The influence of government size on economic growth and life satisfaction. A case study from Japan.

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Abstract. This paper uses Japanese prefecture-level data for the years 1979 and 1996 to examine how the relationship between government size and life satisfaction changes. The major findings are: (1) Government size has a detrimental effect on life satisfaction when government size impedes economic growth in the economic development stage. However, this effect clearly decreases when government size is not associated with economic growth in the developed stage. (2) Particularized trust is positively associated with life satisfaction of females but not with that of males. Such a tendency becomes more remarkable in the developed stage. These results are unchanged when the endogeneity bias caused by local government size and proxies of trust are controlled for.

Keywords: Life satisfaction; Government size; Trust; Growth

JEL classification: I31, H50 H11

1. Introduction

How and why do people become happy? This has been undoubtedly been among the most important questions for policy makers (Layard, 2006). Since the early 1990s, researchers in the fields of economics and political economics have begun to pay attention to it (Frey & Stutzer, 2002). Increasing numbers of works attempting to analyze individual subjective well-being have considered not only economic factors such as income level and consumption but also various other ones such as formal and informal institutions[1]. It is widely acknowledged that the government plays an important role in society. Therefore, in respect to public choice, exploring government size is now thought to be a major issue and empirical works have investigated its impact on subjective-well being[2]. Bjørnskov et al. (2007) presents evidence that government size decreases life satisfaction, which is in line with the view of public choice theory that government size becomes larger than the optimal one to benefit country's citizens because governments actually do not act as 'benevolent dictators'. However, this finding is deduced from limited cross country data, and the dynamic aspect has not been taken into account. It is worthwhile examining whether the negative association between government size and well-being is stable over time because dynamic factors influence on life satisfaction (Bjørnskov et al., 2008d).

The conjecture that resources are allocated less efficiently by larger governments, leading to lower economic growth is supported by several report (e.g., Landau, 1985;

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[1] For instance, informal institutions such as social trust or social capital (e.g., Bjørnskov, 2003; Helliwell, 2006) and formal institution (Frey & Stutzer, 2000; Bjørnskov et al., 2008c) are regarded as critical in determining subjective well-being.

[2] Bureaucratic rent and decentralization are considered to be determinants of life satisfaction (Luechinger et al., 2006; Bjørnskov et al., 2008 b)

Peden & Bradley, 1989; Dar & AmirKhalkhalim 2002; Fölster & Herekson, 2002). On the other hand, some researchers find no discernable relationship between government size and economic growth (e.g., Ram, 1986; Bairam, 1990; Easterly and Rebelo, 1993; Mendoza et al., 1997)[3]. Guseh (1997) pays attention to the institutional features of countries and points out that government size has a detrimental effect on economic growth in developing countries, but that this negative effect is clearly mitigated by democracy[4]. As shown by Acemoglu et al. (2008), per capita income is positively related to the rise of democracy. This leads me to presume that a matured democracy viewed as an outcome of the rise in per capita income decreases government inefficiency, leading to an alleviation of the negative influence of government size on life satisfaction[5]. However, no work has attempted to examine whether the effect of government size on life satisfaction changes under a dynamic process of institutional change.

As well as government size, it is argued that various factors such as social trust, human capital, and age can be considered as determinants of life satisfaction (Bjørnskov et al., 2007; Bjørnskov et al., 2008 c; Scoppa & Ponzo 2008). The determinants of life satisfaction appear to vary between different periods of time, even in the same country. This might be in part because formal and informal institutional changes appear to influence life styles and interpersonal relationships.

Japan has experienced rapid economic growth, especially in the postwar period (Yamamura et al., 2005; Yamamura & Shin, 2007). Such growth inevitably transformed traditional Japanese society into a modern one; this is reflected, for instance, in the rise

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[3] There is argument that the relationship between government size and growth is non-linear (Barro 1997; Grossman, 1988; Chen & Lee, 2005).

[4] The degree of democracy is thought to play a crucial role in improving economic efficiency (Feld & Savioz, 1997).

[5] It is not observed that the degree of democracy alleviates the detrimental influence caused by government size in cross country analysis (Bjørnskov et al., 2007).

in the social standing of women. It seems that in the wake of changes in circumstance, the generational and gender gaps in the way life is perceived have widened[6]. Thus Japan is a country suitable for comparing different circumstances across generations and genders. Survey data on Japan, from 1979 and 1996 cover life satisfaction across 3 age groups and both genders. This data allows me to compare the determinants of life satisfaction between different points in time and across generations and genders. The present paper uses this data to assess the effects of government size and other socio-economic factors on life satisfaction. It also looks at how these effects vary under the influence of societal structural changes.

The remainder of this paper is organized as follows. Features of Japanese society and changes in life satisfaction are briefly reviewed in Section 2. Section 3 explains the data and methods used. Section 4 discusses the results of the estimations. The final section offers concluding observations.

2. Review of modern Japanese society and life satisfaction

As is more fully explained in section 3, the rate of people who feel satisfied with life is used as a measure of life satisfaction index. Data is available separately for males and females across 3 generations at the prefecture level. Change in life satisfaction is exhibited in Table 1 (a); it shows that life satisfaction significantly increases from 1979 to 1996, and that the degree of increase for females is consistently higher than that for males. Government size is measured by the total share of government expenditure in

[6] Empirical research concerning trust in Japan presents evidence that there is a distinct difference in the degree of trust between genders (Yamamura, 2008a), and across generations (Yamamura, 2008 b).

prefectural income and is presented in table 1 (b).[7] From this data it can be seen that government size increased slightly, despite the difference between 1979 and 1996 being statistically insignificant. This shows that the rise in life satisfaction seems to be associated with an increase in government size, which does not correspond to the conjecture derived from public choice theory. The level of real per capita income in 1996 is higher than that in 1979, whereas the 5 years growth rate during 1996-2001 is nearly 0, distinctly lower than that for 1979-1984[8]. This implies that the end of the 1970s can be characterized as a low income and growth stage, while the mid-1990s is a high income and steady growth period[9]. In this paper, 1979 and 1996 are defined as the developing and the developed stage.

Although there appears to be a positive relationship between income level and life satisfaction in Table 1, most existing reports provide no evidence that income level is

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[7] Prefectural GDP cannot be obtained in 1979 and so prefectural income is used instead. There are various measures of government size such as the government share of consumption in GDP (Bjørnskov et al., 2007), total tax share in GDP (Fölster & Herekson, 2001), total government share in GDP (Grossman, 1988; Fölster & Herekson, 2001). Chen and Lee (2005) used three measures; share of total government expenditure in GDP, government investment expenditure in GDP and government consumption expenditure in GDP. It should be noted that the way of measuring government size is thought to influence estimation results when the relationship between government size and economic growth is examined (Landau, 1985). Nevertheless, in this paper, the main focus falls on an assessment of the effect of government size on life satisfaction, which is not explained by rigorous growth theory. Hence, in this paper, I use total expenditure comprised of various types of expenditure at a prefectural level.

[8] This paper looks at the efficiency of government in 1979 and 1996, since people's aspirations appear to change over time (Easterlin, 1995); therefore, the efficiency at a different point in time has less impact on life satisfaction than the present efficiency. Previous works have focused on the growth rate between past and current years and assessed its influence on life satisfaction (DiTella et al., 2003). The growth rate between past and current years reflects past efficiency, rather than current efficiency since economic growth can be considered as an outcome of efficient resource allocation. For this reason, I look at economic growth between current and subsequent years.

[9] It should be noted that Japan experienced miraculous economic growth during the 1950s and 1960s (Hayami, 2001). Therefore, the high growth period in Japan is generally considered to be the two decades prior to 1970s.

positively associated with life satisfaction (Frey & Stutzer, 2002). If an increase in income leads to a rise in individual's income aspirations (Stutzer, 2004), there might be another channel through which income influences life satisfaction. Thus channel, if it exists, has not been taken into account in the existing literature. I aim to shed light on an indirect effect of income increase on life satisfaction, rather than a direct one. It seems plausible that democracy tends to be a mature one when income levels reach those of developed countries (Acemoglu et al., 2008). If this holds true, it would be worthwhile considering how a matured democracy resulting from an income increase is related to life satisfaction. For instance, a possible channel can be considered as follows, "stricter democratic control might restrain bureaucrats' deleterious impact, lead to efficiency gains, and increase people's happiness" (Bjørnskov et al., 2007, pp.270-271).

A cursory examination of figure 1 reveals a negative relationship between government size and life satisfaction, in both 1979 and 1996, which is in line with public choice theory. From figure 2 (a), government size is negatively related with economic growth. For a closer examination, I compare its relationship in 1979 and in 1996. Figure 2 (b) demonstrates a negative relationship in 1979 whereas Figure 2 (c) exhibits a slightly positive one in 1996. This leads me to argue that government size impeded economic efficiency in 1979 but did not in 1996. In my conjecture, one reason why the detrimental effect of government size on efficiency disappears might be that democracy becomes matured as a result of an increase in income. These considerations lead me to advance the Hypothesis:

Hypothesis: Government size is negatively related with life satisfaction in the developing stage when government size causes inefficiency. Subsequently, negative relationships between government size and life satisfaction disappear in the

developed stage when government size does not cause inefficiency.

I now look more closely at life satisfaction in Japan. Life satisfaction is categorized into genders and generations in 1979 and 1996, as set out in Table 2. From Table 2, I found it interesting that the degree of life satisfaction for the 16-40 year old generation is lower than for other generations for both genders in 1979, whereas that of the 16-40 year old generation become higher than the others in 1996. World War II finished 51 years before 1996; thus the 16-40 generation in 1996 can be considered as the only generation of people born in the post-World War II period among those generations in Table2. This generation was educated in a democratic environment and grew up alongside the growth of the Japanese economy[10]. The circumstances in which Japanese people lived changed; partly under the guidance of international society, and partly due to strong citizen empowerment during the postwar period. For instance, Japan ratified the United Nation's "Convention on the Elimination of all Forms of Discrimination Against Women" in 1979[11]. What is more, the Equal Employment Opportunity Law for Men and Women was promulgated in 1985. It was partially amended in 1997 and came into force on 1999[12]. Women thus gained in social standing and had a larger influence on the social lives of Japanese in the 1990s than in the 1970s. The postwar generation's way of thinking and life style has been influenced by their education and are thus congruent to the matured democracy circumstances of Japan in the 1990s. This might be one of reasons why the postwar generation tends to be more satisfied with life than other generations in the developed stage.

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[10] Pre-war Japanese education emphasized an emperor-centered historiography based on state Shintoism, which portrayed Japan as a divine country under the unbroken rule of the imperial family. Prewar education was diametrically opposite to that under the democracy introduced in the post war period.

[11] See http://www.un.org/womenwatch/daw/cedaw/.

[12] http://www.cc.matsuyama-u.ac.jp/~tamura/kintouhou.htm (in Japanese).

3. Data and method

3.1. Data

Table 3 includes the definitions of variables and the means for data analyzed from 1979 and 1996. The life satisfaction and trust data used here are from surveys were carried by the Japan Broadcasting Corporation (Nihon Hoso Kyokai) in 1979 and 1996, Japan Broadcasting Corporation (1979, 1996). Respondents were asked, "Do you feel satisfaction with your life?". There were four choices; "yes", "More yes than no", "no", "No response". Male and female respondents were recorded separately, at the prefecture level. Therefore, using this data I can calculate the rate of respondents who responded positively as "yes" and "I would rather say yes". I use this rate as the measure of satisfaction. There were two questions related to trust; (1) "Are there many persons whom you can trust among your neighbors?", (2) "Are there many persons whom you can trust among your relatives?". The rates of respondents who said "yes" to each question are used as the measure of trust. As discussed later, two kinds of proxies for trust are used to assess the different features of trust on life satisfaction.

Per capita real incomes and population are derived from Index Publishing (2006). The Gini coefficients of income in 1979 and 1994 are from the Statistics Bureau of the Ministry of Internal Affairs and Communications[13]. The human capital index is taken from the Hi-Stat data base[14]. Other variables are from Asahi Shimbun (2004).

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[13] Gini data at the prefecture level are obtained every five years; as 1996 data is not available, I used 1994 data.

[14] Data is available at http://www.ier.hit-u.ac.jp/~fukao/japanese/data/fuken2000/pfactor.xls. This prefecture-level panel data base was constructed by Fukao and Yue (2000).

3.2. Methods

In line with the discussion above, the estimated function of trust takes the following form:

$$Ln(SATISFY)_{itsu} = \alpha_0 + \alpha_1 Ln(GOVSCAL)_{it} + \alpha_2 Ln(NETRUST)_{itsu} + \alpha_3 Ln(RETRUST)_{itsu} + \alpha_4 Ln(INCOM)_{it} + \alpha_5 Ln(POP)_{it} + \alpha_6 Ln(GINI)_{it} + \alpha_7 Ln(HC)_{it} + \alpha_8 Age1640_s + \alpha_9 Age4160_s + \alpha_9 Female_u + \alpha_{10} Year\_1979_t + \varepsilon_{itsu},$$

where *SATISFY* represents the rate of trust in prefecture *i,* for year *t*, generation *s* and gender *u*. α's represents the regression parameters. ε_{itsu} represents the error term.

The structure of the data covers two years, 1979 and 1996, and is for 47 prefectures. Generation dummies are included to capture the generation effects. *Y1640 and Y4160* stand for the 16-40 and 41-60 generations, respectively. The default generation is the generation over 60 years old. *Female* and *Year_1979* are dummy variables aiming to control for gender and year effects, respectively. The dependent variable and all independent variables, with the exception of dummy variables, take log forms. Therefore, their coefficient, α, means the elasticity, which allows me to directly compare the degree of impact of each variable.

It is necessary to deal with the endogenous problem. Satisfied people appear to be lenient in their evaluation of government performance, resulting in excessive government expenditure. That is to say, life satisfaction seemingly influences the government size; thus Bjørnskov et al. (2007) attempt to control for endogeneity of

government size. Furthermore, satisfied people are also likely to trust others, resulting in an endogenous bias. Inevitably, it is necessary to control for endogenous bias not only from government size but also from trust. GMM estimation allows me to generalize the covariance structure of ε and therefore the estimation result is valid even if ε is heteroscedastic (Greene 1997, pp. 742-744). To alleviate these potential endogenous problems and heteroscedasticity, GMM 2SLS estimation was employed.

The effects of each variable on life satisfaction are discussed later in this section. The hypothesis raised in the previous section leads me to expect the coefficient sign of *GOVSCAL* to be negative, while its absolute value for 1996 becomes smaller than that of 1979.

Trust is considered to carry the advantage that transaction costs are reduced in a long-term transaction network based on trust; something that can be seen in the subcontract system in the Japanese manufacturing industry (Asanuma, 1989). I thus generally predict the signs of trust to be positive, as in some studies (Bjørnskov , 2003; Helliwell, 2003, 2006; Bjørnskov et al., 2007). More precisely, interpersonal trust can be roughly divided into generalized and particularized trust (Uslaner, 2002; Bjørnskov 2006). "The central idea distinguishing generalized from particularized trust is how inclusive your moral community is." (Uslaner, 2002: 26-27). People with generalized trust have positive views toward both their own in-group and out-groups, whereas those with particularized trust have positive views of their own in-group but a negative attitude toward groups to which they do not belong. Trust in relatives can convincingly be taken as particularized trust because a blood relationship is relatively stable and closed to others[15]. As pointed out by Uslaner (2002), neighborhood trust shares the

[15] Although other people can become relatives through marriage, this effect seems to be

characteristics not only of particularized trust but also of generalized trust. A lack of the population mobility induces neighbors to repeatedly interact with each other so that interpersonal trust is formed among them through long term relationships. This can be regarded as particularized trust. On the other hand, assuming that there is much mobility in the population of a community, strangers are more apt to become neighbors. In such a situation, trust formed among neighbors can be taken as generalized trust. These difference in characteristics between *RETRUST* and *NETRUST* might lead to different outcomes.

Economic factors are captured by incorporating *INCOM, POP* and *GINI* as independent variables. Above all, *INCOM* is included to empirically test the presumption derived from the traditional economic theory that individuals gain satisfaction from income. It is known that people encounter difficulties in making a success of collective action, although it plays a critical role in increasing benefits for society (Olson, 1965). A previous case study of Japan found that income inequality hampers collective action (Yamamura, 2008c). As well, income inequality is considered to harm health status (Kawachi et al., 1997). I thus predict that the sign of *GINI* becomes negative.

It is acknowledged that human capital increases income (Becker, 1964). If this holds true, human capital will improve life satisfaction. As suggested above, however, income level is already controlled for. Accordingly, I should interpret *HC* to capture the impact of human capital on life satisfaction through other channels. For instance, under the same constraint, more educated individuals seem to consume goods more efficiently because they can more easily access useful information. This is why the anticipated sign

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relatively small.

of *HC* is positive.

4. Results

Table 4 shows the results of the OLS estimations. Tables 5 and 6 report the results of the GMM 2SLS estimations. In Table 5, to instrument for *RETRUST* and *NETRUST*, I employ the following variables; logarithms for changing residence within prefecture, immigrants from other prefectures, and for the number of fire fighting teams, as well as 4 region dummies[16]. As discussed earlier, social trust seems to collapse through population mobility captured by changing residence and as an immigrant (Yamamura 2008a). A local voluntary organization such as a fire fighting team generalizes trust among its members through interpersonal communication in cooperative activities (Yamamura, 2008b). These variables are relevant determinants of the degree of trust and are not directly associated with life satisfaction. In Table 6, not only *RETRUST* and *NETRUST* but also government size is considered as an endogenous variable. Hence, added to the instrument variables as above, I use a logarithm for the number of natural disasters because government spending increases to recover from it.

In each table, the results for all samples are shown in Columns (1)- (3). The results of subsamples consisting of 1979 and 1996 years are in columns (4)-(6) and (7)-(9), respectively. Furthermore, both male and female samples are used in columns

[16] Kanto region dummy, Chubu region dummy, Kinki region dummy, and Urban areas dummy. The Kanto region is comprised of 7 prefectures; Ibaragi, Tochigi, Gunma, Saitama, Chiba, Tokyo, and Kanagawa. The Chubu region is comprised of 9 prefectures; Niigata, Toyama, Ishikawa, Fukui, Yamanashi, Nagano, Gifu, Shizuoka, and Aichi. The Kinki region is comprised of 7 prefectures; Mie, Shiga, Kyoto, Osaka, Hyogo, Nara, and Wakayama. Urban areas consist of 5 prefectures; Tokyo, Kanagawa, Aichi, Osaka, and Hyogo.

(1), (4), and (7) in each of the Tables. Male samples are in columns (2), (5), and (8) in each of the Tables. Female samples are in columns (3), (6), and (9).

4.1. OLS model.

I begin by looking at the key variable, *GOVESCAL*. As shown in columns(1)-(3), the results estimated using 1979 and 1996 year samples show significant negative signs and the absolute value for males is 0.08, which is two times larger than that for females. If samples are restricted to the 1979 year, they continue to indicate significant positive signs and their absolute values become larger, between 0.09 - 0.20. On the other hand, the results obtained for the 1996 year samples show that they are not statistically significant and its absolute values are between 0.002 - 0.02 and therefore show considerable decline although their signs are negative. These results are consistent with the Hypothesis presented in the Section 2.

As for trust, signs of *NETRUST* are not stable and are statistically insignificant, which does not correspond to the anticipation. This might be partly because that the results of *NETRUST* suffer from endogeneity bias. On the other hand, as expected, coefficient signs of *RETRUST* are mostly significant positive signs, with the exception of columns (5) and (8). Compared with *NETRUST, RETRUST* is more likely to be determined exogenously because a kinship relation was formed in the distant past. As a result of this, the results of *RETRUST* are less inclined to be biased. In 1979, the magnitude of the female coefficient is 0.24, which is approximately 5 times larger than that of the male one. A similar result is obtained in 1996.

Consistent with previous research (Frey & Stutzer, 2002), signs of *INCOM* are not stable and therefore the level of income does not play a critical role in improving life satisfaction. By contrast, in all estimations, I found *GINI* to take the expected negative sign although not statistically significant in 1996, which is congruent to the anticipation and to the assertion that life satisfaction is influenced by the income of surrounding people (Scoppa and Ponzo, 2008). Negative signs of *HC* in 1979 are not consistent with the prediction, whereas positive signs in 1996 are in line with it. In my interpretation, educated individuals are more inclined to have many opportunities to work when the market mechanism functions more effectively. That is, a university education confers considerable advantages for job seeking. Abundant opportunity to work leads not only to an increase in income but also to a reduction of the likelihood of unemployment. Therefore, the expected sign of *HC* is positive and its absolute value is larger in 1996 than in 1979 because the life time employment system has been undergoing gradual collapse and a more market orientated mechanism appeared to be working its way into the Japanese labor market.

It is interesting to observe that the coefficients of *Age_1640* and *Age_4160* exhibit negative signs with the exception of *Age_1640* in 1996. This implies that, compared with the over 61 years old generation, younger generations such as *Age_1640* and *Age_4160* are less likely to feel satisfied with life, with the exception of *Age_1640* in 1996. The estimation results correspond to Table 2. The education obtained by the generation born post-World War II is considered to be aligned with democracy, much different from the education received by the previous generation. The circumstances of modern Japan re more influenced by democracy than before the end of World War II. It seems thus an appropriate argument that the relationship between postwar period

education and modern Japanese life is complementary. As a consequence, the life satisfaction rate of the postwar educated generation was higher than that of the older generation in the developed stage. Hence, I find the extent to which human capital matches up to formal political institutions to be important[17]. Significant positive signs of *Female* in all estimations correspond to the results of DiTella et al. (2003).

4.2. 2SLS model.

Before turning to consider the coefficients of each variable in Tables 5 and 6, I first check the validity of the instrumental variable method. An over-identification test is used to test the hypothesis that the instrumental variables are uncorrelated to the error term[18]. As in the third row from the bottom, the results fail to reject the hypothesis and so all estimations pass the over-identification test. Overall, the choice of instruments is valid in all estimations and so the GMM 2SLS estimation is applicable.

As shown in Tables 5 and 6, the results of *GOVSCAL* are unchanged from Table 4 as discussed above after controlling for endogenous bias; this strongly supports the Hypothesis concerning he effect of government size. With respect to trust, *NETRUST* shows consistently positive signs in all estimations, and is statistically significant in 1996.

As for *RETRUST*, I found it surprising that in the 1996 male coefficient takes a negative

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[17] Transition economies are expected to confront the same difficulties since there seems to be differences in education in considering the market economy between communist and post communist periods. It is worthwhile examining the matching problem between the communism generation and the modern market oriented society.

[18] In a GMM context, when there are more moment conditions than parameters to be estimated, a chi-square test can be used to test the overidentifying restrictions. The test statistic is called the Hansen's J statistic. Therefore, I report J statistics instead of Sargan's.

sign whereas the female one takes a significant positive sign. Any difference from Table 4 might be because of an alleviation of endogenous bias by the GMM 2SLS method. I interpret the results of *RETRUST* as follows; compared with males, Japanese females are less inclined to take full-time jobs and so they don't set up inter-personal networks in the work place. Furthermore, market information is incomplete especially in the labor market, whereas long-term repeated personal interactions within a relative network increase the information shared between network members. Females tend to allocate time to interact with relatives because a woman's time allocated to work could be shorter than a man's. This circumstance induces females to rely on informal relative networks rather than market ones. For instance, matching between a child and a strange babysitter is very difficult, leading to a rise in the transaction cost. In Japan, when a mother raising a child cannot care for her child, she is inclined to rely on relatives via a non-market network rather than demand a babysitter through the market. In the developed stage where the market has matured, interpersonal relationships become relatively scarce. Accordingly, an interpersonal network becomes more valuable, causing trust between people to make a greater contribution to female life satisfaction than before.

As for generation dummies, Tables 5 and 6 continue to demonstrate significant positive signs of *Age_1640* in 1996, although other results show mixed signs. This leads me to argue that postwar education is robustly complementary to the circumstances of the 1990s.

We have presented various estimated results. Taking the results together, we concluded that those in this section were consistent with and supportive of the hypothesis and argument concerning other socio-economic determinants put forward in

the preceding section.

5. Conclusion

That government size has a detrimental effect on the degree of life satisfaction from the view point of public choice theory is a plausible conclusion. However, a country transits from the developing stage to the developed one in tandem with increases in income accompanied by institutional change. There appears to be a positive relationship between income and democracy; thus economic growth is thought to influence life satisfaction through a rise in democracy. Another issue then arises, that of whether the negative influence of government size on life satisfaction continues to be stable over time in the process of economic and institutional development. Little is known about this issue. Therefore, this paper used Japanese prefecture-level data for the years 1979 and 1996 to investigate how government size is associated with life satisfaction. The situations for each year can be roughly characterized as follows. Favorable economic growth was achieved although per capita income level was not so high in 1979, whereas per capital income reached a high level despite the low economic growth rate in 1996. Thus 1979 and 1996 are defined as the developing and the developed stage, respectively.

Through a GMM 2SLS estimation, which allows me to control for endogeneity bias, I found as follows: (1) Government size has a detrimental effect on life satisfaction when it impeded economic growth in 1979. By contrast, a negative impact of government size effect on life satisfaction disappeared in 1996 when government size was not associated with economic growth. (2) Particularized trust is positively associated with female life satisfaction but not with male. Such a tendency becomes more remarkable in the developed stage. These results do not change in the developed stage when I control for

the endogeneity bias caused by local government size and proxies of trust. (3). The degree of life satisfaction of the generation born in the post-World War II period is remarkably higher than other generations, for both males and females.

The findings above clarify that government size is not associated with life satisfaction if it does not impede economic growth, consistent with the findings of Bjørnskov et al. (2007) that government effectiveness alleviates the negative effects of government size. Nonetheless, achieving a mature democracy seems to take a long time. I conjecture that in the mid-1990s, Japan reached a level of income and economic development in which democracy substantially functioned, and so was in a matured state. Consequently, as pointed out by Guesh (1997), stronger democracy subdues the negative effect of government size on economic growth. That is, it can be argued that the relationship between government size and life satisfaction evolves under the influence of changes in circumstances.

It is difficult to find proxy variables to appropriately capture the changes of circumstance such as democracy and other formal institution influences. Limitations inherent in the data, deduced from aggregated prefecture-level data, do not allow me to more closely and directly explore the effect of changes of circumstance. For instance, individual characteristics such as the degree of trust, employment and birth year are required to scrutinize the assertion as above (e.g., DiTella et al., 2003; Helliwell, 2003; Bjørnskov et al., 2008a; 2008b). Hence, further research will be necessary to more carefully investigate this.

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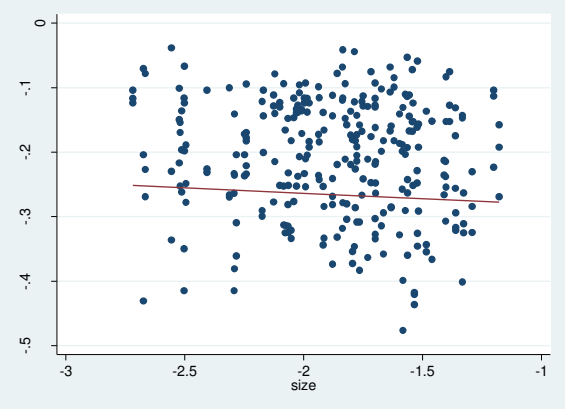
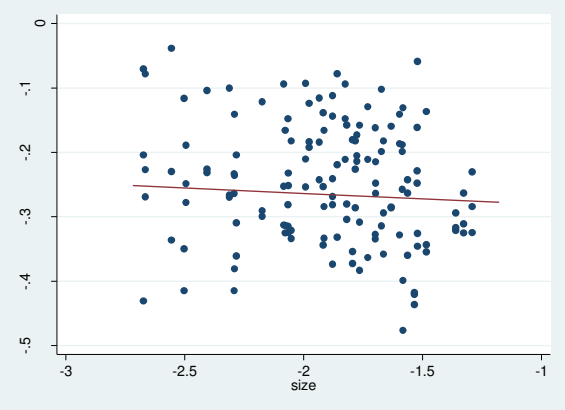
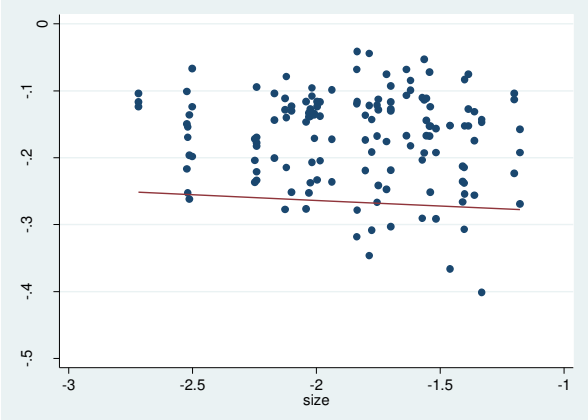


(a) 1979 and 1996



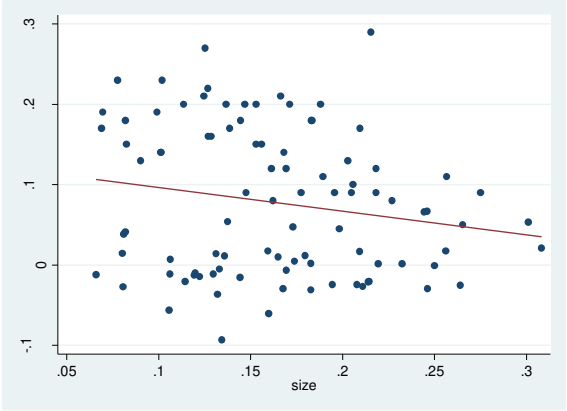
(b) 1979



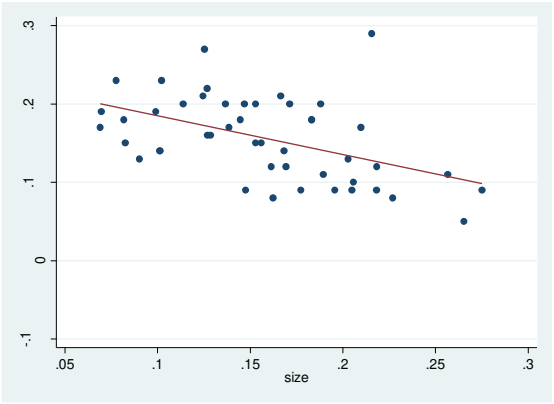
(c) 1996

Fig.1 Government expenditure and life satisfaction.

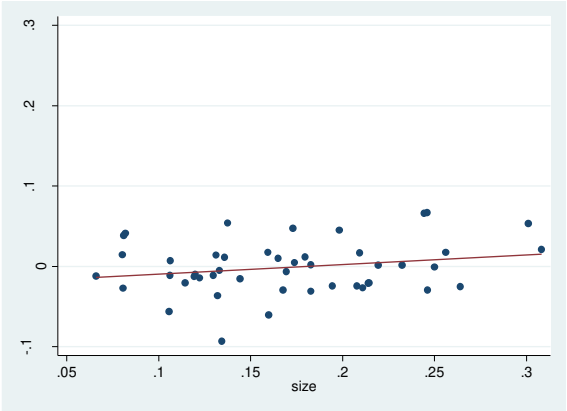
Note. Government size is a log of government expenditure over total income, and life satisfaction is a log of the rate of respondents who feel satisfaction with their life.



(a) 1979 and 1996



(b) 1979



(c) 1996

Fig.2 Government expenditure and growth rate of real per capita income.

Note. Government size is ln(Government expenditure/ Income). The growth rates during 1979-1984 and 1996-2001 are presented in the 1979 and 1996 columns, respectively.

Table 1. Comparison between 1979 and 1996 (%)

(a) Life satisfaction

	1979	1996	t-value
All sample	73.6	82.9	12.7**
Male	68.9	81.4	11.4**
Female	78.3	84.5	7.9**

(b) Government expenditure rate, Regional real per capita income, and Growth rate of real per capita income.

	1979	1996	t-value
Government expenditure (%)	15.7	17.0	1.06
Real per capita Income (Thousands yens)	2,092	3,009	10.7**
Growth rate (%)	15.1	-0.1	17.2**

Note. Absolute t-values are presented. ** denote significance at the 5% and 1% levels, respectively. The growth rates during 1979-1984 and 1996-2001 are presented in the 1979 and 1996 columns, respectively.

Table 2. Life satisfaction by generation in 1979 and 1996 (%) (1)

	Male		Female	
Generation	1979	1996	1979	1996
16-40	63.1	90.5	74.5	88.5
41-60	63.5	72.8	75.0	78.7
*60_*	79.9	80.8	85.5	86.4

Note. Generation categories are different between 1979 and 1996. Categories for 1979 are 16-40 years old, 41-60 years old and over 61 years old. Categories for 1996 are 16-30 years old, 31-55 years old and over 56 years old. These categories are equivalent to those of 1979. For comparison between 1979 and 1996, I roughly group them as follows: 16-30 years old, 31-55 years old, and over 56 years old generations in 1996 correspond to 16-40 years old, 41-60 years old, and over 60 years old generations.

Table 3. Variable definitions and basic statistics

Variables	Definition	Mean	Standard deviation
GOVSCAL	Government expenditure/ Income (%)	16.3	5.61
NETRUST	Rates of respondent trusting neighbors (%)	47.4	10.1
RETRUST	Rates of respondent trusting relatives (%)	68.2	6.8
INCOM	Regional real per capita income (thousands of Yen).	2,550	616
POP	Number of population (thousands).	2,516	2,292
GINI	Gini coefficient of income	0.27	0.02
HC	Human capital index	1.04	0.03
Age_1640	Generation between 16 and 40 years old dummy	0.33	0.47
Age_4160	Generation between 41 and 60 years old dummy	0.33	0.47
Female	Female dummy	0.50	0.50
Year_1979	1979 year dummy	0.50	0.50

Note. Values are simple averages. Data source is the Japan Broadcasting Corporation (1979; 1996), Asahi Shimbun (2004), Index Publishing (2006) and the Statistics Bureau of the Ministry of Internal Affairs and Communications (various years). The definitions of generation dummy variables correspond to those in Table 2.

Table 4. Dependent variable: rates of respondents satisfied with life. (OLS model)

	(1)1979 & 1996	(2)1979 & 1996 MALE	(3) 1979 & 1996 FEMALE	(4)1979	(5)1979 MALE	(6)1979 FEMALE	(7)1996	(8)1996 MALE	(9)1996 FEMALE
Ln(GOVSCAL)	-0.06**	-0.08**	-0.04*	-0.14**	-0.20**	-0.09**	-0.01	-0.02	-0.002
	(-3.02)	(-2.55)	(-1.93)	(-4.68)	(-4.69)	(-2.39)	(-0.72)	(-1.09)	(-0.12)
Ln(NETRUST)	-0.01	-0.005	-0.009	-0.01	0.02	-0.06*	0.008	0.03	0.02
	(-0.57)	(-0.13)	(-0.32)	(-0.51)	(0.59)	(-1.94)	(0.31)	(0.92)	(0.60)
Ln(RETRUST)	0.32**	0.35**	0.27**	0.14**	0.05	0.24**	0.10**	0.03	0.16**
	(8.47)	(5.85)	(7.32)	(2.55)	(0.64)	(3.66)	(2.79)	(0.66)	(4.16)
Ln(INCOM)	0.02	-0.002	0.04	0.002	-0.05	0.04	0.08*	0.07	0.08*
	(0.49)	(-0.05)	(1.05)	(0.06)	(-0.95)	(0.71)	(2.01)	(1.34)	(1.94)
Ln(POP)	-0.01*	-0.01	-0.01*	-0.03**	-0.04**	-0.02*	-0.009	-0.01	-0.008
	(-2.15)	(-1.33)	(-2.02)	(-3.43)	(-2.72)	(-2.19)	(-1.20)	(-0.82)	(-1.03)
Ln(GINI)	-0.22**	-0.24**	-0.19**	-0.36**	-0.39**	-0.34**	-0.04	-0.03	-0.04
	(-3.38)	(-2.41)	(-2.76)	(-3.85)	(-3.24)	(-2.64)	(-0.61)	(-0.38)	(-0.51)
Ln(HC)	0.02	-0.03	0.11	-0.44*	-0.61*	-0.33	0.15	0.06	0.29
	(0.14)	(-0.10)	(0.56)	(-1.93)	(-1.99)	(-1.13)	(0.85)	(0.24)	(1.48)
Age_1640	-0.04**	-0.05**	-0.04**	-0.17**	-0.21**	-0.13**	0.06**	0.12**	0.03**
	(-3.74)	(-2.54)	(-3.08)	(-11.3)	(-10.2)	(-6.50)	(6.28)	(7.33)	(2.75)
Age_4160	-0.01**	-0.15**	-0.09**	-0.17**	-0.22**	-0.13**	-0.08**	-0.09**	-0.06**
	(-12.4)	(-9.64)	(-8.67)	(-14.7)	(-12.6)	(-9.51)	(-7.81)	(-6.13)	(-5.15)
Female	0.08**			0.13**			0.04**		
	(11.8)			(14.7)			(6.13)		
Year_1979	-0.15**	-0.21**	-0.09**						
	(-6.93)	(-6.31)	(-3.77)						
Constant	-0.49	-0.31	-0.60*	-0.70*	-0.32	-0.84	-0.81**	-0.76*	-0.78**
	(-1.55)	(-0.64)	(-1.72)	(-1.82)	(-0.66)	(-1.59)	(-3.07)	(-2.24)	(-2.65)
Obs	564	282	282	282	141	141	282	141	141
Adj. R^2	0.59	0.60	0.54	0.70	0.70	0.55	0.64	0.73	0.60

Note. Values in parentheses are t-statistics calculated by robust standard errors. * and ** denote significance at the 5% and 1% levels, respectively. Year dummies are included, but not reported in order to save space.

Table 5 Dependent variable: rates of respondents satisfied with life (GMM 2SLS model)

	(1)1979 & 1996	(2)1979 & 1996 MALE	(3) 1979 & 1996 FEMALE	(4)1979	(5)1979 MALE	(6)1979 FEMALE	(7)1996	(8)1996 MALE	(9)1996 FEMALE
Ln(GOVSCAL)	-0.09**	-0.15*	-0.04	-0.22**	-0.30**	-0.12**	-0.005	-0.03	0.005
	(-2.54)	(-2.23)	(-1.63)	(-3.69)	(-3.41)	(-2.37)	(-0.19)	(-0.94)	(0.22)
Ln(NETRUST)	0.68*	0.76	0.27	0.53	0.59	0.29	0.42*	0.50*	0.27*
	(2.04)	(1.62)	(1.38)	(1.39)	(1.34)	(0.90)	(2.28)	(2.03)	(2.18)
Ln(RETRUST)	0.09	-0.46	0.42*	0.25	0.02	0.40	0.35	-0.24	0.57**
	(0.28)	(-0.66)	(1.81)	(0.55)	(0.05)	(1.04)	(1.50)	(-0.54)	(2.71)
Ln(INCOM)	0.03	-0.07	0.07	0.03	-0.10	0.10	0.06	0.04	0.06
	(0.64)	(-0.65)	(1.52)	(0.51)	(-1.16)	(1.26)	(1.06)	(0.54)	(0.92)
Ln(POP)	0.001	-0.001	-0.008	-0.03**	-0.03	-0.03*	0.02	0.01	0.01
	(0.05)	(-0.05)	(-0.80)	(-2.33)	(-1.49)	(-1.97)	(1.48)	(0.58)	(1.14)
Ln(GINI)	-0.17	-0.13	-0.23*	-0.43**	-0.44**	-0.42*	0.08	0.07	0.02
	(-1.50)	(-0.74)	(-2.27)	(-2.60)	(-2.64)	(-2.10)	(0.74)	(0.49)	(0.27)
Ln(HC)	1.04*	0.77	0.62	0.39	0.01	0.38	0.65*	0.78	0.52*
	(1.82)	(1.20)	(1.51)	(0.67)	(0.03)	(0.64)	(1.70)	(1.48)	(1.74)
Age_1640	0.18*	0.19	0.06	0.04	-0.01	0.03	0.19**	0.29**	0.10**
	(1.67)	(1.31)	(0.89)	(0.40)	(-0.13)	(0.28)	(3.26)	(3.02)	(2.77)
Age_4160	0.02	-0.01	-0.01	-0.40	-0.08	-0.05	0.02	-0.01	0.04
	(0.36)	(-0.16)	(-0.22)	(-0.46)	(-0.75)	(-0.70)	(0.51)	(-0.30)	(0.92)
Female	0.05**			0.10**			0.04*		
	(4.04)			(6.52)			(1.66)		
Year_1979	-0.09**	-0.19**	-0.07*						
	(-2.40)	(-3.60)	(-2.19)						
Constant	-0.50	0.21	-0.73*	-0.83	0.01	-1.17*	-0.51	-0.47	-0.38**
	(-1.04)	(-0.25)	(-1.91)	(-1.52)	(0.02)	(-1.80)	(-1.08)	(-0.91)	(-0.81)
Obs	564	282	282	282	141	141	282	141	141
O-I test chi^2	3.17	3.23	4.57	5.57	4.01	5.18	0.20	0.98	1.97
p<	0.52	0.52	0.33	0.23	0.53	0.26	0.99	0.91	0.74
Adj. R^2	0.02	-0.11	0.29	0.26	0.22	0.15	0.20	0.30	0.12

Note. Values in parentheses are t-statistics calculated by robust standard errors. * and ** denote significance at the 5% and 1% levels, respectively. Both *NETRUST* and *RETRUST* are treated as endogenous variables and thus instrumented. Six instruments are the Logarithm for the number of fire fighting teams, logarithm for changing residence within prefecture, logarithm fir immigrants from other prefectures, Kanto region dummy, Chubu region dummy, Kinki region dummy, and Urban areas dummy. The Kanto region is comprised of 7 prefectures; Ibaragi, Tochigi, Gunma, Saitama, Chiba, Tokyo, and Kanagawa. The Chubu region is comprised of 9 prefectures; Niigata, Toyama, Ishikawa, Fukui, Yamanashi, Nagano, Gifu, Shizuoka, and Aichi. The Kinki region is comprised of 7 prefectures; Mie, Shiga, Kyoto, Osaka, Hyogo, Nara, and Wakayama. Urban areas consist of 5 prefectures; Tokyo, Kanagawa, Aichi, Osaka, and Hyogo. O-I test presents the Hansen's over-identification test.

Table 6 Dependent variable: rates of respondents satisfied with life (GMM 2SLS model)

	(1)1979 & 1996	(2)1979 & 1996 MALE	(3) 1979 & 1996 FEMALE	(4)1979	(5)1979 MALE	(6)1979 FEMALE	(7)1996	(8)1996 MALE	(9)1996 FEMALE
Ln(GOVSCAL)	-0.15**	-0.23**	-0.08*	-0.40**	-0.49**	-0.30**	0.004	-0.01	0.03
	(-2.63)	(-2.40)	(-1.66)	(-4.33)	(-3.07)	(-3.60)	(0.10)	(-0.20)	(1.05)
Ln(NETRUST)	0.55*	0.65*	0.19	0.29	0.57*	0.09	0.37*	0.44*	0.22*
	(1.83)	(1.70)	(1.02)	(1.15)	(1.67)	(0.36)	(2.27)	(2.08)	(2.07)
Ln(RETRUST)	0.35	-0.05	0.44*	0.47	0.17	0.40	0.33	-0.20	0.46*
	(0.98)	(-0.09)	(1.96)	(1.17)	(0.33)	(1.09)	(1.13)	(-0.43)	(2.23)
Ln(INCOM)	-0.02	-0.13	0.02	-0.12	-0.22*	-0.09	0.07	0.06	0.10
	(-0.40)	(-1.19)	(0.48)	(-1.65)	(-1.76)	(-1.08)	(0.99)	(0.72)	(1.42)
Ln(POP)	-0.01	-0.01	-0.01	-0.08**	-0.08*	-0.07**	0.02	0.01	0.01*
	(-0.81)	(-0.56)	(-1.31)	(-3.46)	(-2.05)	(-2.99)	(1.50)	(0.68)	(1.66)
Ln(GINI)	-0.13	-0.08	-0.18*	-0.27*	-0.26	-0.20	0.05	0.04	-0.01
	(-1.28)	(-0.54)	(-2.00)	(-1.74)	(-1.29)	(-1.10)	(0.53)	(0.27)	(-0.17)
Ln(HC)	0.71	0.52	0.38	-0.44	-0.53	-0.53	0.63*	0.79	0.56*
	(1.29)	(0.83)	(0.89)	(-1.03)	(-0.82)	(-1.19)	(1.74)	(1.51)	(2.02)
Age_1640	0.15	0.16	0.04	-0.01	-0.007	-0.04	0.17**	0.27**	0.09**
	(1.57)	(1.35)	(0.61)	(-0.20)	(-0.07)	(-0.58)	(3.46)	(3.22)	(2.86)
Age_4160	0.01	-0.02	-0.02	-0.08	-0.07	-0.09*	0.01	-0.02	0.02
	(0.20)	(-0.28)	(-0.54)	(-1.52)	(-0.88)	(-1.71)	(0.22)	(-0.55)	(0.45)
Female	0.06**			0.11**			0.02*		
	(4.67)			(8.12)			(2.03)		
Year_1979	-0.14**	-0.23**	-0.09**						
	(-3.00)	(-4.14)	(-2.32)						
Constant	0.11	0.82	-0.33	0.56	1.16	0.42	-0.59	-0.68	-0.80
	(0.18)	(0.89)	(-0.68)	(0.81)	(1.06)	(0.59)	(-0.96)	(-1.00)	(-1.38)
Obs	564	282	282	282	141	141	282	141	141
O-I test chi^2	6.49	3.01	4.83	1.49	1.43	3.83	0.62	1.56	1.18
p<	0.26	0.55	0.29	0.82	0.83	0.42	0.96	0.81	0.88
Adj. R^2	0.17	0.14	0.37	0.43	0.17	0.34	0.30	0.40	0.30

Note. Values in parentheses are t-statistics calculated by the robust standard errors. * and ** denote significance at the 5% and 1% levels, respectively. *GOVSCAL, NETRUST* and *RETRUST* are treated as endogenous variables and thus instrumented. Seven instruments are the logarithm for the number of natural disasters, logarithm for the number of fire fighting teams, logarithm for changing residence within prefecture, logarithm for immigrants from other prefectures, Kanto region dummy, Chubu region dummy, Kinki region dummy, and Urban areas dummy. The Kanto region is comprised of 7 prefectures; Ibaragi, Tochigi, Gunma, Saitama, Chiba, Tokyo, and Kanagawa. The Chubu region is comprised of 9 prefectures; Niigata, Toyama, Ishikawa, Fukui, Yamanashi, Nagano, Gifu, Shizuoka, and Aichi. The Kinki region is comprised of 7 prefectures; Mie, Shiga, Kyoto, Osaka, Hyogo, Nara, and Wakayama. Urban areas consist of 5 prefectures; Tokyo, Kanagawa, Aichi, Osaka, and Hyogo. O-I test presents the Hansen's over-identification test.