Labour Migration and Rural Industrialization in West Bengal in the backdrop of Harris-Todaro model

Course No. :
HSS648

Academic semester:
Spring '23-'24

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Abstract

This report is an attempt at a more careful investigation of the determinants of Rural Industrial Entrepreneurship and Labour Migration which is necessary for alleviating urban and rural unemployment. A further examination of Harris-Todaro model has been performed to refine the assumptions and the methods used in the model to reflect a more accurate relationship between migration and rural industrialization. The report serves as a proof of the authors' hypothesis: *The negative correlation between all the common determinants of Rural Industrial Entrepreneurship and Labour Migration, as inferred from the Harris-Todaro model, is not correct*.

Acknowledgements

The authors would like to express their deep gratitude to Dr. Debdulal Saha, IISER Mohali for his excellent supervision and guidance during the execution of this project under the course HSS648 Development Economics: Theory, Policy and Practice. We would also like to thank Anivesh for his insightful comments and help on this term paper.

1. Introduction

We begin by defining the primary economic phenomena which concerns Harris Todaro model and outline the salient features which shall play crucial role in our understanding.

1.1 Economic phenomena occurring in Harris Todaro model

Migration

The UN Migration Agency, International Organization for Migration [Uni, 2024], defines a migrant as any person who is moving or has moved across an international border or within a State away from his/her habitual place of residence, regardless of:

1. The person's legal status
2. Whether the movement is voluntary or involuntary
3. What the causes for the movement are
4. What the length of the stay is

Rural-Urban migration is defined as *the movement of labour from rural areas to urban areas influenced due to better living standards, jobs, accessibility and income in urban areas and/or unemployment, poverty and conflict in rural areas.*
The underlying reasons for migration can be classified into two broad-based categories:

- **Pull-based migration:** This type of migration involves the differentials being driven by real differences in living standard, better jobs and income opportunities and access to various services.
- **Push-based migration:** This type of migration involves migration fueled by unemployment and poverty in rural areas. The living conditions of many rural and urban residents may have been difficult but they are increasingly vulnerable to other influences such as drought or earthquake.

Urbanization refers to "*a shift in a population from one that is dispersed across small rural settlements, in which agriculture is the dominant economic activity, towards one that is concentrated in larger and denser urban settlements characterized by a dominance of industrial and service activities*" (UN, 2018).

Rural Industrial Entrepreneurship (RIE)

The Food and Agriculture Organization [FAO, 2024] defines Local Economic Development as "*a participatory process that encourages and facilitates partnership between the local stakeholders, enabling the joint design and implementation of strategies, mainly based on the competitive use of the local resources, with the final aim of creating decent jobs and sustainable economic activities*"

Rural Industrial Entrepreneurship is a local economic development process which is the principle mechanism towards increase of marginal productivity in rural sector mitigating rural-to-urban migration. It provides employment to the ever increasing rural labour force which remains unabsorbed by the urban industries.

In [Kumar, 2016], the author considers the scope of rural industries as basically a question of properly utilizing the unexploited natural and human resources and tapping vast material existing in the countryside. Some of the defining features of rural industrialization are low investment of capital, labour intensity and use of simple technology by employing local human and material resources.

[Eco, 2023] discusses the following reasons for the urgent need of Rural Industrial Entrepreneurship in developing countries, especially in the context of India:

1. They serve as relief to the widespread problems of rural disguised unemployment and underemployment stalking the rural areas.
2. It helps in providing jobs to the rural unemployed and helps in reducing gap in income differential between rural and urban areas.
3. These entrepreneur-ships promote balanced regional development by spreading density of industrial area towards rural regions.
4. Development of rural industries serves as an effective means to build up village republics.
5. Rural industries also help preserve the age-old rich heritage of the country by protecting and promoting art and creativity.
6. Rural industrialisation fosters economic development in rural areas. This checks migration from rural to urban areas, on the one hand, and lessens the disproportionate growth in the cities, reduces growth of slums, social tensions, and atmospheric pollution, on the other.
7. Rural industries also lead to development without destruction of the environment

Types of RIE

The various types of village industries come under the following broad categories. These have been discussed in detail in [Kumar, 2016]:

1. ***Agro Based Industries:*** Sugar industries, Jaggery, Oil processing from oil seeds, Pickles, Fruit juice, Spices, Dairy products etc.
2. ***Forest Based Industries:*** Wood products, Bamboo products, Honey, Coir industry, Making eating plates from leaves.
3. ***Mineral based industry:*** Stone crushing, Cement industries, Red oxide making, Wall coating powders etc.
4. ***Textile Industry:*** Spinning, Weaving, Colouring and Bleaching.
5. ***Engineering and Services:*** Small and medium sized industries to produce agricultural machinery, tractors, pipes etc.
6. ***Handicrafts:*** These include making of wooden or bamboo handicrafts that are local to that area, traditional decorative products, toys and all other forms of handicrafts typical to the region.
7. ***Services:*** There are a wide range of services including mobile repair, agriculture machinery servicing, etc which are being performed under this category.

1.2 Harris-Todaro (HT) model

This is an economic model introduced to explain issues regarding the rural-urban migration. The main assumption of this model is: **Migration decision is based on the expected income differentials between the urban and the rural sector**. An equilibrium is reached when the expected urban wage is equal to the marginal productivity of the rural agricultural worker. In equilibrium, the rural to urban migration becomes zero and there is a positive employment in the urban sector.

Rural to urban migration increases if

- Wages increase in the urban sector, increasing the expected urban income.
- Agricultural productivity decreases, lowering marginal productivity and wages in the agricultural sector (w_A), decreasing the expected rural income.

Harris-Todaro model: Formalism

In the article [Harris and Todaro, 1970], the authors introduce a mathematical formalism to try to understand the migration dynamics between rural and urban areas. Let us take the following variables into account:

1. w_A: Wage rate (marginal productivity of labor) in the rural agricultural sector.
2. L_F: Total number of jobs available in the formal urban sector.

3. L_I: Total number of jobs available in the informal urban sector.

4. w_F: Wage rate in the formal urban sector, which could possibly be set by government with a minimum wage law.

5. w_I: Wage rate in the informal urban sector.

Rural to urban migration will take place if:

$$w_A < \frac{L_F}{L_I + L_F} w_F + \frac{L_I}{L_I + L_F} w_I$$

Urban to rural migration will take place if:

$$w_A > \frac{L_F}{L_I + L_F} w_F + \frac{L_I}{L_I + L_F} w_I$$

In equilibrium (No migration):

$$w_A = \frac{L_F}{L_I + L_F} w_F + \frac{L_I}{L_I + L_F} w_I$$

2. Determinants

It is important to classify the determinants of economic phenomena with which we are going to investigate the robustness of the Harris-Todaro model. Below we have summarized the following determinants.

2.1 Determinants of migration

The following are the determinants of migration as obtained from the thesis [Maity et al., 2020]:

Determinant name	Measured quantity
SECTOR	Households located in the Rural area
LDDIST	Households located in the Rural area in the Less Developed Areas
HHSZ	Number of Household Members
HHAGE	Age of the Household head (Primary earning member)
LANDMAR, LANDSSM **LANDSM, LANDML**	Size of land holdings: Marginal, Semi-small, Small and Large
LTR	Literacy Rate
CONST	Percentage of Construction workers
SERV	Percentage of Service workers
PDEN	Population Density
UNEP	Unemployment
AGLP	Agricultural Productivity
CASTE-SC, CASTE-ST, CASTE-OBC	Number of workers based on lower castes

2.2 Determinants of Rural Industrial Entrepreneurship

The following are the determinants of Rural industrial entrepreneurship as obtained from the article [Folmer et al., 2010]:

Determinant name	Measured quantity
CHILMARS	Marital Status-cum-Children
CROP	Number of Crops cultivated
AGE	Age of the farmer
FSUP	Availability of Financial Family Support
RISK	Attitude toward Risk
INNOV	Innovativeness possessed by an individual
WEALTH	Wealth possessed by an individual
STATUS	Professional Status of an individual
EDU	Education level of individual
LANDC	Size of cultivable land
LANDH	Size of homestead land

2.3 Common Determinants

From the two articles used: [Maity et al., 2020],[Folmer et al., 2010], we find the following list of common determinants of migration and RIE.

Migration	RIE	CD
HHSZ	CHILMARS	HH
AGLP	CROP	AGRO
HHAGE	AGE	AGE
LANDMAR, LANDSSM, LANDSM, LANDML	LANDC	LAND
LTR	EDU	EDU
UNEP	STATUS	UEMP

Inferred Impact from HT Model

The Harris-Todaro model assumes that migration is caused by the expected wage differential between the rural and the urban sector. Rural Industrial Entrepreneurship has been proposed to decrease this wage differential. Hence, it can be inferred from the HT model that the common determinants of migration and Rural Industrial Entrepreneurship to should impact each of them in an opposite fashion. Thus, the impact of each of the Common determinants on migration and Rural Industrial Entrepreneurship is illustrated below:

1. **HH (Household Size)** - If this parameter negatively impacts migration, due to lack of mobility of large households, then one can say that it shall positively impact RIE.

2. **AGRO (Agricultural productivity)** - If this parameter negatively impacts migration due to higher rural wage expectation, one can say that RIE shall be positively impacted.
3. **AGE (Age of the Household head)** - If younger farmers are more prone towards entrepreneurship, one can say that tendency of migration among younger generation shall be less.
4. **LAND (Cultivable land owned)** - The migration decision can be negatively impacted by owners of cultivable land with small/medium holdings. This implies that RIE must increase with larger land ownership.
5. **EDU (Literacy rate)** - Higher literacy rate may dissuade the youth from indulging into the risky business of RIE, instead opting for secure government jobs, indicating higher migration.
6. **UEMP (Unemployment)** - A high rural unemployment rate incentivizes migration to urban areas due to higher wage expectation as per the H-T model. Hence RIE must decrease due to lack of incentives to start and invest in rural businesses.

3. Analysis

3.1 Inferred Impact of common determinants

The impact of the common determinants as computed from the data as appearing in Appendix B is tabulated as below

CD	Migration	RIE
HH	**Negative**	**Negative**
AGRO	Negative	Positive
AGE	Positive	Negative
LAND	**Negative**	**Negative**
EDU	Positive	Negative
UEMP	**Positive**	**Positive**

Table 3.1: Impact of CD as inferred from Data

Note from the table that the common determinants, that are marked in red, are the ones which impacts both migration and RIE in the same way. Hence, the main hypothesis of our term paper: *The negative correlation between all the common determinants of Rural Industrial Entrepreneurship and Labour Migration, as inferred from the Harris-Todaro model, is not correct*, has been **confirmed**.

3.2 A proposed modification to the HT model

The rate of migration as proposed by HT is given as [Harris and Todaro, 1970]

$$\dot{N}_u = \psi(W_u^e - W_A), \qquad \psi(0) = 0, \psi' > 0 \tag{3.1}$$

We propose the following modifications based on our observation and the cited data:

1. As far as the common determinants of RIE and migration is concerned, the following two rate equations describes the primary dynamics of our model:

$$\dot{N}_u = \Psi(W_u^e - W_A, HH, AGE, LAND, EDU) \tag{3.2}$$

$$\dot{R} = \Phi(\text{Det. of RIE}) \tag{3.3}$$

   where $\partial\Psi/\partial(CD)$ and $\partial\Phi/\partial(Det)$ is as given by the coefficients in Fig. B.1 and Fig. B.2 respectively and $AGRO$ and $UEMP$ has been absorbed inside the wage differential in case of migration.

2. For simplicity let's consider the linear regime

$$\dot{N}_u = \Psi(W_u^e - W_A) - 0.0122HH + 0.0495AGE - 0.407LAND + 0.2037EDU \tag{3.4}$$

Similar dynamical equations can be written for the endogenous variables in case of RIE using the coefficients in Fig. B.5

3. We further assume that all other determinants of migration works as exogenous parameters in this model. That includes urban expected wage. Moreover, for simplicity we assume the following expression for Ψ:

$$\Psi(W_u^e - W_A) = -0.5(AGRO + R) \tag{3.5}$$

4. Our goal is to decrease the rural-to-urban migration rate while increasing rural employment and productivity.

4. Results and policy recommendation

4.1 Results from the model

The model, including all the endogenous variables is too complicated to solve analytically. Hence, we resort to numerical simulation, whose source code is presented in Appendix A.. We focus on a five-year long plan, beyond which the assumption regarding the constant coefficients might break down, and we need to renew the parameters while using the same proposed model. We hope to recommend policies to mitigate migration based on the results of our simulation. We stress on the importance of financial support in the following simulations:

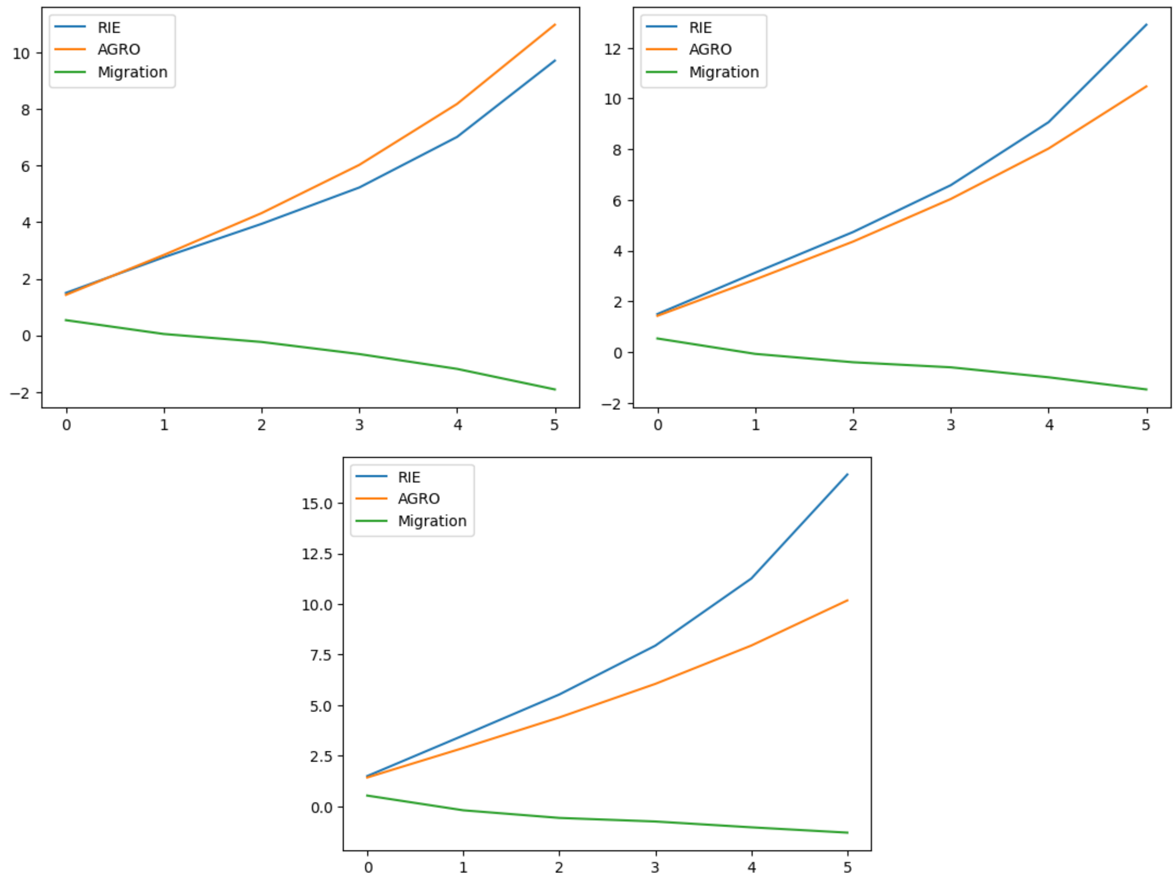

Figure 4.1: Observed effects on Migration, RIE and Agricultural Productivity of farmers having (1)Low income (2) Middle income (3) High income with variation of the initial support provided to the farmer. Other factors are kept fixed (just above average, except for slightly below average land). Note that with increasing financial support, farmers from such background tend to prefer RIE to agriculture.

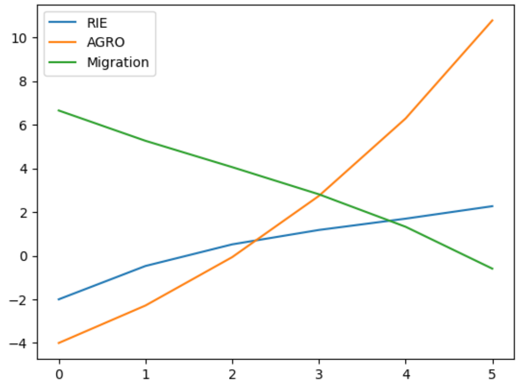

Figure 4.2: Observed effects on Migration, RIE and Agricultural Productivity of poor farmers, below average education, below average agriculture, unwilling to take risk, with high financial support

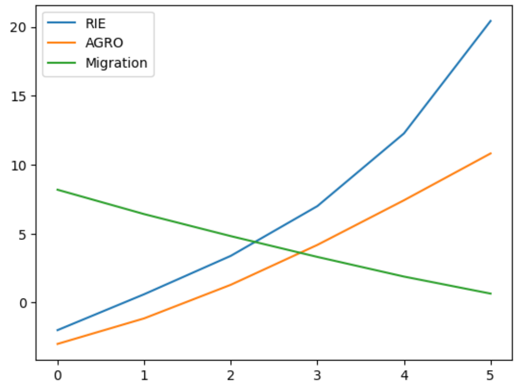

Figure 4.3: Observed effects on Migration, RIE and Agricultural Productivity of extremely poor farmers, moderate household size, below average education, poor agricultural productivity, willing to take risk with high financial support

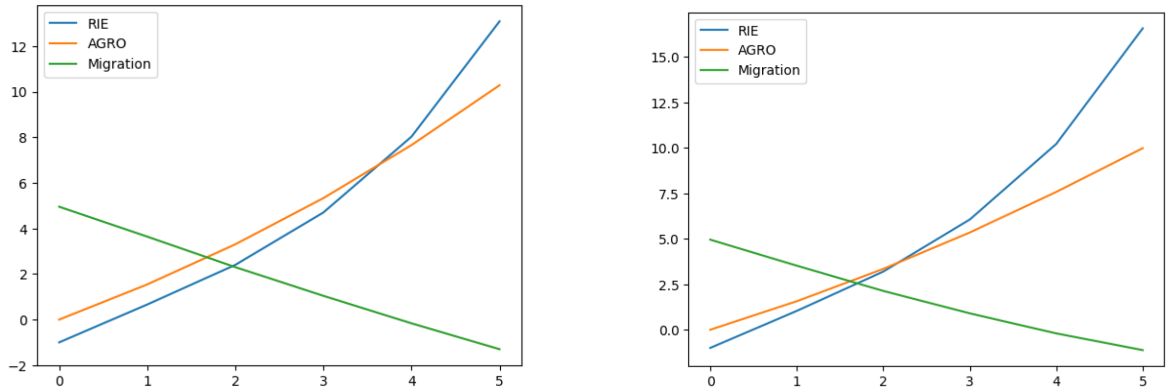

Figure 4.4: Observed effects on Migration, RIE and Agricultural Productivity of rich farmers, moderate household size, above average education, average agriculture, willing to take risk

4.2 Policy recommendation

We conclude that the following policies are to be adopted to enhance RIE and mitigate rural-to-urban migration:

- In the beginning of the five years, the average farmers are to be provided with varying financial support to start an RIE depending on their willingness to take the risk, as it leads to decrease in the migration.
- The poor farmers with 'below average' attributes who are unwilling to take risk, should be assisted with high financial support for agriculture, to rapidly reduce the migration rate to 0 at the end of the five years.
- Extremely poor farmers who are willing to take risk are to be supported with high financial support incentivizing RIE which in turn reduces the migration rate.
- Rich farmers with 'moderate' and 'above average' attributes who are willing to take risk, should be financially supported to enhance RIE and mitigate migration of rich and educated farmers from rural to urban sectors. Rural unskilled labour force can be absorbed into the RIE.

5. Limitations

In this term paper, we have primarily worked with the linear approximation, that the rate of migration and RIE depends linearly on its determinants. Ideally, one should compare the results thus obtained with the actual data over the next 5 years with the then initial factors. Unfortunately, no such data is available, to the best of our knowledge. Hence we are unable to check the validity of the proposed linear model. However, we have instead taken some variation of the proposed model and studied the qualitative nature of the dynamics.

5.1 Comparing with some non-linear models

We will take the case of poor farmers with below average education, below average agriculture, unwilling to take risk, with high financial support, and introduce some non-linearity in the dynamics. In contrast to what has been found in [Maity et al., 2020] for the case of West Bengal, in more advanced theories of migration, household size in the rural areas has been assumed to affect migration positively (as it creates a higher unemployment rate in the rural sector). The following plots are done with this assumption. On top of that we have introduced some linearity in the model.

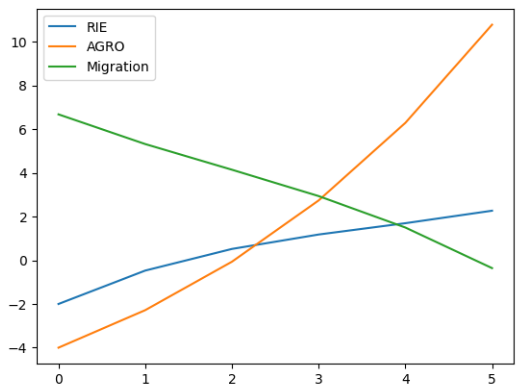

Figure 5.1: Observed effects on Migration, RIE and Agricultural Productivity of when the Migration rate $\propto +HH$

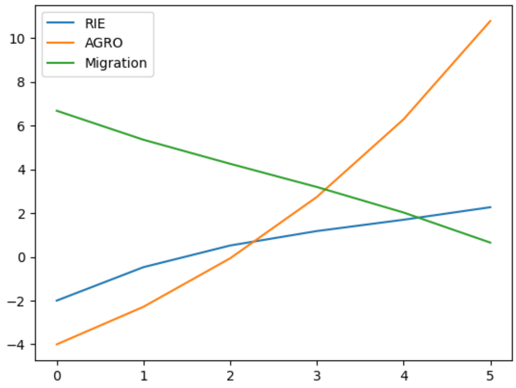

Figure 5.2: Observed effects on Migration, RIE and Agricultural Productivity with the Migration rate $\propto +HH^2$

So far comparing with fig. 4.2, we infer that qualitatively we have similar trend upto quadratic dependence on the household size.

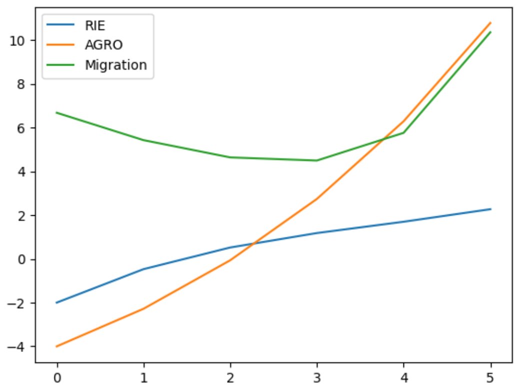

Figure 5.3: Observed effects on Migration, RIE and Agricultural Productivity with the Migration rate $\propto +HH^3$

However for a cubic dependence on the household size, the migration rate shoots up eventually.

6. Conclusion

We conclude this report by summarizing the salient objectives which have been achieved here:

- In this project we carefully studied the determinants of migration and RIE, in the context of West Bengal, respectively from the extensive quantitative work from the authors of [Maity et al., 2020][Folmer et al., 2010]
- We have found out that the inverse relation between the determinants of migration and RIE as simply inferred from the HT model [Harris and Todaro, 1970] is not well-substantiated.
- Motivated by these findings, we propose a modification to the HT model in the presence of RIE taking account of such complicated dependencies.
- Under the assumption of linearity, we observe the dynamics of the observables of interest and infer appropriate exogenous steps to be taken to decrease migration rate and enhance RIE and recommend policies accordingly.
- The model we have proposed is limited by the assumption of linear dependence on the factors. With access to data for more different initial states, we can find more accurate non-linear dependence on the factors.

Bibliography

[Eco, 2023] (2023). https://www.economicsdiscussion.net/entrepreneurship/rural-entrepreneurship/33667. *Economic Discussion*.

[FAO, 2024] (2024). https://www.fao.org/in-action/territorios-inteligentes/componentes/emprendimientos-rurales/marco-general-y-conceptual/en/. *Food and Agriculture Organization of the United Nations*.

[Uni, 2024] (2024). https://www.iom.int/about-migration. *International Organization for migration*.

[Folmer et al., 2010] Folmer, H., Dutta, S., and Oud, H. (2010). Determinants of rural industrial entrepreneurship of farmers in west bengal: A structural equations approach. *International Regional Science Review*, 33 (4)0:367–396.

[Harris and Todaro, 1970] Harris, J. and Todaro, M. (1970). Migration, unemployment and development: A two-sector analysis. *American Economic Review*, 60 (1):126–142.

[Kumar, 2016] Kumar, S. V. (2016). Rural development in india through entrepreneurship: An overview of the problems and challenges. *Anveshana*, 6(2):32–52.

[Maity et al., 2020] Maity, K., Das, P., and Mazumder, D. (2020). *Labour Migration and Livelihood: A Study with Special Reference to Backward Districts of West Bengal*. PhD thesis, Department of Economics , Vidyasagar University , Midnapore , West Bengal , India , 721102.

A. Appendix: Python code used for simulation

The primary code that has been used to investigate the dynamics and infer the impact of different initial states, is given below:

```
import numpy as np
import matplotlib.pyplot as plt

#RIE
#Initialisation
RIE = [1.5]
HH = [2.687]
AGRO = [1.431]
FSUP = [5]
RISK = [0.410]
INNOV = [0.307]
LAND = [-5]
STATUS = [0.2]
AGE = [0]
EDU = [0]
t=[0]
imax=5

for i in range(imax):
    x = 0.15380*RIE[i] - 0.10453*HH[i] + 0.18108*AGRO[i] + 0.07464*FSUP[i]
    +0.05473*RISK[i]+0.14731*INNOV[i] -0.12421*LAND[i]-0.06549*STATUS[i]
    -0.85586*AGE[i]-0.13501*EDU[i]
    RIE.append(x+RIE[i])
    x = -0.24080*RIE[i] - 0.01794*HH[i] + 0.11263*AGRO[i] + 0.00903*FSUP[i]
    -0.01142*RISK[i]-0.03074*INNOV[i] -0.08349*LAND[i]+0.01367*STATUS[i]
    +0.40458*AGE[i]-0.12676*EDU[i]
    HH.append(x+HH[i])
    x = -0.13201*RIE[i] +0.53836*HH[i] - 0.06175*AGRO[i] + 0.00495*FSUP[i]
    -0.00626*RISK[i]-0.01685*INNOV[i] -0.04577*LAND[i]+0.00749*STATUS[i]
    +0.22179*AGE[i]-0.06949*EDU[i]
    AGRO.append(x+AGRO[i])
    x = 0.86916*RIE[i] - 0.02899*HH[i] + 0.13253*AGRO[i] + 0.05750*FSUP[i]
    +0.04123*RISK[i]+0.11097*INNOV[i] -0.09924*LAND[i]-0.04933*STATUS[i]
    -0.63301*AGE[i]-0.10973*EDU[i]
    FSUP.append(x+FSUP[i])
    x = 0.12912*RIE[i] - 0.05576*HH[i] + 0.02370*AGRO[i] + 0.05410*FSUP[i]
```

```
    +0.00807*RISK[i]+0.01648*INNOV[i] -0.13462*LAND[i]+0.02885*STATUS[i]
    -0.40435*AGE[i]-0.02300*EDU[i]
    RISK.append(x+RISK[i])
    x = 0.05106*RIE[i] - 0.02205*HH[i] + 0.00937*AGRO[i] +0.02139*FSUP[i]
    +0.39862*RISK[i]+0.00652*INNOV[i] -0.05323*LAND[i]+0.01141*STATUS[i]
    -0.15989*AGE[i]+0.29089*EDU[i]
    INNOV.append(x+INNOV[i])
    x = -0.61028*RIE[i] +0.05529*HH[i] -0.09578*AGRO[i] -0.03948*FSUP[i]
    -0.02895*RISK[i]-0.07792*INNOV[i] +0.06570*LAND[i]+0.03464*STATUS[i]
    +0.45269*AGE[i]+0.19072*EDU[i]
    LAND.append(x+LAND[i])
    x = 0.05107*RIE[i] +0.00545*HH[i] +0.00723*AGRO[i] +0.25615*FSUP[i]
    +0.05626*RISK[i]+0.00652*INNOV[i] +0.27042*LAND[i] -0.00095*STATUS[i]
    +0.22738*AGE[i]+0.02545*EDU[i]
    STATUS.append(x+STATUS[i])
    AGE.append(1+AGE[i])
    if EDU[i]<2:
        EDU.append(1+EDU[i])
    else:
        EDU.append(EDU[i])
    t.append(i+1)
Ndot = []
ts=[]
for i in range(imax+1):
    x = -0.5*(AGRO[i]+RIE[i])+0.0122*HH[i]**2 + 0.0495*AGE[i]
    - 0.407*LAND[i] + 0.2037*EDU[i]
    Ndot.append(x)
    ts.append(i)

plt.plot(t,RIE)
plt.plot(t,AGRO)
plt.plot(ts,Ndot)
plt.legend(["RIE","AGRO","Migration"])
plt.show()
```

B. Appendix: Data used for analysis

B.1 Data for Migration; Source: [Maity et al., 2020]

Dependent Variables	*Independent Variables*	*Adjusted R-square*	*Beta*	*t*	*Sig. t*	Constant (Intercept)	*Explanation or Remarks*
Volume of Inter-District Male In-Migration **(VIMIG)**	Percentage of Construction Workers (CONST)	0.19	24112.5	2.8	0.007	132.7	More construction workers, more volume of in-migration
	Population Density (PDEN)	0.22	53.4	3.1	0.004	14159.9	More density of population, more in-migration
	Urbanisation (URBANS)	0.30	2596.8	3.7	0.000	10169.5	More urbanization, more volume of in-migration
	Literacy Rate (LTR)	0.21	1897.4	2.6	0.002	-41643	More literacy rate, More volume of in-migration
	Percentage of service worker (SERV)	0.33	27214.0	2.9	0.000	158.3	More service workers, more volume of in-migration
	Agricultural Productivity (AGLP)	0.39	-39.2	2.8	0.002	-11589.3	Low agricultural productivity, low in-migration
	Unemployment rate (UNEP)	0.36	-1245.3	3.1	0.013	2965.4	High unemployment rate, low in-migration

Figure B.1: Impact of the determinants on migration (Source: Computed from Secondary NSSO (2007-08)) [Maity et al., 2020]

Variable	*Coefficient*	*Robust Standard Error*	*z*	*P > z*	
SECTOR	0.2592***	0.036	7.170	0.000	
LDDIST	-0.0059	0.031	-0.190	0.850	
HHSZ	-0.0122	0.017	-0.720	0.473	
HHAGE	0.0495***	0.007	6.970	0.000	
HHAGESQ	-0.0002***	0.000	-2.630	0.009	
CASTST	-0.1878***	0.064	-2.940	0.003	
CASTSC	-0.0177	0.034	-0.520	0.605	Wald χ^2 **(19)** = 1248.18
CASTOBC	-0.1091*	0.058	-1.870	0.061	Prob. > χ^2 = 0.000
FHEADHH	0.9303***	0.045	20.700	0.000	Pseudo R^2 = 0.1370
LANDMAR	-0.6167***	0.122	-5.060	0.000	Log pseudo
LANDSSM	-0.1691	0.117	-1.440	0.149	Likelihood = -5191.133
LANDSM	0.0647	0.119	0.550	0.586	n = 8770
HHSZLANDMAR	0.0395**	0.023	1.730	0.044	
HHSZLANDSSM	-0.0360*	0.021	-1.720	0.086	
HHSZLANDSM	-0.0442**	0.021	-2.120	0.034	
EDUILLIT	0.0935***	0.035	2.660	0.008	
EDUPRMY	0.0648**	0.037	1.730	0.043	
EDUSECND	0.0486	0.031	1.550	0.121	
EDUHS	-0.0032	0.046	-0.070	0.945	
_CONS	-2.1399	0.207	-10.330	0.000	

Figure B.2: Impact of the determinants on migration (Source: Computed from Secondary NSSO (2007-08)) [Maity et al., 2020]

B.2 Data for Rural Industrial Entrepreneurship; Source: [Folmer et al., 2010]

Variable	Mean	St. Dev.	Minimum	Freq.	Maximum	Freq.
RIE	0.583	0.494	0.000	121	1.000	169
AGE	45.234	15.583	17.000	1	90.000	1
MARS	0.859	0.349	0.000	41	1.000	249
CHIL	1.828	1.485	0.000	58	9.000	1
EDU	9.131	4.147	0.000	14	17.000	11
CROP	0.431	0.496	0.000	165	1.000	125
FSUP	0.634	0.482	0.000	106	1.000	184
RISK	0.710	0.454	0.000	84	1.000	206
INNOV	0.207	0.406	0.000	230	1.000	60
LANDC	17.121	14.277	1.000	1	150.000	1
LANDH	7.169	6.540	1.000	12	40.000	3
IRRIGATION	0.862	0.345	0.000	40	1.000	250
HARVEST	0.293	0.456	0.000	205	1.000	85

Note: Sample size: 290.

Figure B.3: Calculation of statistical values for determinants of RIE (Source: Survey by contributors of [Folmer et al., 2010])

		RIE	*CHILMARS*	*CROP*	*FSUP*	*RISK*	*INNOV*	*WEALTH*	*STATUS*	*AGE*	*EDU*	R^2
Eq. 1	RIE	–	−**0.177** (0.028) −6.208	**0.149** (0.031) 4.780	**0.079** (0.020) 3.659	–	**0.127** (0.030) 3.856	−**0.095** (0.011) −8.045	−**0.058** (0.013) −4.204	−**0.690** (0.045) −16.52651	−**0.155** (0.039) −3.93803	.799
Eq. 2	CHILMARS	−**0.297** (0.0163) −17.97930	–	−**0.077** (0.024) −3.220	0.025 (0.019) 1.913	–	–	−**0.113** (0.015) −7.323	–	**0.235** (0.031) 6.759	−**0.147** (0.056) −2.60343	.126
Eq. 3	CROP	–	**0.548** (0.048) 11.393	–	–	–	–	–	–	–	–	.029
Eq. 4	FSUP	**0.764** (0.0455) 16.92376	0.051 (0.063) 0.819	–	–	–		–	–	–	–	.876
Eq. 5	RISK	–	−0.048 (0.035) −1.344	–	0.037 (0.039) 1.242	–	–	−**0.135** (0.022) −5.963	0.036 (0.023) 1.545	−**0.307** (0.043) −7.51681	–	.139
Eq. 6	INNOV	–	–	–	–	**0.395** (0.045) 8.094	–	–	–	–	**0.299** (0.0613) 4.86732	.693
Eq. 7	WEALTH	−**0.528** (0.040) −11.96756	–	–	–	–	–	–	–	–	**0.119** (0.0501) 2.35296	.783
Eq. 8	STATUS	–	–	–	**0.250** (0.030) 7.988	0.053 (0.059) 0.947	–	**0.283** (0.031) 8.973	–	**0.278** (0.032) 8.526	–	.118

Note: Standard error in parenthesis and *t* value at the bottom. Significant coefficients are given in boldface.

Figure B.4: Impacts of determinants of RIE on other determinants (Source: Survey by contributors of [Folmer et al., 2010])

	RIE	*CHILMARS*	*CROP*	*FSUP*	*RISK*	*INNOV*	*WEALTH*	*STATUS*	*AGE*	*EDU*
RIE	**0.15380** (0.02333) 6.59264	**0.07316** (0.01838) 3.97962	**0.03120** (0.00382) 8.16921	-0.00478 (0.00538) −0.88695	**0.05473** (0.01850) 2.95902	**0.01964** (0.00557) 3.52659	**-0.02878** (0.00828) −3.47587	**-0.00702** (0.00351) −1.99689	**-0.16583** (0.02254) −7.35610	0.02085 (0.01660) 1.25608
CHILMARS	**0.05639** (0.01552) 3.63419	-0.01794 (0.01497) −1.19826	**-0.03469** (0.00884) −3.92626	**-0.01660** (0.00548) −3.03004	**-0.01142** (0.00410) −2.78327	**-0.03074** (0.00881) −3.48857	**0.03045** (0.00541) 5.63389	**0.01367** (0.00366) 3.73905	**0.16927** (0.02224) 7.61239	0.02100 (0.01142) 1.83888
CROP	**-0.13201** (0.02075) −6.36232	-0.00983 (0.00876) −1.12256	**-0.06175** (0.01501) −4.11440	0.00495 (0.00816) 0.60640	**-0.00626** (0.00233) −2.68249	**-0.01685** (0.00508) −3.31889	**-0.04577** (0.00991) −4.61723	**0.00749** (0.00231) 3.23945	**0.22179** (0.02986) 7.42762	**-0.06949** (0.03054) −2.27541
FSUP	**0.10504** (0.02567) 4.09286	**-0.08080** (0.02253) −3.58705	**0.13253** (0.02818) 4.70246	**0.05750** (0.01637) 3.51238	**0.04123** (0.01449) 2.84488	**0.11097** (0.02994) 3.70585	**-0.09924** (0.01420) −6.99025	**-0.04933** (0.01277) −3.86305	**-0.63301** (0.05062) −12.50478	**-0.10973** (0.03911) −2.80608
RISK	**0.12912** (0.03421) 3.77370	-0.00754 (0.00553) −1.36224	**0.02370** (0.00656) 3.61469	**0.01634** (0.00723) 2.26155	**0.00807** (0.00399) 2.02459	**0.01648** (0.00682) 2.41651	0.00113 (0.01044) 0.10784	**-0.00726** (0.00293) −2.47661	**-0.09665** (0.02597) −3.72232	-0.02300 (0.01344) −1.71181
INNOV	**0.05106** (0.01605) 3.18099	-0.02205 (0.01362) −1.61912	**0.00937** (0.00299) 3.12972	0.02139 (0.01334) 1.60348	0.00319 (0.00184) 1.73714	**0.00652** (0.00305) 2.13706	**-0.05323** (0.01383) −3.84899	0.01141 (0.01036) 1.10092	**-0.15989** (0.02902) −5.50920	-0.00910 (0.00591) −1.54014
WEALTH	**-0.08135** (0.01558) −5.21975	**0.05529** (0.01506) 3.67015	**-0.09578** (0.02200) −4.35289	**-0.03948** (0.01461) −2.70230	**-0.02895** (0.00983) −2.94612	**-0.07792** (0.02061) −3.77995	**0.06570** (0.00997) 6.58866	**0.03464** (0.00814) 4.25687	**0.45269** (0.05439) 8.32332	**0.07141** (0.02568) 2.78085
STATUS	0.05107 (0.03462) 1.47534	0.00545 (0.01575) 0.34569	0.00723 (0.00608) 1.18924	0.00608 (0.00359) 1.69567	0.00253 (0.00190) 1.33231	0.00652 (0.00479) 1.36091	-0.01340 (0.00688) −1.94787	-0.00095 (0.00393) −0.24299	-0.05154 (0.03114) −1.65489	0.02545 (0.01692) 1.50463

Note: Standard error in parenthesis and *t* value at the bottom. Significant coefficients are in given in boldface.

Figure B.5: Impacts of determinants of RIE on other determinants (Source: Survey by contributors of [Folmer et al., 2010])