Fertility of Immigrant Women in Japan*

Analysis using the own-children method based on micro-data from the population census of Japan

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Abstract

It has been noted that the fertility of immigrant women is higher than that of the native women in many developed countries. Contrary to these findings, it has been revealed that the fertility of immigrant women is lower than that of Japanese women. The present study aims to clarify why the fertility of immigrant women in Japan is lower than that of Japanese women.

The present study assumes the social adaptation theory, which predicts that the fertility of immigrant women with longer residency in Japan will converge to the level of Japanese women. It also examines the disruption effect and the effect of the interrelation of events at the same time.

The present study use the own-children method based on micro data from the population census of Japan. The cases are limited to foreign citizens and 10% of the total Japanese citizens in general households. The present study also uses supplementary micro-data from the vital statistics. The study also focuses on major and important newcomer immigrant groups such as Chinese, Philippine, Thai, and Brazilian women aged 15–49 years at the time of giving birth.

Total rates of fertility estimated by the own-children method are 1.31 for Japanese women, 0.87 for Chinese women, 1.46 for Philippine women, 1.04 for Thai women, and 1.27 for Brazilian women. Only Philippine women show a higher TFR than Japanese women, and all immigrant women score lower fertility than that in their country of origin.

To conclude, the fertility of immigrant women is generally lower than that of Japanese women, partially due to the disruption effect of international migration in the short term. Furthermore, their fertility recovers as promoted by the social adaptation effect to Japanese society in the middle term, although the original level is never again attained, except among young unmarried immigrant women. The main reasons for low fertility even after a longer duration of residency are the severe social environment for child-rearing in Japanese society and unstable marriages among international couples.

Furthermore, these results reveal that the social adaptation theory is not applicable to the Japanese case, because of the insufficient adaptation effect among immigrant women. This means that an additional inflow of immigrant women into Japanese society will not necessarily raise its fertility. In fact, it may decrease, although this is not the case in other developed countries.

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1. Low Fertility of Immigrant Women in Japan

It has been noted that the fertility of immigrant women is higher than that of the native women in many developed countries. While this high fertility increases the receiving country's fertility to a certain degree, immigrant women's level of fertility approaches that of native women over the time elapsed since migration (e.g., Goldstein et al. 2009: 679–82, Sobotka 2008). This is because the level of fertility in their countries of origin is generally higher than that of the receiving country, and this high fertility is maintained even after settling into the host country.

Contrary to these findings, it has been revealed that the fertility of immigrant women is lower than that of Japanese women (e.g., Korekawa 2013, Yamauchi 2010, Kojima 2007). Actually, the fertility level of many Asian countries sending migrants to Japan is generally lower than that in South American and African countries, which send migrants to the US and Europe, although it is still higher than that of Japanese women. This implies that the Japanese experience of the fertility of immigrant women differs from that of other developed countries.

Against this backdrop of low fertility, several studies point out immigrant women's need to send remittances to their families in the country of origin and the large age gaps between their Japanese husbands as factors reducing fertility. However, these findings are limited to those in international marriages with Japanese men, not to the increasing number of immigrant couples. Moreover, these studies are not based on a theoretical perspective to forecast future trends regarding fertility. For example, the social adaptation perspective assesses the effect of longer residency in a host country, different trajectories for type of marriage, and short-term disruption on fertility soon after international migration.

Therefore, the present study aims to clarify why the fertility of immigrant women in Japan is lower than that of Japanese women. The social adaptation perspective is adopted, and the own-children method is employed to analyze micro-data from the Japanese population census conducted in 2010. Furthermore, the study reveals the demographic impact of immigrants' inflow to Japanese society, which has experienced low fertility for several decades since the 1980s and an increased inflow of immigrants.

2. Previous studies

2-1. Disruption Effect

The disruption effect on fertility as a result of international migration and the interrelation of events is typical (Milewski 2009: 21). This effect explains a sharp decline in immigrant women's fertility due to uncertainty regarding the future soon before/after international migration. It can also refer to a rapid increase in fertility owing to the approximate factors of giving birth such as family formation or family reunion soon after international migration. In addition, this is a cohort rather than period effect, which is difficult to analyze in cross-sectional research (Parrado 2011).

Previous studies on "classic immigration countries" such as the US, Canada, and Australia found evidence of the disruption effect, while research in other countries such as Sweden revealed only an increase in fertility after migration. The Swedish study also found that these effects appear approximately five years after migration. More specifically, the disruption effect is stronger among

higher parities than lower parities, and the effect of the interrelation of events is stronger among lower parity groups. Moreover, the interrelation of events, also known as the "catch-up" effect of fertility, is evident more frequently among lower birth orders (Milewski 2009: 134–6, Milewski 2010: 303, Andersson 2004: 771, Parrado 2011: 1073, Vila and Martin 2007: 373).

2-2. Social Adaptation

The effects mentioned above are short term, whereas social adaptation in a host country and socialization in the country of origin are important in explaining the middle- to long-term effects of international migration on fertility. These are referred to as the social adaptation effect and socialization effect respectively. In this regard, social adaptation theory assumes that the fertility of immigrant women will eventually approach the level of native women along with economic rationality and the limitations of the host society's institutional settings. Otherwise, their high fertility remains constant as an effect of socialization in their country of origin[1].

Previous research has highlighted such convergence to that of people native to the country over several generations. Especially, the level of fertility of immigrant women in the US, Canada, and Australia is between that of the first generation and that of native women, or at a level relatively close to that of their country of origin (Mileswki 2010: 300). On the other hand, European cases emphasize the importance of "mode of incorporation" (Portes and Zhou 1993) depending on which country a migrant settles in. For example, Andersson (2004: 770) found that the fertility of immigrant women in Sweden converges to the level of Swedish women five years after migration, partially because of Swedish social settings for child rearing.

2-3. Selection/Compositional Effect

Finally, selection and compositional effects explain the gap between aggregated fertility between immigrant and native women according to the socio-economic compositional difference between native and migrant women. The selection effect focuses on the selection of migrants in their country of origin, arguing that those who migrate tend to already have the lifestyle of a developed society even before migration, and have lower fertility than others in their country of origin. In addition, a theory focusing on the socio-economic compositional difference between native and migrant women explains that the lower socio-economic status of immigrant women on average decreases their fertility to a level lower than that of native women (Milewski 2009: 28–32).

2-4. Previous Studies in Japan

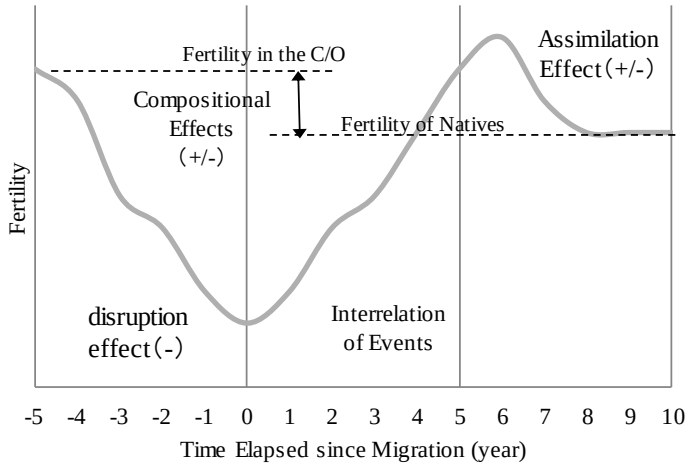
In Japan, few studies focus on the fertility of immigrant women. For example, Mori (2001) and Lee (1998) estimated the aggregated fertility of immigrant women in Japan. Kim (1971) and Kim (1977) analyzed trends in the fertility of ethnic-Korean women in Japan after 1945, while Imai (2011), Katsuno and Hayashi (1990), Kojima (2007), and Hara (1994, 96) focused on the fertility of the spouses of Japanese men. Yamauchi (2010) also compared the fertility of immigrant women in Japan and those in European countries based on an analysis of the child-women ratio. Finally, Korekawa (2013) clarified the relationship between the aggregated fertility of immigrant women in Japan and

changes in immigrants' visa composition.

These studies found that 1) the fertility of immigrant women differs depending on the country of origin; 2) their contribution to the total number of births in Japan is increasing (Lee 1998); 3) the fertility of immigrant women in Japan is lower than that of immigrant women in Europe, this attributed to the low fertility of married immigrant women (Yamauchi 2010); 4) the close relationship between the number of international couples and number of children born to them (Katsuno and Hayashi 1990, Hara et al. 1994, 1996); 5) the fertility of international couples is lower than that of Japanese couples (Kojima 2007, Imai 2011); 6) the fertility of ethnic-Koreans is similar to that of Japanese women (Kim 1971, Kim 1977); and 7) the fertility of immigrant women differs greatly even among immigrant sub-groups, and could increase over the time elapsed since migration (Korekawa 2013a, b).

3. Hypothesis and Research Questions

In light of these studies, the present study assumes the hypotheses below. First, based on the social adaptation theory, the fertility of immigrant women with longer residency in Japan will converge to the level of Japanese women. Otherwise, there are two possibilities. The first is that immigrant women will retain a high level of fertility, which is socialized in their country of origin, or decreased fertility due to the disruption effect that is not mediated by the social adaptation effect. In addition, we must be aware of the effect of the interrelation of events, which can rapidly increase the level of fertility soon after migration.



Source: The author

Figure 1 Fertility of Immigrant Women

To prove these hypotheses, the present study addressed four research questions. The first question addressed whether the aggregated fertility of immigrant women in Japan is higher than that of Japanese women, as is the case in other developed countries. Second, is the effect of the interrelation of events evident soon after migration, and how large is this effect? Third, to prove the effect of social adaptation,

the present study examined the difference in fertility between immigrant and Japanese women according to type of couple to determine if the gap decreases over time since migration. Finally, the socialization effect is examined by comparing the estimated fertility of immigrant and Japanese women.

4. Data and Methods

4-1. Utilization of Micro-Data from the Japanese Population Census

To examine the fertility of immigrant women, it is desirable to use panel data such as the German Socio-Economic Panel (GSOEP) (Milewski 2009: 69–70). However, it takes time to generate such longitudinal data, and it is particularly difficult for new destination countries such as Japan.

The present study utilizes micro-data from the Japanese population census[2], because it includes the basic information needed to examine the hypotheses and research questions described earlier. The cases are limited to foreign citizens and 10% of the total Japanese citizens in general households. The present study also uses supplementary micro-data from the vital statistics, because the population census does not include important information such as number of children ever born and duration of marriage.

The study also focuses on major and important newcomer immigrant groups such as Chinese, Philippine, Thai, and Brazilian women aged 15–49 years at the time of giving birth. Chinese women are typically high-skilled labor immigrants who form their families within the same ethnic group. Philippine and Thai women are typically marriage migrants as the spouses of Japanese men. Brazilian women are mainly Japanese Brazilians, and so referred to as return migrants, who migrate to Japan with other family members and are employed as unskilled manufacturing workers.

4-2. Own-Children Method

The study utilizes the own-children method (Grabil and Cho 1965, Cho et al. 1986), because it is the most appropriate approach other than the life course approach using panel data. This method regards each record of micro-data from the population census as a delayed vital registration, and reproduces an individual's past fertility history for up to the last ten years. It also reproduces the total and age-specific fertility rate for the past. In this regard, many previous studies focus on fertility over the last approximately four years in terms of credibility of the estimation. In particular, the number of cohabitating children aged less than one year indicates fertility of the past one year (Vila and Martin 2007, Stephen and Bean 1992, Dubuc 2009, Goldstein and Goldstein 1981, Ford 1990).

More specifically, the present study utilizes the following methods to specify own children based on studies by the East West Center of Hawaii University and the application of this method to the Japanese population census (Nihon Tokei Kyokai 1990). It specifies the own-children method based on information on the relationship to a household head and the age difference between them. Prospective own children should be aged zero to four years, and their relationships to a household head should be child, grandchild, sibling, other relative, other household member of a household head, or household head. A mother is also specified in the same way. As a result, almost all mother-child relationships are specified, and a few own children are specified by the number of potential own

children divided by the number of potential mothers if there are more than two potential mothers in the same household.

By specifying mother-child relationships, the study further estimates the mid-year population of mothers and number of live births that year[3] to respectively calculate the age-specific fertility rate and total fertility rate.

4-3. Interrelation of Events

The study also compares the total fertility rate (TFRs) for the past one year (TFR_0) and past two to four years ($TFR_{1\text{-}4}$) based on the estimated TFRs[4]. Specifically, combined with information on place of residence five years ago, TFR_0 indicates fertility between 0.5–1.5 years since migration, and $TFR_{1\text{-}4}$ indicates fertility between -3.5 to 0.5 years since migration[5]. Following this, we can compute a TFR ratio using the formula below to show changes in fertility over international mobility (Goldstein and Goldstein 1981)[6].

$$D_{TFR,i} = TFR_{0,i}/TFR_{1-4,i}$$

$D_{TFR,i}$: Ratio of TFRs in the past five years
$TFR_{0,i}$: TFR of nationality i and average duration or residency from 0.5 to 1.5 years
$TFR_{1-4,i}$: TFR of nationality i and average duration or residency from -3.5 to 0.5 years

4-4. Multivariate Analysis

In addition, the study estimated the differences between the fertility of individual women based on marriage type, duration of residency, and so on using the multivariate analysis below.

$$Probit(p) = \alpha + \sum_{i=1}^{4} \beta_1\ Cz_i + \sum_{i=1}^{4} Cz_i\left(\beta_2\ Mg + \beta_3\ Im\right) + \beta_4(Lr \cdot Cz_i) + \sum_{i=1}^{4} (Lr \cdot Cz_i)\left(\beta_5\ Mg + \beta_6\ Im\right) + X'\beta_7 \qquad \cdots (1)$$

p: Probability of giving birth in the past one year
α: Constant term
Cz_i: Dummy variable of being a foreign citizen
Mg: Dummy variable of being married
Im: Dummy variable of being the spouse of a Japanese man (only for immigrant women)
Lr: Dummy variable for residency of longer than five years in Japan (only for immigrant women)
X': Control variables (age, age squared, cross-term with being a foreign citizen and age squared, marital status, school enrollment, age difference between immigrant woman and husband and squared, husband's educational attainment, residing prefecture, population density, population size of residing municipality)

The dependent variable is the probit-transformed probability of giving birth in the past one year. The present study assumes that women intend to give an appropriate number of births in their lifetime[7]; thus, explanatory variables showing differences in fertility between immigrant and Japanese women represent the difference in lifetime fertility.

Cz_i is the dummy variable of being a foreign citizen, which is set separately for Chinese, Philippine, Thai, and Brazilian women, with Japanese women as the reference. Mg is the dummy variable of being married, and the reference is being single at the time of the survey. Im is the dummy variable of being the immigrant spouse of a Japanese man, the reference of which is being an immigrant spouse of an immigrant man. Lr is the dummy variable of being an immigrant who has lived in Japan for longer than five years, and the reference is an immigrant who has lived in Japan for less than five years.

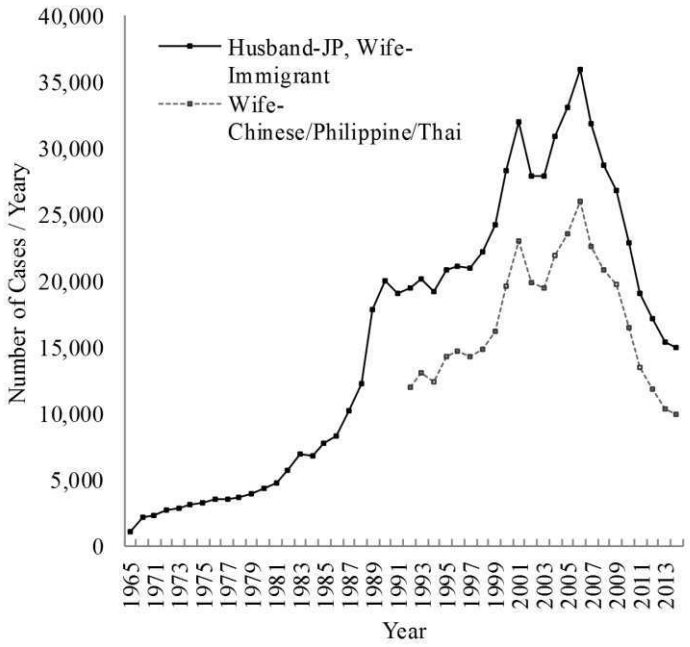
To summarize, the model consists of the effects of being a foreign citizen and the cross-terms with marital status and marriage type (homogamy/heterogamy). In other words, the model aims to estimate the difference in fertility between married women based on type of marriage. The cross-terms between these marital statuses and residency duration further indicate the magnitude of the social adaptation effect.

Finally, X_i is the vector of control variables consisting of age, squared age, cross-term between foreign citizenship and squared age[8], marital status, husband's educational attainment[9], residing prefecture, population density, residing municipality, and school enrolment[10].

5. Immigrant Women in Japan

The number of immigrant women in Japan has increased since the 1990s to the early 2000s. Many came from Asian countries as marriage migrants, and some came to Japan through recruiting companies for foreign brides. These women were sent to rural areas where the number of young women was decreasing. Other immigrant women came to Japan as entertainers, and many worked in the sex industry where they met and married Japanese men (e.g., Takeda 2011). Sassen (1998) points out that these episodes mean that acceptance of immigrant women in Japan began in the form of the globalization of reproductive work.

Indeed, many international marriages between immigrant and Japanese men increased in the 1990s to early 2000s. Specifically, Chinese, Philippine, and Thai women began accounting for around 70% of the total number of foreign brides. However, the tightening of the process to issue spousal visas has decreased this ratio since 2006 (Takeda 2011, Fujimoto 2013).



Source: Ministry of Health, Labour, and Welfare (2015)

Figure 2 Number of International Marriages between Japanese Men and Immigrant Women

There are also differences between the migratory processes of immigrant women. For example, more immigrant women marry than Japanese women. While classified according to the rate of marriage and rate of international marriage, Chinese women display low rates for both marriage and international marriage, Brazilian women display a high rate of marriage and low rate of international marriage, and Thai and Philippine women display high rates for both marriage and international marriage. This reflects the different migratory processes of these women.

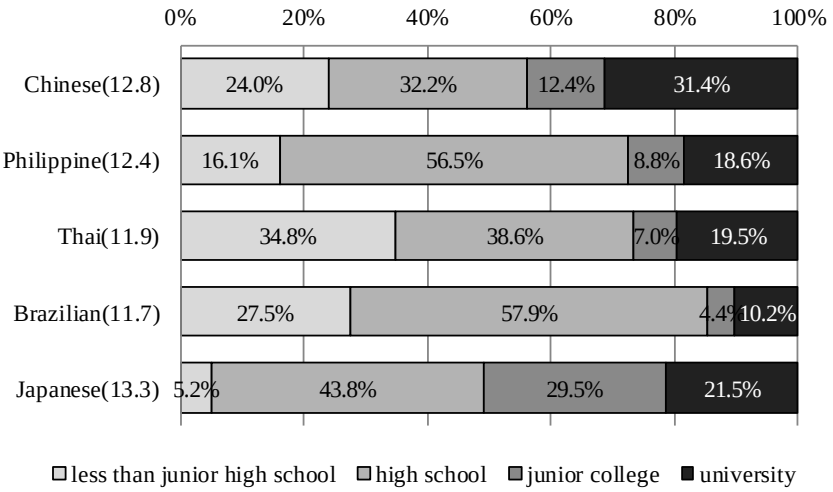
For example, many Chinese women initially come to Japan as international students, and then meet and marry an immigrant or Japanese man afterwards. Meanwhile, Philippine and Thai women come to Japan as foreign brides from the onset, and Brazilian women are mostly Japanese Brazilians, who come to Japan with other family members. This is exemplified in the high rate of marriage and low rate of international marriage.

Table 1 Rate of Marriage of Women aged 15–49 Years and the Proportion of Japanese Men as Spouses in 2010

	Marriage Rate	Within Married Women: Proportion of Japanese Men as Spouses
Chinese	56.3%	57.7%
Philippine	78.7%	89.3%
Thai	76.1%	93.3%
Brazilian	66.1%	11.6%
Japanese	50.9%	-

Source: Tabulated from the population census of Japan

Moreover, the distribution of immigrant women's educational attainment indicates that on average, they are less educated than Japanese women, and immigrant women's educational attainments are polarized into low and high strata. For example, 31.4% of Chinese women have higher than a B.A. degree, which is a larger proportion than Japanese women. A lower number of other immigrant women hold B.A. degrees than Japanese women. On the other hand, many immigrant women are not well educated, as indicated by the 16–35% of immigrant women and 5.2% of Japanese women who attained lower than a junior high school diploma. Furthermore, in terms of education in years, Japanese women received 13.3 years of education on average, Chinese women 12.8 years, Philippine women 12.4 years, Thai women 11.9 years, and Brazilian women 11.7 years. All these have fewer years of education than Japanese women.



Source: Tabulated from the population census of Japan

Note: The figures in parentheses following nationality refer to the average number of years of education

Figure 3 Composition of Educational Attainments of Women Aged 15–49 Years by Nationality

6. Fertility of Immigrant Women

6-1. Estimations using the Own-Children Method

Total rates of fertility estimated by the own-children method are 1.31 for Japanese women[11], 0.87 for Chinese women, 1.46 for Philippine women, 1.04 for Thai women, and 1.27 for Brazilian women. Only Philippine women show a higher TFR than Japanese women. Among immigrant women, the TFR for Chinese women is low, lower than 1, despite that the TFR of their country of origin is 1.7. In this regard, the TFRs of the other immigrant women are also lower than those in their country of origin at 3.2 for Philippine women, 1.4 for Thai women, and 1.8 for Brazilian women. These results reveal that the fertility of immigrant women is lower than that in their countries of origin, as confirmed in previous studies.

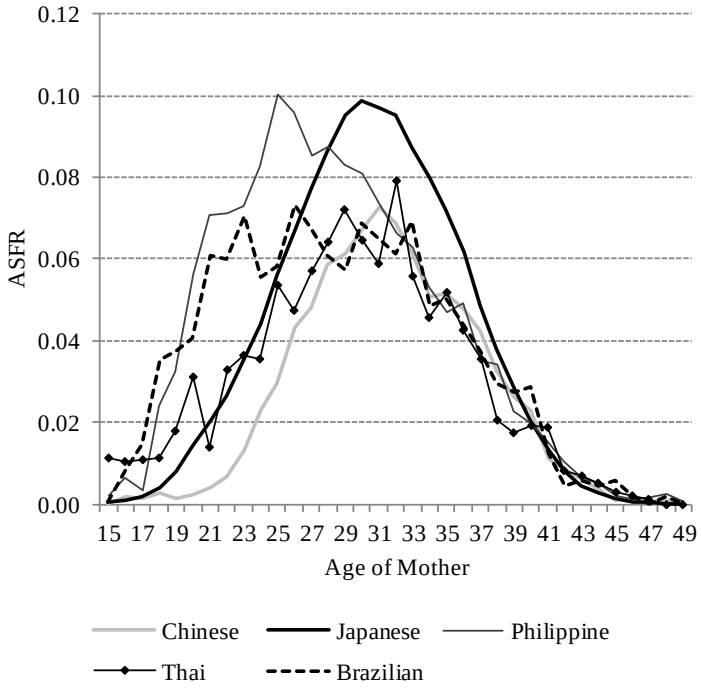
Table 2 TFRs Estimated by the Own-Children Method (2010)

	TFRs in Japan	TFRs in Country of Origin
Chinese	0.87	1.7
Philippine	1.46	3.2
Thai	1.04	1.4
Brazilian	1.27	1.8
Japanese	1.31	-

Source: Tabulated from the population census of Japan

Age-specific rates of fertility indicate that Philippine and Brazilian women experience higher fertility in their teens and early 20s, which is the main driver of their high fertility in Japan. However, the fertility of Chinese and Thai women peaks at around age 30 years, and their fertility is on average lower than that of Japanese women for all age categories.

To summarize, the aggregated TFRs are lower than that of Japanese women, which has not been revealed in studies in the US and Europe.



Source: Tabulated from the population census of Japan

Figure 4 Age-Specific Rate of Fertility by Nationality (2010)

6-2. Analysis of Interrelation of Events

However, the aggregated TFRs noted above compound a change in fertility due to international migration; thus, it is not appropriate to compare these with the TFR of Japanese women directly. Therefore, we examine the effect of the interrelation of events.

The present study looks into $D_{TFR,i}$, which is a ratio of the TFR of nationality i whose average duration or residency ranges from 0.5 to 1.5 years ($TFR_{0,i}$) to the TFR of nationality i whose average duration or residency ranges from -3.5 to 0.5 years ($TFR_{1-4,i}$).

Table 3 TFR in the Last Five Years
(2010, less than five years of residency)

	$D_{TFR,i}$
Chinese	1.51
Philippine	1.03
Thai	1.40
Brazilian	1.15
Japanese	1.04

Source: Tabulated from the population census of Japan

The results indicate a ratio of 1.51 for Chinese women, 1.40 for Thai women, and 1.15 for Brazilian women, all much higher than 1, indicating an increase in fertility possibly because of the effect of the interrelation of events soon after migration. Philippine women scored 1.03, only slightly higher than 1, although their ratio is lower five years after migration at 0.76 (see Table 4). This implies the effect of the interrelation of events earlier than in the last one year.

The next question is whether this increase in fertility soon after migration is only seen during that short period. To answer to this question, we address the following three questions. First, is this increase also evident after more time has elapsed since migration? Second, was this a one-shot event only around 2010? Third, is this also evident among Japanese women?

The present study checked the TFR ratios for short-term and long-term residents in 2010, finding that the increase is only confirmed among short-term residents, implying that the increase is due to the catch-up effect soon after migration.

Table 4 TFR in the Last Five Years
(2010, more than five years of residency)

	$D_{TFR,i}$
Chinese	0.97
Philippine	0.76
Thai	0.85
Brazilian	0.87

Source: Tabulated from the population census of Japan

The next aspect is whether this increase is limited to immigrant women or includes Japanese women as well. The TFR of Japanese women is 1.04, implying no increase during the same period.

Third, we examine whether this phenomenon was only evident around 2010. The present study found that the ratios for 2000 were 1.81 for Chinese women, 1.55 for Philippine women, 1.24 for Thai women, and 1.45 for Brazilian women, all higher than 1, meaning that the increase was not limited to the 2010 cohort, but a universal phenomenon confirmed among immigrant women soon after migration.

Table 5 TFR in the Last Five Years
(2000, less than five years of residency)

	$D_{TFR,i}$
Chinese	1.81
Philippine	1.55
Thai	1.24
Brazilian	1.45

Source: Tabulated from the population census of Japan

To conclude, immigrant women experience an increase in fertility soon after migration, which decreases over time.

6-3. Determinants of the Fertility of Immigrant Women

Table 6 Result of the Multivariate Analysis

	Chinese	Philippine	Thai	Brazilian
Foreign Citizenship	-0.98**	0.02	-0.28	-0.04
*Married	0.21**	-0.92**	-0.56**	-0.77**
*Spouse of JP	0.26**	0.30**	0.21	0.27
More than five years of residency	0.87**	0.46**	0.72**	0.32**
*Married	-0.73**	-0.34**	-0.47	-0.18
*Spouse of JP	-0.19**	-0.28**	-0.46*	-0.06
Control Variables	omitted			
Number of Cases	2,892,949			

Source: Estimated by author

Note: Nationalities in the first line are interacted with socio-economic characteristics in the first column in the single estimation model, not by several estimations being done separately for each nationality.

The results of the multivariate analysis indicated the determinants of the fertility of immigrant women. First, the results for foreign citizenship revealed a negative value only for Chinese women, and statistically insignificant results for immigrant women. This indicates that only Chinese women, whose fertility in their country of origin is 1.7, have lower fertility than Japanese women on average. The fertility of other immigrant women cannot be summarized into a single mean. These findings

clarify that there is no uniform socialization effect on their fertility.

The coefficient of being married is 1.72 (omitted in Table 6), but the cross-terms with foreign citizenship are 0.21 for Chinese women, -0.92 for Philippine women, -0.56 for Thai women, and -0.77 for Brazilian women, indicating that the fertility gap between married and unmarried women is smaller among immigrant women than Japanese women, although married immigrant women have higher fertility than unmarried immigrant women. However, this does not imply many out-of-wedlock births among immigrant women, because this is partially due to the very low fertility of unmarried Japanese women, not to the high fertility of unmarried immigrant women.

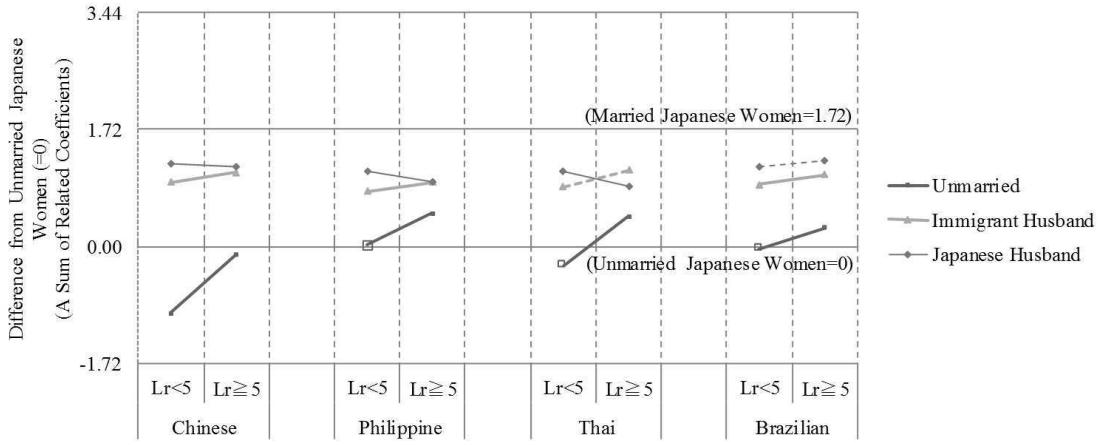
Regarding marriage type, the results for being married to a Japanese man showed a statistically significant positive effect on fertility among Chinese and Philippine women. No fertility difference was found for Thai and Brazilian women married either to Japanese or immigrant men.

The results for duration of residency were 0.90 for Chinese women, 0.44 for Philippine women, 0.66 for Thai women, and 0.30 for Brazilian women, indicating that a longer duration of residency increases fertility, as the social adaptation theory assumes.

Specifically, the results for duration of residency are more varied depending on marriage type. For example, married Chinese and Philippine women demonstrate a smaller effect for longer duration of residency than unmarried women. Moreover, the additional effect of being the spouse of a Japanese man is -0.19 for Chinese women, -0.28 for Philippine women, and -0.46 for Thai women, implying that being the spouse of a Japanese man further reduces the effect of longer duration of residency.

To simplify these results, this study aggregated the results described above to indicate a model of fertility of each category of immigrant compared to that of Japanese women. According to the results, except for Chinese women, no statistical difference in fertility between immigrant and Japanese women among unmarried women was found, and their fertility increased to more than that of Japanese women over time.

However, married immigrant women, supposedly those who give more births, demonstrated a lower level of fertility than Japanese women, even after a longer duration of residency. In particular, the spouse of an immigrant man showed lower fertility than did the spouse of a Japanese man, regardless of duration of residency[12]. Moreover, except Brazilian women, the fertility of the spouse of a Japanese man decreased after a longer duration of residency, contradicting the social adaptation theory. This low fertility is emphasized by the trial estimations showing that the fertility of immigrant women is lower than that of Japanese women, even though the effect of social adaptation is doubled (Figure 6).

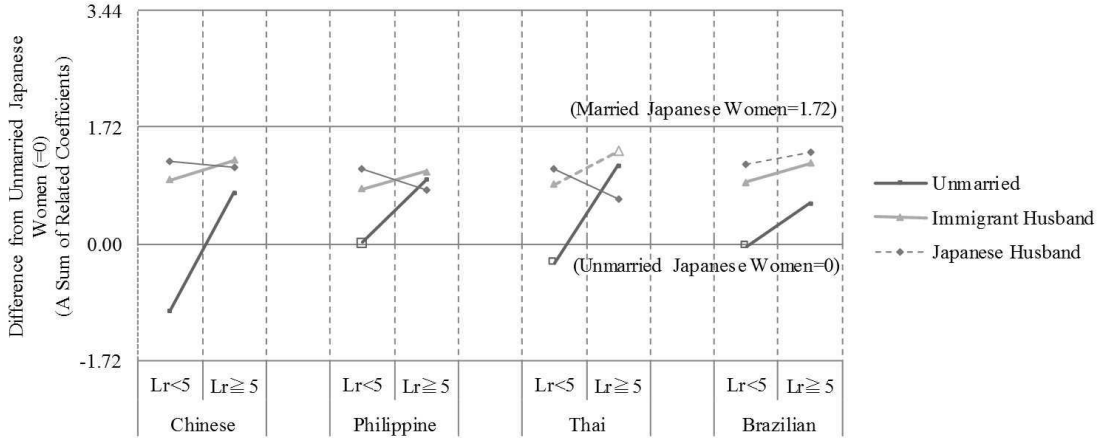


Source: Estimated by author

Note 1: Sum of related coefficients, which are statistically significant.

Note 2: A white marker and dotted line indicate a result statistically insignificant compared to a reference category.

Figure 5 Difference in Fertility between Immigrant and Japanese Women



Source: Estimated by author

Note 1: Sum of related coefficients, which are statistically significant.

Note 2: A white marker and dotted line indicates a result statistically insignificant compared to a reference category.

Figure 6 Difference in Fertility between Immigrant and Japanese Women (in the case of a doubled social adaptation effect)

6-4. Simulated TFRs of Immigrant Women

The present study also implemented a micro-simulation based on the multivariate analysis. The simulation assumes that the distributions of all covariates in the model are the same as those of the Japanese cases in the sample, except covariates relevant to being an immigrant. There are four

scenarios. The first assumes that all marriages are among immigrants (homogamy), and their duration of residency is less than five years. The second assumes all marriages are between immigrant women and Japanese men (heterogamy), and their duration of residency is also less than five years. Third, all marriages are among immigrant women and men (homogamy), and duration of residency is more than five years. Finally, the fourth assumes all marriages are between immigrant women and Japanese men (heterogamy), and duration of residency is more than five years.

As a result, the results for shorter duration of residency indicated lower TFRs than that of Japanese women. However, Philippine women in Scenarios 3 and 4 scored 1.36 and 1.38, Thai women in Scenario 3 scored 1.61, and Brazilian women in Scenario 4 scored 1.45, higher scores than that for Japanese women (1.37), reflecting the pattern of high fertility among younger age.

Table 7 Definitions of Scenarios

	Nationality	Marriage Type	Duration of Residency
Scenario 1		Homogamy	More than five years
Scenario 2	Chinese/Philippine	Heterogamy	Less than five years
Scenario 3	/Thai/Brazil	Homogamy	More than five years
Scenario 4		Heterogamy	Less than five years

Source: Formulated by author

Note: Distribution of marriage age is the same as that of Japanese women.

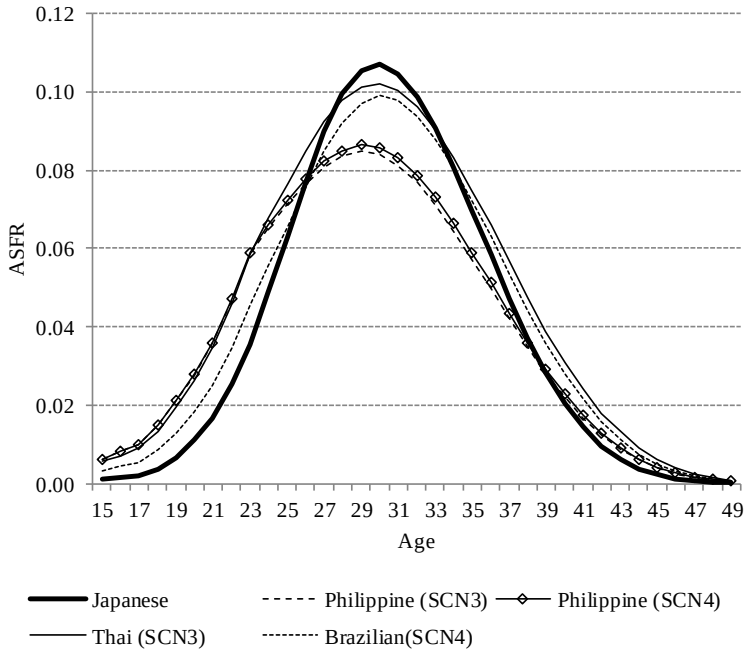
Table 8 Estimated TFRs

	Chinese	Philippine	Thai	Brazilian
Scenario 1	0.71	0.82	0.81	0.75
Scenario 2	1.13	1.29	1.15	1.14
Scenario 3	1.02	1.36	1.61	1.10
Scenario 4	1.15	1.38	1.21	1.45

Source: Estimated by author

Note: The estimated TFR for Japanese women is 1.37.

To summarize, we conclude that the fertility of immigrant women is generally lower than that of Japanese women, even after separating several effects stemming from ethnicity and being an immigrant.



Source: Estimated by author

Note: "SCN" abbreviates "scenario."

Figure 7 Estimated TFRs by Nationality

7. Discussion: Background of Low Fertility

The present study concludes that the fertility of immigrant women is generally lower than that of Japanese women. Young unmarried immigrant women only show slightly higher fertility, which reflects the low rate of out-of-wedlock births among Japanese women. In other words, this does not necessarily mean high fertility among young immigrant women.

On the other hand, low fertility among married immigrant women is mostly due to the insufficient social adaptation effect despite a longer duration of residency. The question is why their fertility does not increase even after a longer duration of residency.

The first possible answer is the severe child-rearing environment for immigrant women. For example, the rate of a leave of absence among married women with an infant aged less than 1 year in the labor force indicates that 51.9% of Japanese women are on a leave of absence[13], but only 22.4% of Chinese women married to immigrant men, 7.5% of Philippine women, 8.3% of Thai women, and 8.8% of Brazilian women are on leave. The unemployment rates of these women indicate that 4.1% of Japanese women are unemployed, as are 11.0% of Chinese women, 18.0% of Philippine women, 33.3% of Thai women, and 26.6% of Brazilian women, which seems to compensate for the low rates of leave of absence with an infant. Furthermore, these low utilization rates are partially due to their unstable employment status, which does not fully guarantee such benefits[14]. To summarize, the results revealed that immigrant couples face a severe environment in terms of having and raising children in Japan[15], which causes their low fertility.

Table 9 Leave of Absence and Unemployment Rate of Women with an Infant Aged Less than One Year

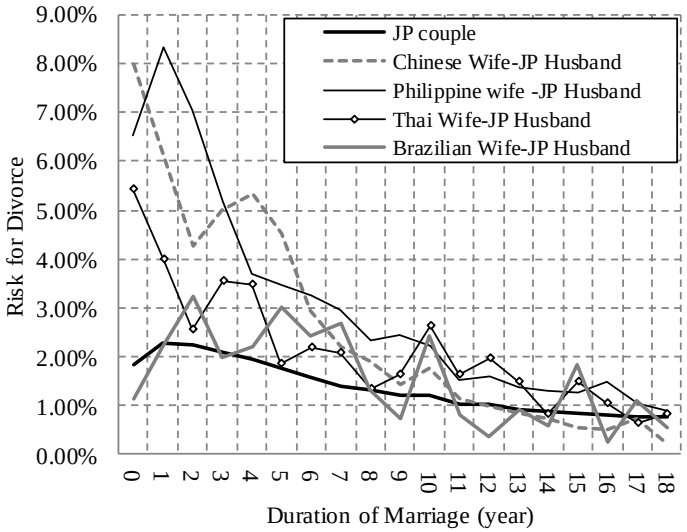
	Leave of Absence Rate	Unemployment Rate
Chinese	22.4%	11.0%
Philippine	7.5%	18.0%
Thai	8.3%	33.3%
Brazilian	8.8%	26.6%
Japanese	51.9%	4.1%

Source: Tabulated from the population census of Japan

Note: The leave of absence rate is for all women in the labor force

The next question is why the fertility of immigrant women married to Japanese men is lower than that of Japanese women. A possible answer is the negative effect of a longer duration of residency. Indeed, previous studies in other countries noted the instability of international couples as a reason for the low fertility of immigrant women (Yang and Schoonheim 2010: 121, Kim 2008, Maffiolii et al. 2012, Kim et al. 2008)[16]. This may also be true in the Japanese case.

To prove the instability hypothesis, the present study estimated divorce rates for immigrant women by using micro-data from the vital statistics and the same method as that of Raymo, Iwasawa, and Bunpass (2005). The analysis found that while 22.4% of Japanese couples divorced after 18 years of marriage, 39.4% of Chinese women married to Japanese men divorced after 18 years, 44.2% of Philippine women, and 33.2% of Thai women. Brazilian women married to Japanese men demonstrated a similar divorce rate, partially reflecting that their Japanese husbands might be naturalized Japanese Brazilian men. Either way, other than Brazilian women, the accumulated divorce rates for immigrant women are high, especially during the first five years, implying an unstable marriage after five years. Moreover, the relatively low divorce rate of Brazilian women married to Japanese men explains why they do not demonstrate the negative effect of a longer duration of residency.



Source: Tabulated from micro-data of the vital statistics

Figure 8 Risk of Divorce according to Couple Type

To conclude, the fertility of immigrant women is generally lower than that of Japanese women, partially due to the disruption effect of international migration in the short term. Furthermore, their fertility recovers as promoted by the social adaptation effect to Japanese society in the middle term, although the original level is never again attained, except among young unmarried immigrant women. The main reasons for low fertility even after a longer duration of residency are the severe social environment for child-rearing in Japanese society and unstable marriages among international couples.

Furthermore, these results reveal that the social adaptation theory is not applicable to the Japanese case, because of the insufficient adaptation effect among immigrant women. This means that an additional inflow of immigrant women into Japanese society will not necessarily raise its fertility. In fact, it may decrease, although this is not the case in other developed countries.

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[1] The minority effect (Goldscheider and Uhlenberg 1969) is seen among immigrant groups. This effect indicates that immigrants experience declining fertility because of social pressure and uncertainty related to being a minority. However, the present study adopts only the social adaptation effect as a hypothesis, as the minority effect is difficult to discern from other effects on immigrant groups, for example the effect of their subculture or socialization in the country of origin.

[2] Coverage of the population census of Japan for foreign citizens is estimated at 70–80% based on other statistics on registered foreign citizens in Japan (Ishikawa 2005).

[3] The 21st completed life table of Japan is used to estimate their survival rates.

[4] These TFRs are neither a period nor cohort type, but a time-cohort type, which needs caution when comparing it to the conventional period or cohort TFR.

[5] In the case of the timing of giving birth, the average elapsed time from migration is respectively 1.5

to 2.5 years and -2.5 to 1.5 years.

[6] Only an aggregated-level analysis was implemented in the present study, because of the limitation of explanatory covariates, which are observed only at the time of the survey. However, an individual-level analysis was similarly considered in the analysis of social assimilation.

[7] It is known that cohort fertility is stable during one's lifetime depending on socio-economic characteristics, although no major theory explains the actual level. Therefore, the model can discern differences in the cohort's fertility as the differences between giving birth in the last one year between women depending on socio-economic characteristics including ethnicity.

[8] It is included to estimate the difference of timing of giving birth between different foreign citizenships.

[9] Categories of educational attainments are lower than junior high school, high school, junior college, and higher than university level. Any of these include current students at each level of educational attainment.

[10] Information on the educational attainment of immigrant women is not included in the model, because its effect on fertility is represented in other socio-economic characteristics.

[11] TFR calculated based on the vital statistics is 1.39 in 2010 for Japanese women, which is slightly higher than that estimated by the own-children method.

[12] A dummy variable of being the spouse of a Japanese man indicates the difference in fertility among married immigrant women depending on the husband's nationality. This covariate is statistically significant only among Chinese and Philippine women, while statistically insignificant positive values are indicated for the other two nationalities.

[13] This is similar to the one obtained from the 14th National Fertility Survey conducted by the National Institute of Population and Social Security Research in 2011 (IPSS 2012: 48), namely 54.7% among mothers who had at least one infant aged less than one year from 2005–2009.

[14] A total of 22.7 % of Japanese women with at least one infant aged less than one year is employed as fixed-term contract workers. Their working benefits are scarce. Furthermore, the proportion of fixed-term contract workers is 33.4% for Chinese, 78.3% for Philippines, 57.1% for Thai, and 62.8% for Brazilian women.

[15] The rate of leave of absence of immigrant women married to Japanese men is 24.7% for Chinese, 9.5% for Philippines, 17.3% for Thai, and 27.3% for Brazilian women, significantly lower than that for immigrant women married to immigrant men. This reflects that the social environment for child-rearing for immigrant women married to Japanese men might be better than that for immigrant women married to immigrant men.

[16] Few studies focus on the fertility of international couples in the US and Europe, which is partly because marriages among immigrants are mostly among immigrants in those countries.

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(J) means that the article is written in Japanese only.