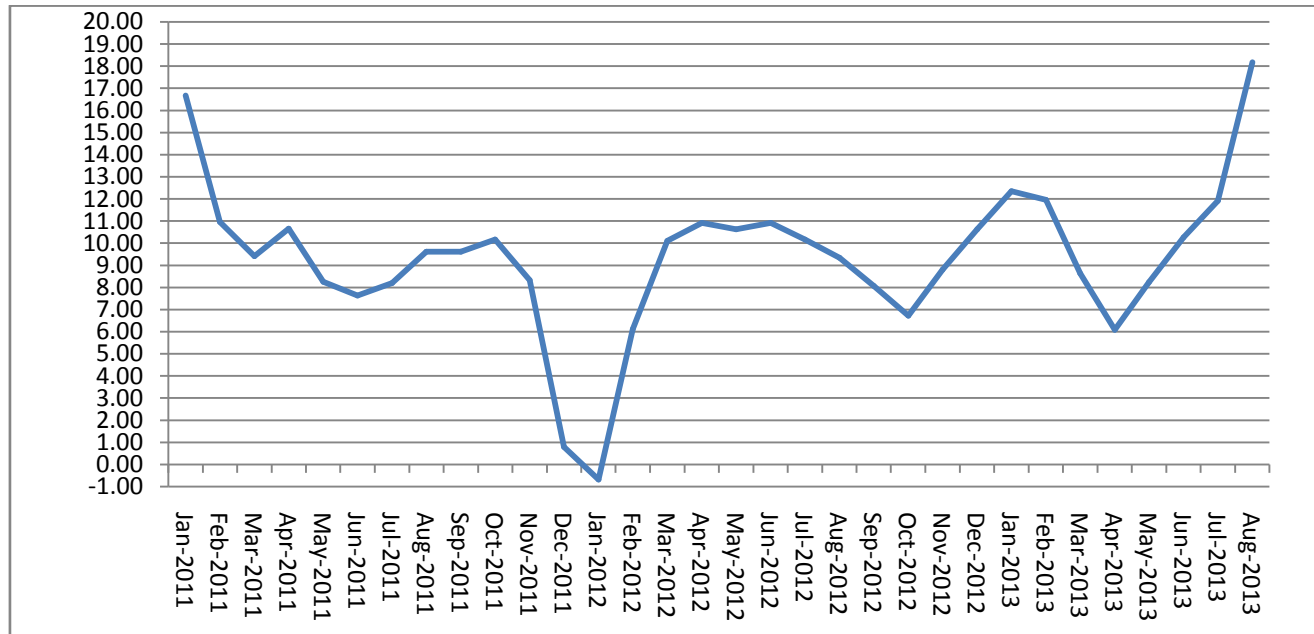
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1. INTRODUCTION

The persistent and high food price inflation over the last few years has become a major concern in the Indian economy. The concern is not only about ensuring food security but also its impact in stimulating an economy-wide inflationary situation, which affects growth and income distribution adversely. Food inflation based on the wholesale price index (WPI) for food articles for the last two years shows that food inflation is roughly around 9.37 per cent on average and crossed the 18 per cent level in August 2013. (Figure 1).

The persistent high food price inflation has led to intense debate among academicians and Indian policy makers related to its causes. Various studies on this issue have tried to identify the reasons for acceleration in food price. The different kind of reasons that are identified — fall in agricultural output between 2008-09 and 2009-10, increase in the domestic demand for food, higher food exports, high minimum support prices for food grains, large-scale procurement of food grains by the Governments, hoarding and speculation, high world food and oil prices, and exchange rate pass-through to domestic prices (Kumar *et.al.*, 2010; Chand, 2010; Carrasco *et.al.*, 2012; Nair and Eapen, 2011, 2012 and Khundrakpam, 2008).

Figure 1: Monthly Food Inflation (WPI, 2004-05 =100)



Source: RBI Indian Database

This period of high food inflation is also characterised by high rural real wages. The daily real agricultural wages (deflated by food WPI) went up from Rs. 63.05 in April 2004 to Rs. 80.05 on Nov. 2012 whereas the rural daily real non-agricultural wages went up from Rs. 83.64 to Rs 92.24 (Based upon the data published by Labour Bureau of India in its monthly publication Indian Labour Journal). The increase in rural wages can influence food price both by enhancing demand and by pushing up the cost of production. The increasing food price in turn stimulates inflationary expectation among the workers inducing them to bargain hard for higher nominal wages in order to neutralise the impact of inflation in their standard of living. There is a need to explore the empirical validity of these theoretical two way relationships between increasing rural wages and food inflation. In order to understand, these relationships, it is pre-requisite to understand the structure of changes in different categories (i.e. in rural wages- agricultural and non-agricultural wages, and in food prices - different food items) of rural wages and food prices. To fulfil this need, this paper put an attempt to trace the food price and rural wage dynamics and their impact on each other.

The monthly wholesale price index at base year 2004-05 of food articles, published by office of the economic advisor (Government of India) is being used as the price deflator. We have categorised rural workers' occupations into three broad categories- i) the skilled non-agricultural ii) unskilled non-agricultural and iii) agricultural workers. Skilled non-agricultural workers are employed as carpenters, blacksmiths, cobblers, masons, and tractor drivers. Agricultural workers are involved in the occupations of ploughing, sowing, weeding, transplanting, harvesting, winnowing, threshing, picking, herdsman, well digging, and cane crushing. The simple average of daily wage rates of agricultural occupations for man has been considered as proxy for daily agricultural wages whereas the daily unskilled labour wage for man in the category of non-agricultural occupation has been considered as proxy for daily wages rates of rural unskilled workers. The simple average of daily rural wage rates of skilled non-agricultural occupations for man has been considered as proxy for daily skilled rural non-agricultural wages. The data published by

Labour Bureau of India in its monthly publication Indian Labour Journal has been used for average daily agricultural and rural wages of skilled and unskilled workers at all India level.

The structure of the paper is as follows- Section 2 describes rural wages dynamics. Section 3 describes the relationship between the rural wages and food prices. There is a concluding section at the end.

2. RURAL WAGES DYNAMICS

The graph in figure 2 plots the daily real wage data (monthly average) for the period April 2004 to November 2012. It shows that the real rural wages in India have gone up during this period. One would like to believe that this is due to labour shortage. And what is causing this labour shortage? Is it high growth in modern industry and services which pull labour towards urban or it is growth in some non-farm sector, say construction, in rural India, or it is something else?

The graph shows that the rural wages of skilled labour are higher than the agricultural and unskilled non agricultural rural wages. The real wages for all the three categories have gone up without showing a uniform trend. The real agricultural wage shows a stable trend within the period between April 2004 and April 2006. Over the next three months it has fallen sharply followed by relatively low stable real wages for roughly one year, September 2006 to August 2007. As a result, the average growth rate of agricultural wages for the period April 2004 to September 2007 has been negative. Thereafter, it has grown continuously. The real unskilled wage was more or less equal to the real agricultural wage for the initial year April 2004 to March 2005. Thereafter, it has dipped increasingly compared to agricultural wage till August 2007. Again roughly for a year, September 2007 to September 2008 it has grew at a much faster pace than the agricultural wage. Thereafter, from October 2008 to June 2012, both were more or less equal. From June 2012 onwards, agricultural wage grew at a faster pace than the wage of rural unskilled workers. The skilled rural wage showed a declining trend during the

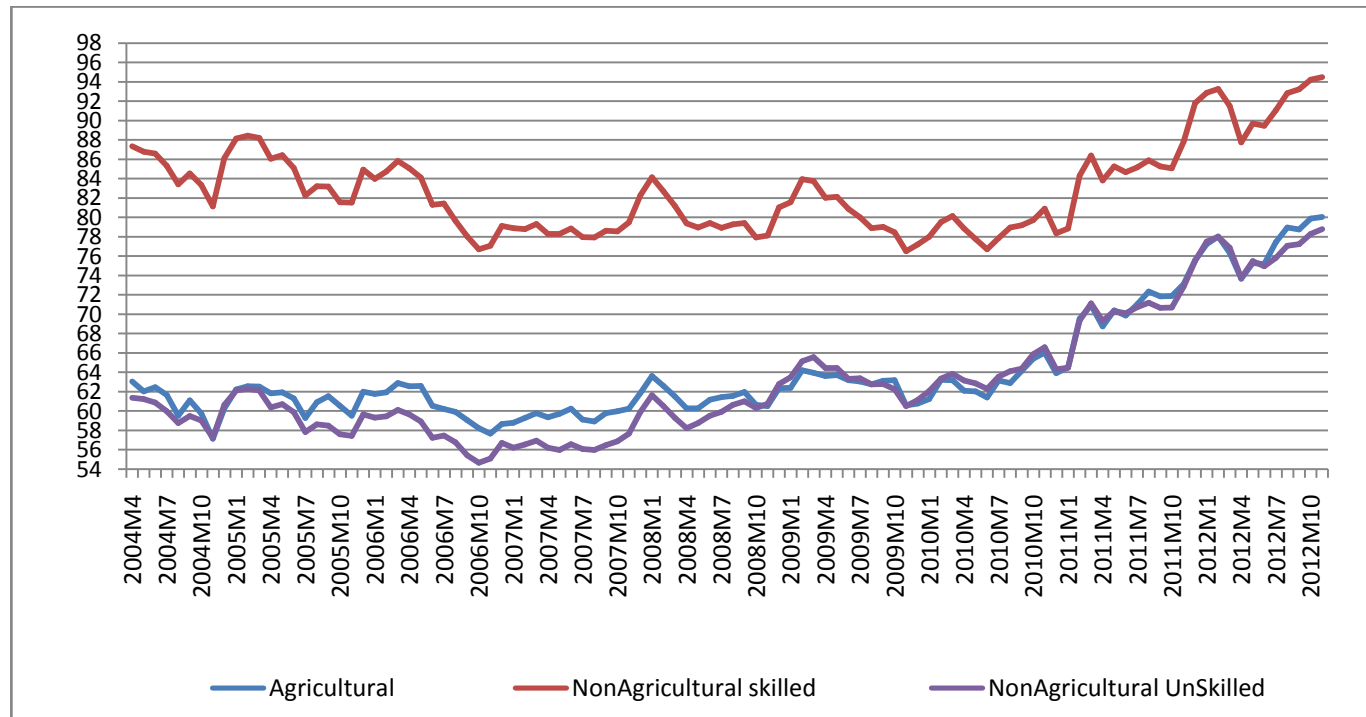
period April 2004 to December 2009. Thereafter it has registered growth. Even then the average growth rate has been lower than the agricultural and unskilled rural wages.

Table -1: Average Growth Rate of Rural Real Wages (in per cent)

	Agricultural	Non Agricultural Skilled	Non Agricultural UnSkilled
April 2004 to August 2007	-0.15	-0.27	-0.21
September 2007 to December 2009	0.12	0.0034	0.33
2010 January to 2012 November	0.81	0.58	0.75

So, it is very clear that of these three rural wage rates the wages of rural unskilled workers started to grow first followed by agricultural wages and, subsequently, the wages of rural skilled workers. Now for the question: is the increase in rural wages caused by any Lewisian transformation? The key to Lewisian transformation is the labour absorption in the modern sector and urban informal sector. If that happens, it should first create labour shortage in the rural skilled labour market, as they are the one are better skilled to get absorbed in the modern sector and urban informal sector in compare to agricultural labourer and unskilled non-farm workers. This fact should also get reflected in the wage growth structure, which is absent here. Further, the increase in wages for the rural skilled labour should percolate down to the wages of agricultural labour and unskilled rural labour. And there should be long run convergence wages across these three sectors, with primarily feedback coming from rural skilled non-farm wages to other two rural wages. If additional demand for rural labour comes from the rural construction sector instead of the modern and urban informal sector, the rural wages' dynamics could be expectedly similar to those corresponding to the Lewisian transformation.

Figure 2: Real Rural Wage (deflated by WPI of food articles)



We have tested this empirically by tracing the long run relationship and the feedback mechanisms between these three wages. The wage rate of skilled labour is integrated of order two; the wage rates of agricultural labourer and unskilled rural non-farm workers are integrated of order one respectively (Table 2). This indicates no possibility of existence of long run convergence between the skilled rural non-farm workers wages and the other two rural wages.

Besides this case there exists a vast amount of empirical literature⁴ that suggests sectoral variation in wage rates. Various attempts have been made to explain these variations within the neoclassical framework via difference in productivity caused due to the difference in skill preventing labour movement from the low to high wages' sector, by the difference in attractiveness of different jobs (primarily rising out of non-market characteristics of the job like geographical location, physical hazards etc.) and hence, with different compensating wages. Another explanation of this occurrence comes from the unobserved heterogeneity of job characteristics and workers, which may not be randomly distributed across industries. As a result, high paying industries may be those with unmeasured high labour quality. The difference in job hazards or the difference in geographical location cannot explain a macro-economic phenomenon of Indian rural labour market - no tendency of long run converges among rural wages.

⁴ A detailed survey of both theoretical and empirical literature on this issue is available at Chatterji, M. And Homagni Choudhury (2011)

Table - 2: Unit Root Test Result

Variables	Model	Adj. t-Stat	Prob.	Test critical values			Lag length
				1% level	5% level	10% level	
Augmented Dickey-Fuller unit root test in the levels							
LNSKILL	Constant,	7.885	1.00	-3.495	-2.8898	-2.582	0
LNAGRI	Constant	4.179	1.00	-3.495	-2.8898	-2.582	0
LNUNSKILL	Constant, linear trend	-2.621	0.27	-4.049	-3.454	-3.153	0
Augmented Dickey-Fuller unit root test in First Difference							
D(LNSKILL)	None	1.546	0.969	-2.590	-1.944	-1.614	11
D(LNAGRI)	Constant	-8.689	0.00	-3.496	-2.890	-2.582	0
D(LNUNSKILL)	Constant, linear trend	-11.165	0.00	-4.051	-3.454	-3.153	0
Augmented Dickey-Fuller unit root test in Second Difference							
D(LNSKILL,2)	None	-7.028	0.00	-2.590	-1.944	-1.614	10

Note: LNSKILL stands for log representation of skilled rural non-farm wage, LNAGRI stands for log representation of rural farm wage, LNUNSKILL stands for log representation of unskilled rural non-farm wage,

The Neo-Keynesian explanations for sectoral wage differentials are based on the efficiency wage hypothesis and rent sharing models⁵. According to this framework a particular firm or industry become more efficient when workers stay in for a longer period. The gains in productivity, due to the unrestricted movement of labour across the firm, are lower than these efficiencies. In which case the labour market structure, employment conditions, and the wage structure will adjust to incentivise the long-term attachments. Hence, a less integrated labour market will be created. The reasons behind the longer association causing efficiency have been categorised into four: (i) Avoiding of shirking⁶ - in high wage industries, those with high monitoring costs, to prevent the shirking by the workers, an efficiency wage is being paid to increase the cost of job loss and create a greater effectiveness in threat of firing. (ii) Reducing turnover⁷ - in which high wage industries are those who want to reduce the turnover of the workers to avoid the high cost to train the replacing workers. (iii) adverse selection models⁸ - in high wage industries, which are more sensitive to labour quality differences and have higher costs of measuring quality, offer higher wage to make self selection by the job seeker in a way such that person with high quality will apply. (iv) fair wage⁹, in which high wage industries are those with high profits due to workers' (form a notion of the fair wage) belief that to maintain fairness firms should share rents.

But the problem with most of these explanations vis-à-vis sectoral difference in wages is that they do not fit with the structure of India's rural labour market. The explanations under efficiency wage hypothesis require long run association between the employers and employees. But more than 78 per cent

⁵ Krueger & Summers (1988), Thaler (1989)

⁶ Shapiro and Stiglitz (1984)

⁷ Stiglitz (1974)

⁸ Weiss (1980)

⁹ Akerlof and Yellen (1990)

of the workers in the rural non-farm sector do not have regular employment and salaries (Table 3). Hence, one can expect the proportion of regular employees who have long-term relationships with their employers to be much lower in the rural non-farm sector. Hence, these explanations under efficiency wage hypothesis framework are less likely to explain this non-convergence among rural wages.

Table - 3 : Distribution of Rural Workers According to Job Status and Sectoral Composition (in %)

No. of Workers (PS+SS)	Agriculture	Non-Agriculture	All
Self Employed	57.6	41.6	52.3
Regular/Salaried	0.9	21.9	7.8
Casual	41.5	36.6	39.9
Total	100	100	100

Source: NSSO Survey, 66th Round

Rather, the non-reducing skill gap among workers who are employed in farm and rural non-farm sector could be an explanation for the non-convergence of rural wages. Here we define unskilled workers as those who have not studied beyond primary school level (Table 4). Among the casual workers' pool in 1993-94 the proportion of unskilled workers within the farm sector was 92.39 per cent. By 2009-10 it reduced to 78.9 per cent. For the rural non-farm sector the proportion of unskilled casual workers in 1993-94 was 80.63 per cent, which came down to 67.62 per cent by 2009-10. So, the proportion of unskilled casual workers employed in rural non-farm has declined marginally faster compared to the farm sector. There has been a marginal increase in the skill gap of casual workers in these two sectors. The skill gap among the regular workers of both these sectors has widened to a greater extent. The use of regular unskilled workers in the farm sector has declined marginally while it has declined by close to 8 per cent for the rural non-farm sector.

Table 4

Share of Unskilled in Rural Farm & Non-Farm Sector for Regular Workers							
		1993-94	2009-10	1993-94	2009-10	1993-94	2009-10
Row No.	Industry	Not Literate		Lit & upto Primary		Total	
1	Agri	63.72	50.37	19.04	31.51	82.76	81.88
2	Non Agri.	13.56	8.50	19.81	16.54	33.37	25.04
3	The Gap (Row1/Row2)	4.70	5.93	0.96	1.90	2.48	3.27
Share of Unskilled in Rural Farm & Non-Farm Sector for Casual Workers							
		1993-94	2009-10	1993-94	2009-10	1993-94	2009-10
Row No.	Industry	Not Literate		Lit & upto Primary		Total	
	Agri	71.81	49.73	20.58	29.17	92.39	78.9
	Non Agri.	48.99	36.60	31.64	31.02	80.63	67.62
	The Gap (Row1/Row2)	1.47	1.36	0.65	0.94	1.15	1.17

Source: NSSO Survey, 50th and 66th Round

Another explanation may come from Marx's write up, *Wage, Labour and Capital* (1891). The cost of production of simple labour-power amounts to the cost of the existence and propagation of the worker. The price of this cost of existence and propagation constitutes wages. The wages thus determined are called the minimum of wages. This minimum wage, like the determination of the price of commodities in general via cost of production, does not hold good for the single individual, only for the race. Individual workers, indeed millions of workers, do not receive enough to be able to exist and to propagate themselves; but the wages of the whole working class adjust themselves, within the limits of their fluctuations, to this minimum. As long as this cost of propagation of the labourer is different for different sectors, each sector will have a different minimum wage and the working class will adjust themselves with it. And this sectoral minimum wage will not converge with each other unless the cost of propagation of the labourer converges across the sectors .

Nonetheless, whatever be the explanation underscoring the non-convergence of the rural wages we can definitely note the absence of any Lewisian effect on the increase of agricultural wages.

3. THE FOOD PRICE-WAGE DYNAMICS IN RURAL INDIA

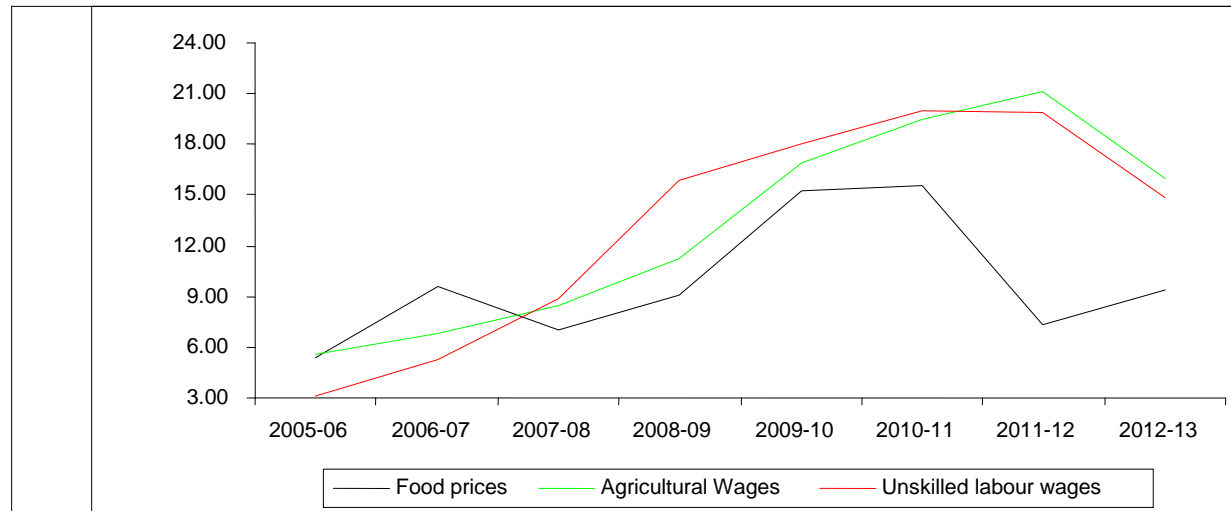
The alternative explanation for the increase of rural wages is associated with the public works programme including MGNREGA. This explores the possible trade-off between public work programmes and food price inflation. In these arguments, the causalities follow the path of rural public works programme influencing the agricultural wages and then the agricultural wages influencing food price inflation. "MGNREGA Sameeksha 2006-12", published by Ministry of Rural Development has surveyed the evidences pertaining to the impact of MGNREGA on rural wages. It has tried to examine the pieces of evidence concerning whether or not this policy is tightening the Indian rural labour market. There is no uniformity in the state of tightness in the rural labour market. Neither can this report state whether MGNREGA has made the labour market, in general, tight or not too tight. It has failed to provide a macro picture. This only indicates to the Indian rural labour market

being highly disintegrated. This report argues about an increase in rural wages, not because of the labour market tightening but because of an increase in the reservation wage of rural labour. This scheme has been helping rural workers to break some of the imperfections in the employment contract.

Nonetheless the public works programmes, which employ large numbers of unskilled workers for improving public infrastructure, may increase the wages of rural unskilled workers; if this market shows a good degree of integration with the agricultural labour market the wages for agricultural workers will go up. Some of the studies indicate marginal increases in agricultural wages due to MGNREGA. Berg et.al (2012) show that on average MGNREG boosts the real daily agricultural wage rates by 5.3 percent. Azam (2012) also argues that MGNREG has a significant positive impact on the wages of casual workers. He shows that the real wages of casual workers increased by 8 percent more in MGNREG districts compared to the increase experienced in non-MGNREG districts.

Figure 3 enables a visual grasp of how the annual food price inflation and growth in nominal agricultural and unskilled labour wages have moved over 2005-06 to 2012-13. The following inferences may be drawn from this graph: First, nominal rural wages for unskilled workers increased at double digit rates over the last five years, i.e. more than or equal to 15 percent every year. Growth started picking up from 2007-08 when nominal non-farm wages for the unskilled increased by 8.9 percent over the previous year. MGNREGA commenced implementation from February 2006 in three phases, with the last phase occurring in 2007-08. And this should have an impact on rural wages with some gestation period. The year, 2007-08, coincides with the period of implementation of MGNREGA. Second, the movement of agricultural wages in relation to that of rural wages for unskilled workers suggests a strong correlation between the two; it has witnessed a similar growth pattern over the years. However, it appears that far from being the reluctant follower, the rural wage of unskilled workers is the leader wielding a strong effect on the wages of agricultural labourers (with some lag). Third, in the line of faster growth in rural wages (including both agricultural and unskilled workers wages) food price inflation too has gone up. The annual inflation in food articles reached 15.6 percent in 2010-11.

Figure 3: Annual inflation in food prices and growth in nominal agricultural and Unskilled labour wages (in % terms)



Source: *Office of economic advisor (govt. of India) and Labour Bureau of India*

It is in this context that we have undertaken an empirical exercise to examine the long run dynamics and causal relationship between food prices, agricultural wages, and rural wages for unskilled labourers by using the Vector Error Correction (VEC) model.

Methodology and Estimation

As discussed earlier in the paper the steep rise in rural wages for unskilled labourers in the recent past is expected to push up agricultural wages. As rural wages increase the demand for wage goods is expected to rise. The increase in demand for wage goods need not be inflationary provided it reflects higher productivity. However, the agricultural productivity growth having remained constant in the recent past (Subba Rao, 2011) its effect should be passed on to output prices resulting in high food price inflation. Further, an increase in agricultural wages should increase the cost of production in agriculture and this should have an inflationary impact on food prices. Therefore, it looks like food prices, agricultural wages, and the rural wages for unskilled labourers are related to each other through a direct transmission and feedback mechanism.

In order to analyse the long run dynamics and the direction of causality between food prices and wages we have used the Vector Error Correction (VEC) model within the framework of the Johansen cointegration test.

A group of non-stationary series is co-integrated if a linear combination of them is stationary. The linear combination of these series is known as the co-integrating equation, which indicates a stable long run equilibrium relationship between the variables. The Johansen cointegration test has been carried out in a Vector Auto Regressive (VAR) mode and is a reduced form method. This test for cointegration is particularly important when one is dealing with cointegration in a multivariate framework, which takes care of endogeneity as well as simultaneity problems associated with simple cointegration tests.

In order to estimate the model, first, the stationarity property of the series has been examined followed by a lag order specification and identification of the trend pattern. Further, to smoothen the data the log transformation of all the three variables has been taken.

To check the stationarity of all the three series, viz, log food prices, log agricultural wages and log rural wages for unskilled labourers, we conducted Augmented Dickey-Fuller (ADF) unit root tests, for which the results are indicated in Table 5. The ADF test result for all three variables shows that in level all variables were non-stationary as we failed to reject the null hypothesis of a unit root in the all the series at conventional significance levels. However, stationarity is reached in all the series after the first difference. Therefore, all the series are integrated of same order i.e. $I(1)$.

The VEC Granger Causality test results are very sensitive to the number of lag differences for endogenous variables. It has been suggested that it is always preferable to estimate higher order VAR while making provisions for adequate lag length. Longer lags are required to capture most of the effects that the variables have on each other. E-Views provides optimal lag length size for the estimated VAR model on the basis of information criteria like: Sequential modified LR test statistics, Final prediction error, Akaike information criterion (AIC), Schwarz Criterion (SC), and HQ information criterion. In our case, the optimal lag length is selected by different criteria. Out of five information criteria, three have suggested a lag order of six for the VAR model. Therefore, we finally decided on a VAR model with six lags for endogenous variables. Remember, the lag length order suggested are at the level for endogenous variables, whereas lag interval required in the Johansen cointegration test is for difference endogenous variables. Therefore, for cointegration test the optimal lag length should be five (Appendix 1).

Table 5: Unit Root Test Result

Variables	Model	Adj. t-Stat	Prob.	Test critical values			Lag length
				1% level	5% level	10% level	
Augmented Dickey-Fuller unit root test in the levels							
LNWPI	Constant, linear trend	-2.717	0.23	-4.0496	-3.454	-3.153	0
LNAGRI	Constant	4.179	1.00	-3.495	-2.8898	-2.582	0
LNUNSKILL	Constant, linear trend	-2.621	0.27	-4.049	-3.454	-3.153	0
Augmented Dickey-Fuller unit root test in First Difference							
DLNWPI	None	-7.931	0.00	-2.588	-1.944	-1.615	0
DLNAGRI	Constant	-8.689	0.00	-3.496	-2.890	-2.582	0
DLNUNSKILL	Constant, linear trend	-11.165	0.00	-4.051	-3.454	-3.153	0

Note: We did not get any statistically significant seasonality in these series

Having determined the optimal lag length size for difference endogenous variables one has to make an assumption regarding the trend underlying variables. In carrying out the cointegration test we have assumed the presence of an intercept and a trend in our model, on the basis of minimum value of AIC and SC for the model.

Empirical Results

The empirical analysis reported here is based upon a two-stage estimation. In the first stage, cointegration analysis has been used to identify a co-integrating relationship between these variables. This is important because if two non-stationary variables are cointegrated the model should include residuals from the vectors (lagged one period) in the dynamic VECM system.

The estimation procedure involves estimating a cointegration relationship with all the three variables. This has been estimated by the Johansen (1988) multivariate cointegration test. The test statistics and asymptotic 5% critical values are shown in Table 6 & 7. Both tests reject the hypothesis of no cointegration ($r=0$) at the 5% level, whereas they do not reject the hypothesis that $r \leq 1$. Therefore, the conclusion is that $r=1$. That is, there is one stationary relationship between the levels of variables. Given that the cointegration relationship exists between these variables empirical tests are performed based on the VECM.

Table 6: Johansen Cointegration Test - Trace Test

Null Hypothesis	Alternate Hypothesis	Statistics	95% critical value	Prob.
$r=0$	$r=1$	53.45*	42.92	0.00
$r \leq 1$	$r=2$	13.57	25.87	0.69
$r \leq 2$	$r=3$	4.46	12.52	0.68

* Significant at 5% level

Table 7: Johansen Cointegration Test - Maximum Eigen value Test

Null Hypothesis	Alternate Hypothesis	Statistics	95% critical value	Prob.
r=0	r=1	39.88*	25.82	0.00
r≤1	r=2	9.11	19.39	0.71
r≤2	r=3	4.46	12.52	0.68

* Significant at 5% level

The results suggest complex long run relationships between agricultural wages (LNAGRI), agricultural prices (LNWPI), and the wages of unskilled rural labourers (LNUNSKILL). The long run relationship between variables is given below:

$$\text{LNAGRI} + 0.036\text{LNWPI} - 0.707\text{UNSKILL} - 0.005\text{TREND} = 0$$

(0.15816) (0.08437) (0.00100)

The above equation was normalised on the LNAGRI. Due to the normalisation process the signs have been reversed to enable proper interpretation. Wages of rural unskilled labourers have a significant positive impact on agricultural wages. Considering that the logs of variables have been used the above relationship expresses the elasticity of agricultural wages on food prices and wages for unskilled rural labourers. Hence, one percent increase in the wages of rural unskilled labour leads to 0.71 percent increase in agricultural wages. Agricultural prices have negative relationship with agricultural wages although the coefficient is insignificant in the cointegrating equation.

The t-statistics on the variables of the Error Correction results (Appendix 2) also indicates that the LNWPI is weakly exogenous to the system because the error correction term is not significantly different from zero at 5 per cent level. This implies the feedback mechanism from agricultural wages and non-agricultural unskilled wages to food price is weak. However, the estimates of the error correction coefficients are highly significant for agricultural wages

and rural wages for unskilled non-agricultural workers with negative signs. This implies that the short run wage movements are stable. The coefficients of the error correction terms indicate the speed of convergence to the long-run equilibrium rate of growth. The estimated coefficients show that while the speed of adjustment to a shock is quicker in the case of agricultural wages and rural wages for unskilled workers it is very slow in the case of food prices. The estimated EC coefficients indicate that about 15 to 22 percent adjustment towards long run equilibrium rate of growth in the case of rural wages for unskilled workers and agricultural wages occurs in one month. So, this result indicates that increase in the wages of rural unskilled non-agricultural labour leads to an increase in agricultural wages. But this increase in rural unskilled non-farm wages does not influence food prices significantly. Hence, the demand impact of increase in wages of rural unskilled non-agricultural labour on food inflation is statistically insignificant.

On an average, from September 2007 to October 2013, the group comprising egg, meat, and fish recorded the highest inflation rate of 14.73%, followed by oil seed (12.02%) and milk (11.37%), fruits and vegetables (11.02%), cereals & pulses (9.4%) (Table 8). Table 9 shows, egg, meat and fish, milk, fruits and vegetables, pulses are the highest growing food item. And these products too, have on average, experienced high inflation. So, low supply cannot be an adequate explanation for inflation. Further, Nair (2013) found by analysing the food expenditure pattern during 2004-12 that rising domestic demand pressures contributed to the upward spiral in the prices of six high-value food commodities- pulses, milk, egg, fish, meat, and edible oil. This indicates demand for food articles as being a substantive reason behind inflation. And a very substantial contributor to this demand is high value food items that the rural unskilled non-agricultural worker and agricultural workers are unlikely to consume to a greater extent. This indicates that the demand impact of increasing rural unskilled non-agricultural wages and agricultural wages on food inflation is rather limited.

Table 8: Average Inflation for Various Food Commodities (in %)

	Average Inflation (Sept. 07 to Oct. 13)
Food Articles	10.95
Food Grains (Cereals + Pulses)	9.40
Cereals	9.90
Pulses	7.99
Fruits & Vegetables	11.02
Milk	11.37
Eggs, Meat & Fish	14.73
Condiments & Spices	8.92
Tea & Coffee	11.43
Oil Seed	12.02

Source: Calculated from the data provided in CSO (<http://eaindustry.nic.in/>)

Further, we tried to find out the Granger causality between wages and food price. The F-statistics have been calculated under the null hypothesis that changes in regressor do not cause movements in the regress and in the Granger sense. The F-statistics represented in the tables measure the significance of the lagged values of the column variables while explaining the respective row variables.

The first row of Table 10 reports that F-statistics for rural wages of unskilled labourers is significant at 1 per-cent level. So, the alternative hypothesis stating that movements in rural wages of unskilled labourers, in the Granger sense, cause a movement in the agricultural wages has been accepted. However, the F-statistics for agricultural wage and food price are insignificant implying that agricultural wage is not influenced by its own past values and neither by food price. F-statistics in the second row of the table imply that food price is significantly explained by its past values and also by agricultural wages but it is independent of the trends in the rural wage of the unskilled worker. In case of rural wage of unskilled workers F-statistics in the third row shows that it is significantly influenced by its own past values and also by

food price but it is independent of the trends in agricultural wage. Therefore, in all the cases, causality has been found to be unidirectional.

Table - 9: Annual Compound Growth Rate of Production of Various Food Commodities (in %)

Items	2006-07/2007-08 to 2009-10*	2008-09/2009-10 to 2012-13*
Rice	-1.14	2.73
Wheat	2.2	4.43
Coarse cereals	-0.5	2.28
Pulses	-0.34	6.45
Fruits	4.42	2.73
Vegetables	2.18	6.03
Tea	0.21	5.46
Coffee	5.14	3.27
Milk	3.86	4.76
Egg	6.05	6.26
Meat	7.24	9.23
Fish (marine & Inland)	5.94	4.1
Spices	-3.99	12.89
Oilseeds	-8.55	5.91

* For rice, wheat, and coarse cereals the growth figures are for 2006-07 to 2009-10; and for others, from 2007-08 to 2009-10.

** For rice, wheat, and coarse cereals the growth figures are for 2008-09 to 2012-13; for fish, from 2009-10 to 2011-12; and for all others, from 2009-10 to 2012-13.

Source: This table has been reproduced from -Nair (2013). Sources include the *Handbook of Statistics on Indian Economy 2012-13*, RBI (for tea and coffee); *Annual Report 2012-13*, Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture (for milk, egg, meat and fish); Directorate of Vanaspati, Vegetable Oils and Fats, Ministry of Consumer Affairs, Food and Public Distribution (for edible oils); *Indian Horticulture Data Base 2012* and National Horticulture Board (for fruits, vegetables, and spices); Department of Agriculture and Cooperation, Ministry of Agriculture (for all others); and *The Economic Times*, 31 December 2012 (for 2012-13 milk, egg and meat). This table is reproduced from Nair(2013)

**Table 10: F-Statistics Calculated by the 5th Order VEC Model
(April 2005 to November 2012)**

	ΔLNAGRI	ΔLNWPI	$\Delta \text{LNUNSKILL}$
ΔLNAGRI	0.64	1.25	5.04**
ΔLNWPI	2.18*	2.79**	1.45
$\Delta \text{LNUNSKILL}$	0.70	2.99**	2.36*

Notes: * indicates rejection of the null at least at the 5 percent significance level.

** indicates rejection of the null at least at the 1 percent significance level.

The first result implies that a rise in rural wages of unskilled workers tends to put upward pressure on agricultural wages. This seems reasonable as various studies mentioned earlier in this section of the paper have shown a rise in real casual labourer wages due to public works programmes (i.e. MGNREGA), with estimates ranging from 5 percent to 8 percent. The second result indicates that agricultural wage is a significant determinant of movements in food prices. The result also supports the argument made earlier in the paper. Increased agricultural wages can affect food prices in two ways: first, by increasing the demand for wage goods and second, by increasing the input cost for agriculture. However, as mentioned earlier, the increase in demand for wage goods need not be inflationary provided there is a higher productivity growth. Near stagnant agricultural productivity growth of the recent past has caused the inflationary pressure to be passed on to output prices. In the case of the third result: apart from its own past values the rural wages of unskilled workers too have been affected by food prices.

The increased prices (Figure 4) of different components of food articles may be divided into two periods- April 2005 to December 2009 and the post December 2009 period. The growth in cereal (a representative of low value food item) prices started to increase well before September 2007 the month that the rural real wages for agricultural workers and non-agricultural workers started to grow. So, it is difficult to link up this phase of inflation of cereal

primarily with demand side factors. The inflation rate of Egg, Meat and Fish (a representative of high value food item) shows a declining trend during this first period. January 2010 onwards shows a rapid inflation rise of this group. Before August 2008 the agricultural real wages were, on average, lower than in the second half of 2004 to the first half of 2005. During September 2008 to mid 2010 inflation was marginally higher than in the second half of 2004 to the first half of 2005. From the second half of 2010 agricultural wages went up rapidly.

To sum up all the pieces of empirical evidence, including those mentioned in the two paragraphs above, fit into the story that from the beginning of 2010, a higher demand for high value food items, has created an inflationary expectation about the increasing food prices (which may be further stoked by increasing energy prices and occasional price hikes due to supply shock and speculation in one or two food products like onion, tomato etc.) in general led to workers, including rural workers, to ask for higher nominal wages. And due to the implementation of various public programmes including MGNREGA, rural unskilled non-agricultural workers are in a better bargaining position, since, they are much smaller in number; it did not increase the food prices via increasing demand. It has, however, enabled the agricultural workers to demand higher real wages. This, in turn, has pushed up the food prices.

4. CONCLUDING REMARKS

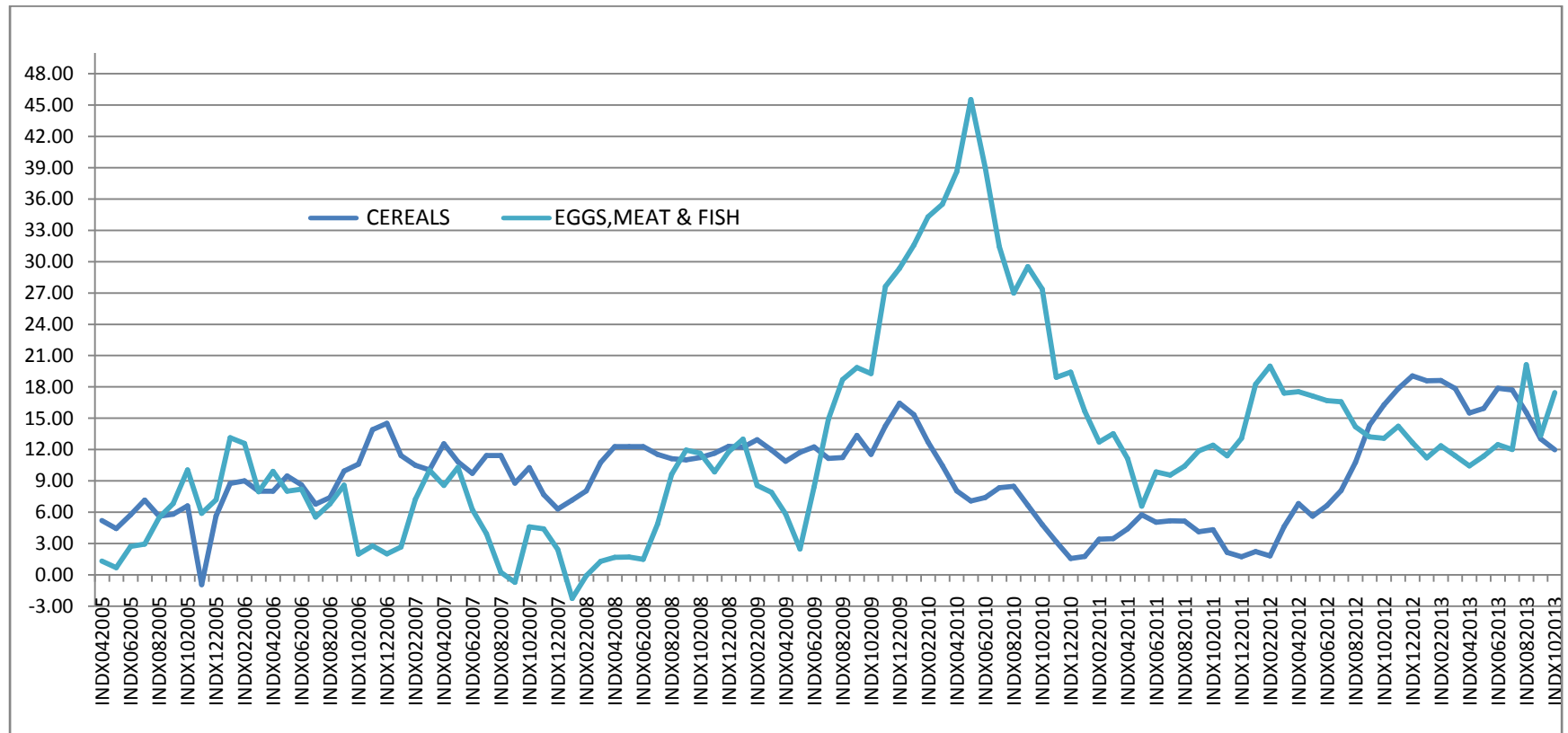
This paper argues that real rural wages have been on the increase not because of any Lewisian transformation or growth in the rural construction sector. From the existing literature it argues that there is the possibilities of the increasing bargaining power owed to public works programme and they are induced to bargain more wages due to food price inflation. The increase in agricultural wages has been pushing up food prices primarily through the rising cost of production. But the greater demand for high value food items has been an important contributor to food inflation in the post 2009 period.

The increase in rural real wage is limiting the adverse impact of rising food inflation on the standard of living of the rural unskilled and agricultural workers which constitute a large majority of the population. But there is a need to contain the food inflation as the rural wages are increasing not because of any Lewisian transformation; the high food inflation will have adverse impact on industrial growth. High growth of industries is required for a sustainable growth of the economy, as industries have the highest backward and forward linkages with the rest of the economy (Guha, 2013). But, the solution for reducing the food inflation has to come through increasing the productivity, reducing the costs of inputs like energy, seeds and fertilisers; not by squeezing the demand for food. For this the State need to change the nature of its intervention. They should withdraw taxes on energy used in agriculture and transportation of agricultural commodities, invest more in rural infrastructure including irrigations, roads, cold storages, encourages Farmer's marketing and input procurement Co-operative etc.

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Figure : 4



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Appendix 1 : VAR Lag Order Selection Criteria

VAR Lag Order Selection Criteria						
Endogenous variables: LNAGRI LNWPILNUNSKILL						
Exogenous variables: C						
Date: 10/24/13 Time: 11:23						
Sample: 2004M04 2012M11						
Included observations: 96						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	384.8300	NA	7.04e-08	-7.954791	-7.874656	-7.922399
1	928.6200	1042.264	1.02e-12	-19.09625	-18.77571*	-18.96668*
2	934.2643	10.46560	1.10e-12	-19.02634	-18.46539	-18.79959
3	941.6573	13.24565	1.14e-12	-18.99286	-18.19150	-18.66894
4	953.1988	19.95728	1.08e-12	-19.04581	-18.00404	-18.62471
5	967.6421	24.07217	9.68e-13	-19.15921	-17.87704	-18.64094
6	978.7937	17.88900*	9.32e-13*	-19.20404*	-17.68145	-18.58858
7	986.2738	11.53179	9.70e-13	-19.17237	-17.40938	-18.45974
8	994.0179	11.45482	1.01e-12	-19.14621	-17.14281	-18.33640
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

Appendix 2 : Vector Error Correction Estimates

CointegratingEq:	CointEq1		
LNAGRI(-1)	1.000000		
LNWPI(-1)	0.035714 (0.15816) [0.22580]		
LNUNSKILL(-1)	-0.707161 (0.08437) [-8.38125]		
@TREND(04M04)	-0.004697 (0.00100) [-4.71767]		
C	-1.252034		
Error Correction:	D(LNAGRI)	D(LNWPI)	D(LNUNSKILL)
CointEq1	-0.221455 (0.04050) [-5.46828]	-0.095196 (0.07824) [-1.21664]	-0.152788 (0.02746) [-5.56443]
D(LNAGRI(-1))	0.022179 (0.12148) [0.18257]	0.489096 (0.23470) [2.08390]	0.018872 (0.08236) [0.22913]
D(LNAGRI(-2))	0.059878 (0.11884) [0.50386]	0.522191 (0.22960) [2.27434]	0.028782 (0.08057) [0.35722]
D(LNAGRI(-3))	0.095199 (0.12011) [0.79262]	0.193671 (0.23205) [0.83459]	0.140960 (0.08143) [1.73099]

D(LNAGRI(-4))	0.196707	0.125833	0.023057
	(0.11925)	(0.23040)	(0.08085)
	[1.64955]	[0.54616]	[0.28518]
D(LNAGRI(-5))	0.073045	-0.259489	-0.036864
	(0.12002)	(0.23188)	(0.08137)
	[0.60862]	[-1.11908]	[-0.45303]
D(LNWPI(-1))	0.018843	0.107207	-0.017122
	(0.05686)	(0.10986)	(0.03855)
	[0.33138]	[0.97584]	[-0.44411]
D(LNWPI(-2))	0.016979	-0.297105	0.023240
	(0.05442)	(0.10515)	(0.03690)
	[0.31198]	[-2.82560]	[0.62982]
D(LNWPI(-3))	0.071055	0.169055	0.098741
	(0.05598)	(0.10815)	(0.03795)
	[1.26934]	[1.56313]	[2.60164]
D(LNWPI(-4))	0.014958	-0.201299	0.056901
	(0.05432)	(0.10494)	(0.03683)
	[0.27539]	[-1.91820]	[1.54511]
D(LNWPI(-5))	-0.081876	-0.096489	-0.033578
	(0.05523)	(0.10671)	(0.03745)
	[-1.48246]	[-0.90425]	[-0.89671]
D(LNUNSKILL(-1))	-0.156244	-0.409315	-0.250026
	(0.19600)	(0.37868)	(0.13289)
	[-0.79717]	[-1.08090]	[-1.88148]
D(LNUNSKILL(-2))	0.059126	0.140602	-0.010377
	(0.19686)	(0.38035)	(0.13347)

	[0.30034]	[0.36966]	[-0.07775]
D(LNUNSKILL(-3))	-0.127920	-0.048755	-0.066176
	(0.18749)	(0.36224)	(0.12712)
	[-0.68228]	[-0.13459]	[-0.52059]
D(LNUNSKILL(-4))	-0.764929	-0.822256	-0.122293
	(0.18481)	(0.35707)	(0.12531)
	[-4.13891]	[-2.30278]	[-0.97596]
D(LNUNSKILL(-5))	-0.618835	-0.225220	-0.325860
	(0.19086)	(0.36876)	(0.12941)
	[-3.24229]	[-0.61075]	[-2.51811]
C	0.021672	0.012743	0.015497
	(0.00363)	(0.00701)	(0.00246)
	[5.97605]	[1.81878]	[6.30289]
R-squared	0.479597	0.378141	0.557959
Adj. R-squared	0.376802	0.255305	0.470642
Sum sq. resids	0.006145	0.022937	0.002825
S.E. equation	0.008710	0.016828	0.005905
F-statistic	4.665541	3.078417	6.390047
Log likelihood	335.1247	270.5834	373.2074
Akaike AIC	-6.492341	-5.175171	-7.269540
SchwarzSC	-6.043929	-4.726758	-6.821127
Mean dependent	0.010398	0.007642	0.010507
S.D. dependent	0.011033	0.019500	0.008116
Determinant resid covariance (dof adj.)		5.39E-13	
Determinant resid covariance		3.04E-13	
Log likelihood		995.0750	
Akaike information criterion		-19.18520	
Schwarz criterion		-17.73446	