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IS URBAN GROWTH GOOD FOR RURAL INDIA?*

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*The views expressed in the paper do not imply the expression of any opinion on the part of the United Nations Secretariat.
**Future Capital Research, India.

IS URBAN GROWTH GOOD FOR RURAL INDIA?

Rapid changes in the country's consumption and production patterns require a more nuanced understanding of the integration between urban and rural India, rather than falling back on traditional myths about the urban-rural divide.

We focus on the impact of growing urban consumption on rural employment and incomes. Using an econometric approach, we find that a 100 rupee increase in urban consumption could lead to an increase in rural household incomes of up to 39 rupees.

Our model suggests that a sustained urban household consumption growth rate could lead to 6.3 million new nonfarm jobs in rural areas and $91bn in real rural household income over the next decade.

The results reflect a relationship between urban and rural India that is largely ignored at the corporate and policymaking level. Urban demand could be one important—and largely overlooked—engine helping to drive a crucial shift from farm to nonfarm employment in rural India.

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HIGHLIGHTS

A casual read of the nation's papers would suggest that India's 'two economies'—urban and rural—are growing further apart each day. The consensus appears to be that growth, especially over the past few years, has focused on urban India, leaving rural India behind. **In the following pages, we counter some myths about the rural economy.** For example, in reality:

- The rural nonfarm economy is growing at a faster clip relative to the urban economy. The process of urbanization is actually occurring at too slow a rate.
- The rural economy can no longer be confused with the agricultural economy. With the non-farm sector fueling just about half of the economy, rural India has diversified markedly over the past two decades.
- Rural-urban inequality has turned around since 2000, and the spending gap between rural and urban India is starting to converge.

Rapid changes in the country's consumption and production patterns will require a more nuanced understanding of the integration between urban and rural India, rather than falling back on traditional myths about the urban-rural divide. In this piece, we focus on the consumption link; or in other words, the impact of growing urban consumption on rural employment and incomes.

Using an econometric approach to analyze national data spanning the past 26 years, we find that **a 100 rupee increase in urban consumption could lead to an increase in real rural household incomes of up to 39 rupees.**

Our model suggests that a sustained urban household consumption growth rate, similar to that seen over the last decade, **could lead to 6.3 million nonfarm jobs in rural areas and $91bn in rural household income over the next decade.**

The role of the non-farm economy is key to this story. An important channel through which urban consumption influences rural income is by generating nonfarm employment. **A 10% increase in urban expenditure is associated with a 4.8% increase in rural nonfarm employment.**

This channel is crucial in light of the fact that arguably, the country's most serious challenge is to find employment for semi-skilled labor. In a situation where agricultural capacity becomes limited and the urban economy is not able to fully absorb a growing labor force, the rural non-farm sector could act as an outlet for surplus semi-skilled labor. **Urban demand could be one important—and largely overlooked—engine helping to drive this shift from farm to nonfarm employment in rural India.**

The results reflect a relationship between urban and rural India that is largely ignored at the corporate and policymaking level. Growing urban demand could provide a significant boost to the rural economy as supply chains strengthen across the country. The continuing lack of adequate urban infrastructure and flexible labor policies means that production processes will further branch out into rural India.

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THE URBAN–RURAL DIVIDEND

Step into any corporate or policymaking discussion about contemporary India, and odds are that you will come across a reference to India's rural-urban divide. For the near-devotional status this issue has become, still little is understood about how the rural and urban economies in modern India actually interact with one another[1].

The roots of the rural-urban debate run deep, and stem from the country's post-independence industrialization strategy, which focused on capital-intensive industrialization and urban infrastructure at the expense of agricultural investment and rural land reform. Today, while there are still compelling reasons to look at the rural and urban economies as distinct from one another (employment patterns, infrastructure availability, financial services penetration), these reasons are not the ones typically referred to in the debate.

A casual read of the nation's papers would suggest that India's 'two economies'—urban and rural—are growing further apart each day. The consensus appears to be that growth, especially over the past few years, has focused on urban India, leaving rural India behind. In the following pages, we counter some myths about the rural economy. For example, in reality:

- The rural nonfarm economy is growing at a faster clip relative to the urban economy. The process of urbanization is actually occurring at too slow a rate.
- The rural economy can no longer be confused with the agricultural economy. With the non-farm economy fueling just about half of the economy, rural India has diversified markedly over the past two decades.
- Rural-urban inequality has turned around since 2000, and the spending gap between rural and urban India is starting to converge.

Rapid changes in the country's consumption and production patterns will require a more nuanced understanding of the integration between urban and rural India, rather than falling back on traditional myths about the urban-rural divide. Linkages between rural and urban economies typically fall into four buckets: production relationships ('backward' or 'forward' supply of inputs among businesses); consumption relationships (demand for final products); financial linkages (remittances, rural savings channeled through urban intermediaries); and migration.

In this piece, we focus on the consumption link; or in other words, the impact of growing urban consumption expenditure on rural employment and incomes. Using an econometric approach to analyze national data spanning the past 26 years, we **find that a 100 rupee increase in urban consumption could lead to an increase in rural household incomes of up to 39 rupees.**

Our model suggests that a sustained urban household consumption growth rate, similar to that seen over the last decade, **could lead to 6.3 million nonfarm jobs in rural areas and $91bn in real rural household income over the next decade.**

[1] Official sources classify urban areas based on the following definition:
- All places declared by the state government under a statute as a municipality, corporation, cantonment board or notified town area committee; and

All other places which simultaneously satisfy or are expected to satisfy the following criteria:
- A minimum population of 5,000; at least 75 percent of the male working population engaged in non-agricultural economic pursuits; and a density of population of at least 400 per square kilometer (1,000 per square mile).

All other areas fall under the rural classification. At the time of 2001 Census there were 6.38 lakh villages and 5,161 towns including 502 statutory towns and 636 census towns in India.

The role of the non-farm economy is key to this story. An important channel through which urban consumption influences rural income is by generating nonfarm employment. A 10% increase in urban expenditure is associated with a 4.8% increase in rural nonfarm employment. This channel is crucial in light of the fact that arguably, the country's most serious challenge is to find employment for semi-skilled labor. Clearly, agricultural growth—even envisaging improved productivity—will not sustain the rural economy. At the moment, the country's average yield per hectare is roughly half that of China, although the agricultural sector employs roughly six million more people. In contrast, India employs just seven million people in the formal manufacturing sector, compared to more than a hundred million in China.

In other words, it is precisely these linkages—if understood properly—that could provide a key leg in answering the country's semi-skilled employment crisis. In a situation where agricultural capacity becomes limited and the urban economy is not able to fully absorb a growing labor force, the rural non-farm sector could act as an outlet for surplus semi-skilled labor. Urban demand could be one important—and largely overlooked—engine helping to drive this shift from farm to nonfarm employment in rural India.

Before discussing these results, in the next section we would like to frame the figures in a better understanding of what today's rural economy really looks like, rather than what we think it looks like. This is crucial in understanding how the links between urban and rural India may evolve, and especially why the rural nonfarm economy is so important.

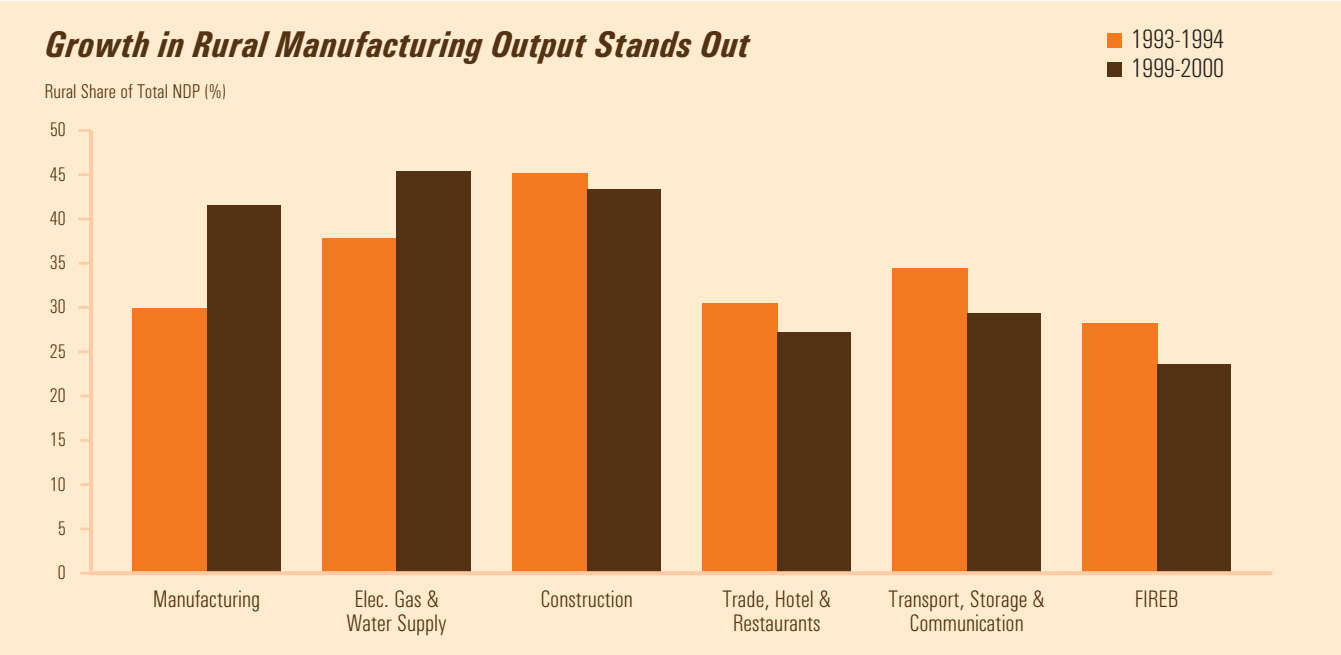
An important channel through which urban consumption influences rural income is by generating nonfarm employment.

THREE URBAN MYTHS ABOUT CONTEMPORARY RURAL INDIA

Myth 1: Faster economic growth in urban India vis-à-vis rural India is driving rapid urbanization.

In reality, the rural nonfarm economy has grown faster than the urban economy over the past two decades. Estimates of economic growth suggest that the rural nonfarm economy has grown on average by 8.4% year-over-year against 8.2% in the urban sector. At 7.0%, per capita rural nonfarm income growth has been more than that of urban India's 6.5% (though off of a significantly lower base). The latest CSO figures show that the rural economy accounted for just under half of India's total NDP. Growth in rural manufacturing output stands out among all rural activities.

The view that the country's income growth is fueling rapid urbanization is also amiss. Slow rates of rural-urban migration coupled with declining rates of natural increase in urban areas means that the **process of urbanization is actually slowing down as economic growth is taking off**—peculiar for the country's current stage of development. Among comparable developing countries, India stands out for both its low level of, and lack of change in, urbanization (see chart on the following page).



Source: Central Statistical Organization, FCH calculations

Rakesh Mohan, deputy governor of the Reserve Bank of India, expresses this imbalance best and largely attributes it to two factors: policies which have discouraged urban industrial employment (such as small-scale reservations that inhibit industrial growth of labor-intensive industries); and a critical lack of urban infrastructure investment. According to him, India's problem is that urban growth has in fact been too slow over the past two decades, and needs to accelerate further. Our results in the following section support this view.

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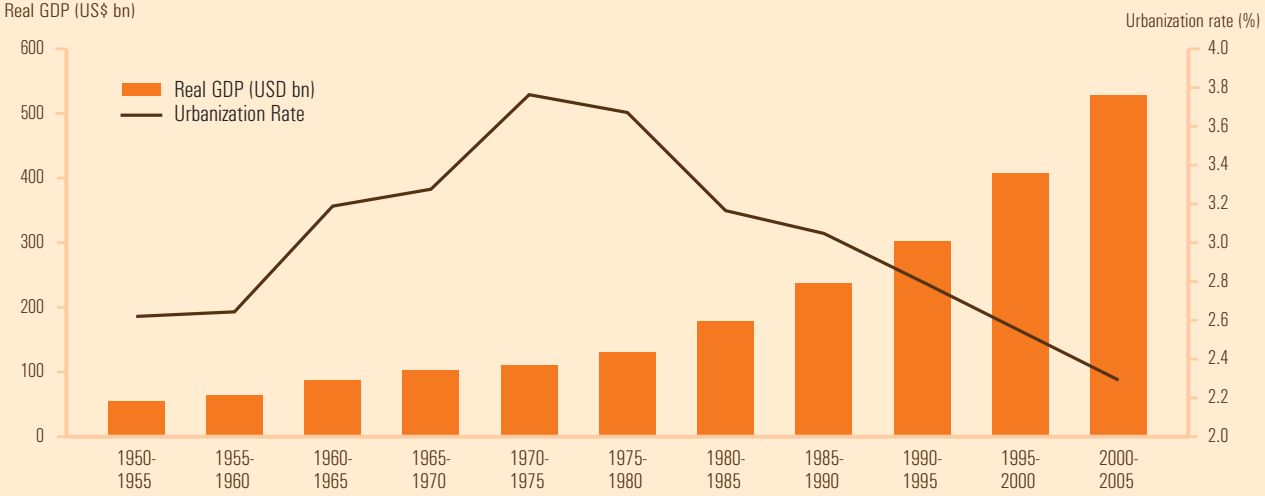
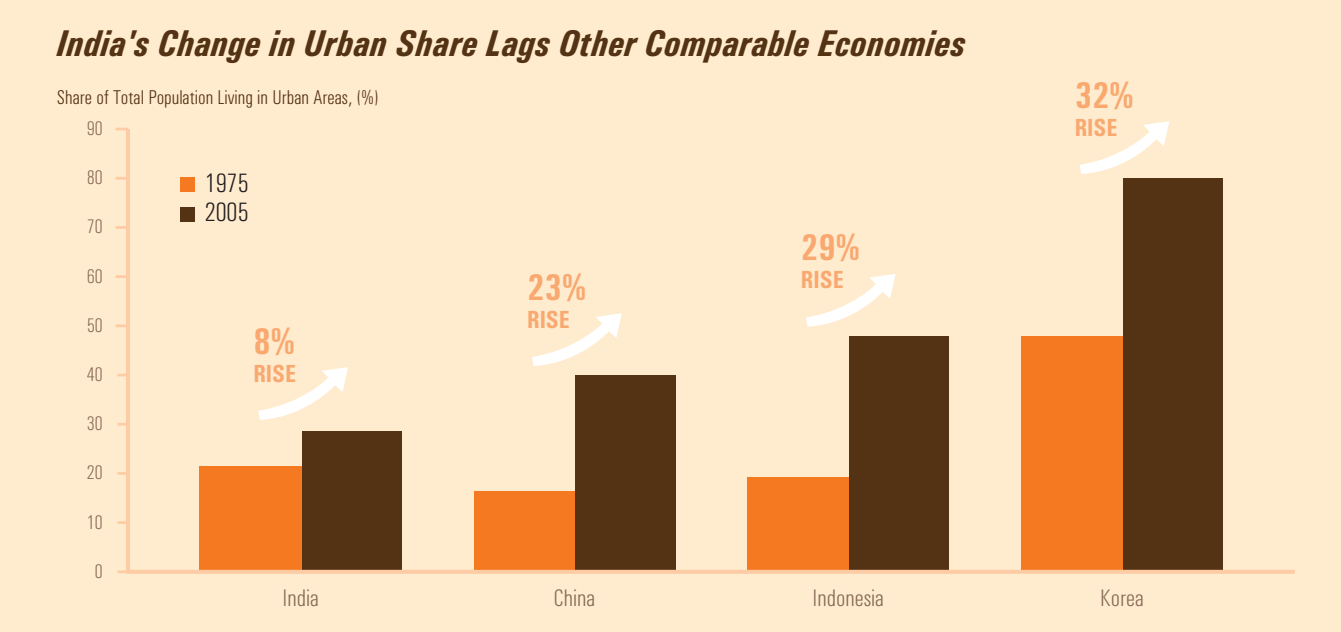
Economy Growing, Urbanization Slowing?



Source: Central Statistical Organization, UN Population Division



Source: UN Population Division

The apparent lack of internal migration may run counter to anecdotal commentary, but the national data bear this out. Census data show that rural-urban migration as a share of total rural population amounted to 2.8% in 2001, and this figure has fallen from 6.5% in 1981. The Census also shows that less than 17% of men live in a location different from their place of birth.

Academic surveys echo this: using national household survey data, a recent paper by Petia Topalova highlights the fact that in urban areas 13% of people have changed their district or sector (from rural to urban, or vice versa), and this pattern has remained constant over time. Less than 4% of the population in urban areas migrated due to economic considerations[2]. Munshi and Rosenzweig find that in a representative sample of rural households between 1982 and 1999, migration rates of men out of their origin villages were low and actually declined from 10% in 1982 to 6% in 1999[3].

However, the mobility story is somewhat less bleak than the surveys suggest because the data often fall short in capturing seasonal migrant spells or urban commuting that feature in rural households. For example, in a survey of rural employment in the Indian state of Gujurat done in the early 1990s, it was found that 25% of rural male non-farm workers commuted to urban areas for work[4].

[2] Topalova, P. (2005), 'Trade Liberalization, Poverty, and Inequality: Evidence from Indian Districts,' NBER Working Paper #11614.
[3] Munshi, K. and M. Rosenzweig (2005), 'Why is Mobility in India So Low? Social Insurance, Inequality and Growth', BREAD Working Paper N.092.
[4] Basant, R. (1994), 'Diversification of Economic Activities in Rural Gujurat: Some Evidence at the Micro-Level,' Ch. 4 in Basant, R., Kumar, B.L. and R. Parthasarthy (eds.) 'Non-Agricultural Employment in Rural Gujurat: Patterns and Trends'.

Myth 2: Rural India is still an agricultural economy.

The composition of the rural economy has undergone a dramatic transformation since the early 1970s, so that now rural India is much less the agri-economy it used to be. Although the national accounts data on urban and rural GDP are slightly dated, they give a good indication of the often-ignored structural changes at work in rural India's economy.

As of 2000, agriculture accounts for just over half (51.8%) of rural economic activity, down from 64% in the early 1980s and 72% in 1971. Services now account for 28% of rural activity, up from 21% in 1981, while manufacturing, utilities and construction have nearly doubled their share in the rural economy to 18% in 2000 from just under 10% in 1971. Growth in nonfarm activity[5] over the past decade has been led by three industries: manufacturing; construction; and trade, hotels and restaurants.

Real manufacturing output in rural India has grown by five times since 1971, against 2 times for urban India, leading the rural economy to gain 16ppt in national manufacturing and 10ppt in services. The rural economy accounts for 42% of total manufacturing output and 27% of services as of 2000.

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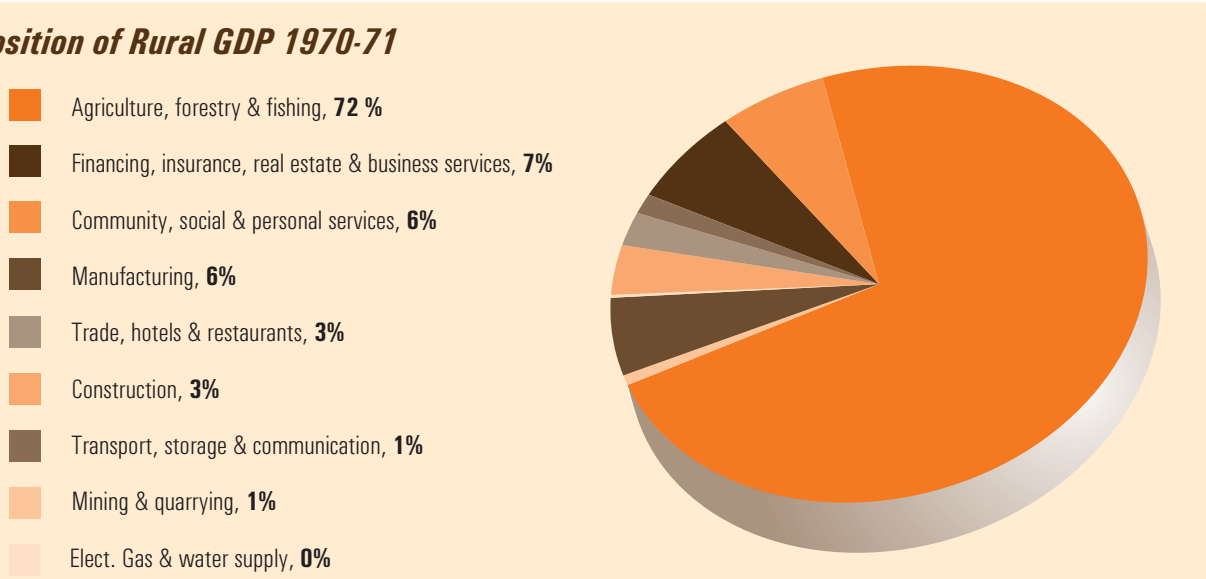
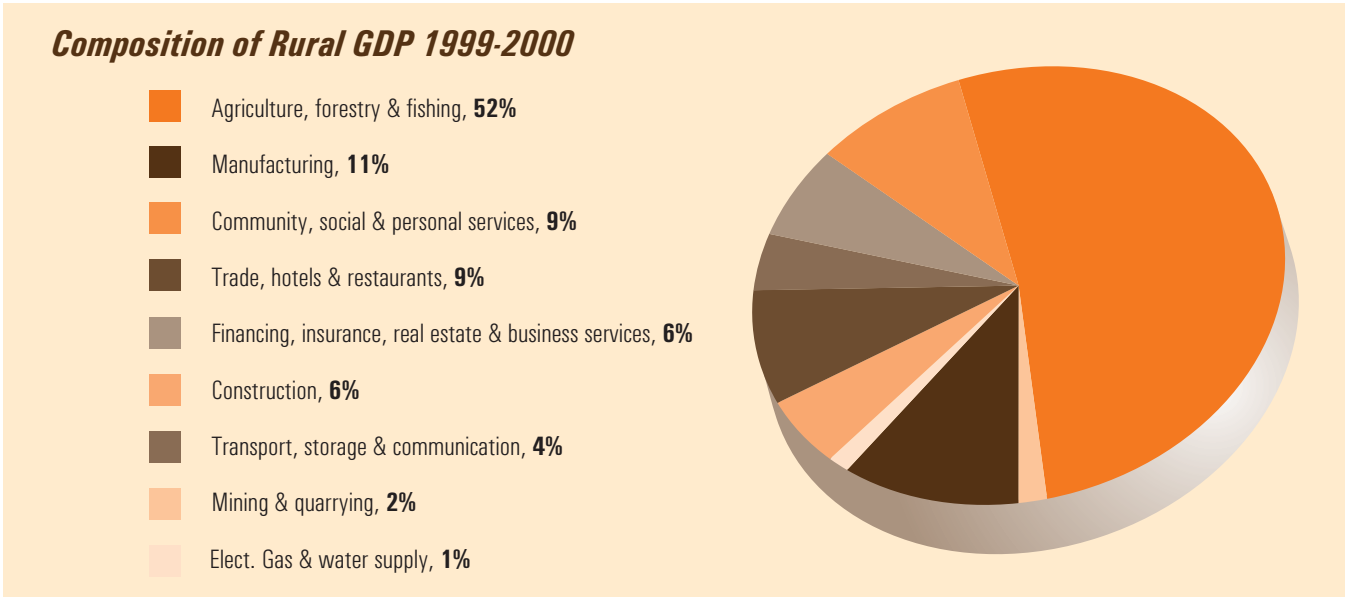
Composition of Rural GDP 1970-71



Source: Central Statistical Organization

[5] The rural nonfarm sector includes mining and quarrying; household and non-household manufacturing; processing; repair; construction; trade and commerce; transport and other services.

Composition of Rural GDP 1999-2000



Source: Central Statistical Organization

The problem is that employment has not kept apace, largely due to inflexible labor markets. While the rural nonfarm economy stands at just under half (48.2%) of rural income, it accounts for less than a third (27.3%) of rural employment.

Rural agricultural employment growth is startingly low at just 1% between 2000 and 2005, suggesting that whatever growth has taken place in the agricultural sector has been effectively jobless. The 20% growth rate of employment in the nonfarm sector, in contrast, has been positive and significant during the past five years. Construction, trade and FIREB (finance, insurance, real estate and business services) services have recorded the highest growth rate over the past five years, although these industries were starting off of a modest base at 9% of rural employment, growing to 14% in 2004-5.

Getting an accurate read on trends in labor productivity is notoriously difficult given data constraints, but the NSS surveys on employment give us an indication of the direction in which real wages are moving[6]. The non-farm wage premium has grown in the past five years, at a rate similar to that seen in the late 1990s. While the disparity between urban and rural wages have reduced dramatically in agriculture, mining, manufacturing and trade, the gap in utilities, construction, transport, FIREB and CSP has grown in the past five years. The difference between urban and rural wages is slimmest for agriculture, manufacturing and trade.

[6] The NSS tracks wages in the wage and salary category only (self-employed and casual workers are not documented). While this accounts for less than 10% of the workforce, it is the best and most timely proxy for rural/urban wages that currently exists.

Myth 3: Rural-urban inequality is on the rise.

Among all of the India-China comparisons currently flourishing, rural-urban inequality is one trend that is evolving quite differently in the two economies. In China, one of the most widely recognized features of growth over the past decade is the country's accompanying rural-urban inequality. Available data indicates a growing urban-rural income gap (the ratio of mean urban to rural incomes), with a significant increase to over 3 today from around 1.8 in the late 1980s. The data indicate that increases in rural-urban income differentials have been the driving factor behind rising overall inequality in China[7]. In contrast, for India the urban-rural income gap has diminished to 2.8 from 3.3 in the early 1990s.

However, this does not mean that the inequality picture is rosy in India. Urban households report almost twice the nominal expenditure reported by rural households. For 2004-05, average monthly household spending in an urban household amounts to 88% more than that in a rural household.

In absolute terms, both urban spending and urban spending inequality have been consistently higher than rural spending and inequality. On the basis of Lorenz ratios (or gini coefficients)[8], the distribution of expenditure per capita has worsened in both urban and rural India over the past 5 years, but it has deteriorated far further in the urban sector. This comes after an improvement in spending equality—particularly within rural India—in the late 1990s.

The rural-urban spending gap, which widened in the 1990s, has started to close in the past five years. Between 2000 and 2005, real rural household consumption expenditure grew by 8% against 4% in urban India. Looking at total rural expenditure as a proportion of urban expenditure, we see that the trendline (which was initially downward sloping) is now rising with the point of inflection occurring around the year 2000-01. As expected, swings in non-food expenditure are much more exaggerated than in food expenditure.

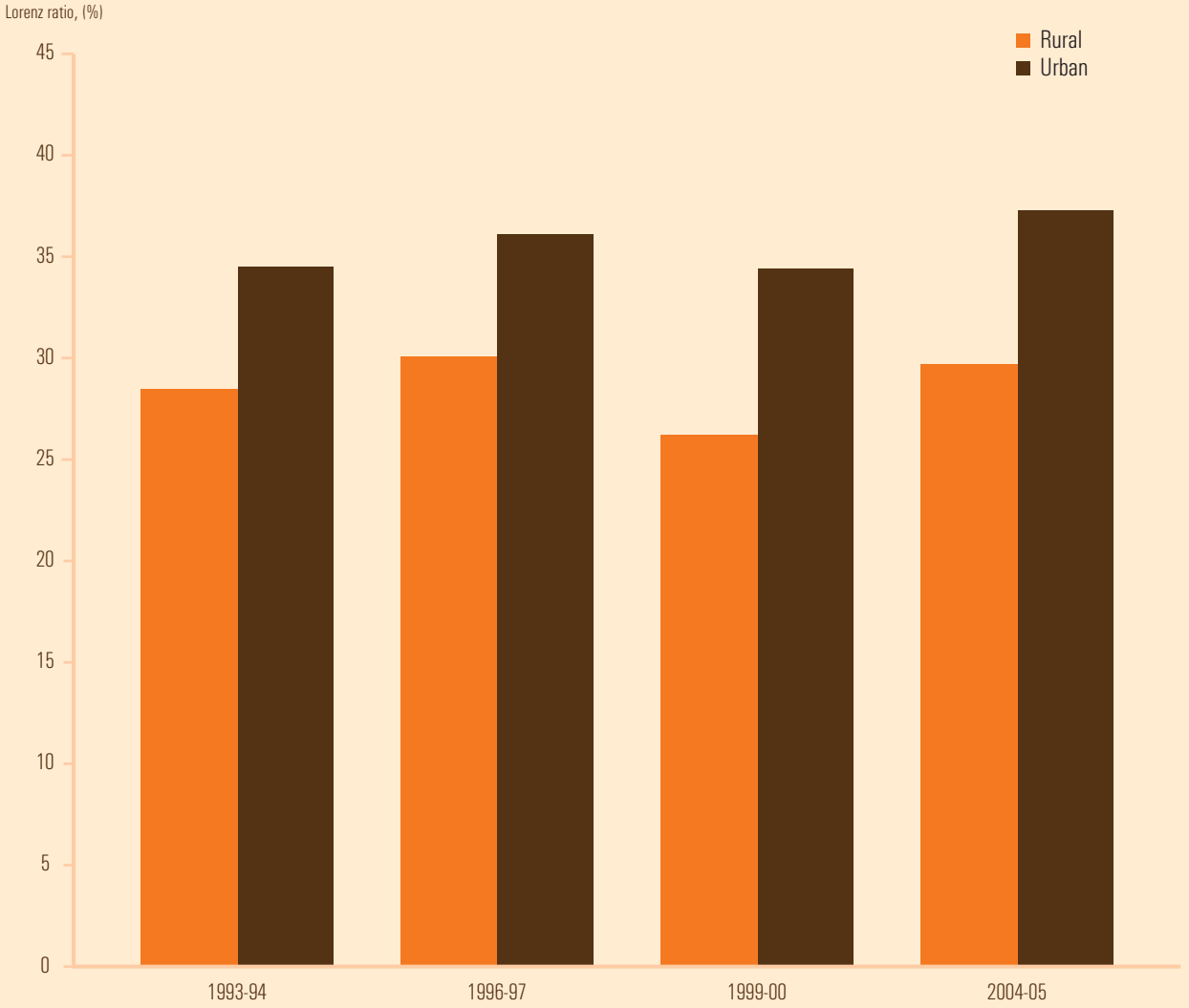
The top 10% of Indian households spend close to double that of the next highest income decile (in rural India, the top 10% spend 1.6 times the next highest 10%; in urban India this figure is 1.8). While the spending gap between urban and rural is closing in lower income households, the gap is widening in higher income groups. In urban India, the higher income groups report the most growth in real expenditure between 2000 and 2005; in contrast, the largest spending increases in rural India are in the lowest two deciles.

The rural-urban spending gap, which widened in the 1990s, has started to close in the past five years.

[7] Dennis Tao Yang (1999), 'Urban-biased policies and rising income-inequality in China', American Economic Review, Vol 89, No. 2, Paper and Proceedings of the One-Hundred Eleventh Annual Meeting of the American Economic Association, p306-310.

[8] The Lorenz ratio, or Gini coefficient, is the most commonly used measure of inequality (or the degree of concentration) in a variable. For our purposes, 0 corresponds to perfect income equality (i.e. everyone has the same income) and 1 corresponds to perfect income inequality (i.e. one person has all the income, while everyone else has zero income). The NSS calculates Lorenz ratios for India using data from their consumer expenditure surveys.

Inequality Worsening More In Urban Areas Than in Rural



Source: National Sample Survey Organization

A LINK BETWEEN URBAN AND RURAL INDIA

On the surface, analyzing urban consumption and rural income runs into many classic text-book econometric challenges. Urban household consumption and rural household income data are highly correlated, given that both variables are jointly affected by a host of other variables related to overall growth conditions—in this case potential omitted variables were given a considerable amount of attention. Given the expected caveat about significant data limitations, we are able to present our best guess—supported by empirical evidence—that part of urban expenditure directly influences rural household incomes.

Our real household income data comes from NCAER's Market Information Survey of Households (MISH), one of the country's most comprehensive primary sources of household income and spending. Real per capita urban expenditure data comes from the National Sample Survey Organization (NSSO) Consumer Expenditure Survey (see appendix for details on data sources).

A ROUGH CUT: THE CROSS-SECTION EVIDENCE

As a first check, we analyze cross section data (data on incomes and expenditure across various states for a given period in time; in this case we analyze the point-to-point difference in our variables between the years 1983 and 2001), placing rural household income as a function of urban consumption expenditure. Given data availability, we focus on 15 major states of India, accounting for 90% of total population[9]. By modeling the change in rural income over time, we control for other factors that may influence the relative level of income in a given state relative to other states, even if they are unobservable.

In addition to urban expenditure and in light of other work on household incomes, we include two other explanatory variables to the model: the initial level of rural income (RY_83); and the initial level of rural literacy in 1983 (RLIT_83). These variables

As a first check, we analyze cross section data, placing rural household income as a function of urban consumption expenditure.

[9] The following states are included in the cross-section analysis: Haryana; Madhya Pradesh; Punjab; Uttar Pradesh; Gujarat; Maharashtra; Rajasthan; Andhra Pradesh; Karnataka; Kerala; Tamil Nadu; Assam; Bihar; Orissa and West Bengal.

take into account different initial conditions across states. In order to introduce rural population as a control, and also to address potential issues of stationarity, we divided all our variables by initial rural population.

These variables were selected after some scrutiny to achieve the best overall fit for the regression (but without taking into account the significance of the coefficient on urban consumption). In determining potential omitted variables, we considered variables such as the degree of urbanization; share of arable land; climate indicators; rural population density; and distance to major markets. Our findings show that these variables are not in fact omitted variables, or in certain cases data did not exist back to 1983. In looking at various infrastructure indicators, we found that our literacy and electrification variables influence rural income in a similar manner. Given that the two are highly correlated, we only included the literacy variable—the more significant of the two—in the final specification.

In the end, rural household income is expressed as a function of a constant, urban consumption expenditure, initial rural income levels and initial rural literacy levels (see box below). We expressed all variables in logarithmic form to interpret the coefficients in terms of elasticity (i.e., we can infer the percentage change in the dependent variable given a percentage change in the independent variable).

The results of the cross-section regression show that urban expenditure, initial rural income levels and initial rural literacy rates move with rural household income in the expected direction. Urban expenditure is significant at the 94% level and the initial rural income variable is significant at the 93% level, while rural literacy is significant at the 89% percent level. In summary, a 10% increase in:

- urban expenditure is associated with a 3.8% increase in rural household income;
- the initial state level of rural income is associated with a 15.2% increase in rural household income (underscoring the idea that starting points do, in fact, matter); and
- the initial level of rural literacy is associated with a 5.7% increase in rural household income.

To check for robustness, we perform a number of tests including endogeneity tests, which check for possible misspecification of the independent variables (see appendix for details). In addition, the model is heteroskedasticity-consistent (the variables do in fact have different variances).

Because of the inherent limitations of cross-section data, we take these initial results as indicative of the direction in which our variables move, but give less weight to the actual coefficients. For a fuller look, we turn to the timeseries evidence.

Log (DRY/RPOP_83) = -4.14+0.38Log(DUCON/RPOP_83)+1.52Log(RY_83/RPOP_83)+0.57Log(RLIT_83/RPOP_83)

where:
DRY= change in rural household income between 2001 and 1983
DUCON=change in urban consumption expenditure between 2001 and 1983
RY_83= level of rural income in 1983
RLIT_83= literate rural population in 1983
RPOP_83=rural population in 1983

A CLOSER LOOK: THE TIMESERIES EVIDENCE

Our timeseries model is based on all-India data spanning the years 1980/81-2005/06. We detrend the data by taking the first difference of all the variables before including them in the regression. Our dependent variable remains rural household income. The derived structural equation includes an explanatory variable covering public investment in agriculture (PUBINVAGRI) in addition to urban consumption expenditure. Public investment in agriculture acts as a proxy for the impact of agricultural investment on rural incomes. All variables were then divided by rural population, similar to the approach used in the cross-section exercise.

We looked at a host of other indicators—including literacy rates; an infrastructure index; policy dummies; and industry-agriculture terms of trade—before settling on the final set of variables. Our timeseries model specifies per capita rural household income as a function of a constant, urban consumption expenditure and public investment in agriculture (all as a share of rural population) (see box below).

The results show that urban consumption expenditure and public investment in agriculture move with rural household income in the expected direction, and both are statistically significant at the 91% and 98% level respectively. A 10% increase in:

- urban expenditure is associated with a 3.9% increase in rural household income per head; and
- public investment in agriculture is associated with a 1.1% increase in rural household income per head.

D(Log(RY/RPOP))=0.05+0.39D(Log(UCON/RPOP))+0.11D(Log(PUBINVAGRI/RPOP))

where:
RY= rural household income
UCON=urban consumption expenditure
PUBINVAGRI=public investment in agriculture (gross capital formation in agriculture)
RPOP=rural population
D=difference operator

The above exercise shows that over time, urban consumption expenditure does in fact exert an important influence on rural income. The next step is to cast light on the channel through which this relationship occurs. Our hypothesis is that the effect of urban expenditure on rural household income may work through rural nonfarm employment (RNFE). Theoretically, the inclusion of rural nonfarm employment should render our urban expenditure variable insignificant. To test this, we extend our time series model with a rural nonfarm employment indicator (rural nonfarm employment data from the NSSO), after dividing it by rural population. The resulting model has rural household income as a function of a constant, urban consumption expenditure, public investment in agriculture and rural nonfarm employment (see box below).

Indeed, we find that the inclusion of rural nonfarm employment dramatically reduces the significance of the urban expenditure variable. Whereas in our initial specification, urban expenditure was significant at the 91% level; now urban expenditure is insignificant (significant at 80% level only). A 10% increase in rural nonfarm employment translates into a 1.7% increase in rural household incomes, at a 98% significance level.

In other words, urban expenditure impacts rural income partly through expanding rural non-farm employment. Related work we have done shows that a 10% increase in urban expenditure could lead to a 4.8% increase in rural nonfarm employment. On conservative estimates, this means that urban household expenditure growth could translate into a boost of 6.3 million rural nonfarm jobs and $91billion in rural household incomes over the next ten years.

As with the cross-section results, we ran robustness checks which we explain in more detail in the appendix. A Granger causality test[10] verified our hypothesis that urban consumption influences rural income, not the other way around. To check for non-stationarity, we followed up our model with an augmented Dicky-Fuller test of the residual.

D(Log(RY/RPOP) = 0.04+0.31D(Log(UCON/RPOP)+0.10 D(Log(PUBINVAGRI/RPOP))+ 0.17 D(Log(RNFE/RPOP)

where:
RY= rural household income
UCON=urban consumption expenditure
PUBINVAGRI=public investment in agriculture (gross capital formation in agriculture)
RPOP=rural population
RNFE=rural nonfarm employment
D=difference operator

[10] A time series X is said to Granger-cause Y if it can be shown, usually through a series of F-tests on lagged values of X (and with lagged values of Y also known), that those X values provide statistically significant information about future values of Y.

CONCLUSION

While we caution that these results are only indicative, given data availability, we think they highlight a relationship between urban and rural India that is virtually ignored at the corporate and policymaking level. Growing urban demand for goods and services could provide a significant boost to the rural economy as supply chains strengthen across the country. The continuing lack of adequate urban infrastructure and flexible labor policies means that production processes could further branch out into rural India.

At the strategic level, the point this piece hopes to convey is that the urban and rural economies are more integrated than we traditionally acknowledge. What happens in urban India matters for rural India's employment and incomes. This paper only focused on one transmission mechanism running from the urban to the rural economy, but there are many more channels running both ways. Although the country tends to focus on distinct rural strategies and rural policies, urban demand may be one important—and largely overlooked—engine helping to drive the shift from farm to nonfarm employment in rural India.

APPENDIX:

I. Data, Definitions and Sources

Urban consumption expenditure data comes from the National Sample Survey Organization's annual Consumer Expenditure Surveys. The NSS carries out quinquennial 'thick' surveys with a sample size of approximately 123,000 households. In between the 'thick' surveys, 'thin rounds' with a much smaller sample size have also been carried out on an annual basis. The NSS collects household consumption expenditure data—focusing mainly on food and durable goods, but also including data on educational and medical expenditures. Since 1970, large surveys were carried out for the years 1973-74, 1977-78, 1983, 1987-88, 1993-94 and 1999-2000. Apart from the large survey, the thin sample survey has been carried out every year since 1994.

Rural household income data comes from NCAER's Market Information Survey of Households (MISH). The survey has been undertaken annually (with a few gaps) by the National Council of Applied Economic Research since 1985-86, and covers roughly 300,000 households. The MISH data are one of the few sources of data on income distribution for India. The survey asks the head of household to estimate household income over the reference period (the prior fiscal year). The MISH concept of perceived household income differs from (and is typically about two-thirds of) the estimate of personal disposable income estimated in the national accounts.

Below are descriptions for the rest of the data used:

CROSS SECTION MODEL:

Variables	Definitions	Source
Rural income (RY) by state	rural household income, converted into 1999-00 prices	Market Information Survey of Households (MISH), NCAER
Urban consumption expenditure (UCON), by state	monthly urban consumption expenditure converted into an annual estimate at 1999-00 prices	NSSO
Rural population (RPOP), by state	population residing in areas classified as rural	Census of India
Rural literacy (RLIT), by state	literate population in rural areas	Census of India

TIME SERIES MODEL:

Rural income (RY)	rural household income, converted into 1999-00 prices	NCAER Market Information Survey of Households (MISH)
Urban consumption expenditure (UCON)	monthly urban consumption expenditure converted into an annual estimate, in 1999-00 prices	NSSO
Rural nonfarm employment (RNFE)	the ratio of nonfarm employment (mining and quarrying; household and non-household manufacturing; processing; repair; construction; trade and commerce; transport and other services) to farm (agricultural) employment.	NSSO
Rural population (RPOP)	population residing in areas classified as rural	Census, mid-year population estimated from various reports
Public investment in agriculture (PUBINVAGRI)	gross capital formation in agriculture by the public sector at 1999-00 prices	National Accounts Statistics (NAS), various issues

II. Cross-Section Results

Table 1: The detailed cross-section results

Dependent Variable: LOG(DRY/RPOP_83)
Method: Least Squares
Sample: 1 15
Included observations: 15

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.14	5.50	-0.75	0.60
LOG(DUCON/RPOP_83)	0.38	0.17	2.22	0.06
LOG(RY_83/RPOP_83)	1.52	0.73	2.09	0.07
LOG(RLIT_83/RPOP_83)	0.57	0.30	1.88	0.11
R-squared	0.67	Mean dependent var		8.48
Adjusted R-squared	0.59	S.D. dependent var		0.48
S.E. of regression	0.34	F-statistic		6.88
Sum squared resid	1.21	Prob(F-statistic)		0.01
Log likelihood	-2.14			
Durbin-Watson stat	3.04			

Note:
DRY = change in rural household income between 2001 and 1983
DUCON = change in urban consumption expenditure between 2001 and 1983
RY_83 = level of rural income in 1983
RLIT_83 = literate rural population in 1983
RPOP_83 = rural population in 1983

Robustness Checks

Table 2: Hausman's Endogeneity Test, Equation 1

Dependent Variable: LOG(DRY/RPOP_83)
Method: Least Squares
Sample: 1 15
Included observations: 15

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.77	0.82	5.91	0.00
LOG(DUCON/RPOP_83)	0.50	0.11	4.83	0.00
LOG(RY_83/RPOP_83)	0.30	0.09	3.29	0.00
R-squared	0.74	Mean dependent var		8.48
Adjusted R-squared	0.70	S.D. dependent var		0.48
S.E. of regression	0.28	F-statistic		16.47
Sum squared resid	0.90	Prob(F-statistic)		0.00
Log likelihood	-0.11			
Durbin-Watson stat	2.22			

Table 3: Hausman's Endogeneity Test, Equation 2

Dependent Variable: LOG(DRY/RPOP_83)
Method: Least Squares
Sample: 1 15
Included observations: 15

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.73	0.80	5.81	0.00
LOG(DUCON/RPOP_83)	0.48	0.10	4.60	0.00
RESID_RELEC	0.29	0.09	3.16	0.01
R-squared	0.73	Mean dependent var		8.48
Adjusted R-squared	0.68	S.D. dependent var		0.48
S.E. of regression	0.27	F-statistic		16.08
Sum squared resid	0.91	Prob(F-statistic)		0.00
Log likelihood	-0.24			
Durbin-Watson stat	2.20			

Note: RELEC: share of rural population with access to electricity (source: Census of India).

Correlation between RESID_RLIT and RESID_RELEC

	RESID_Edu	RESID_RELEC
RESID_RLIT	1.00	0.97
RESID_RELEC	0.97	1.00

Table 4: White's Heteroskedasticity Test

F-statistic	1.51	Probability		0.35
Obs*R-squared	11.35	Probability		0.28
Test Equation: Dependent Variable: $RESID^2$ Method: Least Squares Sample: 1 15 Included observations: 15				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-321.80	123.28	-2.62	0.05
LOG(DUCON/RPOP_83)	-13.30	5.54	-2.41	0.06
$(LOG(DUCON/RPOP\_83))^2$	-0.32	0.15	-2.07	0.09
(LOG(DUCON/RPOP_83))*(LOG(RY_83))	1.57	0.83	1.90	0.12
(LOG(DUCON/RPOP_83))*(LOG(RLIT_83))	1.18	0.61	1.96	0.11
LOG(RY_83)	89.30	33.34	2.69	0.04
$(LOG(RY\_83))^2$	-6.21	2.45	-2.55	0.05
(LOG(RY_83))*(LOG(RLIT_83))	1.10	2.10	0.53	0.62
LOG(RLIT_83)	3.65	14.18	0.26	0.08
$(LOG(RLIT\_83))^2$	-1.82	0.75	-2.44	0.06
R-squared	0.68	Mean dependent var		0.08
Adjusted R-squared	0.20	S.D. dependent var		0.11
S.E. of regression	0.09	F-statistic		1.43
Sum squared resid	0.04	Prob(F-statistic)		0.36
Log likelihood	20.67			
Durbin-Watson stat	1.75			

III. Time Series Model

Table 5: The detailed time-series results

Dependent Variable: D(LOG(RY/RPOP))
Method: Least Squares
Sample (adjusted): 1982 2006
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.05	0.01	4.90	0.00
D(LOG(UCON/RPOP))	0.39	0.22	1.77	0.09
D(LOG(PUBINVAGRI/RPOP))	0.11	0.04	2.72	0.01
R-squared	0.31	Mean dependent var		0.07
Adjusted R-squared	0.24	S.D. dependent var		0.02
S.E. of regression	0.02	F-statistic		4.86
Sum squared resid	0.01	Prob(F-statistic)		0.02
Log likelihood	65.82			
Durbin-Watson stat	2.01			

Note:
RY = rural household income
UCON = urban consumption expenditure
PUBINVAGRI = public investment in agriculture (gross capital formation in agriculture)
RPOP = rural population
D = difference operator

Table 6: Time-series model including RNFE

Dependent Variable: D(LOG(RY/RPOP))
Method: Least Squares
Sample (adjusted): 1982 2006
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.04	0.01	6.08	0
D(LOG(UCON/RPOP))	0.31	0.24	1.32	0.20
D(LOG(PUBINVAGRI/RPOP))	0.10	0.04	2.64	0.02
D(LOG(RNFE/RPOP))	0.18	0.07	2.44	0.02
R-squared	0.35	Mean dependent var		0.05
Adjusted R-squared	0.26	S.D. dependent var		0.02
S.E. of regression	0.02	F-statistic		3.74
Sum squared resid	0.01	Prob(F-statistic)		0.03
Log likelihood	66.40			
Durbin-Watson stat	1.95			

Note:
RNFE = rural nonfarm employment

Robustness Checks

Augmented Dicky Fuller Test of Unit Root (with trend and constant)

	Test Critical Value	
	1% level	5% level
Variables	(-4.38)*	(-3.60)*
Rural_C	-4.44	-3.63
Urban_C	-4.39	-3.61
RY/RPOP	-4.44	-3.63
UCON	-4.39	-3.61
PUBINVAGRI	-4.39	-3.61
INFRA	-4.42	-3.62
RNFE	-4.37	-3.60

Note:
*For sample size 25;

Granger Causality Test

Sample: 1981 2017
Lags: 1
Number of observations: 25

Null Hypothesis:	F-Statistic	Probability
UCON does not Granger Cause PCRURAL	0.09	0.77
RY/RPOP does not Granger Cause UCON	6.60	0.02

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