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Neog, Bhaskar Jyoti and Sahoo, Bimal

IIT Kharagpur, IIT Kharagpur

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Informality in Non-Cultivation Labour market in India with Special Reference to North-East India

Bhaskar Jyoti Neog¹ Dr Bimal Kishore Sahoo²

Abstract: Recent estimate of central statistics office for 2014-15 indicates that share of agriculture in GDP (market price) is about only 14.9 per cent, whereas it employs about 49.5 per cent of India's total workforce. So moving out of agriculture is itself a desirable outcome for improving productivity in agriculture and also of the economy. But the question is "where will the workers of agriculture sector move to?" given the fact that Indian labour market is becoming more and more informal. Therefore, creation of decent jobs outside agriculture is one of the biggest challenges that confront policymakers. The present paper examines the trend and patterns of informal and formal employment in organised and unorganised non-agriculture sectors with special reference to North-East India. The paper, following National Commission for Enterprises in the Unorganized Sector (NCEUS) defined organised and unorganised sector by taking into account enterprise type and number of workers in enterprise. However, where both these information are missing, social security was taken as a yard stick to measure organised or unorganised sector.

We applied logit regressions to find out what are the personal characteristics, household characteristics, and sectoral characteristics to determine the participation in informal sector, and examine whether these determinants are changing over time or not. The study is based on NSSO 2004-05 and 2011-12 employment and unemployment unit level data. The initial result suggests that in the non-agriculture sector, informal employment in unorganised sectors has declined from about 87 per cent to 85 per cent. Thereby it is suggesting, a rise in formal employment within non-cultivation sector. In addition, it is interesting to note that within informal employment in 2004-05 about 29 per cent are female but the corresponding figure for 2011-12 is about 24 per cent. This indicates that proportion of female participation in the informal economy has declined over the years. Similarly it is observed that informality for poorer household has declined for the study period. The logit regression result indicated that being a male reduced the odd of informality by more than 20 per cent in both the periods. Given the slow economic growth in the first half of the new millennium, married female labours were forced to join the informal sector; however, because of rising income in recent past they are not so keen to join the informal employment. Looking at the sectors, it is observed that, being a worker in construction sector and trade, hotel and

¹ Research Scholar, IIT Kharagpur, Kharagpur. Email: bneog8@gmail.com

² Assistant Professor, IIT Kharagpur, Kharagpur. Email: bimalkishore.sahoo@gmail.com

transport sector increased the odd of joining informal sector many fold. This paper also examines these trends, patterns and determinants, with special reference to North-East region. Finally, the paper looks at the determinants of informality at the macro-level using panel data of the Indian states. The study finds a multitude of factors driving informality thereby implying that a multi-pronged strategy would be required to tackle the problem.

Keywords: Labour, Informality, Manufacturing, Social Security, Gender.

1. INTRODUCTION

Labour informality is a very pertinent issue in the current development debate. Its importance is even more in a developing country like India with a significant section of the population living below the poverty line and meagre public provisions for unemployment insurance. This makes unemployment a very unviable alternative for a common man and he is forced take up whatever opportunities that comes his way. In such a scenario looking at the overall unemployment rates doesn't provide a very informative picture of the labour market in the country as a large section of such employment is likely to be of a bare subsistence nature. Hence, it is important to look at the quality of work of the employed which brings to the forefront the issue of labour informality.

The present study examines the trends and determinants of informality in India. Labour informality as a concept has a history going back to the 1970s. Keith Hart, a British ethnographer is credited with discovering the phenomenon and it was he who coined the term 'informal sector'. At about the same time, International Labour Organisation (ILO) launched a number of studies on the phenomenon in Africa (Jütting, Parlevliet, & Xenogiani, 2008). The early conceptualisation of the concept highlighted the informal economy as a residual sector distinct from the formal economy. In the late 1980s, the structuralist school highlighted the close relation between the formal and the informal economy. Still others have emphasized on the role of institutional bottlenecks in creating the incentives to work informally (Chen, 2012). Although there is diversified opinion on the drivers of informality, we can put the different views under two broad groups- informality by choice and informality as exclusion (Perry, Maloney, Arias, Fajnzylber, & Saavedra-chanduvi, 2010). The former premise emphasize the voluntary nature of informality as workers engage in informal work to escape burdensome government taxes and regulations

involved in working formally (Maloney, 2004). On the other hand, the later premise stress the marginal nature of the phenomenon as workers in the absence of decent jobs and unemployment protection are forced to take up job in the informal sector (Chen, Vanek, Lund, Heintz, & Christine, 2005). Some authors take a more nuanced view contending that both the forms of informality may persist in an economy in varying degrees (Perry et al., 2010). Given the diverging views on the drivers of informality, the present study examines the determinants of the phenomenon over time which can provide us with more information on the factors contributing to the phenomenon.

Although the earlier conceptualisation of informality relies on dividing workers on a dichotomous; workers in reality face varying degrees of informality, the most formal of which enjoy multiple degrees of protection, the least formal none at all (ILO 2004). In line with the above argument, the study develops an informality index emphasizing the phenomenon in a continuous scale.

Finally, we study the macro determinants of informality by exploring the variation in the rates of informality across states with respect to various state specific macro variables. The literature on informality ascribes various causes to its prevalence and rise. On the one hand, the proponents of the dualist school highlight the marginal nature of informality associated with poverty and underdevelopment; on the other hand, the neo-liberal school emphasize the role of excessive government regulations and taxes for the rising incidence of informality. Similarly, the structuralist school sees rising contractualization, casualization of employment relationships along with a declining role of the public sector associated with the increasing spread of globalisation as one of the drivers of informality (Chen 2012). Several other studies have also highlighted the role of other factors such as inequality, quality of government services as well as GDP growth in driving informality (Oviedo, Thomas, & Karakurum-Özdemir, 2009; Perry et al., 2010). We investigate the validity of these contradictory hypotheses in India using various state level macro variables.

The paper is divided into four Sections. Section 2 discusses the data and the methodology of the paper. Section three discusses the results of the study including the descriptive statistics, multinomial logistic analysis and panel econometrics. Section 4 provides the conclusions.

2. DATA SOURCES AND METHODOLOGY

The study uses unit level data from the National Sample Survey Organization (NSSO) Employment-Unemployment Survey (EUS) for two time periods 2004-05 and 2011-12. The EUS for the two rounds contains information on the enterprise size and the availability of social security benefits of the workers. It also has information on other variables depicting quality of work such as union membership, regularity of job etc. We utilise this information to distinguish workers into the formal and informal economy. Further, it provides individual and household level information which we utilize for further analysis. The study also uses data on state-level macro variables like Gross State Domestic Product (GSDP), total tax revenue, total government expenditure etc. from the Reserve Bank of India (RBI). Similarly, we use data on electricity demand, road infrastructure, and crime statistics from the Reports of respective departments.

The study defines informality in two ways-

1. a sector based definition considering the size of the enterprise as a criterion, and
2. an employment based definition considering the presence of social security benefits as a criterion.

Efforts to generate statistics on the informal economy at a national level led to the definition of the informal sector by the 15th International Conference on Labour Statisticians (ICLS) as consisting of small-scale unincorporated units with low level of capital and organization and characterised by non-contractual employment arrangements without formal protection. However, such an enterprise based definition of the informal economy was criticised on the ground that it excluded a large and growing section of precarious employment engaged in formal enterprises. Hence, the Delhi Group along with 'Women in Informal Employment: Globalizing & Organizing' (WIEGO) concluded that the enterprise based definition needs to be complemented by an employment based criterion. In line with these efforts, the ILO as part of its Report 'Decent Work and the Informal Economy' suggested a conceptual framework for defining and measuring the informal economy which was finally ratified by the 17th ICLS (ILO, 2002). The 17th ICLS defined informal employment as the total number of informal jobs, whether carried out in formal sector enterprises, informal sector enterprises, or households, during a given reference period. A pioneering study on the definitional and statistical issues relating to the informal economy

in India was conducted by the 'National Commission for Enterprises in the Unorganized Sector' (NCEUS) using NSSO data (NCEUS, 2008). We have used the NCEUS methodology modifying it suitably for our purpose of classifying workers into the formal and informal economy. We discuss this methodology further in the Appendix I to this paper. We carry out our analysis excluding the workers engaged in the cultivation of crops in agriculture as information on availability of social security benefits as well as enterprise type or number of workers in the enterprise is not available for such workers. Hence, our analysis is for the non-cultivation workforce in the economy.

The study also develops a labour informality index which helps us to study informality in a continuum. The methodology to develop our labour informality index has been borrowed extensively from ILO, 2004 although we make slight modifications to it to suit our data. The labour informality index has been developed based on five criteria as follows:-

- i. Regularity Status- A value of 1 is given if a person is in regular wage labour or registered self-employment in the organised sector; 0 otherwise.
- ii. Contract status: A value of 1 if the person has a written employment contract (more than 12 months); 0 otherwise.
- iii. Workplace status: A value of 1 if the person works in or around a fixed workplace, be it an enterprise, factory, office or shop; 0 otherwise.
- iv. Employment protection status: Under this criterion we consider whether a worker is protected against arbitrary dismissal. Due to lack of availability of suitable data, we take eligibility for paid leave as a proxy for this variable. Hence, we impute a value of 1 if the worker is eligible for paid leave; 0 otherwise.
- v. Social protection status: A value of 1 if entitled to paid medical care, whether paid by the employer or by medical insurance; 0 otherwise.

The labour informality continuum, obtained by summing up the values of the five criteria, has a range of values from 0 to 5. Each element is given the same weight. The resultant labour informality spectrum is defined as follows: totally informal = 0 (no criteria met); highly informal =1; moderately informal =2; moderately formal = 3; highly formal = 4; totally formal =5 (all criteria met).

We use binomial Logit model to study the determinants of informality.

Our model is of the following basic form:-

$$y = \alpha + \sum_{j=1}^k \beta_j X_j + u,$$

where, y is our dependent variable and

y=1, if the worker is informally employed, and

=0, if the worker is formally employed.

Also, β_j and X_j are the k independent variables in our model.

Let p_i be the probability for y=1 so that the probability for y=0 is given by (1- p_i). Now, the expected value of y is given by,

$$E(y_i) = 0*(1-p) + 1*p=p_i.$$

$$\text{Hence, } E(y_i=1|X_i) = \alpha + \sum_{i=1}^k \beta_i X_i = p_i.$$

In the logit model, the functional form of $p_i = E(y_i=1|X_i)$ is given by,

$$p_i = E(y_i=1|X_i) = \frac{1}{1 + e^{-(\alpha + \sum_{i=1}^k \beta_i X_i)}},$$

$$= \frac{1}{1 + e^{-z_i}},$$

$$\text{where } z_i = e^{-(\alpha + \sum_{i=1}^k \beta_i X_i)} \dots \dots \dots (1)$$

For ease of exposition, we can write (1) as,

$$P_i = \frac{1}{1 + e^{-z_i}} = \frac{e^{z_i}}{1 + e^{-z_i}},$$

$$\text{Also, } \frac{p_i}{1-p_i} = z_i,$$

$$\text{Taking log we have } L_i = \ln\left(\frac{p_i}{1-p_i}\right) = z_i = \alpha + \sum_{i=1}^k \beta_i X_i$$

It can be shown that as z_i ranges from $-\infty$ to ∞ , p_i ranges from 0 to 1. Also, p_i is non-linearly related to z_i or X_i .

The above model is then evaluated through Maximum Likelihood method to yield our estimates.

The literature suggests a number of determinants of informality among them being age, years of education, technical education, household income, religion, social group, gender, marital status, sector and industry (Bairagya, 2012; Henley, Arabsheibani, & Carneiro, 2009; Yu, 2012). We consider the impact of these variables on informality in our model. We include both age and its square in our model as we hypothesize a quadratic relation of age with informality. However, taking both age and its square creates the problem with multicollinearity. Hence, we deduct from age its mean and take the demean age and its square in our model which solves our multicollinearity problem. Similarly, in order to bring out the effect of education we utilise the information on the education status of workers. However, rather than taking dummies for different educational levels we derive a continuous variable depicting the mean years of education of the workers. The methodology used to arrive at this variable is discussed in the Appendix II to the paper. In order to capture the effect of technical education on informality, we take a dummy for the presence or absence of technical education in our model. Monthly Per Capita Consumption Expenditure (MPCE) of the household is taken as a proxy for household income in our model. Rather than taking absolute MPCE levels, we take the natural logarithm of MPCE in our model as it helps to reduce the scale and dispersion of the variable and makes it normally distributed. We also look at the incidence of poverty across various poverty groups. The derivation of poverty groups is discussed in the Appendix III to the paper.

Among the socio-economics variables included in our model are religion and social group. We consider three broad religions for our study- Hindu, Islam and 'Others' which includes all other religions. We include separate dummies for all the religions except Hindus which we take as the reference category. Similarly, we create separate dummies for the social groups excluding 'Others' which we consider as the reference category. We also have separate dummies for gender (male/female) and sector (rural/urban) our study. We interpret our results taking females and urban as the reference categories respectively. Similarly, for marital status we divide the workforce into two groups- never married and married where all currently married, divorced and widowed workers are clubbed together into a single category. We interpret our results against the base category of never married workers. Finally, we also include dummies for the industrial affiliation of the workers. The industrial affiliation of the workers can be obtained from the National Industrial Classification (NIC) code of the respective workers available in the NSSO data. We divide workers into 7 broad

industries viz. 'Agriculture' (excluding Cultivation workers); 'Mining, Electricity & Water Supply'; 'Manufacturing'; 'Construction'; 'Trade, Hotels & Transportation'; and 'Finance, Insurance & Real Estate'. We create separate dummies for all the above industries except for 'Trade, Hotels & Transportation' which we consider as our reference category.

Finally, we examine the determinants of informality at the macro level using panel econometrics. The incidence of informality across states is measured by the proportion of the non-cultivation workforce informally employed in each state. We use various macro level variables as determinants of informality across states. In doing so, the study makes an attempt to examine the strength of alternative hypotheses of different schools of thought in explaining the occurrence of informality in the country. Similar studies have tried to study the relative weight of alternative theories in explaining the cross-country variation in informality (Hazans, 2011; ILO, 2012; Perry et al., 2010; Williams, 2013, 2015). These studies have found do not favour any particular hypothesis but find multiple factors driving informality. The various macro level variables used in our study are discussed below:-

- a. In order to examine the argument of the dualist school that informality is associated with high poverty and underdevelopment, we consider per capita Gross State Domestic Product (GSDP) as well as Poverty rates at the state level.
- b. In order to examine the soundness of the neo-liberal school that informality is associated with burdensome governmental regulations and taxes, we take into account the Tax-GSDP ratio of the state.
- c. Similarly, the validity of the structuralist view of rising informality associated with lower governmental intervention is examined taking into consideration the Expenditure-GSDP ratio of the state.
- d. Lastly, we also consider the state level Gini co-efficient, last 3-year growth rate as well as an index of government quality to measure the impact of inequality, growth and quality of public services respectively on informality rates.

We collect data on all the variables for the years 2004-05 and 2011-12. We have excluded the Union Territories from our analysis. We also merge the six geographically contiguous North-Eastern states of Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Arunachal Pradesh as these states have individually small sample sizes. In all we have data on 23 state regions for two

time periods. The calculation of the different variables used in our macro study is discussed in Appendix IV. Finally, we discuss our panel econometric methodology:-

Breusch-Pagan test as well as Hausman test applied on our model suggests that fixed-effects model would be appropriate for our data. Our fixed-effects panel data model is then given by,

$$y_{it} = \alpha_i + \sum_{j=1}^k \beta_{jit} X_{jit} + \varepsilon_{it} \text{ -----(2)}$$

where, i indexes individuals, t indexes time periods and β_j 's and X_j 's are the k independent variables in our model.

In the fixed effects model, we allow the intercept term to vary across individuals so that α_i would capture the unobserved heterogeneity across individuals. Also, we allow α_i to be correlated with the X_j 's. Averaging (2) over time yields,

$$\bar{y}_{it} = \alpha_i + \sum_{j=1}^k \beta_{jit} \bar{X}_{jit} + \bar{\varepsilon}_{it} \text{ -----(3)}$$

Subtracting (3) from (2), we get,

$$(y_{it} - \bar{y}_{it}) = \sum_{j=1}^k \beta_{jit} (X_{jit} - \bar{X}_{jit}) + (\varepsilon_{it} - \bar{\varepsilon}_{it}) \text{ -----(4)}$$

The individual-specific effects captured by α_i terms cancel each other as they are invariant over time. Applying OLS to the final model in (3), we arrive at our fixed-effects estimates.

3. RESULTS AND DISCUSSION

A. TRENDS OF INFORMALITY

We first take a look at the overall rates of informality in the country-

	2004-05			2011-12		
	Formal	Informal	Total	Formal	Informal	Total
Organised	49.93	50.07	24.82	43.05	56.95	31.58
Unorganised	1.01	98.99	75.18	1.57	98.43	68.42
Total	13.15	86.85	100	14.68	85.32	100

Source: Authors' calculation based on NSSO data

Labour Informality seems to be quite high in the Indian scenario with around 87 per cent of the non-cultivation workers being employed under informal working conditions in 2004-05. Although this figure fell to around 85 per cent in 2011-12, labour informality is still significant. Similarly, percentage of non-cultivation workers working in the unorganized sector is also substantial at 75 per cent in 2004-05 which fell down significantly to 68 per cent in 2011-12. Looking at the composition of employment within the organised sector, we find that around half of the organised sector workers are informally employed in 2004-05, a figure which rose to 57 per cent in 2011-12. These figures highlight the rising informalisation of the workforce within the formal sector. Although, the proportion of unorganised sector workers engaged informally is insignificant at around 6 per cent in 2004-05, it still rose slightly to around 7 per cent in 2011-12. (Table 1)

Year	2004-05		2011-12	
	Formal	Informal	Formal	Informal
Usual Status				
Own-account workers	0	100	0	100
Employers	13.98	86.02	12.99	87.01
Unpaid family worker	0	100	0	100
Regular Workers	43.97	56.03	44.32	55.68
Casual Workers (Public Works)	4.02	95.98	1.87	98.13
Casual Workers (Other Works)	1.39	98.61	1.21	98.79
Total	13.15	86.85	14.68	85.32

Source: Authors' calculation based on NSSO data

If we look at the composition of informality across usual status we find that own-account employees, unpaid family workers and casual workers consist entirely of the informally employed in both the periods. Around 87 per cent of the self-employed employers are informally employed, whereas around 55 per cent of the regular workers are informally employed. The picture is similar for 2011-12 with no significant changes in the rates of informality. (Table 2)

Years of Education	2004-05		2011-12	
	Formal	Informal	Formal	Informal

Below 6 Years	3.74	96.26	3.41	96.59
6 to 12 Years	15.06	84.94	13.11	86.89
13 Years & above	46.1	53.9	48.86	51.14
Total	13.15	86.85	14.68	85.32
Source: Authors' calculation based on NSSO data				

Year	2004-05		2011-12	
Technical Education	Formal	Informal	Formal	Informal
Have	47.58	52.42	55.37	44.63
Don't Have	11.36	88.64	12.54	87.46
Total	13.15	86.85	14.67	85.33
Source: Authors' calculation based on NSSO data				

Similarly, the analysis of educational levels of informality can give us some idea on the skills of the workers in the different groups. Looking across educational levels, we find the prevalence of informality falling drastically as one move towards higher educational levels with informality rates falling from a high of above 95 per cent for those with primary education or below to a low of around 50 per cent for those with at least a diploma. Over the period, we see stagnant or rising informality in the lower or intermediate educational levels whereas informality is seen to fall at the higher educational levels. (Table 3) Informality is also found to be significantly higher among workers without technical education. There is also an evident decline in informality among all workers over the period, especially among those without a technical education. (Table 4)

Year	2004-05		2011-12	
Age	Formal	Informal	Formal	Informal
Below 15	0.58	99.42	0.28	99.72
16-25	4.12	95.88	7.86	92.14
26-35	12.12	87.88	14.56	85.44
36-45	18.68	81.32	16.75	83.25
46-60	24.88	75.12	22.61	77.39
61 & above	1.64	98.36	2.66	97.34
Total	13.15	86.85	14.68	85.32
Source: Authors' calculation based on NSSO data				

Next, we try to look at the dynamics of informality across ages. Here, we may consider age as an amalgam of the on-the-job-skills of the workers, his experience over the years as well as his social contacts accumulated. Hence, the relation of informality with age might give us an inkling of the possible lifecycle dynamics of the workers as workers move between jobs over the lifetime. The incidence of informality across age groups shows a distinct U-shaped pattern with informality falling from a high level with rising age before rising among the elderly. Probing on it further, we find that the U-shaped pattern is evident only for the wage employment category which makes the overall pattern U-shaped. Hence, we presume that the U-shaped pattern may reflect the aggregation of the internal heterogeneity within the informal economy. We hypothesize that informality is higher in lower ages as people queue in the informal sector for better jobs. As they accumulate skills, experience and contacts they get employed in the formal sector. However as age rise beyond a certain point, informality tends to which may reflect the weight of rising probability of informality among the employers and own-account workers in the higher ages. The incidence of informality is also found to have declined over the period across all age groups. (Table 5)

Indicators		2004-05		2011-12	
		Formal	Informal	Formal	Informal
Sector	Rural	8.02	91.98	9.03	90.97
	Urban	19.86	80.14	21.37	78.63
Gender	Male	15.04	84.96	15.61	84.39
	Female	8.11	91.89	11.58	88.42
Total		13.15	86.85	14.68	85.32
Source: Authors' calculation based on NSSO data					

If we look at the spatial composition of informality, we find that although 56 per cent of workers live in rural areas in 2004-05, it accounts for 60 per cent of informal workers. Labour informality is quite high in rural areas with more than 91 per cent of rural workers working informally in both the periods. The corresponding figures for urban areas are close to 80 per cent. Further, labour informality seems to have declined marginally in both rural and urban areas over the period 2004-05 to 2011-12. The gender composition of informality

shows that informality among women to be higher than men in both the the periods. We also see a marginal decline in informality among women, even though it is more or less stagnant among men. (Table 6)

		2004-05		2011-12	
		Formal	Informal	Formal	Informal
Caste	Scheduled Tribes	11.99	88.01	14.93	85.07
	Scheduled Castes	10.84	89.16	11.07	88.93
	Other Backward Castes	9.83	90.17	11.86	88.14
	Others	18.42	81.58	20.53	79.47
Religion	Hindu	14.19	85.81	16.08	83.92
	Islam	5.92	94.08	5.93	94.07
	Others	15.73	84.27	18.69	81.31
Total		13.15	86.85	14.67	85.33
Source: Authors' calculation based on NSSO data					

The incidence of informality across caste and religions should also throw some light as to whether it is restricted to some social groups. The incidence of informality is significantly higher for backward classes like SCs, STs and OBCs compared to the higher classes. We also see informality to be falling over the period for all the social classes. Looking across religions we find informal employment to be higher for Muslims compared to Hindus and other religions over both the periods. Informality is also seen to be falling over the period for all religions except Muslims. (Table 7)

	2004-05		2011-12	
	Formal	Informal	Formal	Informal
Very Poor	3.34	96.66	3.74	96.26
Poor	6.97	93.03	5.64	94.36
Marginal	10.94	89.06	8.75	91.25
Vulnerable	20.34	79.66	16.91	83.09
Middle Class and above	41.19	58.81	36.21	63.79
Total	13.15	86.85	14.68	85.32
Source: Authors' calculation based on NSSO data				

Many authors consider informality and poverty as synonymous. On the other hand, others consider incomes to be significantly higher for informal workers especially the self-employed relative to the formal economy. Hence, looking at the poverty rates of the workers across informal categories may give us some insight into the nature of the sector. The incidence of informality is seen to fall drastically as we move towards higher income classes in both periods. However, the incidence of informality is seen to rise marginally over the period in all MPCE classes except in the lowest group where it is more or less stagnant. (Table 8)

	2004-05		2011-12	
	Formal	Informal	Formal	Informal
Agriculture	0.65	99.35	1.35	98.65
Manufacturing	10.68	89.32	12.28	87.72
Construction	1.95	98.05	2.25	97.75
Trade Hotels & Transportation	5.71	94.29	8.96	91.04
Finance, Insurance & Real Estate	33.06	66.94	45.44	54.56
Commercial, Social & Personal Services	41.09	58.91	38.98	61.02
Mining, Electricity & Water Supply	44.88	55.12	40.01	59.99
Total	13.15	86.85	14.68	85.32
Source: Authors' calculation based on NSSO data				

Considering the prevalence of informality across broad industries for 2004-05, we find that the incidence of informality is the highest for agriculture with nearly 99 per cent of the workers working informally, followed by manufacturing and services. Looking across narrow industrial groups, we see high informality in Agriculture; Construction; Trade, Hotels & Transportation; and Manufacturing industries. It is found to be significantly lower in the other industries. Over the period, informality is seen to be falling for all industries except for Commercial, Social & Personal Services and Mining, Electricity & Water Supply. The fall is especially significant for Finance, Insurance & Real Estate. (Table 9)

B. INFORMALITY AS A CONTINUUM

So far we have discussed informality as the presence or absence of particular work related benefits such as pensions or medical benefits. The enterprise-based definition which hinges on the size of the enterprise also divides the workers in a dichotomous scale. However, as discussed earlier, informality can be seen in a continuous scale of the presence of a number of considerations such as job contact, location of workplace, eligibility for paid leave apart from pensions and social security benefits. Considering all these measures we created a scale of informality which measures the magnitude of informality so that lower the value in the scale, higher is the informality.

Looking at this informality scale we find that the more informal a worker is the more likely he is to be working in the unorganised sector. Further, higher informality is more likely to be associated with women and workers from rural areas. Interestingly however, totally informal workers are disproportionately male. Higher informality is also more likely to be associated with lower levels of education. Further, higher castes and Hindus are considerably more formal compared to the other groups. Looking across poverty groups, we find that the more informal groups are markedly more poor compared to the formal groups. Finally, we find that the informal groups have a significantly younger workforce. Moreover, these groups also have a sizeable proportion of elderly among them. The results show that the Informality Continuum Index closely corresponds with other dichotomous measures of informality.

C. DETERMINANTS OF INFORMALITY

We finally discuss the binomial logit results of our study-

Year	2004-05	2011-12
No. of Observations	137744	116342
Pseudo R ²	0.4061	0.3447

Source: Authors' calculations based on NSSO data

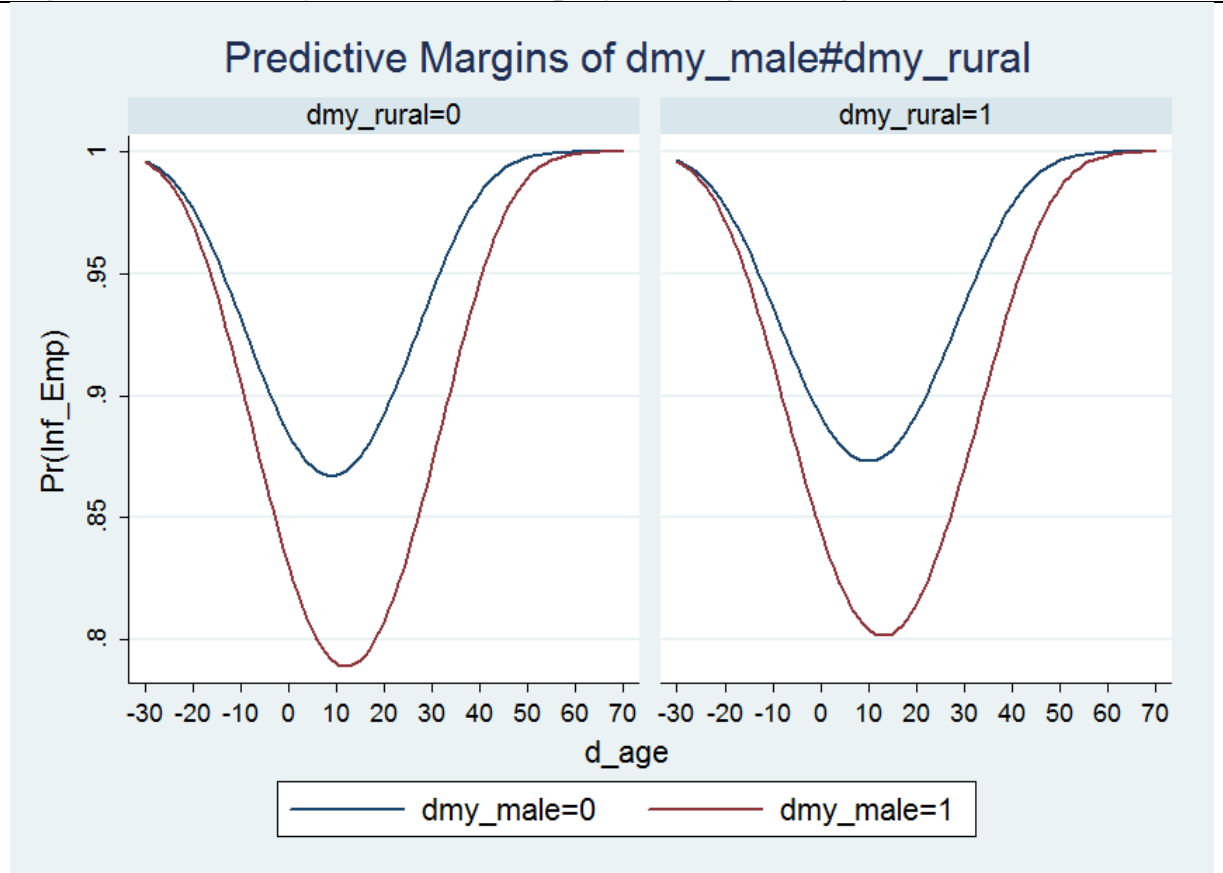
Independent Variables	Coefficients	
	2004-05	2011-12
Mean Years of School	0.87***	0.86***
Age	0.95***	0.97***
Sq. Age	1.00***	1.00***

Log of MPCE	0.43***	0.52***
Islam	1.42***	1.59***
Others	1.27***	1.26***
Scheduled Tribes	0.46***	0.44***
Scheduled Castes	0.60***	0.70***
Other Backward Castes	0.98	1.03
No Technical Education	1.31***	1.89***
Agriculture	2.41***	2.56***
Manufacturing	0.30***	0.43***
Construction	1.62***	1.87***
Finance, Insurance & Real Estate	0.34***	0.30***
Commercial, Social & Personal Services	0.10***	0.20***
Mining, Electricity & Water Supply	0.05***	0.09***
Sector	1.29***	1.04
Marital Status	0.81***	1.08
Gender	0.51***	0.74***
Constant	33.24***	8.87***
<p>Note : Significance levels *** 1%, ** 5 %, * 10%</p> <p>Dummy Sector = 1 if Rural, 0 otherwise</p> <p>Dummy Marital Status= 0 if Never Married, 0 otherwise</p> <p>Dummy Gender=1 if Male, 0 otherwise</p> <p>Other variables in our model include Interaction term between Dummy Gender and Log of MPCE; Interaction term between Dummy Gender and Age; Interaction between Dummy Sector and Log of MPCE; and Interaction between Dummy Sector and Age etc.</p> <p>Source: Authors' calculation based on NSSO data</p>		

Table 10 shows that the goodness of fit for the logit models for the two periods given by Pseudo R^2 is decent at around 0.4. The logistic regression results for 2004-05 show that every additional year of schooling decreases the odds of informality by around 13 per cent which is significant at 1 per cent significance level. The relationship is even stronger for 2011-12 where each additional year of schooling decreases the odds of informality by about 14 per cent. Hence, controlling for other factors higher education is associated with lower odds of informality. Labour informality is also found to be significantly

higher for those with no technical education. On average, having no technical education raises the odds of informality by about 31 per cent and 88 per cent in 2004-05 and 2011-12 respectively. (Table 11)

Figure 1: Probability of informal employment against age



Note: a) As discussed earlier we deduct age from its mean to arrive at d_age . The mean age is found to be around 30 years so that d_age ranges from (-30) to 70.

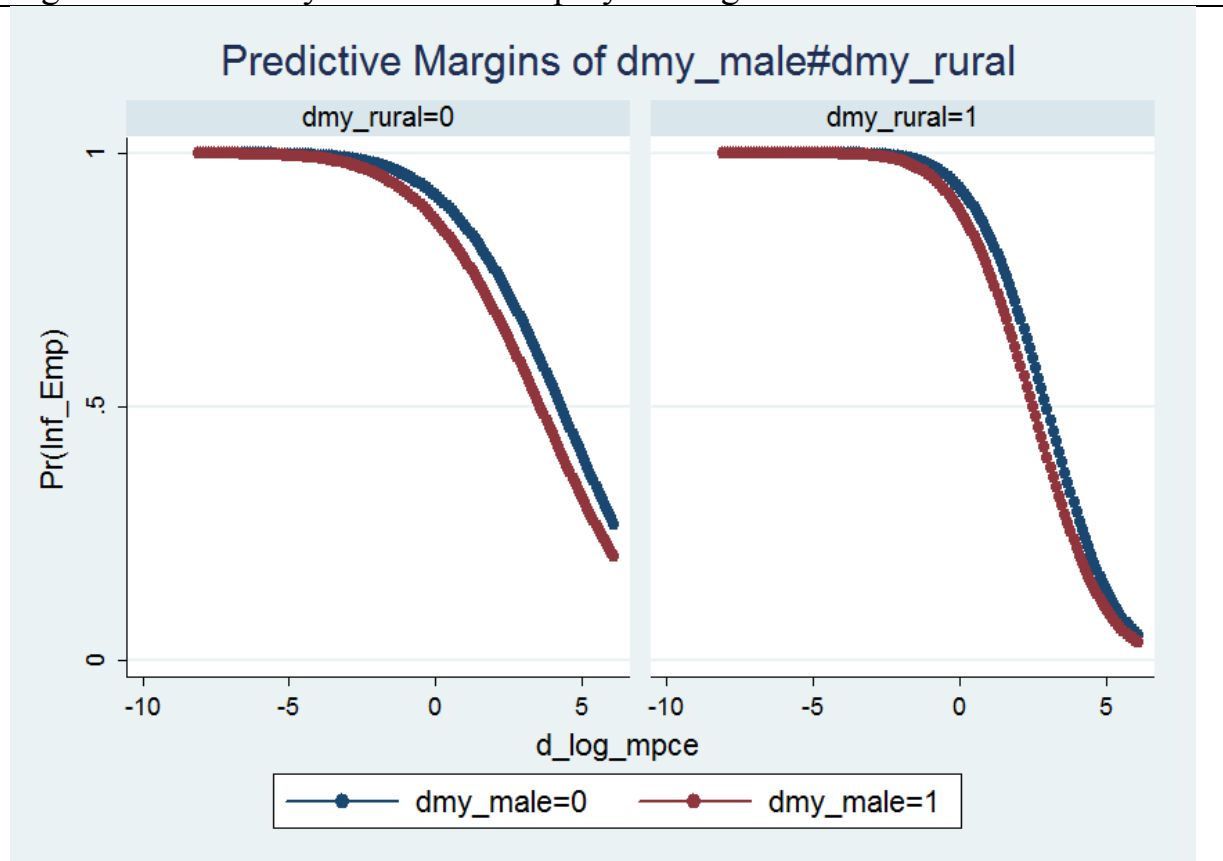
b) The blue and the red curves depict females and males areas respectively. The left panel shows the relation of informality with MPCE for urban areas whereas the right shows the same for rural areas.

Source: Authors' calculations based on NSSO data

Turning to the role of age, we consider a quadratic relation as age shows a distinct U-shaped relationship with informality in Section 1. We find that an additional year of age lowers the odds of informality by around 0.5 per cent. However, the fall in informality is not uniform throughout all ages as given by its significantly positive quadratic coefficient. (Table 11) Probing into the relationship further, we plot the relation of informality with respect to age through STATA's margins command. We find that the probability of

informality fall from a very high level with increasing age until around the age of 45 years. Beyond that age, rising age is associated with lower informality. Looking from a gender perspective, the fall in informality with respect to age is not much significant for females compared to males. There is not much difference in the behaviour of informality between rural and urban areas for both males and females. (Figure 1)

Figure 2: Probability of informal employment against MPCE



Note: The blue and the red curves depict females and males areas respectively. The left panel shows the relation of informality with MPCE for urban areas whereas the right shows the same for rural areas.

Source: Authors calculations based on NSSO data

Informality shows a negative relation with MPCE in both the periods. As seen from the results, a one per cent increase in MPCE lowers the odds of informality by about 0.6 per cent. The relationship is a bit weaker for 2011-12 where every per cent increase in MPCE lowers the odds of informality by around 0.5 per cent. (Table 11) Further, the graph of the probability of informality with reference to the logarithm of MPCE is quite flat for lower

MPCE levels, which becomes steeper as MPCE rises. Hence we postulate that informality falls marginally with rising MPCE at lower levels of MPCE, but this relation becomes much steeper at higher MPCE levels. Further, informality is also found to be higher among females compared to males for all MPCE levels in both rural and urban areas. (Figure 2)

Looking at informality for different religions, we find that for 2004-05 compared to the reference category of Hindus, informality is higher for Muslims and Others for both the periods. Comparing across social groups, we see that informality is significantly lower for STs and SCs against the reference category of the 'Others' group. The relationship is not found to be significant in the case of OBCs. (Table 11)

Further, we find that informality is significantly higher in rural areas compared to urban areas. For 2004-05, being from a rural area increases the odds of informality by about 30 per cent. However, this relationship weakens down considerably for 2011-12, where the coefficient for rural areas is insignificant. Hence, the odds of informality in rural areas compared to urban areas have fallen considerably over the period. We similarly find a statistically significant negative relationship between being male and being informal. Being male decreases the odds of informality by about 50 per cent and 26 per cent for 2004-05 and 2011-12 respectively. The fall in the coefficient for 2011 implies falling odds of informality among women over the period. Further, being married decreases the odds of informality by about 20 per cent in 2004-05. However, this relation dissipates in 2011-12 as we don't find a statistically significant relationship between informality and being married. (Table 11)

Looking at informality across industries we find that in 2004-05. Informality is found to be significantly higher in the Agriculture and Construction industries with reference to the Trade, Hotels & Transportation industry. Similarly, compared to the base category of Trade, Hotels & Transportation industry, informality is found to be significantly lower in Manufacturing; Finance, Insurance & Real Estate; Commercial, Social & Personal Services as well as Mining, Electricity & Water Supply. The results are similar for 2011-12. (Table 11)

D. INFORMALITY ACROSS THE STATES

The investigation of the determinants of informality at the individual level has given us crucial inputs on its nature at the micro level. However, in

order to comprehend better on its determinants at the macro level it becomes necessary investigate further the variation in the incidence of informality across states.

States	2004-05		2011-12	
	Formal	Informal	Formal	Informal
Jammu & Kashmir	20.09	79.91	16.71	83.29
Himachal Pradesh	22.05	77.95	21.23	78.77
Punjab	10.98	89.02	10.96	89.04
Uttaranchal	17.24	82.76	17.07	82.93
Haryana	12.28	87.72	19.55	80.45
Rajasthan	8.51	91.49	9.08	90.92
Uttar Pradesh	7.81	92.19	7.57	92.43
Bihar	6.09	93.91	7.64	92.36
Tripura	14.36	85.64	9.72	90.28
Assam	18.93	81.07	16.26	83.74
West Bengal	11.98	88.02	11.63	88.37
Jharkhand	12.7	87.3	12.73	87.27
Orissa	11.26	88.74	11.5	88.5
Chhattisgarh	17.78	82.22	13.46	86.54
Madhya Pradesh	13.41	86.59	14.29	85.71
Gujarat	14.34	85.66	14.51	85.49
Maharashtra	19.94	80.06	22.99	77.01
Andhra Pradesh	10.75	89.25	15.12	84.88
Karnataka	16.34	83.66	23.12	76.88
Goa	33.43	66.57	45.77	54.23
Kerala	12.83	87.17	12.4	87.6
Tamil Nadu	15.03	84.97	16.27	83.73
NE excl. Assam & Tripura	34.08	65.92	35.93	64.07
Union Territories	28.51	71.49	32.76	67.24
India	13.15	86.85	14.68	85.32
Source: Authors' calculation based on NSSO data				

Looking at the prevalence of informality across states, we find that informality is significantly lower in the North-Eastern states, Union Territories as well as in the northern states of Jammu & Kashmir, Himachal Pradesh. (Table 12)

We discuss the results of the panel data study on macro state-level variables. Breusch-Pagan conducted on the data yields a χ^2 of 6.30 which is highly significant at 1 per cent level of significance. Hence, the test suggests a

panel analysis of the data. Similarly, we conduct Hausman test on our data which reveals a χ^2 significant at 1 per cent level of significance. Hence, we conclude that Fixed Effects Panel method would be appropriate in our study. Hence, we conduct Fixed Effects regression analysis on our data.

No. of observations	46
No. of cross section units	23
No. of time periods	2
R ² : Within	0.71
R ² : Between	0.33
R ² : Overall	0.34
Rho (Fraction of Variation due to individual specific effects)	0.95
Source: Authors' calculation based on NSSO data	

Independent Variables	Coefficients
Poverty Rate	0.054
Last 5 Year Growth Rate of GSDP	-0.094
Tax GSDP Ratio	0.024***
Expenditure GSDP Ratio	-0.554***
Inequality Rate	-20.934
Per Capita GSDP (in 1000 Rupees)	-0.119***
Quality of Public Service Provision	-2.285
Constant	91.528***
Note: Significance levels *** 1%, ** 5 %, * 10%	
Source: Authors' calculation based on NSSO data	

Table 13 shows that our model has an overall R² of 0.34. The within R² however is found to be significantly higher 0.71. Further the Rho value of 0.95 indicates that a significant part of the total error is due to the individual specific error.

The results of our analysis shown in Table 14 reveals that a higher per capita GSDP significantly lowers the extent of informality confirming the dualist school hypothesis of higher informality associated with underdevelopment. However, we don't find a significantly, positive relation between informality and poverty. We also find the Tax GSDP ratio to be

positively related to informality at 1 per cent level of significance. This vindicates the neo-liberal hypothesis of informality rising with higher government taxes and regulations. Similarly, Expenditure GSDP ratio is also found to have a significantly positive relation with informality rates. This result favours the structuralist view that informality is rising due to falling governmental presence to protect workers from poverty. However, other independent factors such as inequality rate, growth as well quality of public services is not found to have any significant impact on informality. On the whole, our results shows that informality is not driven by any single set of macro factors but rather there are multiple factors leading to its rising incidence.

4. CONCLUSION

The study makes an attempt to examine the trends and determinants of informality in India. The paper finds informality to be significantly higher among the illiterates, youth, females and the poor. It also finds informality to be lower among the Hindus, STs and SCs. Its incidence is also found to be higher in Agriculture and Construction relative to other industries. Although rural dwellers and the married are found to be significantly more prone to be informal in 2004-05, this relation dissipates in 2011-12.

The paper also finds informality to be driven by a multitude of macroeconomic factors such as per capita incomes, tax-GDP ratio as well as expenditure-GSDP ratio highlighting the significance of different schools of thought in explaining the phenomenon. Hence, we conclude that efforts to reduce the incidence of informality would need a multi-pronged strategy rather than working on a single front.

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I. Appendix A1

The division of workers into the formal and informal sectors is defined as follows-

Enterprise Type	No. of workers in the enterprise						
	.	1	2	3	4	9	
Missing	.	****					
Proprietary male	1						
Proprietary female	2						
Partnership with members of same hhld.	3						
Partnership with members of different hhld.	4						
Public Sector	5						
Public/Private limited company	6						
Co-operative societies/trusts	7						
Employer's hhlds.	8						
Others	9						

1. Cells shaded blue belong to the unorganised sector.
2. Cells shaded yellow belong to the organised sector.

3. Cells marked with * belongs to the informal sector for all Usual Status except regular and casual workers in government works. Casual workers in public works belong to the organised sector. Similarly, Regular workers belong to the informal sectors if they have Social Security benefits or information on the variable is missing.

The division of workers into the formal and informal employment is done on the basis of presence of social security benefits and informal sector status as follows-

1. Own account workers and unpaid family workers as categorised into informal employment.
2. Casual workers in public works and other works as well as Regular workers are categorised into the formal or informal employment based on the presence or absence of social security benefits.
3. Employers are categorised into formal or informal employment based on whether they belong to the organised or unorganised sector.

II. Appendix A2

The general educational level of a worker is coded as follows in the NSSO data-
not literate -01, literate without formal schooling: EGS/NFEC/AEC -02, TLC -03, others -04;
literate: below primary -05, primary -06, middle -07, secondary -08, higher secondary -10,
diploma/certificate course -11, graduate -12, postgraduate and above -13

The above Education levels refer to the highest level **successfully completed**. For example, if a person has failed in his graduate examination, then his level will be treated only as 'higher secondary'. This is the method followed by NSS.

We derive the mean level of education for a worker as follows-

- a. All persons for who code for education level are from 01 will be allotted 0 years of schooling.
- b. All persons for who code for education level are from 02 to 04 will be allotted 1 year of schooling.
- c. All persons for whom code for education level is 05 will be allotted 2 years of schooling. Below primary means up to Std. 4 (max), so we assume that persons falling under this category will have on an average 2 years of schooling.
- d. All persons for whom code for education level is 06 will be allotted 5 years of schooling.
- e. All persons for whom code for education level is 07 will be allotted 8 years of schooling.
- f. All persons for whom code for education level is 08 will be allotted 10 years of schooling.
- g. All persons for whom code for education level is 10 will be allotted 12 years of schooling.
- h. All persons for whom code for education level is 11 will be allotted 14 years of schooling. Diploma courses are usually for 2 years after completion of Std. 12, so we assume that persons falling under this category will have 14 years of schooling.
- i. All persons for whom code for education level is 12 will be allotted 15 years of schooling. Graduate courses are usually for 3 years after completion of Std. 12, so we assume that persons falling under this category will have 15 years of schooling.
- j. All persons for whom code for education level is 14 will be allotted 17 years of schooling. Postgraduate courses are usually for 2 years after completion of Graduate programme, so we assume that persons falling under this category will have 17 years of schooling.

III. APPENDIX A3

Our poverty lines are based on the Rangarajan Committee methodology for the year 2011-12. For 2004-05 we deflate the poverty lines from the 2011-12 poverty lines for rural and urban areas using Consumer Price Index for Agricultural Workers and Consumer Price Index for Industrial Workers respectively. We borrow the methodology proposed by Sengupta, Kannan & Raveendran (2008) in classifying households into various poverty categories. Our poverty categories are given as follows-

Poverty Category	Criterion
Very Poor	If MPCE \leq 0.75 times poverty line (PL)
Poor	If $0.75 < \text{MPCE} \leq 1 \text{ PL}$
Marginal	If $1 \text{ PL} < \text{MPCE} \leq 1.25 \text{ PL}$
Vulnerable	If $1.25 \text{ PL} < \text{MPCE} \leq 2 \text{ PL}$
Middle Class and above	If $\text{MPCE} > 2 \text{ PL}$

It is worth noting that our poverty rates do not coincide with the Rangarajan Committee Report as our poverty rates are based on the Consumer Expenditure information from the Employment-Unemployment Survey rather than Consumer Expenditure Survey data of NSSO as is the norm. Since consumer expenditure derived from the latter is always greater than that obtained from the former, our poverty rates are likely to be larger than the Rangarajan Committee poverty rates.

IV. Appendix A4

The computation of the different variables used in our study is discussed as follows:-

- i. For calculation of GSDP per capita we divide GSDP at constant prices of the particular state by its population.
- ii. Calculation of the poverty rates of different states have used the official state level poverty rates given by the Tendulkar methodology.
- iii. In order to calculate the tax-GSDP ratio and the expenditure-GSDP ratio we divide the total tax revenue and total expenditure of the state by its GSDP at current prices to arrive at the figures the tax-GSDP ratio and the expenditure-GSDP ratio respectively.
- iv. For calculating the inequality rate we have used the Lorenz ratio (or Gini coefficient) available from NSSO Reports. Since, these figures are available for rural and urban areas separately we multiply the rural and urban figures by the appropriate rural and urban population weights to arrive at the inequality rate for a particular state.
- v. Calculation of growth rates for the last 5-year period uses the following formula:-

$$g_t = (y_t - y_{t-5}) / y_t$$
where y_t is GSDP for year t and y_{t-5} is the GSDP 5 years earlier.
- vi. In order to calculate the index for quality of public services we have used three broad indicators for Crime, Road and Electricity Infrastructure. For the calculation of Road Infrastructure Index we have divided the Total Surfaced Roads of a state by its respective population. Similarly, for Electricity Infrastructure Index we have used Peak Power Deficit measure for the particular state. Finally for calculating the Crime Index we have used various measures such as Rate of IPC Crimes, Rate of Violent Crimes, Rate of Cases Completed by Police and Percentage of cases completed by Courts in 0-3 years. We normalize the variable by using the formula-

Normalized Value = (Max. Value - Actual Value) / (Max. Value - Min. Value),
for positive indicators like Roads per population, Rate of cases completed by
police and courts etc.

= (Actual Value - Min. Value) / (Max. Value - Min. Value),
for negative values like Rate of IPC and Violent crimes, Peak Power deficit etc.

We take simple Arithmetic Mean of the indicators of Crime to arrive at
our Crime index. Finally, simple Arithmetic Mean of the Crime Index, Road and
Electricity Infrastructure yields us the Index for Quality of Public Services.