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Abhinav Alakshendra
Ziming Li

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Local Governments' Impact on Enterprises' Market accessibility: Understanding Enterprises' Location Choices in Hajipur, India

by

Abhinav Alakshendra* & Ziming Li[+]

Abstract

In the context of developing countries, this paper seeks to determine the extent to which the government impacts manufacturing enterprises' market accessibility, specifically when infrastructure is insufficient. Our research derives from a questionnaire-based survey of 153 enterprises, located in the town of Hajipur, India. Based on a statistical analysis of responses to the open-ended questions collected from representatives of the surveyed enterprises, we find that considerations of the consumer market and profit directly drive the agglomeration of enterprises beyond (all) other (examined) factors. We examine the relationship between local government support and market accessibility by using two methods of analysis, OLS regression, and the average treatment effect. There are six indices of local government support which covers subsidies, joint subsidies for production or general support. Four indices for market accessibility are constructed by assigning 3-scale and 5-scale categorization schemes of the locations of final production in both ascending and descending orders. We also find that the government support helps enterprises reduce cost, and facilitates the enterprises' final product to be sold in more distant markets. This research provides a new perspective towards the role government can play in fostering local prosperity in developing countries.

Keywords: Infrastructure, Corruption, Average treatment effects

*Assistant Professor, Department of Urban and Regional Planning, University of Florida

[+]Ph.D. Candidate, Department of Urban and Regional Planning, University of Florida

I. Introduction

Manufacturing agglomeration has proved to be a catalyst for regional economic growth in developing countries (Chakravorty, Koo, & Lall, 2005; Ghani, Kerr, & O'Connell, 2013; Mukim, 2011). However, not much has been written on the current manufacturing agglomeration in Bihar. Bihar is one of the poorest states in India and is categorized in the group of backward states. Bihar's share in the national industrial performance is disappointing in terms of the number of factories (1.52%), investment (0.34% for fixed capital and 0.58% for working capital), the value of output (0.84%), and net value added (0.58%)[1].

However, the growth of industrial development in Bihar has been impressive in the last decade. According to the Annual Survey of Industries 2009-2010 and 2010-2011, from the Government of India Ministry of Statistics and Programme Implementation, the growth rate of industrial net value added in Bihar was 90.21%, which was far greater than the average national growth rate (19.32%).[2] While being the 17th most populous municipality in the State of Bihar, Hajipur became one of the fastest growing cities of Bihar. The rise of Hajipur as an industrial destination is miraculous given the lack of sufficient provisioning of public goods and services, and the potential competition from neighboring agglomeration centers such as Patna and Muzaffarpur. The study attempts to investigate the rationale behind the location choice of the firms in Hajipur. It also attempts to measure the impact of government at all levels on market accessibility (i.e. the weighted distance between the enterprises and the final

[1]The data is for 2013-2014. Government of Bihar. Economic survey, 2016-2017, p. 128. Available at http://finance.bih.nic.in/Documents/Reports/Economic-Survey-2017-EN.pdf

[2] In Table 4 Estimate of some important characteristics by State for the year 2009-2010 in Annual Survey of Industries 2009-2010, the industrial net value added is ₹ 232,130 Lakhs and ₹ 59,211,387 Lakhs for Bihar and India respectively. Table 3 presents Principal Characteristics by the Major States in Annual Survey of Industries 2010-2011, the industrial net value added for Bihar stands at ₹ 441,499 Lakhs, and for India is ₹ 70,457,581 Lakhs. Central Statistics Office (Industrial Statistics Wing) - Ministry of Statistics and PI, Government of India (2010-2011). Annual Survey of Industries 2009-2010, Retrieved from http://www.ilo.org/surveydata/index.php/catalog/206
Central Statistics Office (Industrial Statistics Wing) - Ministry of Statistics and PI, Government of India (2010-2011). Annual Survey of Industries 2010-2011. Retrieved from http://catalog.ihsn.org/index.php/catalog/3438

market of the goods produced) of the firms. While Hajipur has experienced rapid industrial growth, the low-efficiency and high corruption at the local level have been limiting its growth.

The outline for the rest of the paper is as follows. In Section II, we discuss lack of basic amenities in Hajipur, which are essential for industries to thrive. In Section III, we probe the role of the government in the overall development of industries in Hajipur. In Section IV, we discuss the determinants of enterprises' input-output and expansion decisions with the help of quantitative methods, such as bootstrapping and regression analysis. In addition to these methods, we use three types of propensity score matching to estimate the average treatment effect. We do this to understand the magnitude of influence played by the proximity of Patna to the Hajipur on latter's industrial growth. Further, we also estimate the treatment effect of the treatment variables. Section V reports results i) a benchmark OLS model for estimating government support in general, ii) the average treatment model for estimating the impact of support from the Hajipur local administration and iii) the treatment effects models for assessing robustness. Section VI summarizes the findings and concludes.

II. Background

There are two industrial areas in Hajipur, the old industrial area (8.89 acres) and the export promotion industrial park (EPIP) (25.43 acres). Both these areas are under the administration of the Bihar Industrial Area Development Authority (BIADA). In recent years, some relatively big and noteworthy industries have come to the EPIP, however, the old industrial area has been losing industries at an alarming rate. Between 2006 and 2016, Bihar government implemented some of the most generous industrial incentive policies for industries, and Hajipur has been a major beneficiary. Availability and affordability of land attracted most of the industries in both industrial areas.

Hajipur has a locational advantage as it connects Patna to the North Bihar. In terms of market accessibility, goods produced in Hajipur are sold in North as well as South Bihar. Patna, the largest market in Bihar, is across the river Ganga from Hajipur. Patna is a catalyst of growth for Hajipur due to the size of the market and proximity to Hajipur. Hajipur and Patna are connected by the Mahatma Gandhi Setu, a

6 kilometer long bridge. Although, transportation costs have reduced globally (Hummels, 2007), Hajipur has witnessed an increase in the transportation cost to Patna. The Gandhi Setu is in dilapidated condition since last 8-10 years. This is due to an over-reliance on the sole bridge that connects the North and South Bihar. The extreme population growth, urbanization and economic development of Hajipur have exponentially increased the usage and traffic on the bridge. With most products being transported via trucks, the bridge acts as a vital link to the economic vitality of the city. However, overcrowding and lack of alternative options have put pressure on the bridge to exceed capacity, leading to major structural failures (Roy, 2015). This has led to the permanent closure of lanes and restrictions on the freight weight which has made Patna market less accessible for the Hajipur industries.

II (a). Data

The survey mainly covered topics such as enterprises' production, market conditions and linkages, and feedback on the impact of the (local) government and state industrial policies.[3] The education background and role of respondents are shown in Table 1. The total sample size is 153 enterprises and it covers businesses throughout Hajipur. The questionnaire consists of 8 sections including 1) Identification of enterprises and respondents, 2) Enterprise details (i.e. production and market), 3) Worker details, 4) Enterprise practices (i.e. relationship with employees and other enterprises), 5) Input and output of enterprises, 6) OAE information[4], 7) Changes and problems faced, and 8) Government role. Through Section 1) to Section 4), the questions are designed mainly in the format of standard selection. From Section 5) to Section 8), the questions are adopted in an open-ended format.

Table 2 shows the number of enterprises by ownership and by employment. Most of the enterprises are operated perennially, with only 9 operating seasonally. Among these seasonal enterprises, two are owned account enterprises (OAE), (i.e. those which do not hire workers), four are Non-directory enterprises (NDE) (i.e. unit with less than 6 workers) and two are directory enterprises (DE) (i.e. unit with 6 or more employed with at least one of those being a hired worker employed on a regular basis).

[3] This survey was supported by the International Growth Centre (IGC), Oxford.
[4] Own Account Enterprise (those which do not hire workers)

Proprietary enterprises take up the largest share of ownership, while own account enterprises account for the smallest proportion of hired workers.

Table 1 Education background of respondents

	Illiterate	Up to primary	Up to secondary	Higher secondary & above	diploma/ degree-	Certificate/ITI/other vocational Training	Post graduate &above	Total
Household member	1	0	1	0	2	0	1	5
Manager	1	1	7	5	27	2	8	51
Other staff	0	1	3	4	11	2	1	22
Owner	0	3	16	10	38	0	8	75
Total	2	5	27	19	78	4	18	153

Table 2 Basic information of enterprises

		Type of ownership				
		Proprietary	Partnership: with members from the same household	Between members not all from the same household	Others	Total
Type of enterprise/shop (labor load)	OAE	23	2	0	0	25
	NDE	49	0	1	3	52
	DE	42	19	12	2	75
	Vacancy	0	1	0	0	1
	Total	115	21	13	5	153

Notes. OAE: Own Account Enterprise (those which do not hire workers); NDE (Non-Directory Enterprise): unit with less than 6 workers (household and hired workers taken together) of at least one is hired worker employed on a fairly regular basis. DE (Directory Enterprise): unit with 6 or more employed with at least one being a hired worker employed on a fairly regular basis. Blank indicates missing data.

To understand the enterprises' location choices from the perspective of entrepreneurs, we asked the respondents to fill open-ended question, such as 'What was a major motivation for choosing this location

for your enterprises'. We categorized the respondents' narratives into 14 types, counted the frequency of answers in each blank (Table 3 to Table 9) and the sum-up of each factor is in Table 10.

Tables 3-11 (Appendix 1) depict several important findings for deliberation. In table 8, the market factor is the most selected answer among 153 enterprises. Transportation/accessibility, locality, policies, land, location, and labor are also some of the other important location reasonings stemming from the findings. In fact, transportation-related factors came up repeatedly as one of the most important factors, as transportation access and affordability directly affects market access. Therefore, market accessibility (i.e. the weighted distance from all their production's final market to enterprises' location) became one of the most important factors in understanding enterprises' location choices along with laws, regulations, policies, and subsidies. We categorize 'land' and other factors which are affected by governmental policies as government's impact. For example, when respondents report "the land was cheap", this is in relation to land prices in Patna[5]. The main determinant of the location (Table 8) are locality, policies/laws/government, location, land, and labor. The second most important determinant (Table 4) are market, transportation/accessibility, and locality. Therefore, the need arises to check for the significant influential factors stemming from the locality such as social capital, sense of community, and the roles of the local governments. Table 11 shows that congestion is the biggest problem enterprises face. The frequency of 'traffic jam', 'Mahatma Gandhi Setu (bridge)', and 'traffic regulation on vehicles' accounts for 50.36% of all responses, which is higher than complaints about the market related problems such as competition and lack of local demand (16.07%) and government service (14.15%). Furthermore, about 54% of the respondents think that local government provides no or in some cases negative (corruption and inefficiencies) support. This is significant as BIADA has an office in Hajipur along with the local District Industries Centers (DIC). The Mahatma Gandhi Setu (bridge) is the major connection between Hajipur and Patna, which separates Bihar into two parts (Fig. 3). More than 90% of

[5] According to BIADA, land rates in Industrial Estate in Patna is 435 Lakhs Rs./Acre, in Hajipur E.P.I.P. it is 200.83 Lakhs Rs./Acre, in Hajipur it is 204.62 Lakhs Rs./Acre; Industrial land in Patna is costlier than in Hajipur. http://www.biadabihar.in/topics.aspx?mid=GIS%20Map%20of%20Industrial%20Land

enterprises depend on road freight for trade. Given the above background, we also attempt to address issues of agglomeration and its determinants and heterogeneity of firms in the context of industrial location choice.

III. Literature review

III (a). Agglomeration

The general equilibrium assumption of New Economic Geographic models, cost-benefit of location drives the enterprises to have optimal selections. The benefits of agglomeration reflect gains that occur when proximity reduces transport costs for goods, labor, and ideas (Ellison, Glaeser & Kerr, 2010). The first of these refers to the forward and backward linkages between firms and their market accessibility, which is highly relevant to this research. The opposite is the cost of agglomeration, such as commuting cost (congestion cost), higher wages, and land prices, which affects the dispersion of enterprises and industries (Puga, 1998; Accetturo, 2010; Deichmann, et al. 2008).

By using stylized models, some researchers studied the influence of cities associated with bigger markets towards the location choice of heterogeneous firms. For example, Head and Mayer (2004) and Redding and Venables (2004) find that firms tend to be more productive in large markets, and in large cities (Baldwin and Okubo, 2006). Also, spatial sorting of labor is productive (Combes et al. (2008)). On the other hand, (Amitia and Pissarides, 2005; Okubo et al., 2010; Mori and Turrini, 2005; Glaeser and Resseger, 2010) find both firms and workers' performances are critical irrespective of the city size. Both theories and empirical evidence suggest that agglomeration benefits, market access, and infrastructure endowments in large cities outweigh the costs of congestion, higher wages, and land prices (Deichman et al., 2008). However, the basic assumptions in New Economic Geographic models; identical enterprises, neutral government role, and equal and sufficient market competition, hardly reflects the complex realities.

III (b). Heterogeneity of Firms

Puga (2010) identifies three approaches through which the existing theoretical and empirical literature explains agglomeration: 1) on a clustering of production beyond what can be explained by chance or comparative advantage; 2) on spatial patterns in wages and rents; 3) on systematic variations in productivity with the urban environment (Puga, 2010, p. 203). There is a plethora of research on matching and sharing of suppliers, labor pool, facilities, gains from individual specialization (e.g. Rosenthal and Strange, 2001; Henderson and Becker, 2000; Ellison, et al., 2010; Overman and Puga, 2010).

Like Puga's (2010) findings that firms and workers are much more productive in large and dense urban environments, Baldwin and Okubo (2006) also identify the role of different size of cities in heterogeneous firms' location choices. They show that relocating to the big region is most attractive for the most productive firms. All the most inefficient firms end up in the periphery and all the most efficient firms end up in the core. Regional policies such as production subsidies for increasing the share of industry in periphery regions will induce the highest productivity firms to move to the core and the lowest productivity firms to move to the periphery. The relationship between Hajipur and Patna in terms of industrial locations is also akin to the core-periphery structure. But our observation on the agglomeration and industrial prosperity in Hajipur and pre-test analysis from the questionnaire oppose their conclusion. Nevertheless, their assertion is still robust is in doubt if we neglect the impact from Patna to check the Hajipur government's fiscal support.

When it comes to a macro aspect, Lee and Cowling (2012) find limited evidence that 'place' effects (location or locality) play an important role. Correspondingly, they report that out of nine potential obstacles only a lack of access to finance is significant, controlling for other firm characteristics. The finding reminds us to explore what role government should play in increasing accessibility of finance for local enterprises.

III (c). Market Accessibility

Ingram (1971) loosely defined accessibility to market as the advantage of a place with less spatial obstacle or friction (i.e. distance and time) for trade. Because of its different measurement of market accessibility among researchers, market accessibility is loosely defined as simple line distance between production and market to infrastructure network (Geurs and van Wee 2004, Kwan et al 2003, Lei and Church 2010). This study, however, focuses on the categorical differences of distances among jurisdictions and natural obstacles without sufficient infrastructure networks (i.e. only Gandhi Setu connects Hajipur with and South Bihar), which fills the gap of understanding the endogeneity of the governments' double impact (negative for less than sufficient infrastructure and positive for industrial incentives for production).

IV. Research design

IV (a). Methodology and Data

As discussed above, this paper examines whether government support impacts enterprises' market accessibility in Hajipur? We select multiple indices of government support and market accessibility (Table 13 and 14). Additionally, this paper also investigates the impact of support from Hajipur and Patna through Average treatment effect model. For this analysis, we mainly depend on two questions, "Whether you must deal with government offices in Patna" and "In the last five years, how your dependence on Patna has changed". These questions provide a great insight into the administrative dependence of Hajipur on Patna.

The indices representing government support as well as some control variables are significant in the regression models (Table 16, 17 and 18). Therefore, these variables can serve as covariates in estimating the treatment effect. We use propensity score to match the observations in treatment groups and control groups. We also ask more specific questions to understand the extent of the administrative dependence of Hajipur on Patna. Questions such as- 'Please specify the types of work you are dependent on

government offices in Patna' include aspects of both government assistance (dependence) and regulation. We further probe this question by applying treatment effects model to identify the endogenous variables that impact treatment variables (Maddala, 1983). This method is based on the structural equation of discrete choice model of Heckman (1979). We adopt Heckman two-step estimation: The first step is to estimate the coefficient of treatment equation and the second step is to estimate the main model that is embedded with treatment equation.

IV (b). Dependent variable

Market accessibility is calculated based on three questions regarding the destination of final goods and the types of goods. The question 'Destination of the final product (s)' is an open-ended one, which covers production information including sale type, proportion, and place. The sale types cover 'wholesaler', 'retailer', 'both wholesaler and retailer', 'directly to the consumer', and 'suppliers of the inputs'.

We calculate four indices of market accessibility (namely MA_P_1 and MA_P_2, MA_P_3, and MA_P_4, respectively[6]) by final destinations (two groups) and two sub-groups within each group (P_1 to P_4 in Table 12) (Appendix 1). The first grouping focuses on the administrative boundaries. This grouping method reinforces the difference between Patna and other cities in Vaishali District. The second grouping emphasizes the significance of natural segregation because of Ganga River and the traffic situation on Gandhi Setu. Most of the respondents complain about the congestion on the Gandhi Setu and expect the government to solve this problem.

In addition, we also have information on trade connections of enterprises in Hajipur with nearby rural areas including the sale patterns. Similarly, we find that roads are widely used mode of transportation even when transporting to rural areas. We do include sale patterns and mode of

[6] The equation is $MA\_P_i = \sum Q2\_8\_jb*Q2\_8\_jc$ (i=1,2,3,4), where Q2_8_jb represents the destination of Product j and Q2_8_jc is the proportion of Product j in total production of each enterprise. As for the missing data of the first row of MA_1, it is calculated as (100- q2_8_2b)/5*(q2_8_1b+ q2_8_3b+ q2_8_4b+ q2_8_5b+ q2_8_6b)+ q2_8_2b *15.

transportation while constructing indices. Table 13 (Appendix 1) reports the statistical descriptions about all indexes of market accessibility.

IV (c). Independent variable

We select the level of government support as our independent variables. The first index is binary, Q8_1, which refers to whether the enterprises received any government support. Subsequently, the second question asks the respondents who have selected 'yes' to the first one whether the specific support they received changed. It involves 5 aspects: land subsidy, tax holiday, power subsidy, machinery subsidy, and generator subsidy. These aspects cover five monetary support for cost reduction for enterprises. We use Q8_2_i (where I =1, 2, … , 5) to represent each of the above five aspects. The second index, I_1, is the interaction term between Q8_1 and the maximum value among all the aspect Q8_2_i, which examines the impact of specific government support. The third index, I_2, is the interaction term between Q8_1 and the minimum value among all the aspects of Q8_2_i, which aims at identifying the impact of unchanged government support. Table 14 (Appendix 1) reports the statistics of all the independent variables.

IV (d). Control variable

For this study, we utilize four groups of control variables: 1) Difficulties in recruiting labor (skilled, unskilled, and in general); 2) Performance issues; 3) Major motivation of location choices, and 4) Enterprise features including input and output, raw materials, and the number of employees. Table 15 (Appendix 1) demonstrates the details of each variable. Both second and the third group of variables are in the binary form. Since the corresponding questions, Q7_10 and Q7_3 are open-ended questions, we construct 7 categories for Q7_3_1 and 10 categories for Q7_10_1 in the binary form.

Table 15 lists all control variables, but not all the variables are significant. The final independent variables are Q8_1, I_1, I_2, Q8_2_1, Q8_2_2, which have high relevance with the first and third index of market accessibility. Moreover, the chosen control variables are Q3_6_min, Q7_3_1_infr,

Q7_3_1_mrt, Q7_3_1_gov, Q7_10_1_loy, Q7_10_1_mrt, Q7_10_1_land, Q7_10_1_loc, Q7_10_1_tra, Q7_10_1_policies.

V. Results

V (a). Benchmark models

Q7_3_1_infr, Q7_3_1_mrt, Q7_3_1_gov are from the same group and they are statistically significant. Table 16 reports the results of regressions that passed the F-test when selecting the control variables. Table 16 reports the significant negative impact of government support on the first index of market accessibility. The severe congestion on the Gandhi Setu increases the cost of transportation and decreases the market accessibility of Hajipur enterprises with the local market. In addition, locality is one of the significant factors for location choices and it remains significant in Model (1). However, considering other determinants including market and land, locality turns to be insignificant (Model (8) in Table 16) (Appendix 1). These findings explain that the enterprises without historic origins or Hajipur market can still survive locally when government supports them to broaden their market beyond the local market.

Table 17 (Appendix 1) reports the results when dependent variables are MA_P3. The dependent variable uses 3-scale place codes by dividing north and south Bihar into different groups. The change of dependent variable does not alter the results.

Table 16 and 17 (Appendix 1) suggest that despite all the problems enterprises faced, once Hajipur enterprises gain the government support in general, their market accessibility increases. In addition, the difficulties in recruiting labor also influence the enterprises' market accessibility. The coefficients of locality in Model (1) denote that local factors can be a barrier for entrepreneurs.

V (b). Alternative index of independent variable

The above findings remain inconclusive in identifying specific support government can offer. Therefore, for further analysis, we use I_1, I_2, Q8_2_1, and Q8_2_2. Table 18 demonstrates the regressions with the same control from Model (8) in Table 16 and an alternative index of independent variables. The results remain the same as previous models outlined in Table 16 and Table 17. Model (1) and (5) show that the impact of government support, no matter how comprehensive, will enable enterprises to have a wider market in terms of the final product destination. Model (2) and (6) shows the same effect once enterprise received at least one type of government support. Model (3) and (7) denotes that gaining land subsidy benefits enterprises to trade in farther markets, Model (4) and (8) shows the same effect of the tax holiday on the market accessibility. Additionally, when replacing the control variables with Q7_3_1_infr with Q7_3_1_mrt, Q7_3_1_gov, the results remain the same. As for all the insignificant control variables (other problems faced by enterprises), their impact on market accessibility is negligible once enterprises received any form of government support.

V (c). Average treatment effects

We use Q8_4 serves to divide the samples into a treatment group and a control group in respective models. In all the models of Table 16, the group of 'the problems faced' (i.e. Q7_3_1_infr, Q7_3_1_mrt, and Q7_3_1_gov) are all insignificant, while Q7_10_1_loy, Q7_10_1_mrt, Q7_10_1_land, min_3_6, q23 are significant in most cases. Therefore, we choose the significant variables to estimate the average treatment effect through three propensity score matching methods. Given the small sample, we adopt replicable sampling in propensity score matching. However, after several iterations, we find Q7_10_1_loy and Q7_10_1_mrt as the ideal candidates for the matching methods. Table 19 and Table 20 demonstrate the propensity score matching results in the presence of four indices of market accessibility, where the Average Treatment Effect is only significant when using three indexes- MA_P_1, MA_P_3, and MA_P_4.

V (d). Robustness checks: Treatment effects models

To understand the reasons for these discrepancies among OLS and ATT models, we further check for endogeneity issues in the above model. Among the remaining control variables, it is doubtful that the features of enterprises including the difficulties of recruiting (Q3_6_min) or the level of employment (Q23) influence the treatment variable, Q8_4. Table 21 shows the results of treatment effects, which consists of different combinations of variables. All models show that Q23 is the endogenous variable that influences Q8_4, which means the treatment effect exists. The coefficients of Q8_1 remain significantly negative, which solidifies the previous findings on the impacts of government support. Nevertheless, the results from Table 19, 20, and 21 imply that the enterprises' connection with Hajipur government does help them to broaden their market accessibility. We also run the same regression from Table 16 to Table 21 (Appendix 1) by using only OAE samples, and the results are not significant, which suggests that OAE seldom receives government support.

VI. Conclusion

We find that market factors, especially enterprises' access to the market, drive manufacturing industries to Hajipur. This research looks into the rationale of the location choice of industries in Hajipur given the insufficient hard and soft infrastructure in the region. Further, we examine the impact of government support in general on local enterprises located in Hajipur. We find that the enterprises which received government support are more connected and can sell their final products to farther markets than the enterprises which did not. The level and magnitude of support didn't matter and the effect of support remains significant. This finding is important as policymakers should be continuing the policy of providing initial support to industries. In the latest industrial incentive policy, the government identifies key areas to develop and aims to provide support to industries operating in those key identified areas. However, the government has also excluded some of the traditional industries and plans to reduce or eliminate the existing support. The government should also be providing necessary infrastructure especially transportation, security, and transparency.

These findings have also broader implications beyond Bihar. The findings highlight the importance of government support in any form in poor regions where industries are scarce. Also, it's not conclusive, however, we may infer that proximity of a large market and government support may prove to be a winning combination in promoting industrial development in poor regions. The government can support on multiple fronts, however, successful industries in Hajipur have been able to expand their market accessibility. In Hajipur, higher government intervention causes market failures and may weaken competition, however, this should be viewed as necessary evil especially when industrial growth is in infancy. This paper provides a new perspective on the role of government. If adopted carefully, this could be regarding government intervention. If adopted properly by underdeveloped regions, government intervention is beneficial for local economic activities.

Additionally, in developing and underdeveloped countries where resources are usually limited, economic incentive policies for industrialization should be targeted and should aim to promote greater agglomeration. In the case of Hajipur, the infrastructure investment will have a positive spillover effect on all the sectors of Hajipur. This study also suggests that directly subsidizing enterprises from the beginning is the best strategy for industrialization in Hajipur.

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Appendix I

Table 3 Statistics of first motivation for enterprises' location selection

Rank	Factor	Counts	Actual Responses
1	Locality	37	Locality (7), Own house (2)/property (1)/land (2) in Hajipur (5), Local people (4), Local (4), Local residency (3), family business/historic business (3) Close to Home, resident of Hajipur (4) Local area (1), local proprietor (1), Father was engaged as a teacher (1) Own Premise (1) Others (2)
2	Consumer/market competition	23	Main market /commercial area (19) To remove duplication of Titan watches (1)—(to prevent competition in Hajipur) Consumer (3)
3	Land /place	16	land/place available (6), cheap land from BIADA (3), land price (2), others about land (5)
4	Location for trade	13	Location (3) Central region of south & north (3) Proximity to Patna (1) Proximity to Chawk and also to highway (1) Near to Chawk (1) Easy access to north Bihar (1) linkages of trade in North Bihar a major factor (1) Lots of village depends on this town (1) Near administration office near airport (1)
5	Transportation/accessibility	10	Access to road, Land on roadside (4), transportation (3), Near to railway station (2), Near about NH-19 (1),
6	Policies, laws & governments	11	Govt. inspector police (1) law and order (2) Protection (1) Politician Dubey encouraged owner to open factory (1) Power subsidy (1) Industrial policy 2011(1) Land subsidy (5)
7	Hajipur-preference	5	Hajipur is developing city (1) District headquarter of Vaishali (1) District revel town (1) to help in growth of Hajipur (1) Kidney of Hajipur (1)
7	Labour	5	Cheap labor (2), Low wage rate (1), Labour (1), Unemployment (1)
9	Urbanization/ industrialization	4	Industrial area (1) Industrial area (1) No-1 industrial area in Bihar (1) Near to industrial area (1) Totally dependent on Industrial area (1)
10	Electricity/power	3	Electricity (2), power position (1), Power subsidy (1)-not count here
10	Finance	3	Loan (1), Rent (1), near state bank (1)
10	Raw materials	3	
13	Contract/ business relationship	2	Contract of Hindustan lever Company (1) On head office instruction, they have set up their shop here at this place (1)
14	Other miscellaneous	8	Easy available shop, For food
	Total	144	
	Blank	9	

Note. The rankings of each item serve as the numeric value of all the columns in Q7_10

Table 4 Statistics of second motivation for enterprises' location selection

Ranks	Factors	Counts	Actual Responses
1	Consumer/market competition	24	Demand of furniture (Timber) due to few shops in locality (1) Patna market (1) New market (1) Main market (6) Market (12) Market center of Hajipur (1) Consumer (2) Sole Yamaha distributor in the district (1) Lots of consumers are here because it's an industrial area (1) Business (1) Monopoly/lack of competition (4)
2	Transportation/accessibility	21	Well connectivity Road and rail (2) Transportation easy throughout Bihar and Jharkhand (1) Transportation (1) Earlier Ganga bridge provided better connectivity (1) Main road/road connectivity (7) Good connectivity (1) Number of vehicles (1) On the highway (1) Route (1)
3	Locality	17	Local area (2) Local people (2) Being a local gets many benefits (1) Close to home/house, resident of Hajipur (9) Family business (Father has owned this shop before) (1) Owner had relatives here (1) Relatives associated with paint business (1)
4	Land /place	11	Land given by his grandfather (1) Hassel free land title (1) Cheap land (1) Land subsidy (1) Easier land availability (5) Machinery (1) Plot is easily available (1)
5	Location for trade/cluster	9	Near to Patna (4) Near to many villages (1) Patna is close (1) Cluster of all pesticides shop in 0.5 km range (1) There are so many Nurseries (1) Nursery Hub (1)
5	Policies, laws, and government	9	BIADA (1), Laws and orders (2), Pollution free locality (1), safety, Vat free industry (1) Tax holiday (2), Subsidy was good (1)
5	Electricity/power/water/infrastructure	9	"Availability of raw material electricity facility sage from the flood near to Patna" (1) Electricity (7), Power (1)
8	Urbanization/ industrialization	8	Industrial area
9	Labor	4	Cheap labor or available labor (3) Good and positive attitude of worker (1)
9	Finance	4	Near to state bank of India (2) Cheaper rent in compare to Patna (1) Rent saved (1)
11	Infrastructure	3	Good communication system (1), Water (1), Infrastructure (1)
12	Hajipur-preference	2	District revel town (1), Experience in Hajipur (1)
13	Other miscellaneous	4	Casteism in business (1), To generate employment (1), New development (1) cinema hall (1)
	Total	125	
	Missing	28	

Note. BIADA is Bihar Industrial Area Development Authority, http://www.biadabihar.in/.

Table 5 Statistics of third motivation for enterprises' location selection

Ranks	Factors	Counts	Actual Responses
1	Transportation/accessibility	21	Near to main road-NH19 (6) Good Road (3) Close/near to rail station (1) Ganga Bridge (1) Transportation facility (2) Proximity to Patna Airport (2)
2	Policies, laws and governments	18	Government subsidy (mainly land and machinery)- 35% in food processing (1) Electricity/ power subsidy (2) Good political condition (1) Law and order (4) Pro-industry support system (1) Supports of BIADA (1) Municipality office (1) Subsidy: VAT, generator, machines, general (4) Tax holiday (1)
3	Locality	12	Local people (4)/locality (2)/local knowledge is good (1) Near to house/home (3) Customer base (1)
4	Consumer/market competition/profit	10	Stable market (1) Close to market (1) Earning is good (1) Market and good demand (4) Market expansion (1) Demand has increased due to Industrial area (1) Customer base (1) Low competition (1) Easier to earn profit (1) Mall (1)
5	Location for trade and Patna	10	Proximity to Patna (8) Coaching institutes nearby (1) Oldest sawmill of area (1)
6	Land /place	7	Land from BIADA (1) Land available (2) Did not get land in Industrial area of Patliputra (1) Cheaper land (1) Shop is easily available (2)
7	Electricity/power provision	6	Hajipur was only place with maximum hours of electricity supply (1) Electricity (6)
8	Infrastructures except electricity and road	4	Close to facilities (2) Communication is good (1) Need for Sanitation (1)
9	Urbanization/ industrialization	5	Demand has increased due to the Industrial area (1) Better connectivity and communication Near industrial area (1) Nearby villages (1) Near to industrial area (1)
10	Labor	2	Labor (2)
11	Finance	1	Cheap Rent (1)
11	Raw materials	1	Raw materials (1)
11	Contract/business relationship	1	Good relationship with Godrej furniture (1)
11	Other miscellaneous	6	Own business (1) New area development (1)
	Total	104	
	Vacancy	49	

Table 6 Statistics of fourth motivation for enterprises' location selection

Ranks	Factors	Counts	Actual Responses
1	Policies, laws and governments	10	Subsidized land (1) Govt. subsidy was provided (2) Machine subsidy (1) Attracted to govt. policies (1) Safety and security (2) Tax holiday (2) Street law and order (1)
2	Locality	8	Area is nice (2) Near to house (1) Previous experience (1) Local resident (1) Making home
2	Location for trade	8	Near to Patna (6) Connectivity to north & south Bihar (1) Well connectivity to capital and other places (1)
2	Transportation/accessibility	8	Road Transportation (4)
5	Consumer/market competition/profit	6	Good market (4) No competition (2)
6	Electricity/power	5	
7	Land /place	4	Lack of plots in Patna industrial area (1) Land is easily available on lease (1)
8	Labor	3	Cheaper labor (2), Labor available(1)
8	Infrastructures except for electricity and road	3	Garage, drainages, infrastructure
10	Finance	2	3 floors shop is available at a good rate Cooperative bank
11	Urbanization/ industrialization	1	Industrial hub (1) Only one town in the locality and surrounded by villages
11	Raw materials	1	
	Hajipur-preference	0	
	Contract/business relationship	0	
11	Other miscellaneous	5	Close to cinema (1) Yadav chowk is famous for showroom (1) Many hotels (1) Ganga bridge was favorable at that time (1) Student come for job (1)
	Total	65	
	Vacancy	88	

Note. At Digha may connect to sentences in the next column of the questionnaire tabulate

Table 7 Statistics of fifth motivation for enterprises' location selection

Ranks	Factors	Counts	Actual Responses
1	Transportation/accessibility	8	Free from congestion of main town Road and rail (3) Time is saved (1) Benefit of Ganga bridge (2)
2	Consumer/market competition/profit	6	Good market and High demand (4) Market proximity (1) Monopoly (1)
2	Policies, laws and governments	6	Favorable administrative environment Subsidies (3) including generator (2) and general (9) Role of government Govt. policy
2	Urbanization/ industrialization	6	Industrial area/hub (5)
5	Labor	5	Maximum labor of rural background uses cycle Availability of workforce/cheap labor (2)
6	Locality	2	Residence area near the local factory. Owner is good
6	Land /place	2	Availability of land on the road side (1) Easy land availability
6	Location for trade	2	Near Patna (1) Near Patna-market (1)
9	Finance	1	Credit finance by bank
9	Contract/business relationship	1	Franchise has selected it
9	Infrastructures except for electricity and road	1	Light
9	Other miscellaneous	2	Agriculture Mela is organized Wanted to invest in Bihar
	Total	44	
	Vacancy	109	

Table 8 Statistics of sixth motivation for enterprises' location selection

Ranks	Factors	Counts	Actual Responses
1	Transportation/accessibility	6	Traffic free area Ganga bridge is the lifeline of north & south Bihar Near NH-19 (1) Proximity to bus stand & railway station (1) Well connected to India by good transportation system (1) Rail (1)
2	Urbanization/ industrialization	5	Industrial area/hub (2) Industrialization (1) Urbanization (2)
3	Policies, laws and governments	3	Machine subsidy (2) Law and order (1)
4	Consumer/market competition/profit	2	Market available (2)
4	Location for trade	2	Near Patna (1) Junction between Delhi (HQ) & Guwahati (1)
4	Labor	2	Labor abundance due to rural area and high unemployment (1) Probability to expand unit and business Available labor (1)
7	Hajipur-preference	1	Better atmosphere here compare to other places of Bihar
7	Infrastructures except for electricity and road	1	Drinking water
7	Electricity/power	1	
7	Other miscellaneous	3	Clearance window is effective Probability of Growth/expansion in future (2)
	Total	26	
	Vacancy	127	

Table 9 Statistics of last two motivations for enterprises' location selection

	Seventh factor		Eighth factor	
Factors	**Counts**	**Narrative in questionnaire**	**Counts**	**Narrative in questionnaire**
Location for trade	3	Near to Patna	1	Near to Patna
Transportation/accessibility		Near Hajipur railway station		
Policies, laws and governments	3	Subsidy on machinery (1) Subsidy on land (1) Govt. incentive policy (1)	1	Subsidy on food items (1)
Other miscellaneous	2	center place of Bihar with good productivity of growth of business future		
Total	8		2	

Table 10 Total counts of all the reasons for choosing Hajipur by respondents

Reasons	**Count**
Market	62
Transportation	60
Locality	58
Policies	43
Location	34
Land	31
Labour	25
Industrialization	20
Electricity	14
Urbanization/industrialization	12
Finance	9
Hajipur preference	9
Infrastructure	7
Raw materials	7
Contract	4
Others	22
Total	417

Table 11 Statistics of answers to the "Problems enterprises faced" (Q7_3)

Values	Categorizes	Percentages
1	Infrastructure problems including transportation, electricity, drainage, parking, street light and security	50.36%
2	Market problems including competition, demand reduction, illegal work in the market, cost of raw materials	16.07%
3	Government services including corruption, bribery, administration, law and order, paperwork	14.15%
4	financial problem including credit, money, and insurance	5.52%
5	Location problems	2.4%
6	Labor problems including hiring difficulties, trade union etc.	5.04%
9	No problem	0.96%
10	Other problem	5.52%

Note: Since some respondents replied that they do not have safety because of no street light. The others complaints about no security system or good policeman. Although security also involves law and order, we still categorize 'security' into the first rank. In total, there are 10 samples mentioned about security, while only one mentioned it as the first problem faced. Therefore, in the regression model, we use Q7_3_1 as the independent variables to reduce the bias generated by the ambiguous categorization.

Table 12 Descriptions on two types of grouping on destination of the final product in Q2_8

Categories	Value		Descriptions	Categories	Value		Descriptions
	P_1	P_2			P_3	P_4	
Hajipur &Local	5	1		North Bihar	3	1	Hajipur & local, Vaishali Darbhanga, Kosibelt, Madhubani, Muzaffarpur, Samastipur, Chapra, Bhagwanpur, Daudpur, Mahua, Motihari, Purnea, Sarai, Saran, Sitamarhi, Siwan, Thatha, Chapra, Sonepur, Kathhar, Jondaha Gopalganj, Bettiah, (Chak), Garaul
Vaishali District	4	2	Include Lal Gani, Patepur	South Bihar	2	2	Patna, Gaya, Bhagalpur, Munger, Vidhunpura, Ghataro, Arrah(Ara)
Patna	3	3		Outside Bihar	1	3	Allahabad, Assam, Chennai, Jharkhand, Haryana, Punjab, Kolkata, Karnataka, Tamil Nadu Maharashtra, West Bengal, U.P. MP, Orissa
Remaining parts of Bihar	2	4	Except Hajipur, Vaishali, & Patna				
Outside Bihar	1	5	Same as the description of P2				

Table 13 Statistic description of dependent variables

Variable	Description	Obs.	Mean	Std. Dev.	Min	Max
MA_P_1	Weighted sum of P_1 by multiplying the percentage of final products	136	345.0294	144.9695	25	500
MA_P_2	Weighted sum of P_2 by multiplying the percentage of final products	136	249.2941	134.7855	5	480
MA_P_3	Weighted sum of P_3 by multiplying the percentage of final products	136	255.8456	64.03319	15	300
MA_P_4	Weighted sum of P_4 by multiplying the percentage of final products	136	138.4118	58.99912	5	300
MA_R	Market accessibility with rural areas Weighted sum of descending value of places code by multiplying the percentage (Within Districts=3, Outside Districts=2, Outside State=1)	84	128.8869	86.59107	6	300
MA_R_re	Market accessibility with rural areas Weighted sum of ascending value of places code by multiplying the percentage Within Districts=1, Outside Districts=2, Outside State=3	84	55.44643	41.61607	2	191
MA_U	Market accessibility with urban areas Weighted sum of descending value of places code by multiplying the percentage Within Districts=1, Outside Districts=2, Outside State=3	125	200.756	76.49013	9	390
MA_U_re	Market accessibility with urban areas Weighted sum of ascending value of places code by multiplying the percentage Within Districts=3, Outside Districts=2, Outside State=1	125	110.764	64.68312	3	290

Table 14 Statistic description of independent variables

Variables	**Descriptions**	**Obs.**	**Mean**	**Std. Dev.**	**Min**	**Max**
Q8_1	Whether received government support (Yes=1, No=0)	107	.523	.502	0	1
I_1	Q8_1 * sum (Q8_2_i), (i=1, 2, 3, 4, 5)	153	.791	1.542	0	5
I_2	Q8_1 * max (Q8_2_i), (i=1, 2, 3, 4, 5)	153	.255	.437	0	1
Q8_2_1	Whether land subsidy changed (Yes=1, No=0)	91	.56	.499	0	1
Q8_2_2	Whether taxation holiday changed (Yes=1, No=0)	82	.378	.488	0	1
Q8_2_3	Whether Power subsidy changed (Yes=1, No=0)	84	.31	.465	0	1
Q8_2_4	Whether money for machinery changed (Yes=1, No=0)	81	.37	.486	0	1
Q8_2_5	Whether Money to buy generator changed (Yes=1, No=0)	76	.368	.486	0	1

Table 15 Statistic description of potential control variables and covariate variable

Variables	Descriptions	Obs.	Mean	Std. Dev.	Min	Max
I. Difficulties in recruiting						
Q3_6_1	Whether have difficulties in recruiting new skilled workers (Yes=1, No=2)	93	1.796	.405	1	2
Q3_6_2	Whether have difficulties in recruiting new unskilled workers (Yes=1, No=2)	95	1.874	.334	1	2
Q3_6_min	Whether have difficulties in recruiting new workers (Yes=1, No=2), i.e. min (Q3_6_1, Q3_6_2)	99	1.747	.437	1	2
II. Performance problems						
Q7_3_1_infr	1st most important problem faced (if infrastructure=1, otherwise=0)	145	.476	.501	0	1
Q7_3_1_mk	1st most important problem faced (if market=1, otherwise=0)	145	.386	.792	0	2
Q7_3_1_gov	1st most important problem faced (if government/policy/law=1, otherwise=0)	145	.207	.763	0	3
Q7_3_1_crd	1st most important problem faced (if micro finance=1, otherwise=0)	145	.331	1.106	0	4
Q7_3_1_loct	1st most important problem faced (if location=1, otherwise=0)	145	.241	1.075	0	5
Q7_3_1_lab	1st most important problem faced (if labour=1, otherwise=0)	145	.372	1.453	0	6
Q7_3_1_npro	No problem faced=1, otherwise=0	145	.248	1.479	0	9
Q8_3_1	The 1st important support from administration of Hajipur (Negative feedback= -1, no support=0, only mentioned relevant agencies=1, Positive feedback or detailed supporting aspects=2)	129	.651	.965	-1	2
III. Location motivation						
Q7_10_1_loy	Major motivation in choosing the location (if it is locality=1, other=0)	136	.272	.447	0	1
Q7_10_1_mrt	Same as above (if it is market=1, other=0)	136	.338	.752	0	2
Q7_10_1_lan	Same as above (if it is land=1, other=0)	136	.353	.97	0	3
Q7_10_1_loc	Same as above (if it is location=1, other=0)	136	.382	1.18	0	4
Q7_10_1_tra	Same as above (if it is transport=1, other=0)	135	.370	1.314	0	5
Q7_10_1_pol	Same as above (if it is policies/government=1, other=0)	136	.529	1.708	0	6
Q7_10_1_haji	Same as above (if it is Hajipur preference=1, other=0)	136	.257	1.322	0	7
Q7_10_1_lab	Same as above (if it is labor=1, other=0)	136	.294	1.511	0	8
Q7_10_1_in	Same as above (if it is infrastructure=1, other=0)	136	.265	1.526	0	9
Q7_10_1_el	Same as above (if it is electricity/power=1, other=0)	136	.221	1.474	0	10
Q7_10_1_fin	Same as above (if it is finance=1, other=0)	136	.243	1.622	0	11
IV. Input-output						
P_1	Annual performance 1: Profit/turn over, Q5_4/Q5_1	61	.289	.584	.00025	4
P_2	Annual performance 2: Profit/cost, Q5_4/Q5_2	71	2.155	11.858	.00049	100
P_3	Annual performance 3: Profit, Q5_4	72	1.06e+07	5.91e+07	0	5.00e+08
P_4	Income last month	68	.703	1.707	.06	12.5
P_5	Income last year	26	41.332	97.057	1.00e-05	400
Q23	Type of enterprises/shop (OAE/S=1, NDE/S=2, DE/S=3)	152	2.329	.744	1	3
min_q2_6	Minimum value of procuring places code among all raw materials (Within Bihar=1, Outside Bihar=0)	153	.503	.502	0	1
Treatment variables						
Q8_4	Whether have to deal with government offices in Patna (Yes=1, No=0)	136	.419	.495	0	1
Q8_5a	In the last five years, the change of dependence on Patna (Decrease= -1, no change=0, Increase=1)	96	-.073	.729	-1	1

Table 16 Main results: MA_P_1

MA_P_1	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Q8_1	-174.67***	-181.77***	-169.68***	-165.56***	-160.11***	-165.23***	-172.02***	-175.63***
	(28.95)	(29.80)	(28.51)	(29.58)	(30.69)	(30.997)	(27.34)	(27.49)
Q3_6_min	54.45**	62.73**	63.38**	57.66*	53.876	57.74*	63.1**	59.98**
	(31.16)	(31.2315)	(31.08)	(32.34)			(28.92)	(29.00)
Q7_3_1_infr	4.45	1.69	19.43	.47	1.39	.25		37.29
	(28.20)	(28.15)	(29.48)	(29.16)	(29.00)	(29.43)		(34.37)
Q7_10_1_loy	66.07**							37.83
	(34.29)							(34.37)
Q7_10_1_mct		-40.33*					-41.71**	-35.29*
		(21.05)					(19.74)	(20.54)
Q7_10_1_lan			-29.74**				-28.21**	-25.07*
			(14.44)				(13.11)	(13.39)
Q7_10_1_loc				-.61				
				(9.90)				
Q7_10_1_tra					7.58			
					(10.12)			
Q7_10_1_pol						-.24		
						(7.19)		
Q23	-67.47***	-90.35***	-66.63***	-73.78***	-74.11***	-73.68***	-84.25***	-78.90***
	(21.32)	(22.77)	(85.30)	(88.00)	(87.16)	(22.35)	(21.60)	(22.10)
Obs.	57	57	57	57	57	57	58	58
R Square	0.5846	0.5843	0.5886	0.5544	0.5592	0.5544	0.6261	0.6348
Prob.>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Note. Significance levels are denoted by *p<0.1, **p<0.05, ***p<0.01.

Table 17 Main results: MA_P_3

MA_P_3	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Q8_1	-74.64***	-71.17***	-67.23***	-68.84***	-70.93***	-69.57***	-69.63***	-72.44***
	(14.00)	(15.15)	(14.22)	(14.20)	(14.96)	(15.26)	(14.91)	(14.55)
Q3_6_min	53.50***	56.10***	57.76***	57.62***	56.78***	55.61***	58.54***	55.39
	(15.08)	(15.89)	(15.51)	(15.53)	(16.04)	(15.91)	(15.67)	(15.29)***
Q7_3_1_infr	11.47	9.21	16.76**	8.02	8.73	9.22	17.13**	17.21
	(13.65)	(14.32)	(14.71)	(14.00)	(14.32)	(14.48)	(14.82)	(14.39)
Q7_10_1_loy	39.35**							35.60**
	(16.59)							(17.72)
Q7_10_1_mkt		-4.90					-6.06	.37
		(10.71)					(10.54)	(10.72)
Q7_10_1_lan			-12.03				-12.31*	-9.34
			(7.20)				(7.26)	(7.21)
Q7_10_1_loc				7.69				
				(4.75)				
Q7_10_1_tra					-2.43			
					(5.00)			
Q7_10_1_pol						.29		
						(3.54)		
Q23	-21.68**	-27.48**	-22.56**	-26.07**	-25.39**	-25.67**	-24.97**	-19.62*
	(10.32)	(11.58)	(10.60)	(10.48)	(10.72)	(11.00)	(11.47)	(11.45)
Obs.	57	57	57	57	57	57	57	57
R Square	0.5580	0.5113	0.5347	0.5333	0.5116	0.5093	0.5378	0.5730
Prob.>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Note. Significance levels are denoted by *p<0.1, **p<0.05, ***p<0.01.

Table 18 Alternative index of independent variable

Note. Significance levels are denoted by *p<0.1, **p<0.05, ***p<0.01.

	MA_1					MA_2			
	(1)	(2)	(3)	(4)		(5)	(6)	(7)	(8)
I_1	-38.49***					-15.62***			
	(9.38)					(4.20)			
I_2		-161.26***					-64.75***		
		(33.92)					(15.33)		
Q8_2_1			-101.84**					-33.35	
			(40.43)					(24.40)	
Q8_2_2				-94.50**					-56.72**
				(41.92)					(21.77)
Q3_6_min	24.98	41.16	72.73*	60.43		33.77**	40.34***	67.75***	69.62***
	(32.26)	(30.92)	(38.44)	(42.14)		(14.45)	(13.98)	(23.19)	(21.89)
Q7_3_1_gov	15.34	9.37	23.84	27.46		12.03	9.56	18.62	22.24
	(28.87)	(27.73)	(33.56)	(38.09)		(12.93)	(12.54)	(20.25)	(19.78)
Q7_10_1_loy	17.71	24.83	29.32	16.50		20.68	23.72	35.54	25.34
	(38.01)	(36.20)	(47.39)	(54.95)		(17.03)	(16.36)	(28.59)	(28.54)
Q7_10_1_mct	-10.56	-12.21	4.03	10.39		6.87	6.31	15.45	11.40
	(21.79)	(21.02)	(28.33)	(31.03)		(9.76)	(9.50)	(17.10)	(16.11)
Q7_10_1_lan	-25.84*	-25.61*	-38.39**	-28.25*		-8.23	-8.10	-13.12	-9.51
	(14.31)	(13.82)	(16.18)	(15.74)		(6.41)	(6.24)	(9.76)	(8.17)
Q23	-63.19***	-52.31**	-24.24	-32.63		-12.57	-8.34	-4.29	-3.22
	(23.27)	(23.06)	(36.15)	(37.57)		(10.43)	(10.42)	(21.81)	(19.51)
Obs.	76	76	46	43		76	76	46	43
R Square	0.4740	0.5074	0.4425	0.4238		0.4453	0.4712	0.4144	0.5385
Prob.>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 19 Average Treatment effect

	MA_P1			MA_P3		
	Propensity matching (logit)	**k-Nearest neighbors matching**	**Kernel matching**	**Propensity matching (logit)**	**k-Nearest neighbors matching**	**Kernel matching**
Q8_1	1.605***	.96***	.96***	1.605***	.96***	.96***
	(3.01)	(3.03)	(3.03)	(3.01)	(3.03)	(3.03)
Q7_10_1_loy	-1.74**	-1.04***	-1.04***	-1.74**	-1.05***	-1.05***
	(-2.56)	(-2.63)	(-2.63)	(-2.56)	(-2.63)	(-2.63)
Q7_10_1_mkt	-.57	-.33	-.33	-.57	-.33	-.33
	(.31)	(-1.63)	(-1.63)	(.31)	(-1.63)	(-1.63)
Prob>chi2	0.0000	0.0001	0.0001	0.0000	0.0001	0.0001
Pseudo R2	0.1979	0.1962	0.1962	0.1979	0.1962	0.1962
ATT	**	No	**	**	No	*
(t-value)	(-2.04)	(-1.56)	(-2.09)	(-2.04)	(-1.65)	(-1.94)
ATT on Treated	237.3	237.3	237.3	217.825	217.825	217.825
Obs.	83	83	83	83	83	83
Untreated	43	43	43	43	43	43
Treated	40	40	40	40	40	40

Notes. (1) The numbers in the bracket of the first three rows are Z value
(2) In the k-nearest neighbors matching, k is set to 2. In the radius matching, the caliper is set to 0.0001
(3) Significance levels are denoted by *p<0.1, **p<0.05, ***p<0.01.

Table 20 Average Treatment effect on alternative dependent variables

	MA_P_2			MA_P_4		
	Logit matching	k-Nearest neighbors matching	Kernel matching	Logit matching	k-Nearest neighbors matching	Kernel matching
Q8_1	1.59***	.96***	.96***	1.59***	.96***	.96***
	(.51)	(3.14)	(3.14)	(.51)	(3.14)	(3.14)
Q7_10_1_loy	-1.64**	-.98**	-.98**	-1.64**	-.98**	-.98**
	(-2.42)	(-2.49)	(-2.49)	(-2.42)	(-2.49)	(-2.49)
Q7_10_1_mkt	-.45	-.26	-.25	-.46	-.30	-.30
	(-1.3)	(-1.29)	(.20)	(-1.3)	(.20)	(.20)
Prob>chi2	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Pseudo R2	0.1717	0.1702	0.1702	0.1717	0.1702	0.1702
ATT	No	No	No	No	***	No
(t-value)	(1.05)	(1.67)	(1.07)	(-0.14)	(3.66)	(-0.14)
ATT on Treated	268.82	268.82	268.82	139.44	139.44	139.44
Obs.	83	83	83	83	83	83
Untreated	44	44	44	44	44	44
Treated	39	39	39	39	39	39

Notes. (1) The numbers in the bracket of the first three rows are Z value
(2) In the k-nearest neighbors matching, k is set to 2. In the radius matching, the caliper is set to 0.0001
(3) Significance levels are denoted by *p<0.1, **p<0.05, ***p<0.01.

Table 21 Treatment Effects models

		(1)	(2)	(3)	(4)	(5)
MA_P1						
	Q8_1	-158.004***	-158.346***	-153.905***	-157.883***	-146.109***
		(29.751)	(30.720)	(30.259)	(31.325)	(29.125)
	Min_3_6	48.192*	--	48.0299*	--	45.805
		(1.81)		(27.496)		(27.902)
	Q7_10_1_locality	52.739	59.121*	--	27.790	--
		(32.185)	(33.105)		(44.247)	
	Q7_10_1_market	-19.511	-15.938	-22.410	-13.335	--
		(19.883)	(20.519)	(19.518)	(20.994)	
	q8_4	-196.48***	-205.798***	-202.978***	-187.509***	186.033***
		(62.53)	(64.593)	(56.130)	(65.752)	(51.974)
Q8_4						
	Q23	1.312***	1.317***	1.356***	1.388***	1.504***
		(.367)	(.375)	(.387)	(.40)	(.477)
	Q7_10_1_locality	--	--	-.861*	-.895*	-.821
				(.518)	(.530)	(.529)
	Q7_10_1_market	--	--	--	--	.189
						(.327)
	Min_3_6	--	.0302	--	.1540	--
			(.421)		(.440)	
	Prob>chi2 of probit regression	0.0000	0.0002	0.0000	0.0001	0.0001
	Pseudo R2	0.2250	0.2250	0.2627	0.2643	0.2671
Prob>chi2 of Treatment-effects model		0.0000	0.0000	0.0000	0.0001	0.000
Obs.		56	56	56	56	56
Lamda		89.67**	95.686**	89.020*	80.220*	76.125**
		(39.293)	(40.503)	(36.453)	(41.447)	(33.756)
Rho		0.831	0.84955	0.82103	0.748	0.72949
Sigma		107.964	112.632	108.4240	107.314	104.35495

Appendix II

Fig.1 Location of Patna, Muzaffarpur, Samastipur, and Vaishali District

Source: Google map

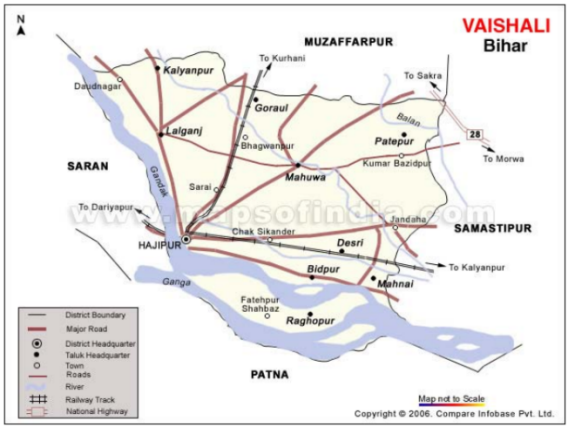

Fig. 2 Road and Rail Linkages in Hajipur and adjacent cities
Source: http://urban.bih.nic.in/Docs/CDP/CDP-Hajipur.pdf
Urban Development and Housing Department Government of Bihar: City Development Plan (2010-30) of Hajipur

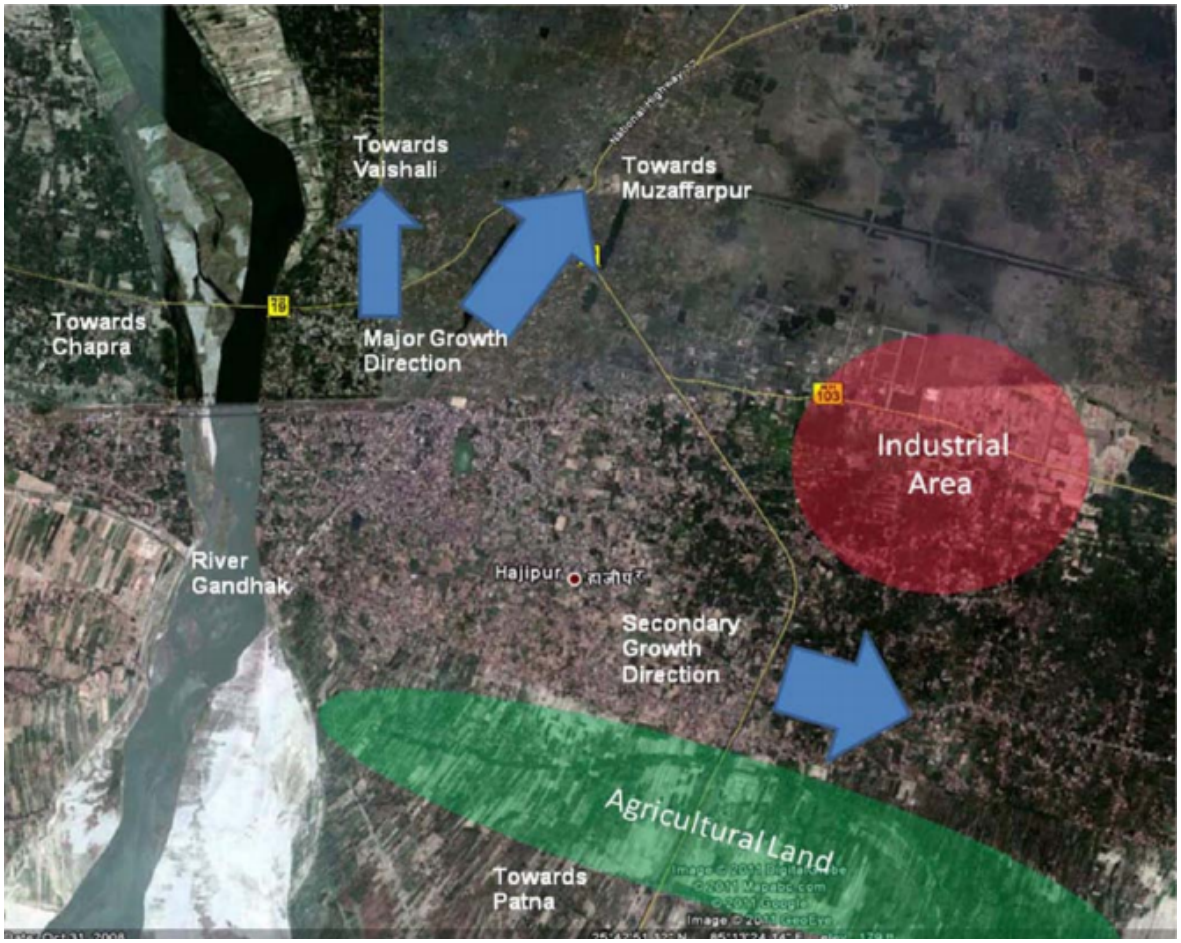

Fig.3 Growth direction

Source: http://urban.bih.nic.in/Docs/CDP/CDP-Hajipur.pdf
Urban Development and Housing Department Government of Bihar: City Development Plan (2010-30) of Hajipur

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