Extended Abstract

A Classic Model in a Low Fertility Context: The Proximate Determinants of Fertility in South Korea and the United States

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John Bongaarts' proximate determinants model of fertility has accounted for over 90 percent of variation in the total fertility rate (TFR) of primarily developing nations and historical populations (Bongaarts and Potter 1983). Recently, dramatically low fertility rates across the globe have raised questions regarding whether this model could be applied to exclusively below-replacement nations. This study follows Knodel, Chamratrithirong, and Debavalya's 1987 analysis of fertility decline in Thailand by conducting in-depth case studies of the proximate determinants in two low fertility countries over time: South Korea, where fertility is well below the level of replacement, and the United States, where fertility has hovered around replacement level for many years.

The Phenomenon of Below-Replacement Fertility

For the latter part of the previous century, the worldwide "population explosion" took center stage. Popular media stories of the baby boom in the countries of the developed world and uncontrolled fertility in many countries of the developing world became constant; statistics of record-breaking population growth fed the public's fears. Policy makers and global activists turned to possible solutions or controls, offering anything they could find to prevent the overburdening of the Earth. Despite these pessimistic overtures, known by some as neo-Malthusianism, in 2004 Ben J. Wattenberg published *Fewer: How the New Demography of Depopulation Will Shape Our Future*, in which he identified *depopulation*, not *overpopulation*, as the new great challenge of the twenty-first century. "Birthrates and fertility rates ultimately yield total population levels," he explained, "*and never have birth and fertility rates fallen so far, so fast, so low, for so long, in so many places, so*

surprisingly" (2004: 5; emphasis his). As of 2009, 75 countries were estimated to have total fertility rates below 2.1, the number known as the "rate of replacement," or the number of babies per woman necessary for a developed, low-mortality society to theoretically replace itself (excluding the influence of migration) (Haub and Kent 2009). Morgan and Taylor estimate that just 3 percent of the current world population lives in countries that have *not* begun fertility decline, noting that "once a fertility transition has begun, it does not stop until birth rates of 2 or below have been achieved" (2006: 378).

The consequences of this new demographic reality cannot be overstated: changes in fertility rates directly affect population levels, which have widespread economic, political, social, psychological and environmental implications that easily extend beyond national boundaries. Additionally, the combination of below-replacement fertility and resultant population aging has generated numerous concerns that have not previously been addressed by nations in any detail. For instance, fewer babies imply a smaller population of future workers to maintain the current economic infrastructure, to generate new ideas and technologies to remain competitive in the global marketplace, and to pay into social security programs. The latter is of utmost concern, and is disproportionately called upon to highlight the potential severity of the impending labor shortages now forecasted for a number of developed countries. Without enough babies to replace the population, the key question is who will support current workers when they reach old age? With millions less people, can these societies continue to function?

Underlying such questions is the reality that "no country has transitioned back to replacement-level fertility (for any five-year period) once falling below it" (Morgan and Taylor 2006: 377). Moreover, there is the nagging knowledge that pro-natalist policies have been consistently deemed ineffective. The failure of countries to raise their fertility rates significantly is mentioned throughout the literature: Huguet comments on how a number of countries have tried to stimulate their fertility levels by instituting programs such as those that focus on making it easier

for women to have children and/or to care for an elderly family member, while at the same time maintaining a career. Yet any resulting increases have been "modest to date, and have not reversed fertility declines" (2003: 108). Similarly, Lutz and Skirbekk describe family policies in Europe that are based on an "equal-opportunity rationale and aim to help women combine childrearing with employment" (2005:705). Despite varied forms and applications, they report that these policies have had little or no effect on period fertility in the countries with lowest fertility. Grant declares that "it will take a massive effort to bring fertility back to replacement level," adding that "industrial nations have had notoriously little success in influencing personal decisions about child-bearing, even where there is some consensus as to desirable family size" (2001: 398).

But why is this? One possibility is that the pro-natalist policies instituted thus far have not effectively targeted the true sources of low fertility in a given country. Fertility rates are affected by a number of distinct and different factors, including sexual behavior and marriage patterns, contraceptive prevalence and use, frequency of induced abortion, and postpartum infecundability. Thus, hypothetically speaking, a country might institute a policy to make day care widely available in an effort to increase the compatibility of having children with having a career. However, it might actually be that a cultural stigma exists against marrying young, resulting in a shorter amount of time during which women can start families, and ultimately a lower number of births across their lifetimes. Such a country might well be more likely to obtain the desired fertility results from a policy addressing that cultural stigma. Making this kind of determination is an area in which much more research remains to be done. If it could be accurately identified *why* a fertility rate is low or ultra-low, it is possible that more effective policies could be put forth.

Concerns such as these call for a more thorough understanding of below-replacement fertility. Because this phenomenon was unprecedented and unexpected by most, it is likely that the standard fertility models applied in the past are no longer as helpful in the examination of below-replacement fertility nations. This is especially likely when both the pace of decline and variation in

the fertility levels across these low fertility nations are taken into consideration (Morgan and Taylor 2006). After all, as Morgan and Taylor explain, "the implications of a TFR of 1.25 are vastly different than those of a TFR of 1.75, as are the potential policy responses to ameliorate the consequences" (2006: 376-377).

Data and Methods

This study seeks to test the proximate determinants model via two main analyses. The first consists of case studies of two of the countries included in Bongaarts' original 1982 investigation—South Korea and the United States. These case studies work to identify how the proximate determinants have changed the course of fertility in these counties over time. Then, in the second analysis, the fertility-inhibiting effect of the proximate determinants is assessed by comparing the quantitative index representing each determinant measured by Bongaarts based on 1960s/1970s data with its corresponding measurement in the 2000s and calculated by myself. For both years, I consider the fertility level that would prevail in the determinant's presence as well as the level that would exist in its absence. Finally, I use each of the indices to calculate the TFR. By comparing the results of Bongaarts' earlier model with my own more recent model, it is possible to assess how the strength of the proximate determinants paradigm varies over time in the two countries. The resulting knowledge could lead to a better understanding of *why* fertility rates are so low, and *why* efforts to raise them have been relatively unsuccessful. If so, it is possible that more effective policies could be recommended. In any case, such an analysis could provide nations with additional information they could use to determine how to adapt to their new demographic reality, which could contribute to making the process of adaptation less complicated.

As mentioned above, each of the two main analyses mimic the style of Knodel, Chamratrithirong, and Debavalya's 1987 study of fertility decline in Thailand. Whereas their study was remarkable for its incorporation of both quantitative and qualitative analyses, I draw solely on

their quantitative investigation. To do so necessitated comprehensive fertility data for each country at two separate points in time. These data were drawn from numerous sources, including the Population Reference Bureau (PRB) *World Population Data Sheets* for 2006, 2007, and 2008; the PRB *2008 Family Planning Worldwide Data Sheet*; the United Nations Population Division *World Marriage Data 2006*; the United Nations *2007 Demographic Yearbook*; and the United Nations *World Contraceptive Use 2007*. Furthermore, calculations for the United States were based upon the National Survey of Family Growth (NSFG) Cycles 1, 2 and 6, as well as the National Vital Statistics System (NVSS). Finally, the case study analysis of South Korea incorporated data from an eclectic collection of sources including the 1974 Korean National Fertility Survey, the 2003 National Fertility and Family Health Survey, the 2005 National Survey on Marriage and Fertility Trends, and an array of data collected and published by the Korean National Statistical Office (KNSO), such as population and household censuses, vital statistics, and more.

It is important to note that whereas Bongaarts' calculations for both South Korea and the United States were based upon data collected for a single year, it was not possible to similarly calculate the more recent indices based on data from the same year. Instead, the input data were collected as close to 2008 as possible, but generally ranging from 2000 to 2008. For this reason, the recent values are designated as measurements from the "2000s." While this is likely to affect the exact extent of the trends represented, it is believed that the direction and general extent of the trends are correct.

Analysis and Results

The quantitative indices developed for the four primary proximate determinants each range from 0 to 1, where 0 represents complete fertility inhibition and 1 represents no fertility-inhibiting effect of a given intermediate variable. Accordingly, it is possible to see how the higher the value for the four determinants overall, the higher the corresponding fertility. However, because the

level of fertility in a population is the result of the combination of all four determinants, the effect of one may overwhelm the effect of another. Table 1 presents the values of the four quantitative indices and other selected measures calculated with the determinants.

Based on the results for the model indices, it is apparent that considerable changes have taken place among the proximate determinants of both South Korea and the United States over the period of the late 1960s/early 1970s and the 2000s. Upon first glance, there is a notable difference between the observed TFRs and the estimated TFRs for the 2000s data that appears more extreme than that resulting from Bongaarts' own estimations. Whereas Bongaarts' estimated TFR for South Korea in 1970 was just 4 percent lower than the observed TFR, my estimated TFR for South Korea in the 2000s of 1.45 was 24 percent higher than the observed TFR, 1.17. Similarly, Bongaarts' estimated TFR for the United States in 1967 was only 3 percent lower than the observed TFR for that same year, while my estimated TFR for the 2000s of 1.66 was about 20 percent lower than the observed TFR of 2.07. In consideration of these differences, it seems reasonable to conclude that the proximate determinants model does not do as well in predicting the total fertility rate of South Korea and the United States in the 2000s as it did back in the late 1960s and early 1970s.

Examining the changes to each determinant individually offers greater insight into the overall difference in fertility over this period of time. This is especially the case in relation to increases or decreases in the inhibiting effect of the determinants on fertility, calculated by subtracting the value of each index from 1.0. In South Korea, the greatest change in percentage points occurred for the index of contraception, revealing that the inhibition due to contraceptive prevalence and effectiveness increased from 23 percent to 80 percent. A second dramatic change, though less so, occurred with the index of postpartum infecundability, which decreased nearly 30 percentage points from 34 percent in 1970 to 5 percent in the 2000s. The change in the index of proportion married or in consensual unions was less pronounced, with its inhibiting effect decreasing about 13 percentage points from 42 percent to 29 percent. Finally, the inhibition due to

Table 1. Estimates of Selected Reproductive Measures and Derived Indices of Four Proximate Determinants According to Bongaarts' Model Over Time: South Korea and the United States

	South Korea		United States	
	1970	**2000s**	**1967**	**2000s**
Measure				
Observed Total Fertility Rate (TFR)	3.97	1.17	2.34	2.07
Total marital fertility rate (TMFR)	6.85	2.03	3.71	3.45
Current contraceptive use (u)	0.24	0.805	0.72	0.729
Total induced abortion rate (TA)	1.5	0.66	1.080	0.17
Lactational infecundability (i)	11.90	2.62	3.0^	3.57
Model Indices				
Index of marriage C_m **= TMFR/TFR**	0.580	0.714	0.631	0.481
Index of contraception C_c **= (1 – 1.08 *u*e)**	0.769	0.197	0.254	0.263
Index of induced abortion C_a **= TFR/{TFR + [.4 * (1 + u) * TA]}**	0.820	0.711	0.999	0.946
Index of lactational infecundability C_i **= 20/(18.5 + i)**	0.658	0.947	0.930^	0.906
Combined Indices $C_m * C_c * C_a * C_i$	0.241	0.095	0.149	0.108
Model Estimate of TFR $C_m * C_c * C_a * C_i *$ **TF**	3.81	1.45	2.27	1.66

^According to Bongaarts and Potter, figure is approximate.
Notes: Total induced abortion rate for South Korea actually based on data from 1999, which was the most recent age-specific abortion data available.
TF = The *Total Fecundity Rate*, or the fertility level that occurs when the combined effect of the remaining intermediate variables is removed, namely fecundability, spontaneous intrauterine mortality, and permanent sterility. Bongaarts estimated this value to be about 15.3 for all women.
e = average use-effectiveness of contraception.
Total induced abortion rate = the number of induced abortions per woman at the end of the reproductive period if induced abortion rates remain at prevailing levels throughout the reproductive period.
Lactational infecundability measured in months.
Sources: 1970 and 1967 data from Bongaarts and Potter 1983

induced abortion increased about 11 percentage points from 18 percent to 29 percent. Based on the direction of these changes, it appears that the rate of contraceptive usage and the prevalence of induced abortion were primarily responsible for the decrease in the TFR over this time period. However, these changes—particularly for the index of marriage—are quite surprising when considered that they occurred counter to the trends witnessed over this period of time. That is,

South Korean women were observed to get married later and in slightly smaller proportions in the 2000s than they did in the 1970s; thus it would seem to hold that the inhibiting effect of marriage would have *increased* over this time. The possible meanings of discrepancies such as this between the results of the case studies and the quantitative analysis are discussed below.

Ultimately, these changes resulted in a differing order of magnitude regarding the extent that each determinant inhibits fertility. In 1970, the proportion married had the strongest inhibiting effect, followed by the average duration of postpartum infecundability, contraceptive usage and effectiveness, and induced abortion. By the 2000s, contraceptive usage and effectiveness had become the strongest inhibitor, followed by induced abortion, the proportion married, and the average duration of postpartum infecundability.

In the United States, change in the inhibiting effects of the individual determinants was less pronounced across the board. The greatest change in percentage points occurred for the index of marriage, revealing that the inhibition due to the proportion married or in consensual unions increased 15 percentage points from 37 percent to 52 percent. The second largest change took place for the index of induced abortion, with the inhibiting effect increasing about 5 percentage points from 0.1 percent to 5 percent. Meanwhile, the inhibiting effects of both postpartum infecundability and contraceptive prevalence and effectiveness remained virtually unchanged, with the inhibiting effect of postpartum infecundability increasing about 2 percentage points from 7 percent in 1967 to 9 percent in the 2000s, and the effect of contraception decreasing very slightly from 75 percent to 74 percent.

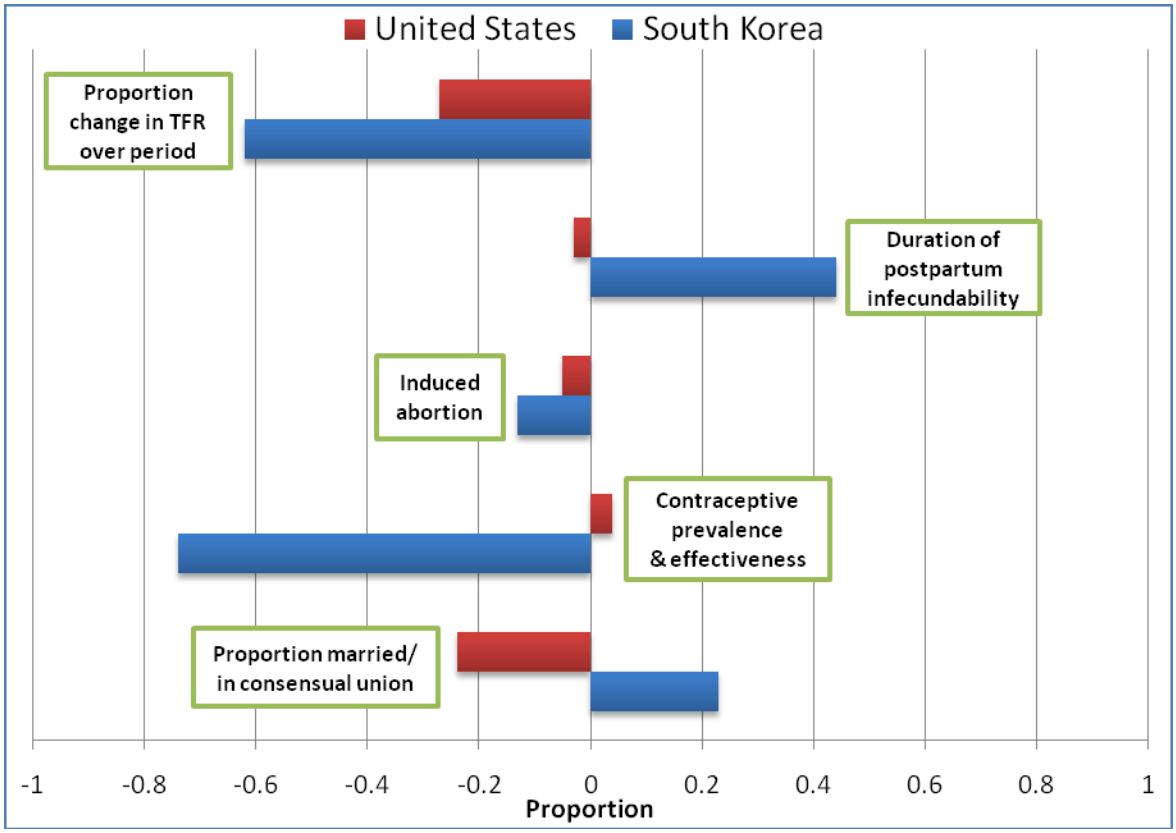
As with South Korea, not all of the trends follow the direction of change suggested by the case study. In particular, the inhibiting effect of contraceptive usage decreased slightly, even though the usage rate, particularly among modern methods, by American women increased between 1960 and the 2000s. However, unlike the case of South Korea, the changes observed over time did not contribute to a different order of magnitude to the extent that each determinant

inhibits fertility. In both 1967 and the 2000s, contraceptive use and effectiveness had the strongest inhibiting effect, followed by the proportion married or in consensual unions, the average duration of postpartum infecundability, and the prevalence of induced abortion.

Another way to interpret the change over time in the proximate determinants is by assessing the proportion of change in the total fertility rate that is due to changes in each determinant. Figure 1 illustrates this concept by representing the proportion change in the determinants between the late 1960s/early 1970s and the 2000s, as well as the overall proportionate change in the TFR over that period. It is useful for seeing both the direction and extent of the proportionate change for each proximate determinant. For South Korea, the TFR underwent a decrease of 62 percent. However, on an individual basis, the change to the index of contraception was greater, decreasing almost 75 percent. Change to the index of postpartum infecundability was second greatest, though in the opposite direction, increasing by about 44 percent. Meanwhile, the indices of marriage and induced abortion underwent slighter changes over time, with the index of marriage increasing by 23 percent and the index of induced abortion decreasing by 13 percent.

It is interesting to note that of the four determinants, two experienced increases while the other two experienced decreases over this same period of time. Because of this, the already significant overall change in the TFR was not as extreme as it otherwise would have been. That is, the inhibiting effects on fertility of the proportion married and the duration of postpartum infecundability decreased, while the inhibiting effects of contraception and abortion increased. It was changes to contraceptive prevalence and effectiveness and the utilization of induced abortion that resulted in the overall TFR declining so precipitously. Yet if the inhibiting effect of marriage had *increased*—indicating that fewer women were entering into consensual unions and thus exposing themselves to the risk of pregnancy (which, as discussed briefly above, is actually what happened)—then the TFR might be even lower than it is. Similarly, if a greater number of women

Figure 1. Proportion of Change in Total Fertility Rate Due to Changes in the Proximate Determinants of Fertility: South Korea, 1970-2000s and the United States, 1967-2000s



had decided to breastfeed their infants, then the duration of postpartum infecundability would have been extended, and the inhibiting effect of this determinant would have been increased. The overall effect would be an even lower TFR than South Korea currently possesses, which is one of the very lowest in the world. Had the above actually occurred, it is likely that South Korea's TFR today would be less than 1.0. On the other hand, had fewer women employed effective methods of contraception or elected to have an induced abortion, the inhibiting effects of these indices would have *decreased*, either slowing down the overall decline in the TFR or even resulting in an increased fertility rate.

For the United States, the percent change in the TFR between 1967 and the 2000s was much less substantial than that experienced by South Korea, decreasing just 27 percent. And unlike the

situation in South Korea, the majority of the effects of the changes in the proximate determinants worked mainly in the same direction, with the indices of marriage, induced abortion, and postpartum infecundability decreasing by 24 percent, 5 percent, and 3 percent respectively, representing an increase in the inhibiting effect of all three. The index of contraception increased slightly by 4 percent. Because three of the four indices changed in the same direction—increasing their inhibiting effect on fertility—it is unlikely that a change to the direction any individual determinant would have had a significant effect on the overall fertility level. However, if one determinant were to have such an effect, it would most likely be the index of marriage. In other words, if women had continued to marry at their 1967 rate, or if a higher proportion of women had either married or stayed married (i.e., fewer divorces), then the index of marriage would have remained higher, while the inhibiting effect of marriage would have been less than it was reported to be for the period around 2000. Overall, this would have slowed down the already-gradual decline in U.S. fertility between 1967 and the 2000s.

Discussion and Conclusion

Whereas it is helpful to analyze changes in the contributions of each proximate determinant over time, it is also possible to identify potential weaknesses to the model with regards to low-fertility application. Essentially, wherever discrepancies arose between trends uncovered in the case studies and the results of the quantitative analysis, it may be interpreted as evidence that the proximate determinants model is possibly in need of respecification for the purposes of analyzing below-replacement fertility nations. Table 2 summarizes the results of the case studies for South Korea and the United States along with the outcomes of the quantitative analysis to pinpoint any discrepancies or "mismatches."

The first mismatch was identified for the marriage determinant. For both South Korea and the United States, women began to marry later and at a decreased rate between the 1960s/70s and

Table 2. Testing the Proximate Determinants of Fertility Model with Results of Case Studies and Quantitative Analysis: South Korea and the United States

Country	Proximate determinant	Trend identified in case study	Change to index implied by case study	Change in index observed from 1960s/70s to 2000s	Mismatch?
South Korea	Marriage	Women are marrying later and at a decreased rate.	Decrease	Increase	Yes
	Postpartum Infecundability	The duration of breastfeeding has undergone a sharp decline.	Increase	Increase	No
	Contraception	There has been a dramatic increase in contraceptive utilization.	Decrease	Decrease	No
	Induced Abortion	The rate and number of induced abortions has declined considerably.	Increase	Decrease	Yes
United States	Marriage	Women are marrying later, at a decreased rate, and with a higher incidence of dissolution.	Decrease	Decrease	No
	Postpartum Infecundability	More women are initiating breastfeeding, with a slight increase in the percentage doing so long enough to have an impact on fertility.	Decrease	Decrease	No
	Contraception	There has been a slight increase in contraceptive utilization, with a more notable increase in the usage of modern methods versus traditional ones.	Decrease	Slight increase; no significant change	Maybe
	Induced Abortion	The rate and number of induced abortions has increased considerably since the data were collected for Bongaarts' analysis, which was prior to the 1973 legalization of abortion.	Increase	Increase	No

the 2000s. This should technically have decreased the index of marriage, since lower values represent that fewer women are married and subsequently exposed to sexual relations and the risk of pregnancy. While this was the case for the United States, the index of marriage *increased* in South Korea, corresponding to a *greater* number of women in such relationships and an ultimately *lower* inhibiting effect on fertility.

It is particularly puzzling that the model would effectively represent one country and not the other; after all, both experienced an increase in the median age at marriage, a higher proportion single by age, and a significant rise in the rate of marital dissolution. The most significant difference between the two nations with respect to marriage behaviors is the attitude toward pre-marital relations, which is virtually sanctioned in the United States but highly condemned in South Korea. Thus, it seems logical to try to tie the inability to accurately represent changes over time in the proportion married in South Korea with this major difference. That is, is there something about the calculation for the index of marriage (see equation in Table 1) which performs more accurately in an environment with significant non-marital fertility than in one with primarily marital fertility? After all, in the case of the United States, there is a lower age-specific proportion married than in Korea after age 24, but with higher age-specific fertility. By employing the equation for the index of marriage, where the age-specific fertility and marriage rates are multiplied, a higher proportion of births are left attributed to the unmarried, and thus not included in this calculation, than in South Korea. Yet it has already been established that that majority of births in South Korea are believed to occur within marriage. Furthermore, even if the index of marriage moved in the appropriate direction for the United States, it does not necessarily follow that the index of marriage is a good determinant of overall fertility in today's day and age. After all, the estimated TFR for the 2000s was 20 percent lower than the observed TFR for the same time frame. This indicates that there is a significant proportion of the TFR left unexplained, and it seems extremely likely that changes in marriage behaviors in the United States would be contributing to this proportion. In reality, these

changes appear to result in the proportion married being a more accurate indicator of the Total Marital Fertility Rate rather than the TFR. In other words, the measure of "marital fertility" is likely no longer capturing the proportion of all births that it once was, since now a significant number of births are occurring outside of marriage, to singles or cohabiting couples. Yet when considering that, even despite this, the data from the case study and quantitative analysis supported each other, it suggests that the model is actually working inefficiently for *both* countries. Regardless, it does not contribute to a possible explanation for why. In this case, the most immediate possible improvement to the proximate determinants model would be to attempt the same kind of quantitative analysis portion, but with a measure of sexual exposure for all women aged 15 to 44, as opposed to just married women—much as Stover (1998) suggested in his analysis of the effectiveness of the proximate determinants model after 20 years. Unfortunately, accurate measures of sexual exposure are not yet commonly collected for most countries.

The second mismatch was identified for the induced abortion determinant. In South Korea, though the rate and number of induced abortions underwent a considerable decline, which should have resulted in an increase in the index of induced abortion: the higher the index, the fewer births that represented as aborted, and the lower the inhibiting effect on fertility. Yet instead, the index underwent a decrease, implying that more abortions are taking place, and the inhibiting effect on fertility has increased. This was a very surprising result, considering that the measurement of this index seemed likely to hold up against change. If the total abortion rate (TA) decreased over time, which it did for both countries, this should decrease the denominator of the equation for the index (see Table 1), thus increasing the quotient, with the larger index ultimately representing the decreased inhibiting effect of induced abortion on fertility. Because this is not what happened, it suggests that either the value for the component representing the number of births averted per each abortion in the equation for the index (0.4 * (1+u); see Table 1), or the relationship between the TFR and the TA have evolved. To address the former possibility, a new mathematical

relationship between contraceptive prevalence and the number of births averted per abortion may need to be developed. In the case of the latter possibility, an index that represents the effect of induced abortion on fertility without relying on a current measure of fertility may be necessary. Whether either can be done is a subject for future research.

Even though the remaining two determinants, postpartum infecundability and contraception, did not exhibit contradictory trends between the case studies and quantitative analysis, it should not be taken for granted that the proximate determinants model is working as it was intended to. For example, in the case of postpartum infecundability, the estimated relationship with the fertility level is contingent upon a number of factors. To establish the value of the index for a population, Bongaarts and Potter identified the length of the birth interval if no breastfeeding or postpartum abstinence are practiced: 20 months, which consists of 1.5 months of minimum postpartum anovulation, 7.5 months of waiting time to conception, 2 months to account for spontaneous intrauterine mortality, and 9 months for a full-term pregnancy (1983: 86). If any of these components have changed over the past several decades—if the waiting time to conception is shorter on average, if women are typically delivering later or earlier on average, etc.—then the calculation of this index necessitates adjustment as well. Consequently, postpartum infecundability may still be an effective determinant of the fertility level, but perhaps not as effective; it may, indeed, be contributing to the portion of the TFR left unexplained. Further, more biologically-based, research could investigate the length of this birth interval for the purposes of revising the calculation of this index.

Then, though the changes in the index of contraception closely mirrored that identified by the case studies, it stands to question how accurate the representation of contraception effectiveness is in the United States. That is, whereas the overall usage of contraception only increased minimally from 0.72 in 1967 to 0.729 in the 2000s, the usage of *modern*—i.e., more effective—methods increased 42.1 percent from 48.2 percent in 1973 to 68.5 percent in 2002. Theoretically, this increase in the utilization of more effective methods should translate into less

contraceptive failure, and an increase in the inhibiting effect on fertility. That is, the index of contraception should have undergone at least a slight decrease, as opposed to the negligible increase it experienced. The fact that a 42.1 percent increase in the usage of modern methods does not resonate in the index of contraception suggests that this is another area that may be contributing to the unexplained portion of the observed TFR. An additional component that should be addressed is the value of 1.08 in the calculation of the index (see Table 1). This value is an adjustment that represents the fact that women who know or believe that they are sterile do not use contraception, causing the practice of contraception to become concentrated among *nonsterile* couples. Essentially, *u* is inflated by this sterility correction factor to take into account this concentration of contraception (Bongaarts and Potter 1983). This constant was estimated directly from data on the proportion of women in a number of countries about 30 years ago who believed that they were nonsterile. Today, the number may be lower due to the higher prevalence of surgical sterility and sterility resulting from sexually transmitted infections and/or HIV/AIDS. In either case, it stands to be reevaluated with more recent data.

Furthermore, even though the index of induced abortion appeared to accurately portray the case of the United States, this may not be the case. The number of abortions in the United States has undergone a considerable overall decline since the 1970s. However, Bongaarts' calculations were based on 1967 data, which was over five years prior to the legalization of abortion in *Roe vs. Wade*. As a result, barring the presence of illegally obtained abortions, the index value of 0.999 seems relatively reasonable at first. If we were to examine a value for this index shortly after 1973, it would certainly be much lower than both the 1967 and 2000s value, meaning that the trend between this period and the 2000s seems to be accurately represented. Yet when the value of the 1967 index of abortion of 0.999 is considered side-by-side with the total induced abortion rate (i.e., the number of induced abortions per woman at the end of the reproductive period if induced abortion rates remain at prevailing levels throughout the reproductive period) of 1.08, it seems

slightly suspect; how could the inhibiting effect of induced abortion on fertility be so minimal, when the hypothetical number of abortions each woman could expect by the end of her reproductive period based on current levels is greater than 1? For this reason, I decided to calculate the index of induced abortion with the equation and data supplied by Bongaarts and Potter (1983). By substituting the 1967 values for the TFR, *u*, and TA into the equation, I was very surprised to produce a value of 0.759 for the index of induced abortion, as opposed to the 0.999 indicated by Bongaarts and Potter. Such a discrepancy could mean a number of things; for instance, Bongaarts and Potter may be operating under certain assumptions that were not made explicit. Perhaps based on the legal status of abortion in 1967, they deemed it unnecessary to account for the illegally obtained abortions in the final index, even though they may have been included within the total induced abortion rate. Regardless of the reason, if this alternate value for the index of abortion was inserted into the model, the trend for the United States would still typically follow that identified by the case study, offering no additional insight into its limited effectiveness in South Korea.

Ultimately, the proximate determinants model does not offer a clean picture of the fertility level in either South Korea or the United States. However, that is not to say that it offers no insight into fertility at all, or that it is no longer a useful tool. On the contrary, the proximate determinants model holds a lot of potential for low fertility application. Improvements in international data collection efforts, specifically in the area of postpartum infecundability, would permit the reproduction of Bongaarts' macro-level analysis for *strictly* below-replacement nations. The results of such an endeavor would better serve the purpose of identifying specific components of the model that could be modified to develop an efficient model of below-replacement fertility.

Morgan and Taylor remind us that "both the current prevalence of low fertility and its persistence are unprecedented" (2006: 377). This means that to address this issue will require considerable time and effort on the part of politicians, government officials, and everyday individuals. Comprehensive research in the area of low fertility can aid in the process of adjustment by providing

additional information with which nations can determine how best to adapt to their new demographic reality. Thus, while many societies of the world certainly face a major challenge on their horizons, they do not face this challenge without tools to aid them, and they do not face it alone. If history is any example, societies will adapt to their below-replacement fertility future and—in some form or another—they will go on.

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