

Recovery to Replacement Level is possible? Fertility Development of Japan since 2005

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Purpose of Research

- Around 2005, the upturn of TFR has been observed in many developed countries and the “End of ‘Lowest-Low’ Fertility?” was speculated (Goldstein, et.al.2009).
 - Within ten years, Japan’s TFR recovered from 1.26 at bottom (2005) to 1.45(2015).
 - This study focused on the fertility development of Japan and cd the effects of late marriage and childbearing on fertility development, to clarify if this trend shows recovery to replacement level of fertility or not. .
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1. Fertility Development of Japan

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Backgrounds of TFR Upturn in Japan

- Japan's TFR recovered from 1.26 at bottom (2005) to 1.45(2015) . The last peak was 1.81(1984) and the most recent record is 1.36 (2019) (Fig.1)
 - A Lexis diagram indicates the shift of relatively high fertility from young to upper ages. (Fig.2)
 - It occurred since 1975 and the age-specific fertility distribution trends to be leveled and its peak is lowered(Fig.2).
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Figure 1: Trend of TFR in Japan :1980-2019

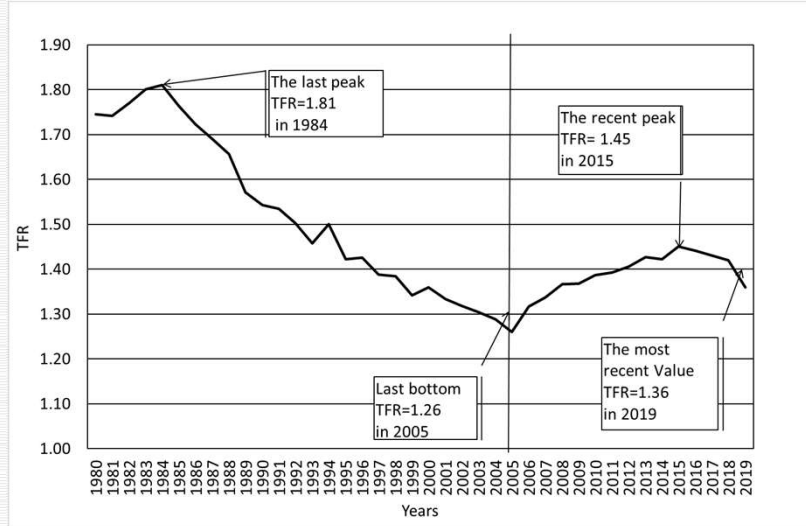
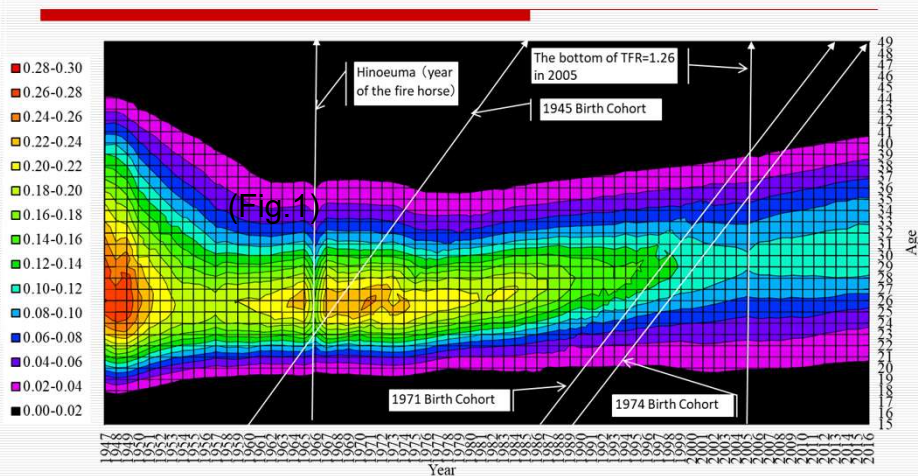


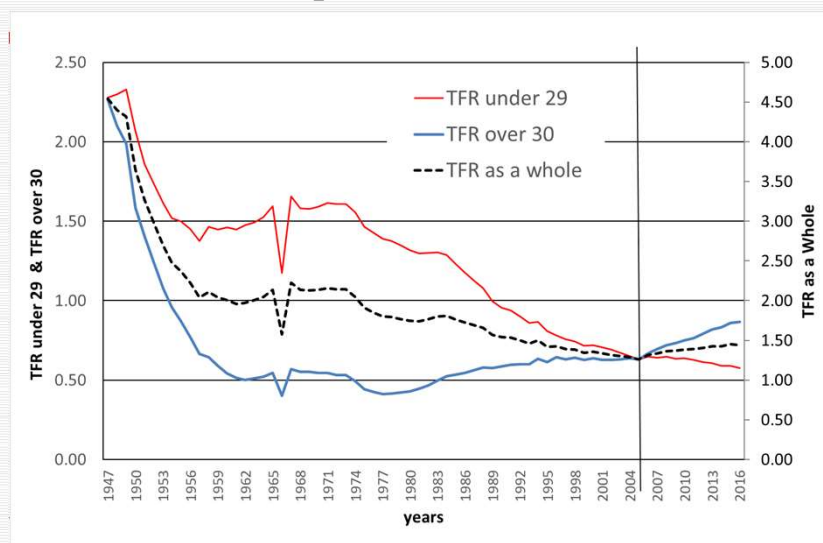
Figure 2 : Age Specific Fertility Rates Japan 1949-2016



TFR under 29 vs. TFR over 30

- Analyzing TFR in two groups, age 15-29 and age 30-49,
- TFR under 29 is decreasing since 1974.
- TFR over 30 is increasing since 1977.
- This trend continues unchanged until today.
- The upturn happened in 2005, when the TFR over 30 caught up and over the TFR under 29 around 2005. (Fig.3)

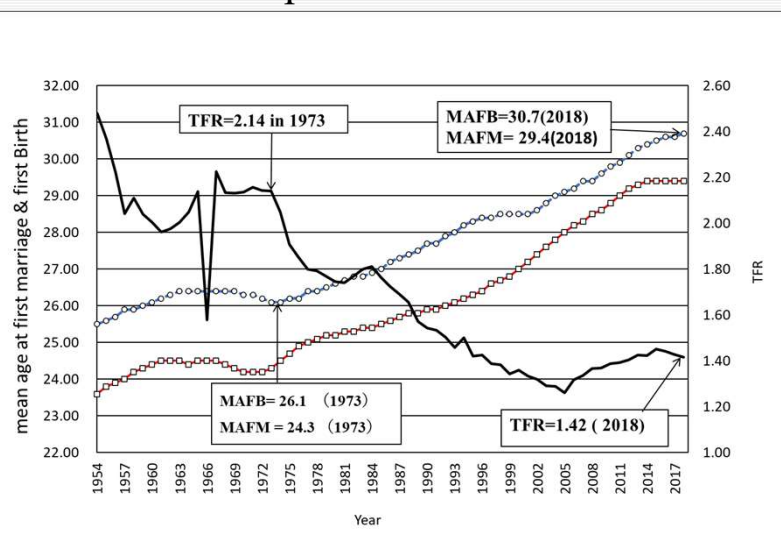
Figure 3: TFR under 29 vs. TFR over 30
Japan 1949-2016



Late Marriage & Childbearing

- From 1973 to 2018, Mean Age at First Marriage (MAFA) of Woman has increased from 24.3 to 29.4. Mean Age at First Birth (MAFB) of Woman has increased from 26.1 to 30.7.
- Total Fertility Rate (TFR) has decreased from 2.14 to 1.42.
- Late marriage and late childbearing are spreading.
- This timing shift of family formation has caused the decline from replacement level of fertility to 'Lowest-Low' Fertility. (Fig.4)

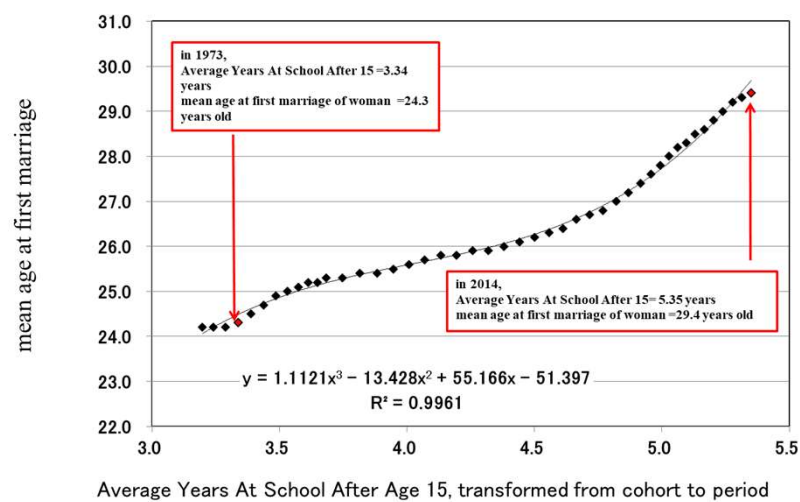
Figure 4 : Late Marriage & Childbearing
Japan 1954-2018



Expanding Years of Schooling

- Using the enrollment and advancement rate of Basic School Research of the MEXT (Ministry of Education, Culture, Sports, Science and Technology), the changing composition of educational attainments of women since 1950 to 2014 was checked, the average years at school after age 15 was calculated and transformed from cohort to period.
- Then, its correspondence with increasing mean age at first marriage of women was indicated. (Fig.5)

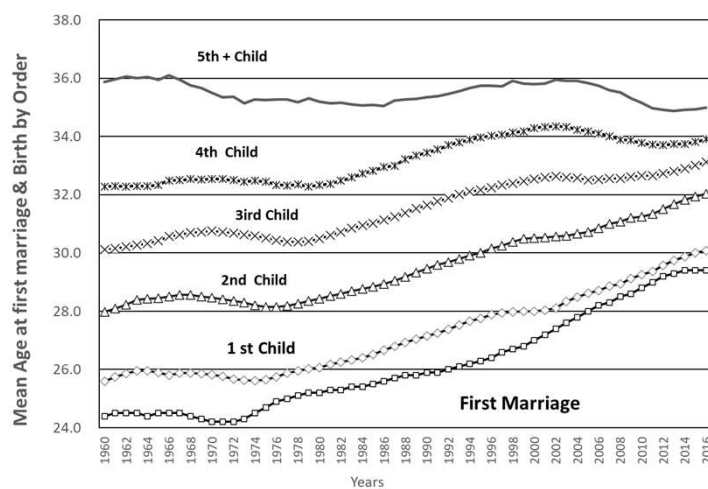
Figure 5 : Average Years at school after age 15, Japan 1970-2014



Timing shift of Family Formation

- The extending average years at school after age 15 causes a timing shift with delayed start for match making process with a partner.
- The delayed start affects the timing not only for the first marriage also for the first birth, the second birth, the third birth, the fourth birth and the birth in higher order. (Fig.6)
- The interval and order among the family formation events are basically fixed but the time span from the first marriage to the birth in higher order become shorter than ever.

Figure 6: a delayed timing for marriage and Marriage & Childbearing : Japan 1960-2016



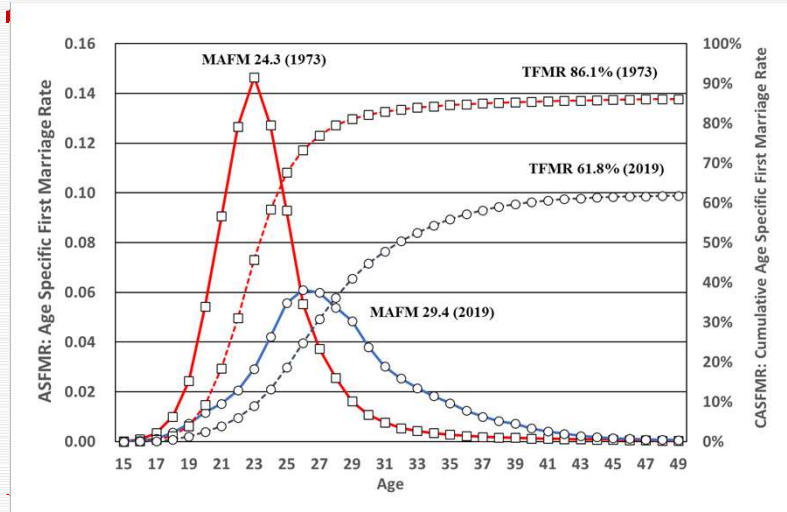
2. Effects of Late Marriage and Childbearing on Fertility

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Changing Pattern of First Marriage

- The four-years delay of mean age at first marriage (MAFM) from 24.3 to 29.4 has changed the distribution of age specific first marriage rates (ASFAR),
 - from an early pattern in 1973 with high peak, left skew and narrow range, to late a pattern in 2018 with low peak, right skew and wide range.
 - As a result, the cumulative first marriage rate, i.e. total first marriage rate (TFMR) grows too slowly and cannot reach high level at the end of reproductive period. It increases the unmarried rate at 50 years old. (Fig.7)
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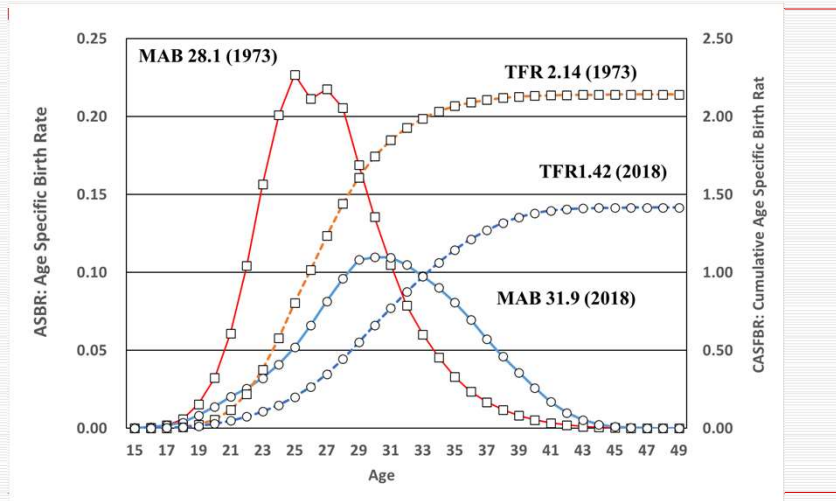
Figure 7: Pattern Change of First Marriage from 1973 to 2018 in Japan



Changing Pattern of Fertility

- The four-years delay of mean age of birth (MAB) from 28.1 to 31.9 has changed the distribution of age specific birth rates(ASBR),
- from an early pattern in 1973 with high peak, left skew and narrow range, to a late pattern in 2018 with low peak, right skew and wide range.
- As a result, the cumulative age specific birth rate , i.e. total fertility rate (TFR) grows too slowly and cannot reach high level at the end of reproductive period. It increases again the childlessness rate. (Fig.7)

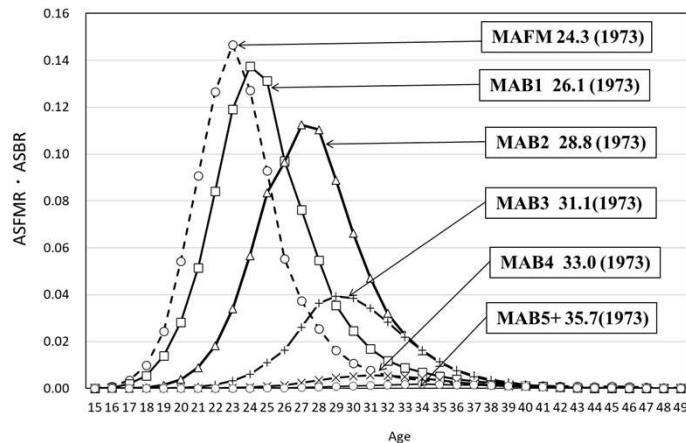
Figure 8: Pattern Change of ASBR from 1973 to 2018 in Japan



Early pattern of Family Formation

- An Early pattern of family formation in 1974 shows,
- shift from ASFMR with high peak, left skew and narrow range, to each ASBR with lower peak, right skewer and wider range in higher birth order.
- MAFM was 24.3, MAB in birth order were 26.1, 28.8, 31.1, 33.0 and 35.7.
- As a result, the cumulative age specific birth rate in each birth order grows faster and can reach high level at the end of reproductive period. (Fig.9)

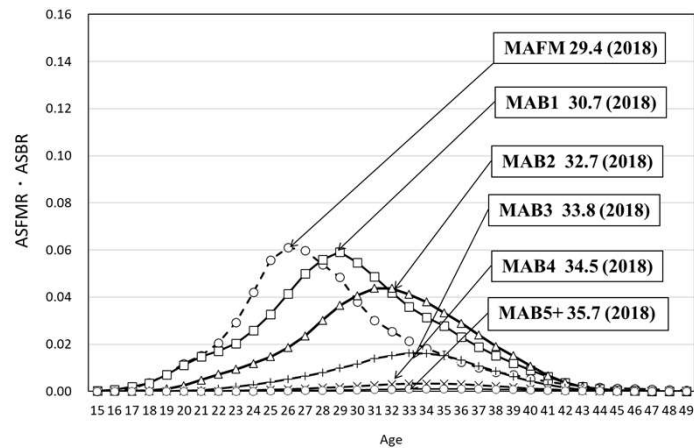
Figure 9: Pattern of First marriage and Childbearing 1973 in Japan



Late Pattern of Family Formation

- A late pattern of family formation in 2018 shows,
- shift from ASFMR with relatively low peak, a few left skew and wide range, to each ASBR with lower peak, right skewer and wider range in higher birth order.
- MAFM was 29.4, MAB in birth order were 30.7, 32.7, 33.8, 34.5 and 35.7.
- As a result, the cumulative age specific birth rate in each birth order grows slower and can not reach the replacement level at the end of reproductive period. (Fig.10)

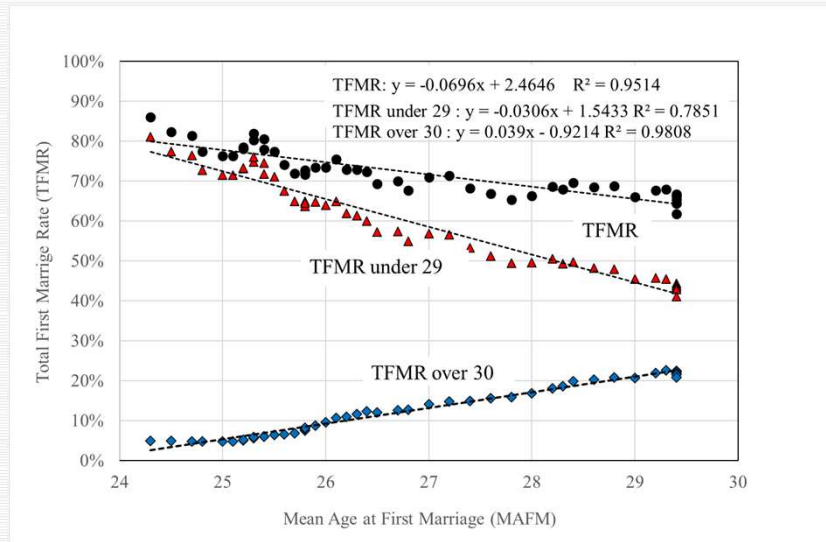
Figure 10: Pattern of first marriage and Childbearing 2018 in Japan



Effect of Late Marriage on Total Marriage

- Correlation between MAFM and TFMR from 1973 to 2018 in Japan shows,
- TFMR is decreasing, if MAFM is growing.
 $y = -0.0696x + 2.4646 \quad R^2 = 0.9514$
- TFMR under 29 is also decreasing, if MAFM is growing. $y = -0.0306x + 1.5433 \quad R^2 = 0.7851$
- TFMR over 30 is increasing, if MAFM is growing.
 $y = 0.039x - 0.9214 \quad R^2 = 0.9808$ (Fig.11)

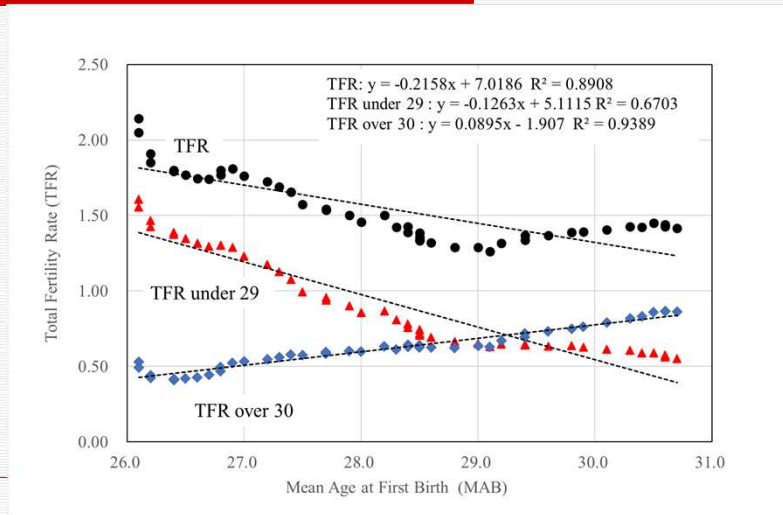
Figure 11: Correlation between MAFM and TFMR from 1973 to 2018 in Japan



Effect of Late Childbearing on Total Fertility

- Correlation between MAB and TFR from 1973 to 2018 in Japan shows,
- TFR is decreasing, if MAB is growing.
 $y = -0.2158x + 7.0186$ $R^2 = 0.8908$
- TFR under 29 is also decreasing, if MAB is growing.
 $y = -0.1263x + 5.1115$ $R^2 = 0.6703$
- TFR over 30 is increasing, if MAB is growing.
 $y = 0.0895x - 1.907$ $R^2 = 0.9389$ (Fig.12)

Figure 12 :Correlation between MAB and TFR
from 1973 to 2018 in Japan



3. Recovery to Replacement Level is possible?

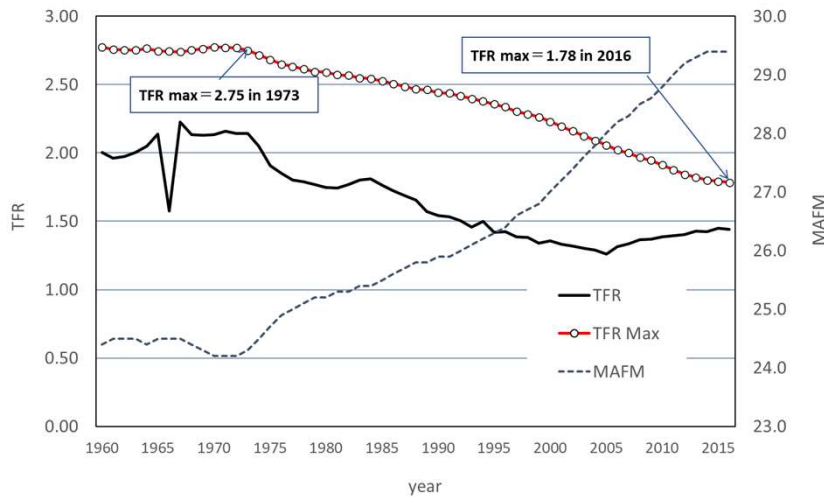
Meaning of TFR Upturn in Japan

- Japan's TFR recovery from 1.26 to 1.45 between 2005 and 2010 was a part of long-term fertility development promoted with the trend of late marriage and childbearing since around 1975.
 - The expanding years of schooling for higher education began to delay the start for match making process.
 - The shift of relatively high fertility from young to upper ages has occurred and the distribution of ASFMR and ASBR trends to be leveled and its peak is lowered.
 - The TFR under 29 is decreasing and TFR over 30 is increasing. This trend continues unchanged until today.
 - The upturn happened, when the TFR over 30 caught up and over the TFR under 29 around 2005.
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Recovery to Replacement is unthinkable

- The delayed start affects the timing not only for the first marriage also for the first birth, the second birth, the third birth, the fourth birth and the birth in higher order.
 - With increasing MAFM and MAB, TFMR and TFR grows too slowly and cannot reach the level for replacement fertility. It increases the unmarried rate at 50 years old and the childlessness.
 - The same effect can be observed in births order, in concern with the mean age and the maximum level of total. As a result, the probability of multiparity is diminishing.
 - The model estimation indicated 1.78 as the maximum level of TFR in 2016, which is less than the replacement level of fertility 2.08.(Fig.13)
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Figure 13: Model estimation of maximum level of TFR from 1960 to 2016 in Japan



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