3.1 The Japanese National Fertility Survey

The JNFS is a nationally representative sample of 18-49 year-old women conducted every five years by the National Institute for Population and Social Security Research. The JNFS has regularly asked respondents if they were previously married, but the 13th survey was the first to ascertain the timing of first marriage and first marital dissolution for those who reported a previous marriage. The 13th JNFS is comprised of separate samples of 4,241 unmarried women and 6,836 married women, with response rates of 70% and 86%, respectively. After excluding never-married women, we are left with a base analytic sample of 7,391.[2] Excluding those who married prior to 1980 (and thus married at relatively young ages) and those who married after 2000 (and thus have had limited exposure to the risk of divorce) leaves a sample of 5,740 first marriages. Further elimination of 312 women with missing marital history information (e.g., date of marriage, date of divorce) and 46 women missing information on educational attainment reduces our sample to 5,382 (92% of the total sample of women for whom year of first marriage either fell between 1980 and 1999 or was not ascertained).

Use of listwise deletion implies an assumption that missingness is random with respect to marriage cohort, educational attainment, and divorce experience. Simple tabulations suggest that this assumption is not warranted. Women who report having divorced are much more likely than those in their first marriage to be excluded as a result of missing data on the timing of marriage and/or divorce and this relationship is stronger for women with a high school education or less, relative to their more educated counterparts. To assess the sensitivity of our results to violation of the assumption that data are missing at random, we imputed values of missing marriage and divorce dates using median values of age at marriage and duration to divorce and widowhood.[3] More specifically, we first imputed missing data on the century month of first marriage by adding observed birth cohort- and education-specific median ages at first marriage (in months) to observed century month of birth. We then imputed missing data on duration to divorce by using observed marriage cohort- and education-specific median durations to divorce. To provide a bound for our estimates, we also made the extreme assumption that all of the 106 currently married respondents with missing information on marital history experienced divorce.

To examine educational differences in divorce, and changes therein, we estimated two sets of proportional hazard models for divorce. We first estimated a model that included educational attainment and marriage cohort and then proceeded to allow educational differences to vary by marriage cohort. We estimated both models for the subset of respondents with no missing data and the full sample with missing data on marital history imputed. We defined marriage cohort by splitting the sample into those who married in the 1980s (44% of total) and those who married in the 1990s (56% of total). Educational attainment is a four-category measure: junior high school, high school, junior college or vocational school, and university. Because the longest exposure to the risk of divorce in the second cohort is 15 years, we censored intact marriages in the first cohort at a duration of 180 months. Because the second cohort is comprised of marriages with lower average exposure to the risk of divorce, we also estimated models using data in which intact marriages were censored at shorter intervals (e.g., 10 years), but doing so did not substantively alter our results.

3.2 Japanese Panel Survey of Consumers

---

[2] We also excluded 103 unmarried respondents who did not answer the question about previous marriage experience.

[3] This procedure resulted in 12 imputed marriage years outside of the period 1980-1999. The sample size for the imputed data is thus 5,662 rather than 5,674.

The JPSC is an ongoing annual survey of a nationally representative sample of women conducted by the Institute for Research on Household Economics. The original sample was stratified by marital status, with 1,002 married women and 498 unmarried women between the ages of 24 and 34 surveyed in the first wave in 1993. A second cohort consisting of 201 married and 299 unmarried women was added in wave 5 (1997) and a third cohort consisting of 351 married and 485 unmarried women was added in wave 11 (2003). The response rate at the first interview in 1993 was low (41%), but characteristics of the resulting baseline sample closely resemble national data and retention across subsequent waves has been about 95% (Higuchi, Iwata, and Nagai 1999).

Our analytic subsample is comprised of person-year records for women in their first marriages, and thus includes those who were married at initial observation in 1993, 1997, or 2003 as well as those who married subsequently.[4] In this sample, 1,928 individual women contributed 14,304 person-years of exposure to the risk of divorce. Most of these women (n=1,529 or 79%) were married at the first observation – wave 1 for the original cohort and waves 5 and 11 for the second and third cohorts, respectively. Marital histories for these women are thus left-truncated but we do know the year of marriage and thus marital duration at initial observation. Marriages of similarly aged women that dissolved prior to the initial survey are left-censored because marital history information was not collected from women who were not married at initial observation.

To evaluate the alternative explanations for educational differences in the risk of divorce summarized above, we used this sample of women in their first marriages to estimate a series of discrete-time hazard models for marital dissolution. Because a significant proportion of women were lost to follow-up during the study and because failure to account for non-random panel attrition may affect estimates for coefficients of interest, we treated loss to follow-up as a competing risk, using the person-year data to estimate multinomial logistic regression models. In the baseline model, we included only educational attainment, a linear measure of marital duration, and a categorical indicator of the presence of children (no children, one child, two or more children). Educational attainment was measured using the same four categories as in the JNFS, but in the analyses presented below we collapsed women in the two highest categories into a single group given small sample size and the similarity of estimated coefficients for women with 2-year and 4-year college degrees.

We then proceeded to incorporate a range of individual and family characteristics that may account for observed educational differences in divorce. To evaluate the role of economic stress, we included measures of family income and husband's employment status. Continuous measures of husbands' and wives' income have been collected at every wave of the survey and we summed these values to construct a measure of total income which we standardized to have a mean of zero and a standard deviation of one. Husband's employment status is a three-category measure distinguishing those in

[4] We limit our analyses to women in their first marriages given the small number of higher-order marriages observed in our sample (n = 35, 2% of all marriages) and evidence that correlates of divorce may differ for first marriages and remarriages (Booth and Edwards 1992). Because women who were married at first observation were not asked about previous marriages, we made the assumption that women living with a child whose age was greater than current marital duration were remarried. This assumption is based on evidence that mothers receive sole custody of children in most divorce cases (Raymo, Iwasawa, and Bumpass 2004) and that premarital births remain very uncommon (National Institute of Population and Social Security Research 2011). This approach obviously precludes identification of remarriages involving women who either did not have children in their first marriage or did not live with children from their first marriage.

regular employment from those who were marginally employed (part-time, contract employees, not working), and those who were self-employed or working in a family business.

To evaluate the role of women's economic independence, we constructed a measure of dependency calculated as husband's income minus wife's income divided by the sum of husband's and wife's income (Sorensen and McLanahan 1987). This measure thus ranges from 1 (total dependency on husband's earnings) to -1 (total dependency on wife's earnings). Women's employment is measured by a dichotomous indicator of regular employment, with all other employment statuses (part-time, contract, self-employed, family worker, not working) coded as zero.

To assess the hypothesized relevance of work-family stress associated with the second shift, we constructed measures of women's time spent on commuting, employment, childcare, and housework on a typical weekday. This information comes from a time use module that has asked women to allocate their time (and their husband's time) across several activities at each wave of the survey.[5] As with income, we standardized this measure of time use to have a mean of zero and standard deviation of one.

Finally, to assess the role of educational differences in the relevance of "face," we included several measures of nonnormative family outcomes, including early marriage (defined as marriage prior to age 22), an approximation of marriage in response to pregnancy (childbirth and marriage in the same year), and indicators of female age hypogamy (wife older than husband) and educational hypogamy (wife more highly educated than husband).[6] To the extent that all of these family behaviors are associated with both lower education and the risk of divorce, we expect them to explain some part of the negative educational gradient in divorce. To assess direct associations between family background and the risk of divorce, we included a categorical measure of respondents' fathers' education. The three categories for this measure are less than high school, high school or vocational school, and university.

A total of 1,598 person-year records (11% of the total sample) had missing information on one or more of the covariates. The prevalence of missing values was highest for respondent's income and husband's income, at 8% and 7%, respectively. To avoid the loss of observations, we used the routine for multivariate imputation via chained equations (ICE) in Stata to impute missing values. Descriptive statistics and coefficient estimates presented below are based on five imputed data sets. Other approaches to dealing with missing data (listwise deletion, mean imputation) produced substantively similar results.

4. Results

4.1 Trends in educational differences

Table 2 summarizes the JNFS data, presenting the proportions divorced within 15 years, by educational attainment and marriage cohort. Figures for the sample with missing dates imputed are presented in the lower panel. The overall proportion divorcing within 15 years increased from .08 for the 1980s marriage cohort to .10 for the 1990s cohort despite the shorter average duration of exposure for the second cohort. The figure of .08 for the 1980-89 cohort is substantially lower than the value

[5] We also considered husbands' participation in childcare and domestic work but this was unrelated to the risk of divorce.

[6] Because respondents were not asked to provide both the month and year of marriage and first childbirth, it is not possible to construct a standard measure of bridal pregnancy or "shotgun marriage" (i.e., first birth within seven months of marriage).

of .17 for the 1985 cohort based on vital statistics data (Raymo, Iwasawa, and Bumpass 2004), reflecting a level underreporting similar to that in the NFRJS01 and JGSS data. In both cohorts, the small group of women who did not complete high school was, by far, the most likely to divorce. Tabulations that include the imputed data (bottom panel) are similar to those in the upper panel, but the levels of divorce are higher (reflecting our assumptions about missing marital histories). This is particularly true in the 1980-89 cohort among women in the lower two educational categories, reflecting the fact that many of the imputed divorces involved less-educated women in the 1980s marriage cohort.

Table 3 presents the results of proportional hazards models for divorce using the JNFS data. Estimates using the sample with no missing data are on the left and those using imputed values for missing data are on the right. These estimates allow for statistical inference regarding tabulations presented in Table 2. As in Table 2, results of these models show that the risk of divorce is inversely related to educational attainment and increased sharply in the more recent marriage cohort. Relative to high school graduates, the risk of divorce is 33% lower for women with a two-year degree and about 50% lower for those with a four-year college degree. The risk of divorce within fifteen years is 74% higher in the 1990s marriage cohort than in the 1980s cohort.

The estimates of primary interest are the hazard ratios associated with the interaction between educational attainment and marriage cohort. These estimated interaction terms are not large, none approach statistical significance, and their inclusion does not improve model fit. In contrast to earlier research (Ono 2009; Raymo, Iwasawa, and Bumpass 2004), we thus find no evidence that the negative educational gradient in divorce has increased, at least when comparing marriages that took place in the 1980s and 1990s. Conclusions are unchanged when we use the imputed data. Hazard ratios for different levels of educational attainment (relative to high school graduates) are similar in the two sets of models and the cohort increase is smaller (reflecting the relatively high prevalence of imputed divorces in the first cohort).

4.2 Correlates of divorce

Table 4 presents descriptive statistics for the JPSC sample (averaged across the five imputed data sets). We present figures for the full sample of person-years (column 1) and for each of the three educational categories (columns 2-4). Looking first at the outcome variable – marital status at wave t+1 conditional on being in one's first marriage at wave t – we see that divorce occurred in 1% of person-years of exposure and that 4% of respondents were lost to follow-up, on average. The annual probability of divorce is much higher for women in the lowest educational group (.03) than in the other two groups (.01). Although women who do not finish high school are an increasingly small and selective group in Japan, they do comprise 6% of our analytical sample. Clear educational differences exist in most of the variables, with education inversely related to the number of children and positively related to couple's income, husband's regular employment, and women's time spent commuting, working, and engaged in childcare and housework. Contrary to our speculation that highly educated women may be more economically dependent, education is inversely related to income dependence and positively related to regular employment in this sample, perhaps reflecting recent changes in the nature of married women's employment in Japan (Raymo and Lim 2011). As expected, early marriage and bridal pregnancy are much more common among women at the lower end of the educational spectrum, but age hypogamy is unrelated to women's education and educational hypogamy is much more common in the highest educational group (reflecting both ceiling effects and the fact that many women with a two-year degree marry high school graduates). Finally, it is clear that father's education is strongly associated with daughter's education.

Tables 5a and 5b present results for the five models described above. As in our analyses of the JNFS data, the baseline model shows a strong negative educational gradient in divorce. In fact, the odds ratios for the different educational categories in Table 5a are remarkably similar to those presented in Table 3, with the odds of divorce relative to high school graduates three times higher among junior high school graduates and roughly half as large among women with a tertiary education. We also see that women with two or more children are significantly less likely to divorce than their counterparts with no children. Importantly, Table 5b shows that there are no significant educational differences in the risk of panel attrition, and estimated educational differences in the risk of divorce in these models are nearly identical to those in models that do not treat loss to follow-up as a competing risk (not shown).

Results for Model 2 show that, consistent with expectations, lower income and husband's marginal employment are both strongly associated with an elevated risk of divorce. Relative to couples with the mean level of income, the odds of divorce are 41% higher for those whose income falls one standard deviation below the mean (i.e., 1.00/0.71 = 1.41). Similarly, women whose husbands are employed part-time, in contract work, or not working have odds of divorce that are nearly three times larger than those with husbands in regular employment. Controlling for these measures of economic stress reduces the estimated educational differences in divorce somewhat, but the negative educational gradient remains pronounced and statistically significant.

In Model 3, the relationship between divorce and the measure of women's economic independence is consistent with expectations. The odds of divorce for women whose income is equal to their husbands are over twice as likely to divorce as those who are completely dependent on husband's income (i.e., 1.00/0.45 = 2.22). Similarly, women who are in regular employment appear to have a higher risk of divorce than those who are not, but this difference is not statistically different from zero. However, as noted above, higher education is associated with greater economic independence in this sample, and inclusion of these indicators of women's economic (in)dependence does little to alter the estimated educational differences in divorce.

Model 4 provides no evidence to support the "second shift" hypothesis, as women's total work hours are unrelated to the risk of divorce. The results of Model 5 are interesting and partially inconsistent with the hypotheses developed above. Consistent with expectations, non-normative family behaviors are strongly associated with divorce. The odds of divorce are roughly twice as large for women who married a man younger than themselves, married in response to pregnancy, and married before age 22. However, contrary to the "face" hypothesis elaborated above, fathers' education is positively related to the risk of daughters' divorce. Relative to those whose fathers did not complete high school, the odds of divorce are 49% higher for women whose father completed high school or vocational school and 83% higher for those whose father graduated from university. Presumably, parental economic resources and access to housing and other forms of financial support following divorce are more important than "face" in predicting divorce (unless, of course, loss of face associated with divorce is more important for lower SES families). Higher paternal education offsets the marriage destabilizing behaviors concentrated among women with lower education so that the educational differences in divorce in this final model are similar to those observed in the previous models. Thus, none of our posited explanations accounts for the pronounced negative educational gradient in divorce in Japan.

5. Discussion

Our goal in this paper was to provide the first comprehensive analysis of educational differences in divorce in Japan. To this end, we used data from a large survey with retrospective marital history in-

formation to estimate educational differences in divorce and their change across two marriage cohorts and data from an ongoing panel survey to examine individual and family factors that may account for observed educational differences in divorce.

In the first set of analyses, we found a strong negative educational gradient in the risk of divorce, with women who completed a two-year or four-year college degree 30-50% less likely than high school graduates to divorce within the first 15 years of marriage. The small group of women who did not complete high school also had a far higher likelihood of divorce than any other group. In these analyses, we found no evidence that the negative educational gradient in divorce has grown over time. Our results thus provide no support for the one scenario in which we expected a stronger negative gradient in the second cohort (economic stress) or for the three scenarios in which we expected the negative educational gradient to weaken over time (women's independence, work-family stress, and face).

Our second set of analyses confirmed the strong negative educational gradient in divorce, with estimated educational differences very similar to those found in our analyses of the JNFS data. We also found that, with two exceptions, the posited correlates were related to the risk of divorce in expected ways. The exceptions were women's total time spent on work, commuting, childcare, and housework, which was unrelated to the risk of divorce, and father's education, which was positively related to the risk of divorce. Contrary to our expectations, however, inclusion of these variables did little to explain the large estimated educational differences in the risk of divorce. Indeed, the only result consistent with our hypotheses was evidence that the negative educational gradient was partially explained by lower combined income and husband's marginal employment among women with lower levels of education. The concentration of early marriage and bridal pregnancy (included in Model 5) also explained a small part of the high relative likelihood of divorce among the least educated women.

The theoretical puzzle motivating our analyses thus remains unsolved. The relative insensitivity of the educational gradient to control for posited mediators suggests three possibilities. The first is that we have not adequately measured the key concepts of economic hardship, wives' economic dependence, work-family stress, and the role of "face." However, most of the measures used in our analyses are standard and straightforward, thus suggesting that incorporation of additional measures of the same concepts would presumably not alter our results. It is possible that there are other dimensions of "face" or reputation that we have not measured. Examples might include the role of family, friends, and coworkers in bringing couples together or the importance of family stability for husband's reputation at work. If couples introduced by family, friends, or work colleagues are less likely to divorce, and if such pairings are more common among the highly educated (or more stable among the highly educated), we would expect a negative relationship between education and divorce. Similarly, if stable marriage is relevant for men's promotion prospects (or successful social interactions more generally), higher opportunity costs of divorce may contribute to the observed negative educational gradient. Unfortunately, the data needed to evaluate these hypotheses do not exist.

A second possibility is that our data are problematic, with divorces among highly-educated women underrepresented. Although both surveys produce predicted levels of divorce that are lower than those based on vital statistics data, the estimated educational differences in the two surveys are nearly identical. This similarity reduces our concerns about data quality somewhat.

The third, and most interesting, possibility is that the four explanations we have offered are indeed largely irrelevant and some other form of contextual modification to standard theorization is required to understand the strong negative relationship between educational attainment and divorce in Japan. Possible examples might include patterns of selection into marriage or the central importance of in-

vestment in children's educational success in Japan's highly competitive educational system. Evidence that highly-educated women are less likely to ever marry (e.g., Raymo 2003) suggests the possibility that those who do marry may be more selective than their less educated counterparts with respect to effort invested in the spouse search process, marital commitment, or other unobservable factors associated with marital stability. Alternatively, the observed negative educational gradient may reflect stronger commitment to, and familial investment in, children's educational success among more highly-educated women (and their husbands) in a context where private expenditures on education are large, competition for entrance into more prestigious schools is fierce, and educational success is a powerful predictor of life outcomes.

Subsequent efforts to understand the theoretically unexpected relationship between educational attainment and divorce in Japan should seek to employ richer data (that cover a longer period of historical time and do not suffer from the same degree of underrepresentation of divorce that characterizes the JNFS and JPSC). Another potentially useful strategy is the evaluation of similar questions in societies like Japan where divorce has increased rapidly while the social and economic costs remain substantial. Interestingly, Park and Raymo (2009) find evidence of a strong negative educational gradient in divorce in Korea, another setting where such a relationship is not predicted by standard theoretical frameworks. Better understanding the conditions that contribute to a concentration of divorce at the lower end of the socioeconomic spectrum despite limited reduction in its social and economic costs has potentially important implications for the evaluation of linkages between family change and processes of stratification in other countries in Asia (and elsewhere) where divorce is currently uncommon but family change is occurring rapidly.

References

Abe, A. 2008. *Children's Poverty: A Study of Inequality in Japan.* Tokyo: Iwanami Shoten. (in Japanese)

Abe, A. and Ōishi, A. 2005. "Social Security and the Economic Circumstances of Single-Mother Families." Pp. 143-161 in *Social Security for Households with Children*, edited by National Institute of Population and Social Security Research. Tokyo: Tokyo Daigaku Shuppankai.

Andersson, G. and Philipov, D. 2001. "Life-Table Representations of Family Dynamics in 16 FFS Countries." MPIDR Working Paper Series WP 2001-024, Max Planck Institute for Demographic Research, Rostock, Germany.

Atoh, M. 2001. "Very Low Fertility in Japan and Value Change Hypotheses." *Review of Population and Social Security Policy* 10:1-21.

Becker, G. S. 1991. *A Treatise on the Family.* Cambridge, MA: Harvard University Press.

Beppu, M. 2002. "An Analysis of the Marriage Life Cycle in Japan using Multistate Life Tables: 1930, 1955, 1975, and 1995." *Journal of Population Studies* 30:23-40. (in Japanese)

Beppu, M. 2006. "Multistate Life Table Analysis of Marriage and Divorce: 1955-2000." Pp. 43-65 in Demographic Research on Divorce and Remarriage in the Context of Low Fertility, vol. 1, edited by National Institute of Population and Social Security Research. Tokyo: National Institute of Population and Social Security Research. (in Japanese)

Bianchi, S. M., Robinson, J. P., and Milkie, M. A. 2006. *Changing Rhythms of American Family Life.* New York: Russell Sage Foundation.

Booth, A. and Edwards, J. N. 1992. "Starting Over: Why Remarriages are More Unstable." *Journal of Family Issues* 13:179-194.

Bumpass, L. L. and M. K. Choe. 2004. "Attitudes Relating to Marriage and Family Life." Pp. 19-38 in *Marriage, Work, and Family Life in Comparative Perspective: Japan, South Korea, and the United States*, edited by N. O. Tsuya and L. L. Bumpass. Honolulu, HI: East-West Center.

Bumpass, L., and Raley, K. 2007. "Measuring Separation and Divorce." Pp. 125-143 in *Handbook of Measurement Issues in Family Research*, edited by S. L. Hofferth and L. M. Casper. Mahwah, NJ: Lawrence Erlbaum Associates.

Choe, M. K., L. L. Bumpass, and N. O. Tsuya. 2004. "Employment." Pp. 95-113 in *Marriage, Work, and Family Life in Comparative Perspective: Japan, South Korea, and the United States*, edited by N. O. Tsuya and L. L. Bumpass. Honolulu, HI: East-West Center.

Dalla Zuanna, G., M. Atoh, M. Castiglioni, and K. Kojima. 1998. "Late Marriage Among Young People: The Case of Italy and Japan." *Genus* 54:187-232.

Ezawa, A. and C. Fujiwara. 2005. "Lone Mothers and Welfare-to-Work Policies in Japan and the United States: Towards an Alternative Perspective." *Journal of Sociology and Social Welfare* 32:41-63.

Fuess, H. 2004. *Divorce in Japan: Family, Gender, and the State 1600-2000*. Stanford, CA: Stanford University Press.

Goode, W. J. 1963. *World Revolution and Family Patterns*. New York: Free Press.

Goode, W. J. 1966. "Marital Satisfaction and Instability: A Cross-Cultural Class Analysis of Divorce Rates." Pp. 377-387 in *Class, Status, and Power: Social Stratification in Comparative Perspective*, edited by R. Bendix and S. M. Lipset. New York: The Free Press.

Goode, W. J. 1993. *World Changes in Divorce Patterns*. New Haven, CT: Yale University Press.

Hara, J. and Seiyama, K. 2005. *Inequality amid Affluence: Social Stratification in Japan*. Melbourne, Australia: Trans Pacific Press.

Härkönen, J. and Dronkers, J. 2006. "Stability and Change in the Educational Gradient of Divorce. A Comparison of Seventeen Countries." *European Sociological Review* 22:501-517.

Higuchi, Y., Iwata, M., Nagai, A., 1999. Objectives and Summary. Pp. 1–23 in *Contemporary Women Seen through Panel Data,* edited by Y. Higuchi and M. Iwata. Tōyō Keizai Shimpōsha, Tokyo. (in Japanese).

Ikenoue, M. and Takahashi, S. 1994. "Multistate Marriage Lifetables." *Journal of Population Problems* 50:73-96. (in Japanese)

Ishikawa, A. 2006. "Trends in Marriage and Divorce: Analysis of Divorce by Marriage Cohort." Pp. 15-42 in *Demographic Research on Divorce and Remarriage in the Context of Low Fertility*, vol. 1, edited by National Institute of Population and Social Security Research. Tokyo: National Institute of Population and Social Security Research. (in Japanese)

Kaneko, T. and Shiraishi, N. 1998. "Marriage Lifetables: 1990, 1995." *Journal of Population Problems* 54:36-45. (in Japanese)

Katō, A. 2005. "Determinants of Divorce: Family Structure, Social Class, and Economic Growth." Pp. 77-90 in *Cohort Comparison Analysis of Family Change in Postwar Japan*, edited by Japan Society for Family Sociology. Tokyo: Japan Society for Family Sociology. (in Japanese)

Kosugi, R. 2004. "The Transition from School to Work in Japan: Understanding the Increase in Freeter and Jobless Youth." *Japan Labor Review* 1:52-67.

Lebra, T. S. 1976. *Japanese Patterns of Behavior*. Honolulu, HI: University of Hawaii Press.

Lesthaeghe, R. and Surkyn, J. 1988. "Cultural Dynamics and Economic Theories of Fertility Change." *Population and Development Review* 14:1-45.

Martin, S. P. 2006. "Trends in Marital Dissolution by Women's Education in the United States." *Demographic Research* 15:537-560.

Matysiak, A., Styrc, M., and Vignoli, D. 2011. "The Educational Gradient in Marital Disruption: A Meta-analysis of European Longitudinal Research." Working Paper no. 2011/13, University of Florence, Department of Statistics, Florence, Italy.

Nagase, N., 2003. "Standard and Nonstandard Work Arrangements, Pay Differences, and Choice of Work by Japanese Mothers." Pp. 267–300 in *Nonstandard Work in Developed Economies: Caus-*

es and Consequences, edited by S. Houseman and M. Osawa. Upjohn Institute for Employment Research, Kalamazoo, MI,.

Nakane, C. 1970. *Japanese Society*. Berkeley, CA: University of California Press.

National Institute of Population and Social Security Research. 2011. *Latest Demographic Statistics*. Tokyo: National Institute of Population and Social Security Research. (in Japanese)

OECD. (2011). *Doing Better for Families*. OECD: Paris.

Ogawa, N. and Ermisch, J. F. 1994. "Women's Career Development and Divorce Risk in Japan." *Labour* 8:193-219.

Ono, H. 2009. "Husbands' and Wives' Education and Divorce in the United States and Japan, 1946-2000." *Journal of Family History* 34:292-322.

Ono, H. 2006. "Divorce in Japan: Why it Happens, Why it Doesn't." Pp. 221-236 in *Institutional Change in Japan*, edited by M. Blomstrom and S. LaCroix. New York: Routledge.

Park, H. and Raymo, J. 2009. "Divorce in Korea: Trends and Educational Differentials, 1991-2005." Paper presented at the annual meetings of the American Sociological Association, San Francisco (August).

Raley, R. K. and Bumpass, L. 2003. "The Topography of the Divorce Plateau: Levels and Trends in Union Stability in the United States after 1980." *Demographic Research* 8:245-260.

Raymo, J. M. 2003. "Educational attainment and the Transition to First Marriage Among Japanese Women." *Demography* 40:83-103.

Raymo, J. M. 2008. "Educational Differentials in Divorce in Japan: Evidence from Multiple Data Sources." in *Demographic Research on Divorce and Remarriage in the Context of Low Fertility*, vol. 2, edited by National Institute of Population and Social Security Research. Tokyo: National Institute of Population and Social Security Research.

Raymo, J. M., Iwasawa, M., and Bumpass, L. 2004. "Marital Dissolution in Japan: Recent Trends and Patterns." *Demographic Research* 11:395-419.

Raymo, J. M., and Lim, S.-j. 2011. "A New Look at Married Women's Labor Force Transitions in Japan." *Social Science Research* 40:460-472.

Raymo, J. M., Mencarini, L., Iwasawa, M., and Moriizumi, R. 2010. "Intergenerational Proximity and the Fertility Intentions of Married Women." *Asian Population Studies* 6:193-214.

Sorensen, A. and McLanahan, S. 1987. "Married Women's Economic Dependency, 1940-1980." *American Journal of Sociology* 93:659-687.

Tsuya, N. O., Bumpass, L. L., Choe, M. K., and Rindfuss, R. R. 2005. "Is the Gender Division of Labour Changing in Japan?" *Asian Population Studies* 1:47-67.

Waldfogel, J., Higuchi, Y., and Abe, M. 1999. "Family Leave Policies and Women's Retention After Childbirth: Evidence from the United States, Britain, and Japan." *Journal of Population Economics* 12:523-545.

Yodanis, C. 2005. "Divorce Culture and Marital Gender Equality: A Cross-National Study." *Gender & Society* 19:644-659.

Yu, W. 2002. "Jobs for Mothers: Married Women's Labor Force Reentry and Part-Time, Temporary Employment in Japan." *Sociological Forum* 17:493-523.

Zhou, Y. 2008. "Single Mothers today: Increasing Numbers, Employment Rates, and Income." Pp. 26-38 in *Research on Employment Support for Single Mothers*, JILPT Research Report no. 101 (pp. 26-38). Tokyo: Japan Institute Labour Policy and Training. (in Japanese

Table 1: Evidence on educational differences in divorce in Japan

Author (Year)	Data source	Unit of analysis	Findings
Ogawa and Ermisch (1994)	1988 Mainichi Family Survey	Women	No educational differences
Raymo, Iwasawa, and Bumpass (2004)	1980, 1990, 2000 Japanese Censuses	Women	Negative educational gradient in recent years
Katō (2005)	National Family Research Japan 2001	Couples	Husband's education negatively associated with divorce
Raymo (2008)	National Family Research Japan 2001	Women	Negative educational gradient, no evidence of change across marriage cohorts
Raymo (2008)	2000-2003 Japan General Social Surveys	Women	Negative educational gradient, no evidence of change across marriage cohorts
Ono (2009)	2000-2002 Japan General Social Surveys	Couples	Husband's education negatively associated with divorce in recent marriage cohorts

Table 2: Proportion divorced within 15 years of marriage, by marriage cohort and educational attainment (13th Japanese National Fertility Survey)

Education	Marriage cohort = 1980-1989 Did not divorce	Divorced	Total	Marriage cohort = 1990-1999 Did not divorce	Divorced	Total
Junior High School						
n	82	24	106	73	36	109
%	0.77	0.23	1.00	0.67	0.33	1.00
High School						
n	1,055	105	1,160	1,131	152	1,283
%	0.91	0.09	1.00	0.88	0.12	1.00
Junior College/Vocational School						
n	753	46	799	1,086	98	1,184
%	0.94	0.06	1.00	0.92	0.08	1.00
Univer-						
n	272	16	288	426	27	453
%	0.94	0.06	1.00	0.94	0.06	1.00
Total						
n	2,162	191	2,353	2,716	313	3,029
%	0.92	0.08	1.00	0.91	0.10	1.00

Education	Marriage cohort = 1980-1989* Did not divorce	Divorced	Total	Marriage cohort = 1990-1999* Did not divorce	Divorced	Total
Junior High School						
n	83	43	126	77	47	124
%	0.66	0.34	1.00	0.62	0.38	1.00
High School						
n	1,065	173	1,238	1,146	205	1,351
%	0.86	0.14	1.00	0.85	0.15	1.00
Junior College/Vocational School						
n	765	73	838	1,095	127	1,222
%	0.91	0.09	1.00	0.90	0.10	1.00
Univer-						
n	276	21	297	429	37	466
%	0.93	0.07	1.00	0.92	0.08	1.00
Total						
n	2,189	310	2,499	2,747	416	3,163
%	0.88	0.12	1.00	0.87	0.13	1.00

Note: * indicates sample that includes observations with missing data imputed

Table 3: Hazard ratios from Cox regression models for divorce within 10 years of marriage

	Listwise deletion of missing data		Imputation of missing data	
Variable	Model 1	Model 2	Model 1	Model 2
Education				
Junior high school	2.98 **	2.78 **	2.90 **	2.88 **
High school (omitted)	1.00	1.00	1.00	1.00
Junior college/Vocational school	0.67 **	0.62 **	0.65 **	0.61 **
University	0.53 **	0.60 #	0.51 **	0.49 **
Marriage cohort				
1980-89 (omitted)	1.00	1.00	1.00	1.00
1990-99	1.74 **	1.69 **	1.41 **	1.36 **
Interaction				
Junior high school x 1990-99		1.15		1.01
Junior college/Vocational school x 1990-99		1.12		1.13
University x 1990-99		0.83		1.05
N	5,382	5,382	5,662	5,662
df	4	7	4	7
log-likelihood	-4,196	-4,195	-6,084	-6,084

** p< .01, * p<.05, # p<.10

Table 4: Descriptive statistics for the JPSC sample, by educational attainment

Variable	Total	Junior high school	High school	Jr. college/ Voc. school/ University
Status at wave t+1				
Married	0.95	0.92	0.95	0.95
Divorced	0.01	0.03	0.01	0.01
Lost to follow-up	0.04	0.05	0.04	0.04
Education				
Junior high school	0.06	1.00	0.00	0.00
High school	0.63	0.00	1.00	0.00
Jr. college/Vocational School/University	0.31	0.00	0.00	1.00
Marital duration (years)	9.33	10.8	9.62	8.45
(s.d)	(5.2	(5.44	(5.25)	(5.16)
Number of children				
Zero	0.13	0.06	0.11	0.19
One	0.23	0.21	0.20	0.28
Two or more	0.64	0.73	0.69	0.53
Couple income (standardized)	0.00	-0.36	-0.08	0.22
(s.d)	(1.0	(0.87	(0.96)	(1.05)
Husband's employment status				
Regular employee	0.85	0.75	0.83	0.90
Part-time/contract/not working	0.04	0.07	0.04	0.03
Self-employed/family worker	0.11	0.17	0.12	0.07
Income dependency	0.72	0.78	0.72	0.69
(s.d)	(0.3	(0.35	(0.36)	(0.40)
Regular employment[a]	0.19	0.12	0.17	0.23
Total work, commuting, and domestic hours (standardized)	0.00	-0.07	0.00	0.01
(s.d)	(1.0	(1.06	(0.99)	(1.00)
Early marriage[a]	0.09	0.45	0.09	0.01
Bridal pregnancy[a]	0.06	0.16	0.07	0.03
Educational hypogamy[a]	0.16	0.00	0.10	0.32
Age hypogamy[a]	0.14	0.14	0.13	0.15
Father's education				
Less than high school	0.44	0.63	0.51	0.23
High school/vocational school	0.44	0.33	0.42	0.49
University	0.13	0.04	0.05	0.28
N	14,3	832	9,001	4,471

a: 1=yes, 0=no

Table 5a: Odds ratios from competing risks models of divorce (divorce vs. remaining mar-

Variable	Model 1		Model 2		Model 3		Model 4		Model 5	
Education										
Junior high school	3.16	*	2.74	*	2.94	*	2.94	*	2.26	**
High school (omitted)	1.00		1.00		1.00		1.00		1.00	
Jr. college/Vocational /University	0.53	*	0.61	*	0.61	*	0.60	*	0.48	**
Marital duration	1.01		1.01		1.01		1.01		1.02	
Number of children										
Zero (omitted)	1.00		1.00		1.00		1.00		1.00	
One	0.82		0.78		1.03		0.97		0.89	
Two or more	0.49	*	0.47	*	0.62	#	0.57	#	0.47	*
Couple income (standardized)			0.71	*	0.66	*	0.65	*	0.70	**
Husband's employment status										
Regular employee (omitted)			1.00		1.00		1.00		1.00	
Part-time/contract/not working			2.73	*	1.71	#	1.71	#	1.58	
Self-employed/family worker			1.28		1.24		1.23		1.30	
Income dependency					0.45	*	0.46	*	0.48	**
Regular employment[a]					1.46		1.42		1.41	
Total work, commuting, and domestic hours (standardized)							1.08		1.07	
Early marriage[a]									1.82	*
Bridal pregnancy[a]									2.48	**
Educational hypogamy[a]									1.42	
Age hypogamy[a]									1.70	*
Father's education										
Less than high school (omitted)									1.00	
High school/vocational school									1.49	*
University									1.83	*
N	14,304		14,30		14,304		14,30		14,304	
df	10		16		20		22		34	
log-likelihood	-3,341		-3,322		-3,305		-3,304		-3,283	

** p< .01, * p<.05, # p<.10

a: omitted category is "no"

Table 5b: Odds ratios from competing risks models of divorce (panel attrition vs. remaining unmarried)

Variable	Model 1		Model 2		Model 3		Model 4		Model 5	
Education										
Junior high school	1.21		1.25		1.25		1.25		1.10	
High school (omitted)	1.00		1.00		1.00		1.00		1.00	
Jr. college/Vocational /University	0.97		0.93		0.93		0.93		0.91	
Marital duration	0.99		0.99		0.99		0.99		0.98	#
Number of children										
Zero (omitted)	1.00		1.00		1.00		1.00		1.00	
One	0.66	*	0.68	*	0.70	*	0.69	*	0.70	*
Two or more	0.65	*	0.69	*	0.70	*	0.69	*	0.69	*
Couple income (standardized)			1.11	*	1.09	*	1.09	*	1.09	*
Husband's employment status										
Regular employee (omitted)			1.00		1.00		1.00		1.00	
Part-time/contract/not working			1.38	#	1.42	#	1.42	#	1.38	
Self-employed/family worker			1.28		1.24		1.23		1.30	
Income dependency			0.83		0.87		0.87		0.86	
Regular employment[a]					1.38	*	1.38	*	1.35	*
Total work, commuting, and domestic hours (standardized)							1.00		1.01	
Early marriage[a]									1.40	*
Bridal pregnancy[a]									1.09	
Educational hypogamy[a]									0.95	
Age hypogamy[a]									0.83	
Father's education										
Less than high school (omitted)									1.00	
High school/vocational school									0.94	
University									1.25	#
N	14,304		14,30		14,304		14,30		14,304	
df	10		16		20		22		34	
log-likelihood	-3,341		-3,322		-3,305		-3,304		-3,283	

** p< .01, * p<.05, # p<.10

a: omitted category is "no"

Ⅲ. 資 料 編

1 Eurostatの人口推計に関する報告　報告資料(スライド)

Projecting demographic scenarios for European countries

- The Eurostat experience -

Giampaolo LANZIERI
Visiting JSPS Research Fellow

With the support of the JSPS Invitation Fellowship Programs for Research in Japan.
This presentation is given to inform interested parties about research work and to encourage discussion. The views expressed are exclusively those of the author and do not necessarily represent the views of the European Commission / Eurostat.

Contents

- Little introduction to Eurostat and why it does projections
- Production cycle of the Eurostat population projections
- Main assumptions and technicalities of the latest exercise (Europop2010)
- Outcomes in comparisons with Japan
- The way forwards

What is Eurostat?

- Eurostat is…
  - …the Statistical Office of the European Union, first established in 1952 as a service of the High Authority for Coal and Steel
  - ...now one of the 44 Departments/Services of the European Commission
  - ...the Directorate General whose mission is to provide the European Union with a high-quality statistical information service
  - ...the central institution of the European Statistical System (ESS) - a network of National Statistical Institutes (NSIs) from all EU and EFTA Countries (*statistical law*)

Why Eurostat does projections?

- Population projections are primary input to **economic and budgetary projections**, used for the assessment of the long run sustainability of public finances in the EU (pensions reforms, etc.)
- Eurostat receives a **mandate** from ECOFIN (the Council of Ministers of Economics and Finance of the EU Member States)
- Eurostat projections are therefore the **EU official projections** (but alternatives do exist)

The cycle of population projections in Eurostat

Eurostat projections production

- Focus on EU and EFTA countries (31)
- On annual basis: **nowcasting**
  - short-term forecasts of vital events year T and population on 1 January year T+1 based on the latest observed monthly vital data (*Nowcast* data collection), usually published on 15 December year T
- On 3-year basis: **population projections**
  - Long-term projections at national and regional level (NUTS2) by sex, single year and single age (100+)
  - Acronym: EUROPOP*year* = EUROstat POpulation Projections *year*-based
  - Outsourced during 1980-2002. Internal production from 2003.

The production cycle (1/4)

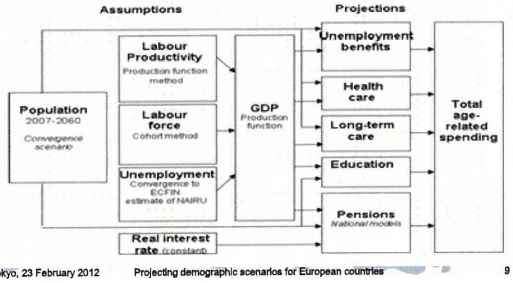
1) Direct mandate from ECOFIN (Council of Ministers of Economics and Finance of the EU Member States)
   - Close cooperation with the EPC Ageing Populations and Sustainability Working Group (national official **economists**) and with the Eurostat Working Group on Population Projections (NSIs **demography experts**)
2) Organisation of Joint Eurostat/UNECE Work Session on Demographic Projections
   - Review of the state of the art in the domain
   - Events: Vienna 2005, Bucharest 2007, Lisbon 2010

The production cycle (2/4)

3) Preparation of the methodology and provisional results
   - In-house activity
   - National level
   - Data from Eurobase (official data) plus – if needed – few adjustments, usually in cooperation with NSI
4) Discussion at the Joint Eurostat WG on "Population Projections" and EPC WG on "Ageing populations and Sustainability"
   - About 70 experts from Member States and EFTA countries
   - In-depth screening of EUROPOP
5) Fine-tuning of EUROPOP
   - Eventual further consultation

The production cycle (3/4)

6) Public release of EUROPOP national level
   - Entry into the process of age-related expenditure projections



The production cycle (4/4)

7) Sensitivity variants upon request from main users (e.g. higher life expectancy, higher migration, etc.)
8) Preliminary calculations of projections at regional level (NUTS2), based on methodology developed by NIDI some time ago
9) Transmission to the NSIs for feedbacks
10) Fine-tuning
11) Public release of EUROPOP regional level

Past exercises

- EUROPOP2004: **Trend** Scenario
  - Baseline + 6 variants: high population, low population, younger age profile population, older age profile population, high fertility and zero migration
  - regional (NUTS2 level) projections (up to 2031)
- EUROPOP2008: **Convergence** Scenario
  - main results and "no migration" variant
  - faster/slower convergence variants (not released)
  - regional (NUTS2 level) projections (up to 2031)
- EUROPOP2010: **Convergence** Scenario
  - main results and "no migration" variant
  - same convergence distributions of Europop2008
  - no regional projections

Assumptions and Technicalities of Europop2010

A varied continent

- Small and big countries: from Liechtenstein (30k inhabitants) to Germany (80,000k)
- Several changes of the borders/territorial coverage (Cyprus, France, Germany, ex-Czechoslovakia, ex-URSS, ex-Yugoslavia)
- Differing data availability and quality

Call for simple and robust method!

The main assumption

The socio-economic differences across European countries (belonging to the EU or EFTA) will fade out in the very long run

Demographic convergence

But:

No full convergence reached within the time horizon of the projections!

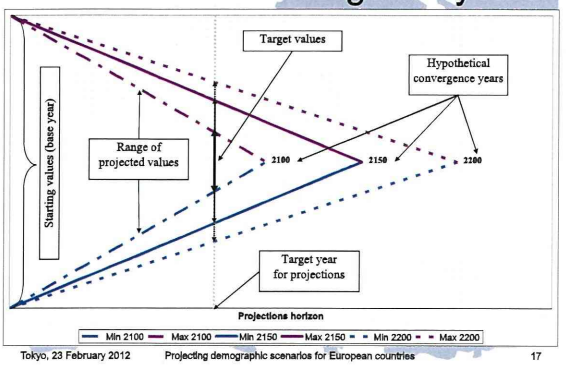
How is this implemented?

- A hypothetical year in which full convergence between countries is achieved is defined (*convergence year*)
- Reference distributions are defined for the convergence year (*convergence values*)
- The values observed in the base year are the *starting values*
- *Intermediate values* are obtained by interpolation between starting and convergence values.
- *Target values* are those intermediate values in the *target year* of the projections.

Cross-countries consistency

- The full convergence is never achieved within the projections horizon (unless it is an explicit assumption), but the range of values is smaller in the target year
- The closer the convergence year, the quicker the convergence (i.e., the smaller the range)
- A change of the convergence year and/or convergence values affects all countries; a change in a starting value only the corresponding country

Ex.: different convergence years



Basic choices

- In both Convergence exercises (Europop2008 and Europop2010) the convergence year has been set in 2150
- The same convergence year has been applied to every component, although in principle they may also be different (slower/faster convergence for some of them)
- Latest target year for population is 2061 => assumptions required until 2060 included

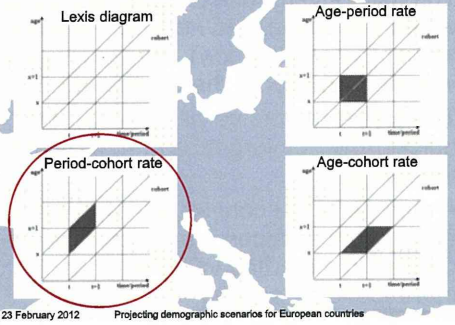
Projections methodology

- Multistate (dynamic) projections
  - no real difference from standard cohort-component method when using only age-sex breakdown
  - but possibility of further breakdowns (e.g. by regions, by national/foreign background,…) and consistency rules
- LIPRO software (Van Imhoff and Keilman 1992)

Data preparation

- Collection of raw official period-cohort data from countries (usually regular Eurostat data collections)
- Modelling of the age-sex patterns of each component for each country
- Computation of assumed future period-cohort rates for each component and country

Occurrence-exposure rates



Fertility

Fertility scenario in summary

- Second Demographic Transition continues in Europe (Sweden more advanced and its TFR=1.85 taken as reference for convergence)
- Fertility is expected to recover for the countries with lower levels
- Countries with rapidly rising fertility will slow down the increase
- Fertility differentials between countries tend to become smaller

Fertility modelling

- Schmertmann model (2003, 2005):