Rural Urbanization & Rural Industrialization in West Bengal: An Illustration through Empirical Models

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A successful rural industrialization program in West Bengal would need to pay proper attention to rural physical and social infrastructure, and a credit delivery system in order to facilitate the rural transformation process from the traditional domain to a growth trajectory. Rural infrastructure would play a very important role in developing numerous small urban pockets and the rural non-farm sector in those urban pockets would bring in changes in the rural economy through various linkages with the farm sector.

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Introduction

The characteristics of an urban area often tend to draw upon the size/density of the population and level of non-farm employment in a particular geographic area. In some poor parts of the world, rural areas are known as pastoral folk, heavily dependent on agricultural activities, poor infrastructure, limited employment opportunities and low levels of income (Haggblade, 2007). On the other hand, the few primate cities are known as the hub of non-agricultural activities, better infrastructure, better institutional environment, greater employment opportunities and higher levels of income (Chapman & Wanmali, 1981). To minimize this gap, urban amenities should be taken to rural areas by adopting a policy of dispersed urbanization (Dutta, 2002). For that, the whole of rural areas does not need to be transformed into an urban area but it requires to be well connected with the nearest small urban centers which also need to be supported with proper

amenities (Friedmann, 1973). The higher degree of rural-urban interaction helps the rural economic diversification process to set in motion and thereby develops healthy rural settings with urban ambiance.

This study focuses on West Bengal. The traditional sector i.e. agriculture is already burdened with over-employment in many parts of West Bengal. The rural non-farm sector as a source of new employment opportunities has been emphasized by many scholars as being of immense importance (Dutta, 2007). The degree of spatial underdevelopment of a region can be captured through the movements of labor from agrarian (mainly concentrated in rural areas) to non-agrarian sectors (mainly concentrated in urban areas). Poor, less-educated, people move from the agrarian sector to the non-agrarian sector because of two main reasons: one, income earned through their involvement in agricultural activities is insufficient, and, two, non-farm employment is not adequately available in their own locality. Besides, a section of the unskilled rural labor force living in an agriculturally backward area, in general, out-migrates to relatively fertile agricultural areas.

We would now like to capture the need for adopting dispersed urbanization policies through a couple of empirical models. In the first model, our emphasis would be on what determines rural to urban migration. It is assumed that labor force living in rural areas endowed with low levels of physical infrastructure, social infrastructure, banking service, population concentration, and electricity consumption in commercial activities as well as public works would tend to migrate to urban areas.

Variables & Hypotheses: Model 1

Dependent Variable

$$\frac{\text{Rural - Urban migration (for employment \& income)}}{\text{rural - rural migration (for employment and income)}}$$

RURR: >1; mostly seeking non-agricultural employment either for survival or for a better living. This happens when non-agricultural employment opportunities are absent due to lack of proper industrialization (this indicates rural-urbanization level is low).

RURR=1; seeking employment outside the village for survival either in agriculture or in non-agriculture.

RURR<1; seeking agricultural employment due to lack of non-agricultural skill or urban links or information.

Independent Variables

1. PII: Physical Infrastructure Index

Hypothesis: PII and RURR are negatively related (PII is an indicator of rural physical infrastructure of a district. So, the higher the value of PII, the higher the possibility of rural-to-rural migration).

2 SII: Social Infrastructure Index

Hypothesis: SII is positively related to RURR.

According to Lucas (1993), the main engine of growth stems from the accu-

mulation of human capital—in other words, knowledge—and the main source of the differences in living standards among nations becomes apparent through a difference in human capital. On this score, India suffers from substantial deficiency, especially in the rural sector. High levels of illiteracy in rural India have been considered to be one of the inhibitive factors in the growth of a vibrant rural non-farm sector. In rural areas, due to lack of education labor has either been stagnant in agriculture or moving to casual work occupations in the distress-driven non-farm sector (Planning Commission, 2000). Since most of the rural non-farm activities do not include capital-intensive, sophisticated, industries, or service industries like information technology, a country that desires to develop its rural industrial sector to accommodate a large number of rural unemployed or under-employed masses in the workforce must concentrate in primary and secondary education in the rural regions. Islam (1997) argues that literacy enhances the productivity of the workforce and also enables them to apply their skills acquired through training. He emphasizes secondary education in stimulating the entrepreneurial capacity of the rural talents and convincingly argues that, in developing countries, an entrepreneur with elementary education can expect to earn an income that is 41 percent higher than the one with no education at all.

It is not just education that matters. Health care is an important aspect of rural development through rural industrialization, because the applicability of human capability, earned through education and training, is conceived to be routed through better health (Tewari et al. 2005) and, for that, adequate healthcare services are a prerequisite. However, in most developing countries including India, rural healthcare services are far below the commendable stage. Largely, the quality healthcare services in India are concentrated in urban areas. The qualitative aspects of the small rural healthcare centers are in poor condition in many parts of the country. Thus, the rural stakeholders would share greater expectations from the urban health centers and thus want them to perform well (Bloom, 2001). Accordingly, the demand for urban healthcare services is seen to be much higher than that of rural hospitals. In this connection, Doeksen et al. (1997) argue that large urban medical facilities often receive a much higher proportion of patients from outside the urban areas.

3 NRCB

Hypothesis: Greater no. of commercial banks per lakh population in rural areas leaves scope for greater access of rural people to financial institutions, which might augment greater rural economic activities, and that induces rural in-migration which may further lead to higher scope for rural urbanization. Therefore, there will be a negative relationship between NRCB and RURR.

4 TBLU

Hypothesis: The higher ratio indicates a lower level of rural urbanization as well as a lower level of rural industrialization.

Thus, the probability of urban migration will go up. Therefore, there is a positive relation between this variable and the RURR.

5 PCIPP

Hypothesis: This is considered to be a substantially urban-biased variable. Thus, PCIPP and RURR are positively related (PCIPP is an indicator of the urban physical infrastructure of a district. So, the higher the value of PCIPP, the higher the possibility of rural-to-urban migration.)

Variables & Hypotheses: Model 2

Dependent Variable

PPRSS: The *pressure* of rural working population on rural small scale sector (measured by the no. of rural workforce per rural small scale unit)

The higher value of this variable implies greater pressure on the rural workforce to find avenues of non-farm employment. This pressure can be reduced through the promotion of successful rural industrialization by way of facilitating the transfer of the rural workforce from the pastoral farm sector to the non-farm sector.

Conceptual Formulation of the Dependent Variable

For the sake of simplicity, we classify the entire rural workforce into three categories, C1, C2 and C3 as follows:

C_1 => engaged exclusively in agricultural activities;

C_2 => engaged partly in agricultural and partly in non-agricultural activities; and

C_3 => engaged exclusively in non-agricultural activities.

Let

x = Total number of rural small enterprise

N = Total rural workforce=n_1+n_2+n_3, where

n_1 = Number of workforce engaged in C_1

n_2 = Number of workforce engaged in C_2

n_3 = Number of workforce engaged in C_3

Now, the pressure of rural working population on rural small scale sector is expressed as $\frac{N}{x}$.

$$\frac{N}{x} = \frac{n_1 + n_2 + n_3}{x} = \frac{n_1}{x} + \frac{n_2}{x} + \frac{n_3}{x} \text{ --(1)}$$

We assume that the employment capacity of the rural non-farm sector has increased (either in the form of expansion or in number or both) as a result of growth in this sector. Let us now express the non-farm sector with its new capacity as x_1 (where $x_1 \geq x$). We assume that the total number of rural workforce remains unchanged and there has not been any rural-to-large-urban migration of rural workforce. Then, there will be some redistribution of employment within

the above-mentioned workforce categories.

Again, let

n_1^* = number of workers left from C1 to C3 after redistribution. Note that $0 \leq n_1^* < n_1$ depending on their operational land holding size.

n_2^* = number of workforce left from C2 to C3 and $n_2^* \leq n_2$ depending on their skill and opportunity to join in C3

n_3^* = number of workforce shifted to C3 from C1 and C2 after redistribution of workforce.

Hence, = + pressure of workforce has absorbed in the non-farm sector.

Independent Variables

1. RURIND

Hypothesis: RURIND is an indicator of the degree of rural industrialization. If the degree of rural industrialization increases, the pressure of rural working population on rural small scale sector (i.e. the dependent variable) will decrease. Hence, there should be a clear-cut inverse relationship between these two variables. One can argue that such a relationship between these two variables is inherent in their respective formations. In spite of that, we have considered RURIND as an independent variable in order to validate the concept of our dependent variable (i.e. PPRSS) as a manifestation of the employment pressure on the traditional sector.

2. SVTT

Hypothesis: The higher value of this variable implies increased scope for vocational/technical training which in turn will increase the scope of non-farm activities in semi-urban and rural areas. This will enhance the scope for dispersed urbanization and rural industrialization. The issue involves two facets. Firstly, together with the lack of technical skills, there is little incentive for rural firms to invest in technology, leading to low levels of labor productivity in the rural manufacturing sector compared to urban manufacturing (Chadha, 2003). So, higher training will generate greater scope for rural entrepreneurship. Secondly, as a region/district experiences rural industrialization, the process creates employment opportunities for the upcoming skilled/semi-skilled persons; thus, reducing the number of rural workforce per unit of rural small-scale enterprise. This phenomenon, as we would like to emphasize, is nothing but a transfer of rural workforce from the traditional sector to the non-farm sector. Thus, we hypothesize that if the scope for vocational and similar type of training/education increases and if at the same time rural industrial sector develops, the pressure of the rural workforce on the rural small scale sector will reduce.

3. Electric

Hypothesis: The higher the proportion of households having access to electricity, the lower the pressure of rural working population on rural small scale sector via the scope for the generation

of additional household economic activities.

4. RPOC

Hypothesis: Increase in RPOC indicates growth in rural industrial activities which in turn is expected to lower workforce pressure on the existing volume of rural economic activities — which is predominantly agriculture — by opening up new avenues of employment in the domain of rural non-farm activities.

5. AII

Hypothesis: As the agricultural infrastructure level increases the pressure of rural workforce on small enterprises decreases, via the growth in non-farm activities not only at the agriculture/non-agriculture interface but also at the exclusive-non-farm domain.

Data, Models & Results

We have used SPSS software to estimate the models as conceptualized above. For the estimation, OLS method has been used. Table 1 presents the detailed descriptions of the variables along with their sources. Besides, the descriptive statistics of the variables of two different models have been presented in Table 2. Currently, there are 19 districts in West Bengal, out of which we have taken 17 districts as units of observation. Note that Kolkata being the sole metropolitan district has been excluded from our conceptualization since the rural part is totally missing in this district. For the dependent variable of our first model, i.e. rural-urbanization model, the latest data has been available from the 2001 Census (also, the 2001 Census data has been used for many other variables that have been expressed in terms of "per capita", "per lakh population", "per 10,000 population" etc.). On the other hand, the district of Midnapore has been divided into two districts, namely Purba Medinipur and Paschim Medinipur, in 2002. Thus, for the sake of simplicity, we have considered the undivided district for all other variables, irrespective of whether the data has been available in the form of undivided nature or divided nature. Thus, the total number

Table 1 Description of the Variables

Variable	Measurement	Variable name	Source of data
Rural-Urbanisation Model			
Dependent variable			
Migration (for employment and income reason)	Ratio of rural-to-urban migration to rural-to-rural migration	RURR	Census of India, 2001 (Note: this source has been used wherever we have referred to population data in the following rows)
Independent variable			
Physical infrastructure index	Composite index that consists of two dimension	PII	For road: Public Works (Road) Department, Gov-

	indexes (1) rural road index [measured by rural surface road length per sq.km. (maintained by PWD and panchayats including zilla parishad)]; * and (2) rural household electric lighting index (measured by percentage of rural households using electricity for lighting)		ernment of West Bengal, 2001-02;For electric lighting: Census of India, 2001
Social infrastructure index	Composite index which consists of four dimension indexes (1) health index measured by availability of beds per 10,000 population; (2) number of doctor per lakh population;** (3) education index measured by teacher-student (class VI-X) ratio and number of high schools); and (4) number of high school	SII	For hospital bed and doctor: State Bureau of Health Intelligence, Government of West Bengal, 2001;For school, teacher and student: Department School Education, Government of West Bengal, 2003-04
Commercial bank in rural area	Number of commercial banks in rural areas per lakh rural population	NRCB	Bureau of Applied Economics and Statistics, Government of West Bengal, 2001
Degree of low level of urbanisation	Ratio of number of administrative blocks having urbanisation of 10 per cent or below to total number of administrative blocks	TBLU	Census of India, 2001
Consumption of electricity for commercial, Industrial, Public lighting and public works purposes	Per capita consumption of electricity for commercial, Industrial, public lighting and public works purposes	PCIPP	Divisional Engineer, West Bengal State Electricity Board (O & M), 2005-06
Rural-Industrialisation Model			
Dependent variable			
Pressure of total rural workforce on rural non-agriculture (i.e. need for rural industrialization)	Ratio of number of rural workforce to number of rural small enterprises	PPRSS	For number of rural small enterprise: Third Small-Scale Industry Census, 2001-02;For number of rural workforce: Census of India, 2001

Independent variable			
Rural industrialisation	Number of rural small enterprises per 10,000 rural population	RURIND	For number of rural small enterprise: Third Small-Scale Industry Census, 2001-02
Scope of vocational-cum-technical training	Number of engineering and vocational institute per lakh population (15-34 age groups) in a district	SVTT	District Statistical Handbook, Govt. of West Bengal
Rural household electricity access	Per cent of rural household using electricity	Electric	Census of India, 2001
Rural per capita outstanding credit for artisan small-scale enterprises	Outstanding credit provided to artisans and small-scale enterprises divided by total rural population	RPOC	For credit: Reserve Bank of India
Agricultural Infrastructure Index	Composite index which consists of (a) Govt. canal irrigation index (i.e. per cent of govt. canal irrigated area in gross irrigated area), (b) cold storage index (cold storage capacity (in ton) per '000 ha), and (c) warehouse index (warehouse capacity (in metric ton) available per 1000 ha of food grains and oilseed produces).	AII	For canal irrigation: District Statistical Handbook, Govt. of West Bengal;For cold storage and warehouse: Directorate of Agricultural Marketing, Govt. of West Bengal

Note: The descriptions presented in the measurement column of this table indicate district-level information/data. However, the term 'rural' has been specifically mentioned wherever we have taken exclusively rural information/data for the districts;
* PWD stands for Public Works Department of the state government. Panchayat is a local government at village level, whereas zilla parishad represents similar body at district level;
**10 lakh = 1 million.
For the details of rural physical infrastructure index, rural social infrastructure index, and agricultural infrastructure index, see Appendix 1, Appendix 2 and Appendix 3, respectively.

of districts in our study has come down to 17 as the total number of observations. Another important thing to be noted here is that, for the selection of the year of data for all other variables, the closeness to 2001 has been the only criterion. Such closeness aspect has been taken care of in our second model as well. We now interpret the results of the model estimations.

Rural-urbanisation -(RURR Model)

We have found all the variables of our RURR model significant, of which two (TBLU and SII) are highly significant. The model's R-squared value is 0.822, which demonstrates that the data fits the model extremely well. Let us now analyze the results in terms of individual variables (Table 3).

Table 2 Descriptive Statistics of the Variables

	N	Minimum	Maximum	Mean	Std. Deviation
RURR	17	0.030	1.750	0.36529	0.482028
PCIPP	17	1.3353	11.8093	3.375867	2.7270098
NRCB	17	2.8049	5.1282	4.016648	0.7797450
TBLU	17	0.6429	1.0000	0.877404	0.1165570
SII	17	0.2480	0.7064	0.451180	0.1237826
PII	17	0.1723	0.8201	0.414908	0.1917596
PPRS	17	23.5000	131.6900	63.778235	29.5594660
RURIND	17	28	155	72.83	31.963
SVTT	17	0.2507	3.2963	1.136930	0.7579802
RPOC	17	37.72	644.66	161.4074	162.31976
AII	17	0.0000	0.7978	0.231047	0.2478337
Electric	17	0.1637	1.0000	0.470039	0.2347916
Valid N (list-wise)	17				

Table 3 Results of RURR Model Estimation

	Coefficient	Std. Error	t-value	Sig.
Constant	2.522	0.938	2.689	0.021
PCIPP	0.055	0.028	1.961	0.076
NRCB	0.302	0.129	2.338	0.039
TBLU	-2.929	0.917	-3.194	0.009
SII	-3.265	1.003	-3.255	0.008
PII	1.175	0.512	2.296	0.042
R^2	0.822			
Adjusted R^2	0.741			

PCIPP

As shown in Table 3, PCIPP appears to be a significant variable (at 10 percent level) and positively related to RURR. So, there is no reason to reject our hypothesis. This implies that rural labor would tend to move to urban-urban areas if commercial as well as industrial activities grow and urban public infrastructural investments are emphasized. To restrain such movement of the labor force, adequate investments are required to develop decentralized small urban pockets. Although to develop urban pockets in rural areas, initiatives from both public and private sectors foment a reinforcing mechanism, at the initial stage public sector initiatives are considered to be a priority. Thus, to encourage the rural labor force to find local employment, public infrastructural investments need to be made in the rural sector in order to develop rural markets and local small urban centers/growth centers.

Rural labor would tend to move to urban-urban areas if commercial as well as industrial activities grow and urban public infrastructural investments are emphasized.

NRCB

As it appears, NRCB is a significant variable (at 5 percent level) and positively related to RURR. According to the results, our hypothesis has been rejected. This implies that in spite of the increase in the number of commercial banks in rural areas, the rural labor force has not been attracted to come into rural areas. One possible inference from this result could be drawn as follows: An increase in the number of commercial banks does not necessarily imply liberal credit disbursement and thus the scope of creation of new employment opportunities — via the growth of rural non-farm sector — has been restrained.

An increase in the number of commercial banks does not necessarily imply liberal credit disbursement.

TBLU

TBLU has come out as a statistically highly significant variable (at 1 percent level), having a negative relationship with RURR. This indicates that our hypothesis has been rejected. This result bears highly critical implications for the context of the present study. With the increase in the number of administrative blocks having 10 percent or even lower levels of urbanization, the likelihood of rural-to-urban migration goes down. The objective of this study is to seek policy prescriptions in favor of rural urbanization and thus to provide employment opportunities within the administrative blocks which in turn, it is expected, would restrict rural-to-urban migration. The result of this variable apparently supports our objective, reflecting on the lower likelihood of people migrating to urban areas, but in reality, it has happened at the cost of rural urbanization, which does not corroborate our central objective. From this perspective, this result, however, entails further elaboration, drawing on the situation related to the grass-root realities of the study area. A district having a critically low level of urbanization suffers from inadequate levels of road connectivity, communication facilities, information flows, physical as well as social infrastructure, institutional shortfalls, and so on. All these restrain the rural population — who were bogged down in their traditional, pastoral, agricultural occupations — from accessing larger options of non-agricultural employment avenues.

SII

This variable has been found to be statistically highly significant and is negatively related to the dependent variable. The sign of the coefficient of this variable shows that our hypothesis has been rejected. This again means that if SII increases then the likelihood of rural people migrating to urban areas decreases. This result requires further elaboration. Social infrastructure, as has been captured through the variable SII in our model, comprises two crucial social parameters, health and education. These parameters have a direct impact on human capability which heavily draws on the quali-

If SII increases then the likelihood of rural people migrating to urban areas decreases.

tative aspects of health and education, not just on the quantitative dimensions. Moreover, if the highest-ranked district, as seen in the present case study (Appendix 2), itself represents a very low social infrastructure level, the other ranks are believed to illustrate even poorer conditions. Thus, an overall low level of human capability in terms of poor quality of health and education (though sometimes it may reflect on a relatively high level of quantitative infrastructure) will have a negative reflection on the overall economy through productivity consequences. These consequences are often dependent on the growth of economic activities in the concerned region. If a region is stuck in a low level of economic activities then productivity consequences — driven by mere quantitatively enhanced health and education infrastructure — would most probably fail to be adequately generated and thus would not attract labor-force to migrate to urban places.

PII

PII has been found to be positively related to RURR and the variable is significant at 5 percent level. The regression result shows that if the level of rural physical infrastructure increases then the likelihood of rural people migrating to urban areas would increase. This does not support our hypothesis. It was expected that a vibrant rural industrial sector in the small urban centers would create an adequate backward linkage effect in the farm sector in rural areas, which would create greater opportunities in the farm as well as non-farm sector in villages. But, in our study area rural economic activities in villages have not been generated in the absence of a necessary backward linkage mechanism. Thus rural labor force, having been forced by the low-income farm sector, wanted to find alternative sources of employment elsewhere. A flourishing alternative that was open to them was the urban construction sector (and some related service industries). On the other hand, improved rural road connectivity has facilitated a higher degree of labor mobility and thus the rural labor moved to urban areas. Besides, access to domestic electricity implies an increase in the level of income of the household and that might also have ignited their desire to adopt more urban-like consumption patterns (Papola & Misra, 1980: 1745). Consequently, to fulfill their desires, they looked for work elsewhere, mostly available in urban areas. Thus, let us conclude that the greater the rural physical infrastructure, the greater the likelihood that rural people migrate to urban centers in search of better employment and income.

The greater the rural physical infrastructure, the greater the likelihood that rural people migrate to urban centers.

Rural-industrialization Model (i.e. PPRSS Model)

Out of the five variables, four have been found as significant in this model. The R-squared value of the model is 0.872 which demonstrates that the data fits the model extremely well. Let us now analyze the results in terms of individual variables (Table 4).

Table 4: Results of PPRSS Model Estimation

Variable	Coefficient	Std. Error	t-value	Sig.
Constant	72.109	15.899	4.535	0.001
RURIND	-0.516	0.126	-4.084	0.002
SVTT	11.280	5.002	2.255	0.045
Electric	59.461	22.807	2.607	0.024
RPOC	-0.048	0.026	-1.847	0.092
AII	-16.312	16.145	-1.010	0.334
R^2	0.872			
Adjusted R^2	0.814			

RURIND

As our regression result shows, RURIND has been found to be negatively related to PPRSS at 1 per cent significance level. The result shows that our hypothesis has been confirmed.

SVTT

This variable has been significant at 5 percent level and is positively related to PPRSS (dependent variable). This indicates that our hypothesis has been rejected. The result bears significant implications. As the scope for vocational and similar types of training/education increases, the pressure of the rural workforce on the rural small-scale sector also increases. This has happened because the rural industrial sector did not grow satisfactorily, meaning that the potential rural labor force that has been produced by such types of institutes over the years did not find placement in local regions.

Electric

This variable has been found to be positively related to the dependent variable (at a 5 percent level). The result implies that our hypothesis has been rejected. This further indicates that the increase in rural household electricity consumption has failed to impact on rural non-farm activities due to quantitative as well as qualitative (both in terms of adequate need of the household) constraints of supply of electricity. This phenomenon characterizes the regional development pattern as urban-biased, which, as said earlier, is primarily reflected through the growth of urban construction and allied industries and its rural-to-urban migration consequences, leaving rural areas with weak backward linkages generated from the present unsustainable urban explosion.

RPOC

In the model regression, RPOC has been found to be negatively related to PPRSS at 10 per cent significance level. The result shows that our hypothesis has been confirmed. This estab-

Credit has been given to enterprises that have grown and thus have reduced the pressure on the rural traditional economy.

lishes the fact that credit has been given to enterprises that have grown and thus have reduced the pressure on the rural traditional economy as indicated above. In other words, as it appears, only growth-induced small enterprises have access to formal credit. Among the rest, many might be starving from capital and thus termed as distress-driven enterprises which do not have access to formal, institutional credit. This restricts the spread of the non-farm activities that have future growth potential among the distress-driven enterprises according to their present financial status. However, this requires further elaboration. How come distress-driven, capital-starving, small enterprises have 'growth potential'? The simple answer is: In case of rural 'small' enterprises, the role of other forms of capital (e.g. social capital such as personal goodwill, personal networks, etc.) is embedded in its 'smallness'. For example, a new entrepreneur who wants to start a large firm would find it extremely difficult to mobilize physical capital using his personal goodwill, whereas a small entrepreneur who has some 'personal qualities' can mobilize initial capital from acquaintances to start a business and can then even grow. Taking into consideration these aspects, there is a need to formulate a new credit policy to include potential but capital-starved small entrepreneurs who have the future growth potential and, in this regard, the state has a role to play to ensure growth in the backward regions. We would further elaborate this policy need in the conclusion of this paper.

AII

This variable has been found to be insignificant.

Policy Recommendations and Conclusions

In this paper, our objective was to identify the causal factors behind rural-to-urban migration (i.e. rural-urbanization) and the diffusion of pressure of the rural workforce from the traditional sector (i.e. rural industrialization). In our conceptual framework, the variables that have been conceived as important for the first model include physical infrastructure (captured through road index and rural household electric lighting index); social infrastructure (captured through health infrastructure index and educational infrastructure index); rural institutional financial infrastructure; existing district-wise rural-urbanization level; and district-wise per capita consumption of electricity in commercial, industrial, and public works. Interestingly, all the variables in the model appeared to be significant in the regression results. From the perspectives of policy implications, the findings of several of our variables (such as PII, SII, TBLU, and PCIPP) suggest that greater public investments in physical and social infrastructure are required for developing small urban pockets in rural areas. Besides, the increase in the number

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of commercial banks in rural areas is not able to promote rural industrialization and thus fails to check rural-to-urban migration, unless the credit delivery system is improved.

Next, the conceptualization of our rural-industrialization model, as described above, seeks to capture the influence of technical education, household electricity consumption, credit disbursement to rural enterprises, and agriculture infrastructure on the diffusion of workforce pressure from the farm sector to the non-farm sector. The result of the variable of vocation training institutes suggests that to make use of the potential technical labor force generated from such types of training institutes, the government needs to emphasize the creation of non-farm employment in small urban satellites through rural industrialization programs as well as other helpful mechanisms (for example, by facilitating the creation of new avenues through promoting linkages between urban economy and rural economy; and new cluster development), otherwise either rural labor force of this type may remain underutilized in the traditional sector or find other non-suitable employment. Similarly, the results of the variable, viz. rural household consumption of electricity, suggest that, in order to generate demand consequences (i.e. demand for new non-farm goods and services which have consumption linkages with electricity, as described above) of its increase, the government needs to ensure its quantitative as well as qualitative aspects. As regards the credit disbursement variable, our result simply confirms the proposition that small enterprises that have growth potential are creditworthy (or vice versa). Such empirical support, on the other hand, implies that enterprises of low financial capacity (in terms of their existing assets/wealth) are not creditworthy. To accentuate the idea of inclusive growth, the government has to adopt an innovative credit policy (considering necessary insurance mechanisms to cover the repayment failure possibility in order to reduce the risks of banks) for the enterprises that have future growth potential in some other sense (for example, entrepreneur's credit-worthiness should not just be evaluated on the basis of one's repayment 'capacity' in terms of one's existing wealth, but his 'capability' of future growth in terms of the other criteria like social capital should also be taken into consideration).

In sum, we conclude that a successful rural industrialization program in West Bengal would need to pay proper attention to rural physical and social infrastructure, and credit delivery systems in order to facilitate the rural transformation process from the traditional domain to a growth trajectory. Rural infrastructure would play a very important role in developing numerous small urban pockets and rural non-farm sector in those urban pockets would bring in changes in the rural economy through various linkages with the farm sector.

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Appendix 1 Rural Physical Infrastructure Index (district-wise)

District	Surface road length per sq. km.	% of rural household using electricity (2001)	Road index	Rural HH Electricity Consumption Index	Physical Infrastructure Index
Bankura	0.27	24.01	0.134	0.534	0.267
Birbhum	0.52	23.59	0.260	0.525	0.369
Burdwan	1.13	26.08	0.560	0.580	0.570
Coochbehar	0.36	7.36	0.181	0.164	0.172
Dakshin Dinajpur	0.55	12.98	0.272	0.289	0.280
Darjeeling	0.53	42.11	0.263	0.936	0.496
Hooghly	1.22	44.97	0.608	1.000	0.780
Howrah	1.95	31.17	0.970	0.693	0.820
Jalpaiguri	0.45	23.48	0.224	0.522	0.342
Maldah	0.38	14.37	0.188	0.320	0.245
Purba Medinipur	2.01	9.21	1.000	0.205	0.453
Paschim Medinipur	0.90	11.81	0.450	0.263	0.344
Medinipur	1.24	15.94	0.618	0.354	0.468
Murshidabad	0.75	13.71	0.372	0.305	0.337
Nadia	1.29	20.3	0.639	0.451	0.537
North 24-Parganas	1.47	20.77	0.729	0.462	0.580
Purulia	0.50	13.61	0.248	0.303	0.274
South 24-Parganas	0.51	16.81	0.254	0.374	0.267
Uttar Dinajpur	0.48	8.08	0.240	0.180	0.369

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Appendix 2 Social Infrastructure Index

District	Health indicator		Education indicator		Health Index		Education Index		Social Infrast-ructure Index
	Availability of beds per 10,000 populat-ion (2001)	No. of Doctors per lakh population	Teacher-student (T-S) ratio (VI-X)	No. of high schools	BED Index	Doctor Index	T-S ratio Index	School Index	
Bankura	8.95	8.14	0.015355	453	0.520991	0.426813	0.995570525	0.321505	0.517
Birbhum	7.86	8.42	0.015262	402	0.457752	0.441476	0.989517963	0.285309	0.489
Burdwan	10.02	13.82	0.014854	862	0.583381	0.724349	0.963119062	0.611781	0.706
Coochbehar	5.65	7.10	0.010133	278	0.328893	0.372075	0.657014797	0.197303	0.355
Dakshin Dinajpur	5.35	5.92	0.014686	161	0.311512	0.310314	0.952199	0.114265	0.320
Darjeeling	17.17	19.08	0.014345	205	1.000019	0.999902	0.930095179	0.145493	0.607
Hooghly	7.47	8.05	0.010894	493	0.435251	0.422033	0.706313264	0.349894	0.462
Howrah	9.53	12.29	0.01172	546	0.555002	0.643929	0.759915076	0.387509	0.570
Jalpaiguri	12.31	9.82	0.010899	290	0.717146	0.514682	0.706657662	0.20582	0.481
Maldah	3.48	3.77	0.014452	323	0.202664	0.197508	0.937011631	0.229241	0.305
Purba Medinipur	2.99	4.55	0.015415	665	0.174036	0.238481	0.999480457	0.471966	0.374
Paschim Medinipur	6.62	8.95	0.015423	744	0.385328	0.469269	1	0.528034	0.556
Murshidabad	4.94	4.41	0.010224	499	0.287802	0.231386	0.662880126	0.354152	0.354
Nadia	11.37	7.62	0.010416	455	0.662241	0.399499	0.675369432	0.322924	0.490
North 24-Parganas	4.82	5.94	0.006678	963	0.280505	0.311499	0.432990547	0.683463	0.401
Purulia	8.93	8.67	0.014692	333	0.520068	0.454576	0.952570796	0.236338	0.480
South 24-Parganas	2.32	3.06	0.013337	771	0.134921	0.160116	0.864734363	0.547197	0.318
Uttar Dinajpur	2.95	4.75	0.01	192	0.171971	0.248984	0.648369866	0.136267	0.248

Appendix 3 Agricultural Infrastructure Index

District	Govt. irrigation Infrastructure Indicator	Agro-storage Infrastructure Indicator		Agricultural Infrastructure Index	Agro-storage Index
	Govt. canal irrigation index	Cold storage Index	Warehouse Index		
Bankura	0.6475	0.6382	0.2811	0.4880	0.4236
Birbhum	0.7071	0.1972	0.2514	0.3273	0.2226
Burdwan	1.0000	0.9971	0.5093	0.7978	0.7126
Coochbehar	0.0254	0.1791	0.2841	0.1089	0.2256
Dakshin Dinajpur	0.0000	0.0000	0.4636	0.0000	0.0000
Darjeeling	0.6312	0.0012	0.6833	0.0811	0.0291
Hooghly	0.3237	1.0000	0.6339	0.5898	0.7962
Howrah	0.4038	0.2931	0.8880	0.4719	0.5102
Jalpaiguri	0.7629	0.3783	0.2001	0.3866	0.2752
Maldah	0.0000	0.0457	0.2013	0.0000	0.0959
Purba Medinipur	0.1386	0.0140	0.5019	0.0990	0.0837
Paschim Medinipur	0.4169	0.6721	0.2191	0.3944	0.3837
Murshidabad	0.2332	0.0471	0.2911	0.1473	0.1171
Nadia	0.0000	0.0151	0.2628	0.0000	0.0630
North 24-Parganas	0.0000	0.0425	1.0000	0.0000	0.2062
Purulia	0.5177	0.0000	0.0922	0.0000	0.0000
South 24-Parganas	0.2558	0.0058	0.1098	0.0546	0.0252
Uttar Dinajpur	0.0528	0.1160	0.2125	0.1092	0.1570

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