Distribution of Funds for Road Investment and Regional Economic Growth: A Case of Japanese Prefectures

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Abstract

This paper clarifies whether or not the distribution of funds for road investment from the central government to local governments is affected by political incentives and whether or not the funds contribute to regional economic growth. I employ a simultaneous-equation approach in order to attain this aim, and estimate the regional distribution functions and the regional growth regression using a panel of Japanese prefectural level data for a period of 1980 to 2010. Empirical results show that, (1) conditional convergence is observed between Japanese prefectures during our sample period, (2) regional distribution of funds for road investment is affected by political factors such as governing party (LDP)'s incentive to buy votes and pressure by a local interest group, (3) the funds for road investment conducted by local governments contribute regional economic growth, but road investment funded or conducted by the central government does not. This finding indicates the possibility that road investment conducted by local governments, which is less likely to affected by distributive politics, contribute regional economy more than road investment funded or conducted by the central government does and that decentralization is desirable in order to improve efficiency of road investment.

Keywords: Redistributive politics, Regional economic growth, Road investment in Japan

JEL Classification: H54, H77, R11, R42
1. Introduction

It has been pointed out the distribution of funds for infrastructure between regions has been determined not by efficiency or equity concerns but also by political or other institutional reasons (e.g., Castelles and Solé-Ollé 2005, Cadot et al. 2006, Golden and Picci 2008, Albalte, Bel and Fageda 2012, Solé-Ollé 2013). This phenomenon is what we call ‘redistributive politics’ or ‘pork barrel politics’ in public choice literature, which is not necessarily unnatural because public investment policy is determined by political process in democracy. However, redistributive politics can cause economic loss due to misallocation or excessive expense of public funds. Therefore, it should be an important issue to discover how the funds for road investment are distributed among regions.

On the other hand, there are many previous studies which clarify the contributions of public infrastructure to regional economic growth using various approaches such as production function (e.g., Mera 1973, Aschauer 1990, Munnell and Cook 1990, Duffy-Deno and Eberts 1991, Kemmerling and Stephen 2002), cost function (e.g., Keeler and Ying 1988, Morrison and Schwartz 1996, Cohen and Paul 2004), Vector Auto Regression (e.g., Doi 1998, Pereira and Andraz 2011), Barro regression (e.g., Nakazato 1999, 2001, De Mello 2002, Leon-Gonzalez and Montolio 2004). Though many papers reports positive and significant effect of public expenditure to regional economy, some papers raise questions about the validity of those estimation results because of endogeneity of public investment (e.g., Eisner 1991, Holtz-Eakin 1994).

As mentioned above, many papers point out an existence of pork barrel politics and analyze the contributions of public infrastructure to regional economy. However, there are few papers discovering the relationship between redistributive politics and regional economy. In general, redistributive politics believed to cause economic loss due to misallocation of public funds, but at least politically strong districts which have larger share of public funds may enjoy economic benefits in the short run. On the other hand, distributive politics may harm politically strong districts in the long run if the funds distributed are used for wasteful purposes or a kind of transfers for rent-seekers, which can cause lowering economic growth in the region.

The purpose of paper is to examine the relationship between pork barrel politics in the distribution of funds for road investment and regional economic growth using Japanese prefectural level panel data during the period of 1980 to 2010. The reasons we examine road investment as an object of pork barrel politics are as follows. First, road

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1 See Romp and de Haan (2007) and Pereira and Andraz (2010) for example, for a survey of this literature.
investment is one of most important infrastructure policy in many countries, and in case of Japan, road investment has made up 25~30% of total public investment, which has been the largest component in the last decades\(^2\). Second, regional road investment in Japan is considerably funded by the central government and it has been pointed out the distribution of the funds is easy to be affected by political pressures including politicians and local interest groups (e.g. Nagamine and Katayama 2001, Kondoh 2008).

To achieve this aim, we employ simultaneous equation approach to estimate the regional distribution functions of public funds for road investment and the regional growth regression, avoiding endogeneity problem. We can understand whether or not pork barrel politics is present in Japan from the result of distribution function and can assess how the economic impact of road investment and whether or not pork barrel politics is good for regional economic growth.

This paper is organized as follows. The next section presents a survey of related literature. In section 3, we explain an institutional setting of Japan including the relationship between the central and local governments, the system of politics and the system of road investment. Section 4 presents empirical framework and results. Section 5 concludes this paper.

2. Related Literature

In this section, we briefly introduce previous studies about the following two aspects: (1) pork barrel politics, and (2) the effect of public investment and political economy

(1) Pork barrel politics

There are two main theoretical approaches explaining pork barrel politics, one is ‘swing voter’ model, and the other is ‘core voter’ model. The swing voter approach has been developed by Lindbeck and Weibull(1987) and Dixit and Londregan(1998), which state that central (upper-layer) government allocate more funds to state with more swing voters, who do not have attachment to particular party. Case(2001), Dahlberg and Johansson(2002), Johansson(2003) and Milligan and Smart(2005) empirically support the swing voter model in the case for the distribution of intergovernmental grants in

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Albania, Sweden and Canada. Moreover, Wright(1974), Fiorina(1981), Stein and Bickers(1994), Bickers and Stein(1996), Denemark(2000) have also gain supportive results toward swing voter model in the sense that they show more money tends to be distributed to electorally vulnerable regions in order for the government party to secure enough seats and maintain the power.

On the other hand, the core voter model is theoretically explained by Cox and McCubbins(1986), which states that risk-adverse politicians care about their strongholds and distribute more funds to their regions. Baron(1991) clarifies theoretically why pork barrel politics is occurred and how the funds is distributed, shows that the benefits are distributed among a minimal number of regions by the majoritarian incentive. Grossman(1994), Levitt and Snyder(1995), Balla et. al.(2002), Ansolabehere and Snyder(2006) gain empirical results consistent with the core voter model. For example, Ansolabehere and Snyder(2006) examines the effects of party control of the state governments on the distribution of intergovernmental transfers in US and show that the governing party skew the distribution of funds to the areas that provide them with the strong electoral support. Golden and Picci(2008) and Joanis(2011) also show that the result consistent with core voter model for the case of interregional distribution of infrastructure investment in Italy and Canada.

Another important issue about pork barrel politics is alignment between central government and local governments. Solé-Ollé and Sorribas-Navarro(2008) concludes municipalities controlled by the same party with upper-tier government receive more grant than those that are unaligned using the Spanish panel data.

In addition, regional distribution of funds can be influenced by other factors such as political representation (e.g. Ansolabehere, Gerber and Snyder 2002, Horiuchi and Saito 2003), interest groups (e.g. Grossman 1994, Kemmerling and Stephan 2002, Cadot. et. al 2006, Kondoh 2008, Mizutani and Tanaka 2010), tradeoff between efficiency and equity (e.g. Yamano and Ohkawara 2000, Castells and Solé-Ollé 2005).

(2) The effect of public investment and political economy

There are few papers which analyze the effect of public investment taking politics into consideration except for Kemmerling and Stephan(2002), Cadot et.al 2006 and Mizutani and Tanaka(2010). They use a panel data of Germany, French and Japan respectively, and evaluate the economic effect of public capital by simultaneously estimating production function and policy function which describes the distribution of public investment or intergovernmental grant to avoid endogeneity bias coming from policy determination. These papers conclude that public investment or grant is distributed not
only by normative reasons but also by political reasons and that public capital contributes to regional economy. However, they mainly focus on the economic impact of public capital and do not clarify whether or not the economic impact of funds for road investment is different by their category.

In this paper, we estimate distribution function in order to clarify how funds for road investment are distributed from the central government to local governments, considering above-mentioned political factors into consideration. In addition, the growth regression is also estimated to evaluate economic impacts of funds for road investment by different category (including total, funded by the central government, conducted by the central government and conducted by local governments) on regional economy. Our approach has an advantage in the sense that we will be able to understand better how distributive politics affect regional economic growth by estimating regional distribution functions and the growth regression simultaneously.

3. Institutional setting of Japan

3.1 Local System

Japan is a unitary state which has three tier administrative system of the central government, prefectures and municipalities (including cities, towns and villages). Recently, Japanese government promoted municipal consolidation (The Great Heisei Consolidation), thereby the number of municipalities was sharply declined from 3,218 (as of April 1, 2002) to 1,727 (as of April 1, 2010). On the other hand, there has been no boundary change among prefectures since 1972 when Okinawa was returned to Japan from US. Each local government has their assembly and their budgets.

3.2 Political System

The Diet in Japan has bicameral legislature, the upper house of the Diet is the House of Councilors (HC) and the lower house of the Diet is the House of Representatives (HR), which has 242 and 480 members respectively. The term of the HC is 6 years and elected by half every three year, on the other hand, the term of the HR is 4 years but it the executive branch can dissolve the HR (Prime Minister can call an election of the HR). The HR is powerful house in the sense that it has superiority over the HC in the debate on bills including the budgetary bill. We have experienced several changes in the number of total seats and electoral system of the Diet. The electoral system of the HC has been mixture of proportional representation and multi-seat constituency system. However, the total number of the HC changed from 252 to 242 in 2001, when
proportional representation part changed from closed list system to open list system. The Electoral system of the HR is now combination of proportional representation and single-seat constituency system, to which changed from SNTV-MMD (single non-transferable in multi-member districts) system in 1994. The total number of the HR changed from 511 to 500 in 1994, and to 480 in 2000. There have been multiple parties in Japan, but Liberal Democratic Party of Japan (LDP) has been in power during almost all period of time from 1955 to 2009.

The important feature of local politics system is ‘Double Representative System’ where both prefectural governor or municipal mayor and local assembly member are directly elected from citizens. They are elected under the single or multiple electoral district system, and the term of office for them is 4 years.

3.3 Road investment in Japan

The Five-Year Plan for Road Development (Douro Seibi Gokanen Keikaku in Japanese) had played an important role in deciding total amount of road investment in Japan since 1954 to 2003. However, it was consolidated to The Priority Plan for Social Infrastructure Development (Shakai Shihon Seibi Jyuten Keikaku in Japanese) including other public investment project such as railway, airport, sewage, park and land conservation in 2003. As we noted above, the share of road investment in total public investment in Japan has been the largest in recent years.

According to the classification by Administrative Investment, road investment is divided to national or prefectural road and municipal road. In this paper, we would like to concentrate on national or prefectural road because municipal road is fully funded by municipal governments and because we are interested in analyzing the distribution of funds from the central government to local governments. As for national or prefectural road investment, we can use the road investment data classified by the administrative body which conducts and funds the project. If we classify road investment by the body which conducts the project, road investment is divided into project conducted by the central government (conducted by Central) and project conducted by local government (conducted by Local). If we classify road investment by the body which funds the project, road investment is divided into project funded by the central government (funded by Central) and project funded by local governments (funded by Local). Figure 1 depicts the amount of road investment since 1980 to 2009 by the classification mentioned above. The amount of road investment reached around 9 trillion yen at its peak in 1998, however, it has declined to around 4 trillion yen in 2004 because of anti public investment policy due to deterioration of fiscal balance.
4. Empirical Analysis

We estimate a regional growth equation and regional distribution functions jointly in order to measure an impact of road investment to regional economic growth and to clarify how funds for road investment are distributed across regions, avoiding an endogeneity of these funds determined by politics. Equations are formulated as following equation (1) and (2).

**Growth regression**

In order to capture the effect of road investment to regional economy, neoclassical $\beta$ convergence framework developed by Barro(1991) is employed as a growth regression. The growth regression is specified as equation (1), where prefectural economic growth (GROWTH) is regressed on initial level of prefectural income (INC), road investment level (ROAD), private investment ratio (INV), Level of human capital (HC).

\[
\text{GROWTH}_{i,t} = \alpha_0 + \alpha_1 \text{INC}_{i,t} + \alpha_2 \text{ROAD}_{i,t} + \alpha_3 \text{GCON}_{i,t} + \alpha_4 \text{INV}_{i,t} + \alpha_5 \text{HC}_{i,t} + \alpha_6 \text{HC}_{i,t} + \epsilon_{i,t} + \eta_i + \epsilon_{it}
\]

where $c_i$ a prefectural-specific dummy, $\eta_i$ is an year-specific dummy and $\epsilon_{it}$ is an error term. Prefectural economic growth (GROWTH) is defined as five-year average growth rate of per capita GDP in each prefecture. Initial level of prefectural income (INC) is defined as per capita GDP. This variable captures whether or not conditional convergence is present between prefectures in Japan. Negative coefficient of INC means low income prefectures grow faster than high income prefectures, so it means $\beta$ conditional convergence.

Long run effects of road investment are captured by road investment level (ROAD), which is defined as a ratio of road investment to prefectural GDP. If the coefficients of this variables is positive, we can interpret road investment is useful for enhancing regional economic growth. In addition, governmental consumption ratio (GCON), private investment ratio (INV), level of human capital (HC) is included as controls for

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3 There are some discussions on what is the optimal length of time span in studying growth convergence in panel framework. Islam (1995) states the assumption that some parameters(such as saving rate or population growth rate) are constant is valid for shorter period but that yearly time spans are too short to be appropriate for studying growth. In conclusion, he chose five-year intervals. We also select five-year intervals following Islam(1995).
regional economic growth. Governmental consumption (private investment) ratio is calculated as a ratio of governmental consumption (private investment) to prefectural GDP. We employ the ratio of persons who graduated from tertiary education as a proxy for the level of human capital (HC).

Distribution function

In order to clarify how the funds for road investment are distributed across prefectures in Japan, the distribution function is specified as equation (2), where road investment level (ROAD) is regressed on four sets of variables which capture different factors affecting public investment level. That is, (a) efficiency-equity tradeoff, (b) political factors, (c) intergovernmental relationship, (d) controls.

\[
\text{ROAD}_{it} = \beta_0 + \beta_1 \text{INC}_{it} + \beta_2 \text{HRLDP}_{it} + \beta_3 \text{HRDIF}_{it} + \beta_4 \text{LCLDP}_{it} + \\
+ \beta_5 \text{LGLDP}_{it} + \beta_6 \text{SIGC}_{it} + \beta_7 \text{RSUB}_{it} + \beta_8 \text{RPR}_{it} + \\
+ \beta_9 \text{RSEC}_{it} + \beta_{10} \text{RYOU}_{it} + \beta_{11} \text{ROL}_{it} + \beta_{12} \text{RJO}_{it} + \epsilon_{it} + \eta_i + \epsilon_{it}
\] (2)

Firstly, we use an initial level of prefectural income (INC) as variables which explain efficiency-equity tradeoff in central government’s decision. If the central government would like to maximize the effect of public investment, it is reasonable to invest more in prefectures which have high income, but it may enhance regional economic disparities. So, if the central government cares about regional income disparity, it will invest more in prefectures which have low income.

Secondly, as for political factors, number of LDP member in the House of Representatives (HRLDP) and difference in the votes between LDP and the largest opponent party in previous the House of Representative election (HRDIF) are used to explain central government’s political incentives. As discussed above, two potential powers could work in redistributive politics. One is core voter model, which states that money flows more to the government party’s stronghold, and the other is swing voter model, which states that money is distributed more to regions where the government party is weak in order to buy their votes. In the context of Japan’s politics in our sample period, LDP has been the government party almost consistently. So, we use HRLDP as

\[4\] Yamano and Ohkawara (2000) and others show marginal productivity of public capital is higher in high income areas like metropolitan Tokyo or Osaka for the case of Japan.

\[5\] A few exceptions were the period from August 1993 to April 1994 (Hosokawa administration) and from September 2009 to December 2012 (when the Democratic Party of Japan was in power).
proxies for LDP’s incentive to distribute to their strongholds (core voter model) and HRDIF as a proxy for LDP’s incentive to distribute to vulnerable areas (swing voter model). Because total number of the Diet changed several times, we use relative index for HRLDP like indices proposed by Kawaura (2003). HRLDP is calculated as a ratio of number of LDP member in prefecture i to prefecture i’s population divided by a ratio of total number of LDP member to total population in Japan. If LDP’s incentive is consistent with core voter model, the coefficient of HRLDP should be positive. On the other hand, if LDP distribute money in the way swing voter model implies, the coefficient of HREDIF should be negative. The reason we take only the House of Representatives as a political factor of national politics is superiority of the House of Representatives to the House of Councilors.

Moreover, ratio of LDP member in prefectural assembly (LCLDP) and LDP governor dummy (LGLDP) are introduced to capture alignment effect between the central and local government. LGDP is defined as a dummy variable which takes 1 if a prefectural governor was recommended by LDP in a previous gubernatorial election, because most of prefectural governors in Japan do not belong to particular party. If alignment matters in the distribution of public funds as suggested by previous papers, the coefficients of LCLDP and LGLDP should be positive. In addition, ratio of workers in the construction industry is used as a proxy for power of special interest group for road investment (SIGC). There is possibility that workers in construction industry pressure politicians or government to increase road construction, because road construction greatly contributes to construction industry’s revenue. If lobbying by special interest group leads more road investment in that region, the coefficient of SIGC will be positive.

Thirdly, rate of subsidization (RSUB) is introduced to account for intergovernmental relationships. Because our data for road investment includes local government’s subsidized and own project, RSUB may be positive if subsidized projects induced by subsidy. However, it can also be insignificant or negative if the degree to which subsidized projects crowd out own projects was too high.

Fourthly, road length divided by the number of owned cars (RLC) and the growth rate of the number of owned cars (DCAR) are included as independent variables in order to control demand factor of road investments. To put it another way, we can control a level of road infrastructure stock by including RLC, and can control an increase of traffic congestion by adding DCAR. If the central government distributes funds to prefectures where road demand is high in the sense that road infrastructure is not enough, the expected sign of RLC and DCAR will be negative and positive, respectively.

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6 RSUB is defined as ratio of grants to total prefectural expenditure.
Finally, we use share of primary industry (RPRI) and share of secondary industry (RSEC) as controls for structure of prefectural economy, and use share of younger age population (RYOU) and share of older age population (ROLD) as controls for democratic structure. Job offers-seekers ratio (RJOB) is introduced to capture the possibility that the government spends more in the region where labor demand is weak in order to stimulate employment. If public investment is used a tool for stabilization policy, the coefficient of RJOB should be negative.

4.2 Data and estimation method

The dataset for this study is a panel of Japanese prefectural data for the period of 1980-2010. Because there are 47 prefectures in Japan as mentioned and we can use up to 2005 to define five year average growth rate (GROWTH), total sample size becomes 1222. We estimate three equations (1) growth regression, (2) distribution function and by three stage least squares (3SLS).

As for road investment level (ROAD), we consider four sets of investment data: (1) total investment, (2) funded by the central government, (3) conducted by the central government, (4) conducted by the local government, in order to check whether the contribution to regional economy or distribution of road investments is different depending on which government pays for or conduct it.

Data sources are as follows. Economic statistics by prefecture including GROWTH, INC, GCON, INV, RPRI, RSEC and prefectural GDP mainly come from the Annual Report on the Prefectural Account (Kenmin Keizai Keisan Nempo) issued by Economic and Social Research Institute(ESRI), Cabinet Office. Road investment data come from the Administrative Investment (Gyosei Toshi Jisseki) issued by Ministry of Internal Affairs and Communication(MIAC). Data for intergovernmental grants come from Annual Statistical Report on Local Public Finance(Tihou Zaisei Tokei Nempou) by MIAC. Data relating to demand of road investment such as RLC and DCAR comes from the Annual Report on Road(Douro Tokei Nenpo) and Statistics of Motor Vehicles Owned(Jidou sha Hoyu Sharyousu Tokei) issued by Ministry of Land, Infrastructure and Transportation (MLIT). Ratio of workers in the construction industry is calculated from data of Employment Status Survey(Shugyo Kozou Kihon Chosa) and Census(Kokusei Chosa) issued by MIAC. Political variables including HRLDP, HCLDP, HRDIF come from Survey on the House of Representatives Election.

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7 Younger age means the age of 0 to 14, older age means the age of 65 or more.
and Results of a Review of the Supreme Court by the Citizens at the Polls (Shugiin-Giin Sosenkyo Saikosaibansho-Saibankan Kokuminshinsa Kekka Shirabe) and Survey on the House for Councilors Election (Sangiin-Giin Tsujyo Senkyo Kekka Shirabe) by MIAC. Data for local assembly and governor are obtained from Survey on Local Assembly and Governor (Chihokokyodantai no Gikai no Giin oyobi Cho no Shozokutohabetu Jin’in Shirabe) by Party Affiliation issued by MIAC and List of Governors (Zenkoku Kubicho Meibo) issued by the Japan Research Institute for Local Government. RJOB comes from Statistics for Job Placement Operations (Shokugyo Antei Gyomu Tokei) issued by Ministry of Health, Labor and Welfare (MHLW).

List of explanatory variables in equations and expected sign are summarized in Table 1 and descriptive statistics are shown in Table 2.

4.3 Estimation results

Estimation results are shown in Table 3. As we mentioned earlier, funds for road investment are classified by the body which conducts or funds it. Therefore, we estimated the equations by using four definitions of road investment: (1) total amount (referred to as ‘Total’), (2) the amount funded by the central government (referred to as ‘Funded by Central’), (3) the amount conducted by the central government (referred to as ‘Conducted by Central’) and (4) the amount conducted by the local government (referred to as ‘Conducted by Local’).

Firstly, as for the growth regression, the coefficients of initial income level (INC) are consistently negative and statistically significant in all equations. This means \( \beta \) conditional convergence is achieved between Japanese prefectures in our sample period. However, we have mixed and contrasting results with coefficients of road investment level (ROAD). If we use total amount (column 1) or the amount conducted by the local government (column 4), the coefficients of ROAD are significantly positive. On the other hand, we do not have positive coefficient for ROAD if we use the amount funded or conducted by the central government (column 2 and 3). This result suggests that funds for road investment conducted by the local government contribute to regional economy, but that others do not. Although governmental consumption ratio (GCON) is positively related to regional economic growth in some cases, private investment level (INV) and level of human capital (HC) do not affect regional economic growth in many cases. Especially, the coefficients for human capital (HC) have negative signs, which is not consistent with theoretical prediction. This may be because HC cannot be a proper proxy for human capital level.
Secondly, as for the distribution function, we have positive and statistically significant coefficients for the number of LDP member in the House of Representatives (HRLDP) but negative and statistically negative coefficients for the difference in the votes between LDP and the largest opponent party (HREDIF) except for road investment conducted by local (column 4). This result suggests that regional distribution of funds for road investments funded or conducted by the central government in Japan is consistent both with core voter model and swing voter model, but that one conducted by the local government is not. On the other hand, political variables such as the ratio of LDP member in prefectural assembly (LCLDP) and the power of special interest group (SIGC) are positively significant in many cases. Positive signs of LCLDP mean that alignment between the central government and local government matters in case of distribution of funds from the central government to local governments. Positive signs of SIGC may reveal political power of construction industry as a special interest group for public works. However, the coefficients of LGLDP are not positively significant. We can interpret this result reasonably if prefectural governor tends to choose conservative policy in order not to violate fiscal discipline.

The coefficients of these political variables may seem to be very small because independent variable is defined as a ratio to prefectural GDP. However, if we evaluate effects of political variables on road investment in percentage point change, they are not necessarily small. According to point estimates of total road investment (column 1 in figure 3), a one standard deviation increase in HRLDP, LCLDP, SIGC increases amount of public investment by 4.6, 6.6, 11.9 percentage points respectively.

With respect to variables which control demand for road investment, the coefficients of road length divided by the number of owned cars (RLC) is significantly negative, which may imply the funds for road is distributed more to regions where road stock is not enough. On the other hand, the coefficients for growth rate of the number of owned cars (DCAR) is significantly positive only in case for road investment conducted by the local government (column 4) except for total investment, which may indicate the possibility that road investment conducted by the local governments matches its demand better than road investment by the central government does.

As a variable which relates to equity-efficiency trade off, initial level of prefectural income (INC) have negatively significant coefficients. It may suggest regional income disparity is also one of factors for the decision of public investment as Kamada, Okuno

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8 Let p be money distributed to a region, x be political variable and y be prefectural GDP and b be coefficients estimated. We can obtain percentage increase in p evaluated at average value by $b \times \frac{y}{p} \times \text{one standard deviation of } x$. 

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and Futagami(1998) pointed out. The coefficients for the job offers-seekers ratio (RJOB) are not necessarily negative, which is not consistent with the idea that public works is used as stabilization policy. However, we do not detect systematic effects from variables such as rate of subsidization (RSUB), share of secondary industry (RSEC) and share of younger age population (RYOU), although coefficients of share of primary industry and older age population (RPRI, ROLD) are consistently positive.

Summarizing these results, we have three major findings. First, conditional convergence is observed between Japanese prefectures during our sample period. Second, the economic impacts of road investment differ between the project conducted by the central government and local governments. Road investment conducted by the local governments contributes regional economic growth, but others do not. Third, political factors matter in the distribution of funds for road investment, but redistributive politics by LDP matters especially in the case of funds from the central governments.

5. Conclusion

This paper investigates how public funds for road investment are distributed and whether or not these funds contribute regional economy using a panel of Japanese prefecture during the period of 1980-2010. From our empirical results, we show that political factors such as governing party’s objective or power of special interest group matter in the distribution of public funds, but the degree to which the distribution of funds are affected by political factors and the economic impacts of these funds are different depending on the body which funds or conduct it. To be concrete, our results imply that road investment conducted by local governments, which is less likely to be affected by distributive politics by LDP, contributes regional economy, but that the road investment funded or conducted by the central government does not.

It implies possibility that funds for road investment from the central government to local governments cause economic loss due to political distribution compared with road investment conducted by local governments. As policy implications, decentralization reform is needed to mitigate economic loss derived by distributive politics and more transparent government is desirable to limit influence of special interest groups such as construction industry as mentioned by Yamamura and Kondoh(2013). The investigation seeking for mechanism which mitigates asymmetry of information between governments and citizens will be a topic for further research.
References


Figure 1 Road Investment in Japan (1980–2009)

Source: Administrative Investment

Table 1. List of variables and expected sign

<table>
<thead>
<tr>
<th>Variable</th>
<th>Expected sign</th>
<th>Description</th>
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<tbody>
<tr>
<td>Growth regression</td>
<td></td>
<td></td>
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<tr>
<td>INC</td>
<td>-</td>
<td>initial level of prefectural income</td>
</tr>
<tr>
<td>ROAD</td>
<td>?</td>
<td>road investment level</td>
</tr>
<tr>
<td>GCON</td>
<td>?</td>
<td>governmental consumption ratio</td>
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<tr>
<td>INV</td>
<td>+</td>
<td>private investment ratio</td>
</tr>
<tr>
<td>HC</td>
<td>+</td>
<td>level of human capital</td>
</tr>
<tr>
<td>Public investment function</td>
<td></td>
<td></td>
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<tr>
<td>INC</td>
<td>?</td>
<td>initial level of prefectural income</td>
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<tr>
<td>HRLDP</td>
<td>+</td>
<td>number of LDP member in the House of Representatives (relative index)</td>
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<tr>
<td>HRDIF</td>
<td>-</td>
<td>differences in votes between LDP and the largest opponent party in previous the HR election</td>
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<tr>
<td>LCLDP</td>
<td>+</td>
<td>ratio of LDP member in prefectural assembly</td>
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<tr>
<td>LGLDP</td>
<td>+</td>
<td>LDP governor dummy</td>
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<tr>
<td>SIGC</td>
<td>+</td>
<td>power of special interest group (ratio of workers in the construction industry to all workers)</td>
</tr>
<tr>
<td>RSUB</td>
<td>?</td>
<td>rate of subsidization</td>
</tr>
<tr>
<td>RLC</td>
<td>-</td>
<td>road length divided by the number of owned cars</td>
</tr>
<tr>
<td>DCAR</td>
<td>+</td>
<td>growth rate of the number of owned cars</td>
</tr>
<tr>
<td>RPRI</td>
<td>?</td>
<td>Share of primary industry</td>
</tr>
<tr>
<td>RSEC</td>
<td>?</td>
<td>Share of secondary industry</td>
</tr>
<tr>
<td>RYOU</td>
<td>?</td>
<td>Share of younger age population (at the age of 0-14)</td>
</tr>
<tr>
<td>ROLD</td>
<td>?</td>
<td>Share of older age population (at the age of 65 or more)</td>
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<tr>
<td>RJOB</td>
<td>-</td>
<td>Job offers seekers ratio</td>
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</tbody>
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Table 2. Descriptive Statistics

<table>
<thead>
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<th>Variable</th>
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<th>S.D.</th>
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<th>Maximum</th>
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<td>0.0020</td>
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<td>ROAD (Funded by Central)</td>
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<td>0.0067</td>
<td>0.0007</td>
<td>0.0576</td>
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<td>ROAD (Conducted by Central)</td>
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<td>0.0062</td>
<td>0.0011</td>
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<td>0.1080</td>
<td>0.3050</td>
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<td>0.0790</td>
<td>0.4460</td>
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<td>HRLDP</td>
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<td>0.0005</td>
<td>0.0115</td>
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<td>RPRI</td>
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<td>RYOU</td>
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<td>0.0339</td>
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<tr>
<td>ROLD</td>
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<td>RJOB</td>
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### Table 3: Estimation Results (3SLS)

<table>
<thead>
<tr>
<th></th>
<th>(1)Total</th>
<th>(2) Funded by Central</th>
<th>(3) Conducted by Central</th>
<th>(4) Conducted by Local</th>
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<tbody>
<tr>
<td><strong>A. Growth Regression</strong></td>
<td></td>
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<tr>
<td>INCit</td>
<td>-0.0958 *** ( -7.51 )</td>
<td>-0.0746 *** ( -6.22 )</td>
<td>-0.0788 *** ( -6.48 )</td>
<td>-0.1139 *** ( -8.59 )</td>
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<tr>
<td>ROADit</td>
<td>0.5014 *** ( 3.43 )</td>
<td>-0.1741 ( -0.88 )</td>
<td>0.0635 ( 0.33 )</td>
<td>2.5416 *** ( 7.15 )</td>
</tr>
<tr>
<td>GCONit</td>
<td>0.0804 ( 1.05 )</td>
<td>0.2428 *** ( 3.52 )</td>
<td>0.2102 *** ( 2.93 )</td>
<td>-0.0546 ( -0.70 )</td>
</tr>
<tr>
<td>INVit</td>
<td>-0.0290 ( -1.62 )</td>
<td>-0.0204 ( -1.12 )</td>
<td>-0.0239 ( -1.31 )</td>
<td>-0.0301 * ( -1.66 )</td>
</tr>
<tr>
<td>HCit</td>
<td>-0.2651 *** ( -7.51 )</td>
<td>-0.2813 *** ( -7.93 )</td>
<td>-0.2783 *** ( -7.82 )</td>
<td>-0.2648 *** ( -7.48 )</td>
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<tr>
<td><strong>B. Distributive Function</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>INCit</td>
<td>-0.0164 *** ( -4.94 )</td>
<td>-0.0079 *** ( -2.66 )</td>
<td>-0.0097 *** ( -3.21 )</td>
<td>-0.0063 *** ( -5.80 )</td>
</tr>
<tr>
<td>HRLDPit</td>
<td>0.0017 *** ( 3.76 )</td>
<td>0.0019 *** ( 4.56 )</td>
<td>0.0018 *** ( 4.33 )</td>
<td>0.0002 ( 1.08 )</td>
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<tr>
<td>HRDIFit</td>
<td>-0.0059 *** ( -3.22 )</td>
<td>-0.0031 * ( -1.85 )</td>
<td>-0.0043 ** ( -2.54 )</td>
<td>-0.0009 * ( -1.66 )</td>
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<tr>
<td>LCLDPit</td>
<td>0.0099 *** ( 5.29 )</td>
<td>0.0071 *** ( 4.12 )</td>
<td>0.0073 *** ( 4.19 )</td>
<td>0.0025 *** ( 4.32 )</td>
</tr>
<tr>
<td>LGLDPit</td>
<td>-0.0021 *** ( -4.89 )</td>
<td>-0.0026 *** ( -6.45 )</td>
<td>-0.0026 *** ( -6.41 )</td>
<td>0.0002 ( 1.26 )</td>
</tr>
<tr>
<td>SIGCit</td>
<td>0.1673 *** ( 3.62 )</td>
<td>0.1765 *** ( 4.20 )</td>
<td>0.1726 *** ( 4.06 )</td>
<td>0.0166 ( 1.14 )</td>
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<td>RSUBit</td>
<td>0.0059 ( 0.31 )</td>
<td>0.0127 ( 0.73 )</td>
<td>0.0086 ( 0.49 )</td>
<td>-0.0050 ( -0.84 )</td>
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<td>RLCit</td>
<td>-2.4725 *** ( -4.22 )</td>
<td>-1.5789 *** ( -2.96 )</td>
<td>-2.0064 *** ( -3.71 )</td>
<td>-0.5956 *** ( -3.24 )</td>
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<td>DCARit</td>
<td>0.1593 *** ( 3.36 )</td>
<td>-0.0142 ( -0.33 )</td>
<td>-0.0081 ( -0.19 )</td>
<td>0.1261 *** ( 8.30 )</td>
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<tr>
<td>RPIit</td>
<td>0.0598 * ( 1.83 )</td>
<td>0.0738 ** ( 2.47 )</td>
<td>0.0599 ** ( 1.98 )</td>
<td>0.0071 ( 0.69 )</td>
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<tr>
<td>RESCit</td>
<td>0.0063 ( 0.56 )</td>
<td>0.0079 ( 0.77 )</td>
<td>0.0072 ( 0.69 )</td>
<td>-0.0014 ( -0.39 )</td>
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<td>RYOUlt</td>
<td>0.0079 ( 0.27 )</td>
<td>-0.0635 ** ( -2.37 )</td>
<td>-0.0290 ( -1.07 )</td>
<td>0.0196 ** ( 2.11 )</td>
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<tr>
<td>ROLDit</td>
<td>0.2025 *** ( 5.31 )</td>
<td>0.0517 ( 1.49 )</td>
<td>0.0882 ** ( 2.50 )</td>
<td>0.0887 *** ( 7.40 )</td>
</tr>
<tr>
<td>RJOBit</td>
<td>-0.0050 ( -0.90 )</td>
<td>0.0048 ( 0.97 )</td>
<td>0.0025 ( 0.49 )</td>
<td>-0.0048 *** ( -2.69 )</td>
</tr>
</tbody>
</table>

**pseudo R²** | 0.789 | 0.788 | 0.793 | 0.778 |

Notes:
1. t-statistics are in parentheses. *** 1%, ** 5%, * 10% significant.
2. Equations of each column are simultaneously estimated using 3SLS.