Ethnic Mix and Economic Performance in Japanese Cities

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Abstract

This paper presents an examination of immigration and economic performance in major Japanese cities. Panel data of large Japanese cities—the 13 largest cities—during 1984–2005 are analyzed. Traditional economic growth approaches from the literature and cultural diversity concepts reveal a positive relation between immigration into Japan and a city's economic performance. These results are robust after controlling for endogeneity problems that often result from simultaneity bias. These are the first reported empirical findings showing that cultural interaction among different social values spurs economic growth of a city, even in a homogeneous society such as Japan's.

Keywords: Immigration, Economic performance, City growth

JEL Classification: 011, R11, R50, Z10

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I. Introduction

Immigration affects a city's performance through labor market and cultural diversity. Reports of the existing literature on labor markets have described whether the inflow of foreign-born workers has a positive or negative impact on wages or productivity of native workers using national and city-level data. Ottaviano and Peri (2008) show that the positive correlation between immigration and native wages using national data. Based on the model presented by Roback (1982), Ottaviano and Peri (2006) show that immigration raises both wages and rents while enabling substitutability between immigrants and native workers using city level data. Illustrations of the effects imparted through cultural diversity is theoretically developed by, for example, Florida (2002) and Landry (2006): immigration affects city development through interaction and assimilation of different social values, creative ideas, work ethics, mutual learning, and competition. Alesina and Ferrara (2005) survey empirical studies of effects on economic performance of cultural diversity attributable to immigrants from various countries.

We study the effects of foreign residents on economic performance using panel data of large Japanese cities. City performance such as wages of natives and per-capita GDP will decrease if foreign workers are substituted for Japanese workers. In terms of cultural diversity, foreign residents might spur city growth through interaction between new and old ideas. Foreign residents in Japan represent a mix, including highly professional technicians to manual workers. They consist of foreign business professionals, highly ranked technical experts, artists and musical performers, language teachers, and religious missionaries, as well as unskilled workers who immigrate to fulfill short-term contracts. They are thought to fill technical and professional as well as labor shortage gaps in Japan.

Numerous factors accrue to the economy of each city or region within a country. To list a few, major policy targets of both central and local governments as well as locality traits strongly influence the pace and speed of any region's development. Access to factors of comparative advantage and demand markets add to the differential growth potentials of the locality. Leadership factors are no exception.

We investigate the effects of foreign residents on economic performance in major Japanese cities during 1984–2005 with careful consideration of other factors that affect economic performance, such as human capital endowments, industrial

structure, government consumption, expenditures for cultural or education, and trade structure with other cities. In formulating the estimated model, we use neoclassical growth theory and empirical studies.

Economic growth theory has steadily evolved to serve cyclical fluctuations in popularity and interest. Its debates have persisted from the 1960s neoclassical model that was later patched up by deviation from exogenous constant-technology progress to a new wave of incorporating endogenous ones, as extended from the older model to include the discovery of new ideas, human capital, government policies, and continuing technology change to avoid the tendency for diminishing returns to capital inherent to the earlier neoclassical model of Solow (1956) and Swan (1956). Indeed, with subsequent follow-up works of Arrow (1962), Shesinski (1967), Romer (1986, 1990), Lucas (1988), and Barro and Sala-i-Martin (2004, ch.6,7) and many others, the tendency for diminishing returns to per-capita capital accumulation could be remedied by either accommodating endogenous growth or providing that productivity creation is possible through investment, new ideas, R&D activities and other product factors such as government actions (i.e., taxation and expenditure, maintenance of law, and other aspects of the economy). More recently, some efforts have been undertaken in relation to determination of both absolute and relative rates of growth across countries as well as across regions within a country, considering economic, social, and cultural factors (see Barro, 1997, 2000; Guo, 2006, 2007; Hwang and Ahn, 2007; Knack and Keefer, 1997; Nopo, Saavedra and Torero, 2007; Robinson, 2003; Tolley, 2006; etc.).

Many economists, anthropologists, and sociologists have tried to assess the influence of cultural factors, including immigration, on economic and social development. A salient argument suggests that diverse states are more susceptible to growth-inhibiting internal strife than their homogeneous counterparts are (Easterly and Levine, 1997; Lemico, 1991; Adelman and Morris, 1971; Haug, 1967). Others argue that cultural and social diversity is a driving force for change and creative society along with economic development (Florida, 2002; Harrison and Huntington, 2000; Landry, 2006). Alesina and Ferrara (2005) report that the share of immigration affects the growth rate of per-capita GDP using national level data if they control for the number of assassinations, the black market premium, and the fiscal surplus. However, Ottaviano and Peri (2008) interestingly point out that the negative impact of immigration on native workers is likely found in national level analyses, although no

clear evidence exists in cross-city analyses[1].

Most such empirical studies use macro data or U.S. city-level data. Notable exceptions are Manacorda et al. (2006) using U.K. data and D'Amuri et al. (2008) using German data. Our study is closely related to these prior works, which specifically examine the relation between native wages, which imply economic performance, and immigration. However, the novel contributions of the present paper are careful consideration of the endogeneity bias and analysis of the effects of immigration on city economic performance using panel data for Japan. These analyses use data of 13 Japanese ordinance-designated cities[2] for 1984(5)–2004 with specific examination of relevant factors along with the inflows of foreign residents.

This paper is organized as follows. Section II briefly reviews immigration policies in Japan. Section III presents the analytical framework and its varieties of estimation models. In Section IV, data will be presented and discussed. The methods of deriving human capital and foreigners' shares are provided. In Section V, based on the available panel data of 13 cities during 1984–2005, we report the results. Section VI concludes this paper with discussion of future research related to this subject.

II. Immigration Policies in Japan

We begin with defining two keywords: "foreign workers" and "foreign residents". "Foreign workers" are defined as workers without Japanese nationality, excluding Koreans with special permanent resident status, diplomats, and official business people (Ministry of Health, Labour and Welfare, Japan). "Foreign residents" are defined as foreigners who are legally registered to the Japanese government and have lived in Japan for longer than three months (Ministry of Justice, Japan)[3]. The latter include students, children, and spouses who are not working in Japan.

In our empirical study, we use data for registered foreigners (foreign residents) because the cultural impacts on the host society come not merely from workers'

[1]For a comprehensive review of the literature on the effects of immigration on economic performance, see Borjas (1994), Longhi, Nijkamp and Poot (2005) and Card and Lewis (2007). Ottaviano and Peri (2008) also present a review of this issue, addressing substitutability between natives and immigrants.

[2] An ordinance-designated city is a city with more 500,000 population that has met the approval of a national cabinet meeting. An ordinance-designated city has many privileges in administrative as well as financial areas. An ordinance-designated city's administrative status is equal to the prefecture level. There were 17 ordinance-designated cities in Japan as of 2008. Tokyo is not an ordinance-designated city, however.

[3] Neither includes illegal workers or illegal residents.

communities but also from schools, meeting places, and resident communities. Hereinafter, foreign residents and immigrants are used interchangeably.

Japanese society has been recognized as “homogeneous” with few or no immigrants because the society closed its doors to foreigners at the start of the Edo era (1603). Nevertheless, in recent years in Japan, brisk arguments have been made about the low fertility rate and aging society. The total fertility rate in Japan was 1.26 in 2005. The Japanese population began to decrease in 2005. At the same time, reflecting firms’ demand for labor, the number of foreign workers began to increase in the 1990s. Although the foreigners’ share of the total population in Japan remains low (1.69% as of 2007), the inflow of foreign workers is rapidly increasing. The rate of growth was 3.7% annually during 1997–2007. Moreover, the foreigners’ countries of origin have dispersed to include more than 190 countries[4].

The number of foreign-born residents increased during the 1990s. There are several notable features related to the increase and changes in the composition of foreign-born residents in the last decade. First, Koreans have traditionally constituted the largest foreigners’ share in Japan since the Japanese military occupation of the Korean peninsula, which ended after World War II. We refer to those foreign residents as “old comers” hereinafter. However, the Korean share has gradually declined; Chinese became the largest group of foreign residents as of 2007. Chinese immigrants work in many industries, including agriculture, in many cities in the framework of a technical internship program that began in 1993.

A second notable feature is that foreign residents from Latin America, such as Brazil and Peru, have been increasing since 1990, when the Japanese immigration control and refugee recognition act was revised. The Japanese government revised the act and provided permanent residence status mainly for Japanese Brazilians and Japanese Peruvians.

A third notable feature is that Chinese, Filipino, Vietnamese, Thai, and Indonesian people moved into Japan in the late 1990s, mainly because of the introduction of technical internship programs that began in 1993.

These “newcomers” from Latin America and eastern and Southeast Asian countries are mostly unskilled laborers who are employed mainly in manufacturing, especially in the automobile industry and in agriculture.

III. Estimation Methods

In this paper, we specifically address the question of whether immigration affects economic performance. We use the hybrid model of the traditional economic growth and the empirical studies of immigration to answer this question. We estimate the effects of foreign residents on the economic performance in cross-city and time series analysis. Economic performance in this paper is measured either as the per-capita gross regional product (GRP) or as the growth rate of per-capita GRP.

Our estimation equation is based on the standard growth regression model adopted for studies such as those by Barro and Sala-i-Martin (2004) and Alesina et al. (2003). The dependent variable is the log of GRP per capita or growth rate of GRP per capita in city *i* in year *t*.

As documented well in most cross-country growth regression analyses, the process of economic growth can be analyzed using the shape of endogenous production function. Following Barro and Sala-i-Martin (2004) and many others in the tradition of neoclassical growth models, we assume that growth is driven in part by the level of education, life expectancy, fertility rate, government consumption rate, degree of democracy, international openness, investment ratio, inflation rate, and so on.

Our analysis is also based on the immigration and economic performance literature described in the introduction. In most traditional studies described in the literature, the effects of immigration on the wages of natives have been investigated[5]. Borjas (1994, 2003) and Borjas and Katz (2007) identify the negative impacts of immigration on native workers' wages while Card (2001) and Ottaviano and Peri (2008) find a positive but small impact. Many studies, including two by Ottaviano and Peri (2005, 2008), use the ratio of educated workers to control for differences in human capital endowments and city size measured by the log of number of

[4] See Immigration Bureau of Japan's home page (http://www.immi-moj.go.jp/english/index.html) for details about the foreigners' countries of origin.

[5] Some studies of the cultural diversity literature use the log of income (Ottaviano and Peri, 2006), log of per-capita GDP (Bellini et al. 2008), and the first difference in log of per-capita GDP (Alesina and Ferrara, 2005) as dependent variables. Card (2007) investigates average earnings per capita and immigration in U.S. cities. One interpretation is straightforward: they are interested in the impact on a city's economic performance. Another interpretation is that the per-capita income is a proxy for the wage when wage data are unavailable.

employment or population. Bellini et al. (2008) use the share of agricultural employment to control for differences in industrial structure. Considering results of these empirical works, we estimate the impact of foreign residents on economic performance, as measured by per-capita GRP.

In contrast, in many empirical studies, there often arises an endogeneity problem by which an explanatory variable is correlated with an error term. When endogeneity exists, ordinary least squares (OLS) might give biased and inconsistent estimates. In our empirical study, it is possible that the foreign share is correlated with unobserved factors, possibly related to a city's historical background, that also affect per-capita income. This kind of omitted variable or unobserved effect problem is likely to produce an endogeneity problem.

Wooldridge (2002, ch. 10), for instance, suggests some methods to treat omitted variables or unobserved problems in the case of panel data. Most popular methods to eliminate unobserved effects and ascertain a consistent and unbiased estimator are a fixed effects model and a first differencing method. Consequently, we use the following basic regression equation.

$$\begin{aligned}\ln(y_{it}) = {} & \alpha + \beta_1 Foreign_{it} + \beta_2 \ln(Human_{it}) \\ & + \beta_3 Manufacturing_{it} + \beta_4 Openness_{it} \\ & + \beta_5 Government_{it} + \beta_6 Culture_{it} + \beta_7 Education_{it} + \varepsilon_i + \varepsilon_t + \varepsilon_{it}\end{aligned} \tag{1}$$

The dependent variable $\ln(y_{it})$ is the log of per-capita GRP in city *i* in year *t*. $Foreign_{it}$ is the share of registered foreigners in city *i* in year *t*. As discussed in the next section, we use foreigners' shares of two types: one is the total foreigners' share; the other is the foreigners' share excluding Koreans. The other independent variables are included to control the effect on the economic performance. Many studies of the relevant literature use human capital or skilled labor ratio to control for differences in human capital endowments.[6] We use the log of the number of educated people in the city *i* in year *t* as a proxy for human capital. The educated people in the city *i* in year *t* are quantified as

$$\left(\text{the number of college students}_{i,t+1} / 4\right) \times a + \sum_{j=0}^{t} b^j h_{i,j} \ ,$$

[6] For example, see Ottaviano and Peri (2006), and Bellini et al. (2008).

where a is the rate of new workers in city *i* who graduate from college located in city *i*. We set $a = 0.6$. In addition, b and h_j are the discount rates of human capital and the number of college graduates in city *i* in year *j*. Furthermore, b is assumed as 0.8. The share of manufacturing is introduced to control for differences in industrial structure as in Bellini et al. (2008). Openness is often included in the growth literature, as in Barro and Sala-i-Martin (2004), which is defined as |exports – imports|/GDP. However, in this paper, net domestic trade and GRP are used for calculating openness rather than foreign trade and GDP: some cities in our sample have no ports and therefore have no direct international trade with foreign countries. Furthermore, many cities trade with other Japanese cities. Consequently, this proxy captures the openness to domestic trade within Japan.

Three other variables are included to control for effects of the foreigners' share of per-capita GRP. $Government_{it}$ represents the government consumption ratio to GRP in city *i* in year *t*. The effects on the per-capita GRP are, however, ambiguous. A higher government consumption rate might induce demand from the private sector and boost the economy. On the other hand, excessive government expenditures would hinder the growth of the private sector. Barro and Sala-i-Martin (2004, p.535) report the negative effect of government consumption on economic growth in cross-country data.

$Cultural_{it}$ is defined as the ratio of cultural expenditure of households in the total private consumption in city *i* in year *t*, controlling for cultural differences among cities and years. As Ottaviano and Peri (2005) summarize, city-level cultural diversity positively affects economic performance. The sign of this variable is therefore expected to be positive. The last control variable is $Education_{it}$, which is defined as the share of education-related expenditures in total private expenditures in city *i* in year *t*.

City fixed effects ε_i control for unobserved effects, such as history, culture, and institutions that can be viewed as roughly constant over the period. The year dummy ε_t is also introduced to control for time-variant events, such as business cycles. Finally, ε_{it} is an error term that follows regular assumptions.

Another popular way to eliminate the time-constant unobserved effects is to take the first differentiation of variables in both sides.

$$\Delta \ln(y_{it}) = \delta_1 \Delta Foreign_{it} + \delta_2 \Delta \ln(Human_{it}) + \delta_3 \Delta Manufacturing_{it} + \delta_4 \Delta Openness_{it} + \Delta\mu_t + \Delta\mu_{it}, \quad (2)$$

Therein, $\Delta \ln(y_{it}) = \ln(y_{it}) - \ln(y_{i,t-1})$, $\Delta Foreign_{it} = Foreign_{it} - Foreign_{i,t-1}$, and so on. This first differentiation transformation enables reduction of omitted variable biases and also yields consistent estimates of time-varying variables.

We estimate eqs. (4) and (5) and discuss the results in the next section.

IV. The Data

We use foreign residents' data, rather than foreign workers' data because we investigate not only labor market impacts but also cultural impacts on city performance. Cultural impacts on the society arise not only from labor markets but also from schools and activities in the community. In this sense, we must consider the possible impact of foreign families, i.e. foreign residents, rather than workers only.

The raw datasets come from both *Annual Statistics Book for Big City Comparison* published by the Association of Big City Statistics Cooperation and *Japan Statistical Yearbook* by the Ministry of Internal Affairs and Communications (1985–2005). The data include those for 15 ordinance-designated cities during 1984–2005: Sapporo, Sendai, Saitama, Chiba, Tokyo, Kawasaki, Yokohama, Shizuoka, Nagoya, Kyoto, Osaka, Kobe, Hiroshima, Kitakyushu, and Fukuoka. Two cities—Saitama and Shizuoka—have no relevant data; thereby we exclude these cities from our unbalanced panel dataset. Furthermore, three cities provide only partial time series data: Sendai (1994–2005), Saitama (1994–2005), and Yokohama (1985–2005). Consequently, we have about 260 samples over the period.

Table 1 presents a summary of data of 13 cities. Per-capita GRP is shown in million yen units. Tokyo was the richest city for three observed years; it had the highest annual growth rate during 1985–2005: 6.36%. Most large companies locate their headquarters in Tokyo. For that reason, the GRP is expected to be larger in Tokyo than in other cities. In addition, a considerable number of Tokyo workers reside in satellite cities of Tokyo, such as Yokohama, Kawasaki, and Chiba, and

commute to Tokyo. Osaka has almost identical features to those of Tokyo, having Kobe and Kyoto as satellite cities.

Partly reflecting this satellite situation, Yokohama and Kawasaki are the bottom two lowest per-capita GRP cities. It is noteworthy that Yokohama and Kawasaki are cities in the same prefecture, Kanagawa, which is Tokyo's neighbor. However, looking at the growth rate during 1985–2005, Yokohama's is 4.78% per annum: the third highest among the 11 cities. Kawasaki has the lowest growth rate, 0.87%, during that period.

Another interesting finding is that although Kitakyushu and Fukuoka cities are located in the same prefecture, the annual growth rate of per-capita GRP in Fukuoka city is 4.95, which is the second highest, while the growth rate in Kitakyushu is 2.80%, which is the second lowest among the 11 cities. Reflecting this low growth rate, the per-capita GRP of Kitakyushu was 3.59 million yen in 2005, which was 11th among 13 cities. The annual average population growth rate during 1985–2005 in Fukuoka was 0.9%, but -0.3% in Kitakyushu. Those two cities show a sharp contrast of growing and declining cities despite their close proximity.

The foreigners' share is defined as the share of the number of registered foreigners among that city's population. The Korean share is also defined as the share of the number of registered Koreans among the number of foreigners in that city. First, we see from these two kinds of shares in Table 1 that foreigners' shares in Japanese large cities are small, 0.24–4.46% in 1985, for example, and that Korean shares are very high, 53.6–94.1%, in 1985. Special permanent residents who are composed of mainly Koreans and Taiwanese are the people who had been living in Japan before the surrender of Japan in World War II on September 2, 1945 and had lost Japanese nationality on the basis of the Treaty of Peace on April 28, 1952, and their descendants. Historically, their descendants remained as the major constituents of registered foreigners in Japan in many cities.

Another notable finding is that while foreigners' shares are increasing in almost all cities except for Kyoto and Kobe, Korean shares are declining in all cities over the observed period. This trend simply implies that the number of foreigners aside from Koreans is increasing while the number of registered Korean is declining. One reason for the declining number of registered Koreans is that the younger Korean people feel freer to acquire Japanese nationality than people of older generations.

Actually, younger people were born and educated in Japan, so many have few or no ties to Korean culture; many cannot even understand the Korean language.

It is statistically difficult to distinguish "newcomer" Koreans who came to Japan after World War II from old comers who came to reside in Japan before the war. Since newcomers from Korean peninsula are few compared to Koreans who settled in Japan before the war and their descendants, we infer that most registered Koreans are old comers or their descendants and have a common cultural background with Japanese people. It is expected that there are different impacts of the two shares on economic activity. Therefore, we calculate two shares in our study. One is the registered foreigners' share in city *i* in year *t*, which is defined as

$$Foreigner's\ share_{it}\ 1 = (Total\ Registered\ Foreigners_{it}) / (Population_{it}).$$

The second measure excludes old comer Koreans and is defined as the following.

$$Foreigner's\ share_{it}\ 2 = (Total\ Registered\ Foreigners_{it} - RegisteredKorean) / (Population_{it})$$

For empirical estimation, we expect that the Foreigners' share 2 has a larger coefficient estimate than Foreigners' share 1 if the majority of Koreans are assimilated into Japanese society to some degree.

V. Empirical Results

As discussed in section III, we specifically examine the effects of ethnicity, as measured by the share of foreigners on economic performance at the city level. To control the experiments, we introduce several explanatory variables: human capital endowments, economic structure, trade structure, and government policies.

Table 2 presents summary statistics of these explanatory variables as along with the dependent variable, per-capita GRP. The effective sample size is 261, which reflect 13 cities over 21 years. Some values are missing; thereby the dataset is an unbalanced panel. Foreigners' shares 1 and 2, the manufacturing share and the openness are measured in shares whereas per-capita GRP and human capital variables are measured in natural logarithms. Means of foreigners' shares show a large

deviation, which indicates that the Korean share is quite large, on average, in all samples.

(1) Pooled OLS

Before proceeding to a rigorous empirical study, we verify the basic correlation between city performance and the foreigners' share. The results of pooled OLS are reported in Table 3. Columns (1) and (2) show the correlation between city performance measured by per-capita GRP and foreigners' share with no other control variables. Columns (1) and (2) portray strong correlations between the two factors no matter which foreigners' share is used. As expected, the estimated coefficient for Foreigners' share 2 is larger than that of Foreigners' share 1, indicating that newcomers are more strongly correlated with city performance than older foreigners.

Controlling for human capital, economic, and trade structures in columns (3) and (4), we obtain positive and highly significant estimated coefficients for foreigners' shares, although they are smaller than those in columns (1) and (2). Estimated coefficients for human capital in column (3) and (4) are positive and highly significant, as we expected, although estimated coefficients for manufacturing shares are negative and significant.

Including policy variables, such as the government consumption ratio, cultural expenditure share, and education expenditure share in columns (5) and (6), almost identical results were obtained for foreigners' shares 1 and 2, and other control variables. The coefficients for government consumption ratio are negative but not significant, although the coefficients for cultural expenditure are positive and highly significant in both foreign share cases. The coefficients for the education expenditure share are negative but not significant.

However, these results are not controlled for unobserved effects. We examine the results with controlling for unobserved effects in the next section.

(2) Panel Fixed Effect Model

Table 4 reports results of the panel fixed effect model. A notable finding is that estimated coefficients for Foreigners' shares 1 and 2 for all specifications are positive and statistically significant. Compared with the previous pooled OLS results, the sizes of the estimated coefficients for foreigners' shares are smaller, indicating that unobserved effects are well captured by city fixed effects.

The results of panel fixed effect model support for our claim that the size of coefficient for Foreigners' share 2 is greater than that for Foreigners' share 1. The estimated coefficients for control variables in columns (3) and (4) also support our claims that human capital and openness are positively correlated with per-capita GRP. It is noteworthy that, in contrast to previous results, the estimated coefficients for manufacturing share are positive and statistically significant, suggesting that the manufacturing sector is an important sector in many cities. Inclusion of three policy variables, the government consumption ratio, cultural expenditure share, and education expenditure share improve the significance of human capital in column (5), leaving the coefficients for other variables unchanged. Coefficients for the government consumption ratio are negative and statistically significant, which is consistent with the result of Barro and Sala-i-Martin (2004, p. 535). However, coefficients for cultural and education expenditure shares are not significant.

Endogeneity problems might also arise from the simultaneity which arises when explanatory variable(s) and dependent variables are determined simultaneously. Apart from the endogeneity problem, it is interesting to check the direction of causality, i.e., the foreigners' share affects economic performance or vice versa. We estimate eq. (2) with lagged independent variables to mitigate these problems. We also check the robustness of the analysis using this specification. The results are reported in Table 5. Variables in the right-hand side (RHS) include one-year lagged explanatory variables and city-specific effects and year dummies. The coefficients for foreigners' shares are positive and statistically significant, which supports our claim that the foreigners' share positively affects the economic performance in cities. Other relevant control variables, such as human capital, manufacturing share and openness are also positive and statistically significant. Another interesting finding is that the sizes of foreigners' shares presented in Table 5 are smaller than those shown in Table 4, which suggests that new immigrants at year *t* give the city a new lease on life, and much more so than older settlers do.

(3) First Difference Model

As discussed in the preceding section, a popular means to avoid the endogeneity problem is to differentiate variables on both sides. The left hand side (LHS) variable is the log of per-capita GRP. Therefore, the first differentiation in LHS means the annual growth rate of per-capita GRP. The interpretation differs

slightly from the previous exercises to Table 6: we now have all variables as growth rate terms.[7] The robustness of the analysis is also examined using this first-difference model.

The results of specifications by which the independent variables are the foreigners' share and year dummies are reported in columns (1) and (2). Judging from the statistical significance of the estimated coefficients, we can accept the hypothesis that a positive correlation exists between economic growth and the growth of foreigners' shares. A positive correlation was also found for other specifications. In columns (3) and (4), where control variables include human capital, manufacturing share, and openness, it is observed that only the coefficients for change in openness are significant. A positive correlation was found between growth in per-capita GRP and the change in the size of trade volumes.

Adding three policy variables in columns (5) and (6) alters the results slightly. The coefficient for Foreigners' share 1 is positive and significant in column (5) whereas the coefficient for Foreigners' share 2 is not significant in column (6). The manufacturing share and openness have positive and significant estimates in both columns (5) and (6).

Among coefficients for the growth rates of policy variables, the government consumption ratio and education expenditure share have negative and significant coefficients, although the cultural expenditure share has positive and significant estimates in columns (5) and (6).

Considered together, the first difference model suggests a strong correlation between the per-capita GRP growth rate and the foreigners' share growth rate, even though the experiments are controlled for economic structure and policy variables.

VI. Conclusions

As described in this paper, we explain the relation between a city's economic performance and the share of foreign residents. Controlling for unobserved effects using city fixed effects, we found that the foreigners' share is positively and strongly correlated with the city's economic performance, as reflected by the level of per-

[7] The constant term is dropped because of the first-differentiation transformation.

capita GRP. We also found that human capital endowments, industrial structure, and openness are positively correlated with a city's economic performance. Furthermore, we estimated the relation between city growth and the change in foreigners' share and found a mutual correlation between them. This correlation between economic performance and the share of foreigners is statistically robust, irrespective of the method used for eliminating endogeneity problems.

These results are consistent with findings obtained by Alesina and Ferrara (2005), Card (2007), and Ottaviano and Peri (2006) for the U.S. and Bellini et al. (2008) for European countries. Furthermore, the results support the ideas of Florida (2002) and Landry (2006): that immigration affects city development through interaction and assimilation among different social values, creative ideas, work ethics, mutual learning, and competition.

It is worth noting that even in a homogeneous society such as that of Japan, cultural interaction among different social values might spur the city's economic growth. Policymakers, especially local city governments in Japan, should consider this finding when considering countermeasures against shrinking population in a city.

Although we identified a positive relation between economic performance and immigration in large Japanese cities, we did not explicitly introduce the idea of a substitution problem between native workers and immigrants, as discussed by Borjas, Grogger, and Hanson (2008), and Ottaviano and Peri (2008), to name a few. Two directions of studies are open to us in the future: one is to observe the impact of immigration on the wage rates of Japanese skilled labor, which data were not available in this paper. The second is to investigate the effects of cultural diversity, not just the foreigners' share, on a city's economic performance, such as Ottaviano and Peri (2006) and Bellini et al. (2008). It would be interesting to investigate whether differences exist in effects of foreigners on economic performance according to their respective nationalities.

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Table 1: Main Indicators by Cities

City	per capita GRP				Foreigner's share			Korean share		
	1985	1995	2005	(1985-2005)	1985	1995	2005	1985	1995	2005
1 Sapporo	2.40	3.69	3.71	(4.36%)	0.24%	0.36%	0.46%	69.4%	43.3%	30.7%
2 Sendai		4.25	3.91			0.68%	1.00%		46.0%	29.3%
3 Chiba			3.92				2.04%			24.1%
4 Tokyo	5.98	10.09	11.28	(6.36%)	1.50%	2.75%	3.56%	53.6%	36.5%	29.8%
5 Kawasaki	3.17	4.27	3.45	(0.87%)	0.99%	1.62%	2.08%	83.5%	46.8%	33.1%
6 Yokohama	2.17	3.19	3.51	(4.78%)	0.79%	1.40%	1.94%	56.2%	32.9%	22.8%
7 Nagoya	3.68	5.69	5.78	(4.52%)	1.48%	1.98%	2.70%	90.4%	59.3%	36.2%
8 Kyoto	2.52	3.94	4.02	(4.66%)	2.77%	3.00%	2.89%	91.7%	80.8%	66.7%
9 Osaka	5.83	7.68	8.55	(3.83%)	4.46%	4.57%	4.67%	94.0%	85.8%	72.1%
10 Kobe	2.67	4.25	3.92	(3.85%)	2.79%	2.95%	2.93%	70.3%	63.8%	51.9%
11 Hiroshima	2.77	4.25	4.40	(4.61%)	1.18%	1.25%	1.39%	87.1%	67.4%	45.3%
12 Kitakyushu	2.71	3.50	3.59	(2.80%)	1.09%	1.10%	1.14%	94.1%	81.5%	61.5%
13 Fukuoka	3.15	4.72	5.17	(4.95%)	0.71%	1.04%	1.42%	79.7%	50.9%	32.7%

Notes: Per capita GRP by city is in million Japanese yen. Growth rates from 1985 to 2005 are in parentheses. Foreigner's share is defined as the number of registered foreigners/city population. Korean share is defined as the number of Korean/foreigners in the city.

Table 2: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
log of per capita GRP	261	1.465	0.362	0.759	2.423
Foreiner's share 1	261	0.019	0.012	0.002	0.048
Foreiner's share 2	261	0.007	0.005	0.001	0.025
log of Human capital	261	10.395	0.879	8.161	12.711
Manufacturing share	261	0.182	0.098	0.041	0.550
Openness	261	0.181	0.169	0.000	1.803
Government consumption ratio	261	0.1007	0.0433	0.0078	0.2447
Cultural expenditure share	261	0.0887	0.0265	0.0076	0.3147
Education expenditure share	261	0.0269	0.0124	0.0024	0.1198

Notes: Log of per capita GRP is defined as $GRP_{it}/population_{it}$ for city i in year t. Foreigner's share 1 is defined as the number of registered $foreigners_{it}/population_{it}$ for city i in year t. Foreigner's share 2 is defined as (the number of registered $foreigners_{it}$-the number of registered $Korean_{it}$)/$population_{it}$ for city i in year t. Log of human capital is the log of cumulative college graduate students in the city. Manufacturing share is the share of manufacturing value-added divided by GRP for city i in year t.

Table 3: Results of Pooled OLS

	(1)	(2)	(3)	(4)	(5)	(6)
Foreiner's share 1	18.796***		11.829***		11.760***	
	(1.344)		(2.681)		(2.481)	
Foreiner's share 2		42.911***		28.383***		29.043***
		(3.322)		(3.235)		(4.042)
Human capital			0.155***	0.075***	0.150***	0.076***
			(0.020)	(0.022)	(0.020)	(0.021)
Manufacturing share			-0.671***	-0.582***	-0.718***	-0.754***
			(0.148)	(0.110)	(0.184)	(0.164)
Openness			0.596	0.965**	0.564	0.884**
			(0.366)	(0.399)	(0.375)	(0.411)
Government consumption ratio					-0.814	-1.232
					(0.613)	(0.811)
Cultural expenditure share					1.988***	0.838**
					(0.447)	(0.367)
Education expenditure share					-1.727	-1.111
					(1.528)	(1.210)
Constant	1.105***	1.156***	-0.355*	0.411*	-0.342	0.527**
	(0.023)	(0.025)	(0.209)	(0.218)	(0.211)	(0.265)
Observations	261	261	261	261	261	261
Adjusted R-squared	0.365	0.373	0.65	0.64	0.67	0.652

Notes: Dependent variable is ln (GRP_{it} / $population_{it}$).

Foreigner's share 1=number of registered $foreigners_{it}$ / $population_{it}$

Foreigner's share 2=(number of registered $foreigners_{it}$ – number of registered $Korean_{it}$)/ $population_{it}$

Human capital = ln(number of educated $workers_{it}$)

Manufacturing share = manufacturing $value\text{-}added_{it}$ / GRP_{it}

Openness = |net $trade_{it}$ | / GRP_{it}.

Robust standard errors are in parentheses.

* Significant at 10%, ** significant at 5%, and *** significant at 1%.

Table 4: Results of Panel Fixed Effect Model

	(1)	(2)	(3)	(4)	(5)	(6)
Foreiner's share 1	6.534***		10.815***		7.869***	
	(1.987)		(1.573)		(1.966)	
Foreiner's share 2		7.205***		15.709***		11.013***
		(2.742)		(2.149)		(2.775)
Human capital			0.026	0.094***	0.075**	0.121***
			(0.030)	(0.027)	(0.030)	(0.026)
Manufacturing share			1.162***	1.242***	1.094***	1.141***
			(0.157)	(0.153)	(0.148)	(0.148)
Openness			0.081***	0.079***	0.070***	0.068***
			(0.022)	(0.026)	(0.018)	(0.021)
Government consumption ratio					-1.164***	-1.097***
					(0.249)	(0.256)
Cultural expenditure share					0.01	0.053
					(0.107)	(0.104)
Education expenditure share					-0.288	-0.341
					(0.337)	(0.325)
Constant	0.883***	0.902***	0.503*	-0.073	0.201	-0.199
	(0.023)	(0.023)	(0.267)	(0.247)	(0.254)	(0.226)
Observations	261	261	261	261	261	261
Adjusted R-squared	0.98	0.98	0.987	0.987	0.989	0.989

Notes: Dependent variable is ln (GRP_{it} / $population_t$).

Foreigner's share 1=number of registered $foreigners_{it}$ / $population_{it}$

Foreigner's share 2=(number of registered $foreigners_{it}$ – number of registered $Korean_{it}$)/ $population_{it}$

Human capital = ln(number of educated $workers_{it}$)

Manufacturing share = manufacturing $value\text{-}added_{it}$ / GRP_{it}

Openness = | net $trade_{it}$ | / GRP_{it}.

City fixed effects and year fixed effects are included for the calculation but not reported for the brevity.

Robust standard errors are in parentheses.

* Significant at 10%, ** significant at 5%, and *** significant at 1%.

Table 5: Results of Panel Fixed Effect Model with Lagged Independent Variables

	(1)	(2)	(3)	(4)	(5)	(6)
Foreiner's share 1 (t-1)	4.931**		8.737***		7.750***	
	(1.957)		(1.632)		(1.832)	
Foreiner's share 2 (t-1)		5.450**		13.238***		11.750***
		(2.674)		(2.204)		(2.513)
Human capital (t-1)			0.047	0.099***	0.062*	0.107***
			(0.031)	(0.030)	(0.034)	(0.032)
Manufacturing share (t-1)			1.054***	1.139***	1.039***	1.113***
			(0.162)	(0.161)	(0.157)	(0.157)
Openness (t-1)			0.072***	0.067**	0.064***	0.060**
			(0.026)	(0.028)	(0.023)	(0.025)
Government consumption ratio (t-1)					-0.503*	-0.404
					(0.280)	(0.278)
Cultural expenditure share (t-1)					-0.086	-0.051
					(0.100)	(0.095)
Education expenditure share (t-1)					-0.071	-0.104
					(0.331)	(0.301)
Constant	1.280***	1.288***	0.356	-0.097	0.285	-0.113
	(0.016)	(0.015)	(0.283)	(0.268)	(0.298)	(0.282)
Observations	248	248	247	247	247	247
Adjusted R-squared	0.981	0.981	0.987	0.987	0.987	0.987

Notes: Dependent variable is ln (GRP_{it} / $population_{it}$).

Foreigner's share 1=number of registered $foreigners_{it}$ / $population_{it}$

Foreigner's share 2=(number of registered $foreigners_{it}$ – number of registered Korean $_{it}$)/ $population_{it}$

Human capital = ln(number of educated $workers_{it}$)

Manufacturing share = manufacturing $value\text{-}added_{it}$ / GRP_{it}

Openness = |net $trade_{it}$ | / GRP_{it}.

City fixed effects and year fixed effects are included for the calculation but not reported for the brevity.

Robust standard errors are in parentheses.

* Significant at 10%, ** significant at 5%, and *** significant at 1%.

Table 6: Results of First Difference Model

	(1)	(2)	(3)	(4)	(5)	(6)
∆Foreiner's share 1	10.552**		11.374**		9.816**	
	(4.494)		(4.757)		(4.323)	
∆Foreiner's share 2		8.765*		9.654*		7.769
		(5.082)		(5.635)		(5.157)
∆Human capital			0.010	0.028	0.040	0.055
			(0.144)	(0.153)	(0.139)	(0.146)
∆Manufacturing share			0.265	0.233	0.470**	0.440**
			(0.231)	(0.232)	(0.184)	(0.183)
∆Openness			0.022**	0.022*	0.020**	0.019**
			(0.011)	(0.011)	(0.009)	(0.009)
∆Government Consumptin ratio					-1.104***	-1.112***
					(0.221)	(0.222)
∆Cultural expenditure share					0.205**	0.203**
					(0.082)	(0.083)
∆Education expenditure share					-0.541***	-0.541***
					(0.207)	(0.206)
Observations	248	248	247	247	247	247
Adjusted R-squared	0.624	0.620	0.628	0.623	0.728	0.724

Notes: Dependent variable is the first difference in ln (GRP_{it} / $population_{it}$).

Foreigner's share 1=number of registered $foreigners_{it}$ / $population_{it}$

Foreigner's share 2=(number of registered $foreigners_{it}$ – number of registered Korean $_{it}$)/ $population_{it}$

Human capital = ln(number of educated $workers_{it}$)

Manufacturing share = manufacturing $value\text{-}added_{it}$ / GRP_{it}

Openness = |net $trade_{it}$ | / GRP_{it}.

Year fixed effects are included for the calculation but not reported for the brevity.

Robust standard errors are in parentheses.

* Significant at 10%, ** significant at 5%, and *** significant at 1%.