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Descriptive Finding

A decade of TFR declines suggests no relationship between development and sub-replacement fertility rebounds

Hampton Gray Gaddy

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Hampton Gray Gaddy[1]

Abstract

BACKGROUND

Human development is historically associated with fertility declines. However, demographic paradigms disagree about whether that relationship should hold at very high levels of development. Using data through the late 2000s, Myrskylä, Kohler, and Billari (2009, 2011) found that very high national levels of the Human Development Index (HDI) were associated with increasing total fertility rates (TFRs), at least at high levels of gender parity.

OBJECTIVE

This paper seeks to update that finding and to introduce the Human Life Indicator (HLI) as a novel measure of development within this debate.

RESULTS

Among the countries that reached HDI 0.8 before 2010 (n = 40), there is no clear relationship between changes in the HDI and the TFR at HDI > 0.8 through 2018. Conditioning on high levels of gender parity does not change this finding. This negative result is closely tied to the sharp declines in fertility seen in most highly developed countries since 2010 – a median decline of 0.125 in tempo-adjusted TFR through the most recent available year (n = 23). Furthermore, the longer historical coverage of the HLI shows that at all high levels of development, at least one country has exhibited almost every level of TFR between 1.2 and 2.0.

CONCLUSIONS

Fertility declines over the last decade mean that the previous suggestion that very high levels of development and gender equality foster fertility increases is no longer supported on the national level.

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1. Introduction

Paradigms of demographic change disagree as to what fertility regime should occur at very high levels of human development. Classical models of demographic transition expected that birth and death rates would eventually stabilise at approximately equal values. Easterlin's (1973) cyclical fertility model suggested that birth rates would tend to rise and fall in cycles according to the size of parental cohorts and their consequent difficulty in finding employment. The theory of the second demographic transition predicts that ideational change in favour of weak family ties, low fertility intentions, and significant fertility postponement is causing sub-replacement fertility to become deeply entrenched at high levels of development (Lesthaeghe 2010, 2020). On the other hand, theories that view low fertility as the result of adverse economic incentives imply that fertility may rise at very high levels of development – for example, if that development entails an improvement in domestic gender equity and/or a reduction in income inequality (McDonald 2000; Bryant 2007; Balbo, Billari, and Mills 2013; Anderson and Kohler 2015; Lappegård 2020; Lappegård and Kornstad 2020).

The most often cited finding on this topic is that of Myrskylä, Kohler, and Billari (2009). Using data through 2005, they correlate national Human Development Index (HDI) data with national TFR and find that the classical negative relationship between development and fertility switches to a positive one at very high levels of development. Using data through 2007, Luci-Greulich and Thévenon (2014) come to the same conclusion by correlating GDP per capita with TFR.

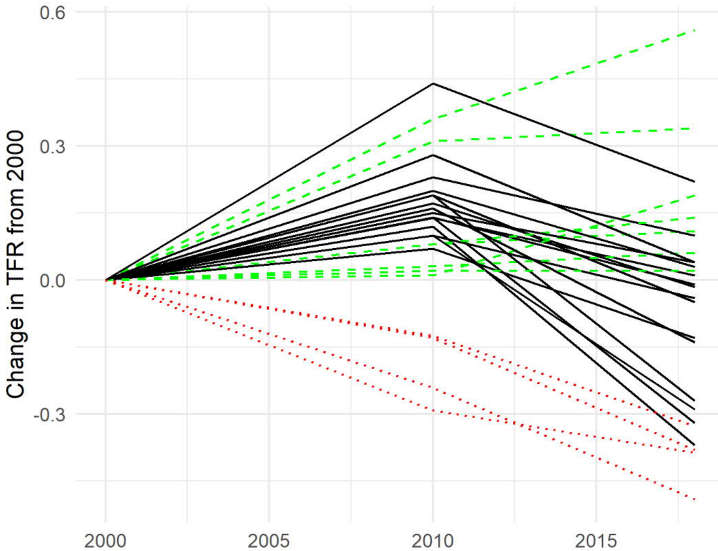
This finding warrants continued testing because of how significant it would be. Long-term population forecasting is notoriously difficult (see Gietel-Basten and Sobotka 2020 for recent discourse in that field). This is especially the case to the extent that migration is a powerful force of demographic change in developed countries (Parr 2020), yet it is fundamentally difficult to forecast, particularly due to factors like political change (e.g., Mirilovic 2010; Wiśniowski, Bijak, and Shang 2014) and climate change (e.g., Gemenne 2011; Hoffmann et al. 2020). However, even the high-growth variant of the UN's 2019 World Population Prospects suggests that the global old age dependency ratio (20–69 versus 70+) will rise from 10% in 2020 to 22% in 2100. The medium- and low-growth variants project long-term ratios of 29% and 40%, respectively. If increased fertility were a persistent feature of highly developed countries, the population ageing and decline that policymakers fear would be less drastic and proceed less quickly – even if fertility never reached replacement.

However, Myrskylä, Kohler, and Billari's (2009) finding has significant detractors. Bongaarts and Sobotka (2012) find that tempo and parity corrections make the period TFR increases that the correlation stemmed from negligible. Lesthaeghe and Permanyer's (2014) regional analysis suggests that the correlation is an example of Simpson's paradox. They find that the more developed regions of northern and western Europe tend to have higher TFRs and the less developed regions of southern and eastern Europe tend to have lower ones, but that there is no correlation, or possibly a negative correlation, between development and fertility within those two geographic groupings. Rindfuss, Choe, and Brauner-Otto's (2016) global analysis also suggests this conclusion on the national level. Furthermore, Harttgen and Vollmer (2014) find that they cannot replicate Myrskylä, Kohler, and Billari's (2009) conclusions when using the new HDI formula that was introduced in 2010. This paper aims to contribute to this important debate. Specifically, it will assess the national relationship between fertility trends, high levels of development, and gender equality using the most recent data, as well as a new measure of development.

The relationship between development and fertility also bears revaluating because of recent changes in both TFR patterns and the conceptualisation of development within social science. Myrskylä, Kohler, and Billari (2009) finished their analysis at a time of rising TFRs throughout the highly developed world – a period that ended with the global financial crisis at the turn of the last decade. And, although earlier literature suggested that the abatement of that crisis would mean the continuation of fertility increases (Bongaarts and Sobotka 2012; Goldstein et al. 2013), there has been a remarkable decline in TFRs in highly developed nations over the last decade.

Figure 1 shows the TFR trajectories between 2000 and 2018 for the 27 countries that reached an HDI of 0.8 by 2000. Although there were notable increases in TFR between 2000 and 2010, there were even more significant declines between 2010 and 2018. Between 2000 and 2010 the TFRs of these countries increased by 0.108 on average (n = 27, 95% CI: 0.045, 0.165). Then those increases more than completely reversed between 2010 and 2018: the average change in TFR was –0.159 (n = 27, 95% CI: –0.224, –0.092). Over the latter period, a 0.01-unit increase in the HDI correlated with a –0.085 change in TFR (n = 27, 95% CI: –0.122, –0.050). Besides Israel, which has an anomalous fertility regime, the only highly developed countries that experienced non-negligible TFR increases (greater than +0.03) between 2010 and 2018 were Czechia (+0.20) and Germany (+0.18). On average, 146% of the gains in fertility between 2000 and 2010 were lost between 2010 and 2018 (95% CI: 81%, 293%). This development suggests that Myrskylä, Kohler, and Billari's (2009) conclusion should be treated with increasing scepticism. It also casts doubt on the 2011 update of their work (Myrskylä, Kohler, and Billari 2011) in which they suggest that the relationship between high development and increasing fertility requires high levels of gender equity: many of the countries plotted in Figure 1 have such levels of gender equity.

Figure 1: TFRs of countries that reached HDI 0.8 by 2000 (n = 27), measured in 2010 and 2018 relative to 2000



Note: black solid line: increases over 2000–2010 and decreases over 2010–2018, n = 16; green dashed line: increases over both periods, n = 7; red dotted line: decreases over both periods, n = 4.

Criticism of the HDI and the view of development that it embodies have also grown in the last decade. A revised formula for the HDI was introduced in 2010 in an attempt to better capture the aspects of human development. It was also introduced because some countries were approaching the maximum HDI of 1 by the late 2000s. By 2009, 12 countries had exceeded the per capita income cap built into the old formula, and so one of the major changes between the old and new formulas was the upward adjustment of that cap (Klugman, Rodríguez, and Choi 2011). The HDI formula may be adjusted again by the end of this decade. The 2019 Human Development Report saw Norway reach an HDI of 0.954, seven countries have already exceeded the current cap on expected years of education, and Japan is expected to exceed the current cap on national life expectancy at birth by up to 3.6 years by 2030 (Kontis et al. 2017). Methodological revisions limit the historical usefulness of the HDI. When the new formula was introduced in 2010, the United Nations Development Programme (UNDP) retrospectively calculated the annual HDI values for all countries back to 1990, but the previous HDI dataset had started at 1975. As I show, revised HDI estimates can also be calculated for the single years of 1980 and 1985. However, this is still not optimal.

Furthermore, the HDI formula has been criticised for failing to adequately conceptualise human development itself. It is derived from estimates of life expectancy at birth, educational attainment, and gross national income (GNI) per capita – three variables that are highly correlated with each other. It has also been criticised for containing implicit, perverse trade-offs between these variables. For example, in 2016, Senegal could have kept its HDI constant by increasing its population's mean education by one year but decreasing its GNI per capita by 23.3% (Ghislandi, Sanderson, and Scherbov 2019). The HDI's use of period life expectancy at birth can be criticised on similar grounds, as period life expectancy can stay constant despite growing lifespan inequality (see van Raalte, Sasson, and Martikainen 2018).

For these reasons, this paper adds consideration of the Human Life Indicator (HLI) as an alternative measure of development (Ghislandi, Sanderson, and Scherbov 2019). Whereas life expectancy at birth is the arithmetic mean of the period life table age-at-death distribution, the HLI is its geometric mean. Therefore, the HLI is closely related to population longevity, but it contains a penalty for populations with high degrees of lifespan inequality. As such, the HLI contains none of the trade-offs, somewhat arbitrary caps, and highly correlated components of the HDI. It can also be easily calculated over long periods of time, given the availability of historical life tables, and it recognises the longstanding observation that the combined length and equality of life is a fundamental measure of population wellbeing (Sen 1998; Edwards and Tuljapurkar 2005; Peltzman 2009).

2. Methods

This paper, first, performs a longitudinal correlation analysis of the relationship between the HDI and the TFR for several subsets of highly developed countries. Next, it considers the relationship between the HLI and the TFR. Finally, it analyses the joint trends in development and gender equality versus TFR. All calculations can be replicated with the provided R Markdown and CSV files.

2.1 HDI–TFR associations

In my first analysis I update the original longitudinal finding of Myrskylä, Kohler, and Billari (2009). That finding is not the most recent or nuanced one in the literature on this topic, but it is still thought-provoking and the most cited one by far, including in recent years. To that end, it is valuable to reassess that original finding in light of the most recent data.

Doing so requires a consideration of the old versus the new HDI formulas. Using the old formula, Myrskylä, Kohler, and Billari (2009) find a positive HDI–TFR relationship above an HDI of 0.86. I find that, for highly developed countries, the new formula usually yields 5–10% lower HDI values than the old formula. This suggests that a positive HDI–TFR relationship could be found beyond approximately HDI 0.8 when using the new HDI formula. Myrskylä, Kohler, and Billari (2011) suggest that the new HDI formula tends to produce a downward revision of roughly 0.05 units, implying a similar threshold of 0.81. Furthermore, HDI 0.8 is the UNDP's own threshold for "very high human development", and I conduct sensitivity analyses that test the usage of other threshold values.

Of the 189 jurisdictions for which the UNDP calculates an annual HDI, 46 reached HDI 0.8 by 2010. I do not analyse the jurisdictions that reached HDI 0.8 between 2011 and 2019, to allow a sufficient duration for longitudinal analysis. I also exclude the six jurisdictions from my sample that reached HDI 0.8 by 2010 but are geographically very small, e.g., Hong Kong and Qatar. I do this to better mirror the methodology of Myrskylä, Kohler, and Billari (2009). I divide the remaining 40 countries into those that reached HDI 0.8 in 2000 or before (n = 27), i.e., the 'original' countries, and those that reached HDI 0.8 between 2001 and 2010 (n = 13), i.e., the 'newcomers'. The original countries include all of the very high development countries that Myrskylä, Kohler, and Billari (2009) highlight in their study, plus Cyprus and Czechia.

In section 3.1 I use a simple longitudinal correlation analysis to determine the associations between the HDI and the TFR. For example, the HDI–TFR association above HDI 0.8 for the United Kingdom is $(TFR_{2018} – TFR_{1992}) / (HDI_{2018} – HDI_{1992})$, as 1992 is the year that the United Kingdom reached HDI 0.8. To find all mean associations and confidence intervals I used nonparametric BCa bootstrapping (Canty and Ripley 2020; Davison and Hinkley 1997). This is an admittedly simplistic way to ascertain the relationship between these two macrosocial variables. However, this crude technique is useful for testing whether there is a clear, long-term association between changes in the HDI and the TFR. Such an association would be needed to avert many of the generally unwanted long-term effects of low fertility.

The main data sets used in this analysis are the World Bank's TFR data (1960–2018) and the UNDP's HDI data (1990–2018). Of the 40 countries in my sample, 9 reached HDI 0.8 before 1990. To examine the long-term HDI–TFR relationship for those countries, I estimate their HDIs for the years 1980 and 1985 using the four component variables of the new HDI formula. I rely on World Bank data for life expectancy, Barro and Lee's (2013) data for mean years of schooling, and UNDP data for gross national income per capita and expected years of schooling. The last of these variables is generally the most difficult to obtain data for: pre-1990 HDI calculations can only be made for the single years of 1980 and 1985 because of the availability of harmonised expected years of schooling data for these two years. I validate my HDI calculations for 1980 and 1985 by using the same composite methodology to calculate HDIs for 1990, 1995, 2000, and 2005. The calculated values for those years are highly accurate when compared to the official (post-2010) UNDP values for those years (see Supplementary Materials for demonstration).

For the four countries that reached HDI 0.8 before 1980, I substitute 1980 as the year they reached HDI 0.8. The HDI values for those countries in 1980 ranged from 0.813 to 0.832. This does not have an impact on my conclusions; I do not claim any borderline results as important. For the seven countries that reached HDI 0.8 between 1980 and 1989, I substitute 1980, 1985, or 1990 as the threshold year, as appropriate. The HDIs in these substitute years were no more than ±0.010 from 0.8.

The original countries and the (actual or assumed) years in which they reached HDI 0.8 are Australia (1980), Austria (1991), Belgium (1990), Canada (1980), Cyprus (2000), Czechia (2000), Denmark (1990), Finland (1993), France (1992), Germany (1990), Greece (2000), Iceland (1990), Ireland (1996), Israel (1991), Italy (1995), Japan (1985), South Korea (1997), Luxembourg (1991), Netherlands (1985), New Zealand (1985), Norway (1980), Slovenia (1997), Spain (1995), Sweden (1985), Switzerland (1980), the United Kingdom (1992), and the United States (1980).

The newcomers and the years in which they reached HDI 0.8 are Argentina (2006), Chile (2007), Croatia (2007), Estonia (2002), Hungary (2005), Latvia (2005), Lithuania (2004), Malta (2002), Poland (2002), Portugal (2005), Saudi Arabia (2009), Slovakia (2006), and the United Arab Emirates (2003).

2.2 HLI–TFR associations

In my second analysis I analyse national trends in the HLI and TFR. Conveniently, the HLI is calculated using just a period life table. For current highly developed countries, the existence of historical life tables means that historical levels of development can be calculated for much longer periods of time via the HLI than via the HDI. Researchers should also take note that, given the existence of regional life tables, the HLI enables sub-national analyses of human development that were only previously achievable given the existence of harmonised HDI component data for sub-national jurisdictions (e.g., Lesthaeghe and Permanyer 2014).

The life tables I use to calculate the HLI were primarily retrieved from the Human Mortality Database (HMD). The HMD contains historical life tables for 33 out of the top 40 jurisdictions in the most recent HDI report, plus data for Chile, Hungary, Croatia, Russia, Belarus, and Bulgaria. I increase coverage of the top 40 jurisdictions with life tables from the Human Life-Table Database (HLD) for Singapore, Malta, and Cyprus. I also extend the available national HLI series for New Zealand from 2013 (the end of HMD data) to 2017 using HLD life tables. The remaining four jurisdictions in the top 40 are Liechtenstein, the United Arab Emirates, Andorra, and Saudi Arabia. I only use female data to calculate the HLI because trends in lifespan inequality tend to be more variable for males than for females (e.g., Gillespie, Trotter, and Tuljapurkar 2014).

I compare HLI trends to TFR trends using visual inspection and longitudinal analysis with nonparametric BCa bootstrapping, as described above.

2.3 The role of gender equality

Myrskylä, Kohler, and Billari (2011) updated their 2009 finding to argue that only countries with very high human development and relatively high levels of gender equality would see fertility decline reversals. In my third analysis I revisit this suggestion.

To do so, I use the same general method as Myrskylä, Kohler, and Billari (2011): comparing the change in period TFR per unit change in the HDI with the World Economic Forum's Global Gender Gap (GGG) index. The GGG is a composite measure of the gender parity in a population with respect to education, politics, health, and the economy. This index has significant coverage issues. It was first calculated in 2006, and data is missing for 2017 for all countries, as well as other years for certain countries. It has also not been calculated for some jurisdictions of interest, namely Hong Kong and Taiwan. However, contemporary coverage is at least sufficient to assess the most recent overall relationship between development, gender equality, and fertility.

3. Results and discussion

3.1 HDI–TFR associations

For the sample of all countries that reached HDI 0.8 before 2010 (n = 40), there is no clear association between increases in the HDI above 0.8 and changes in period TFR. Through 2018, a 0.05-unit increase in the HDI above 0.8 correlates with a –0.032 change in the TFR (95% CI: –0.104, 0.025). As a benchmark, the United States has averaged an 0.05-unit HDI increase every 23 years since it reached HDI 0.8. Australia has done so every 19 years, the United Kingdom every 9 years, and South Korea every 8 years. Since 2010, these rates have slowed to every 44, 32, 25, and 16 years, respectively. This reflects the fact that increases in the HDI become progressively more difficult to attain at higher levels of the HDI.

Out of the total sample of 40 countries, one should arguably remove the four countries that had not yet experienced sub-replacement fertility when they hit HDI 0.8 (Argentina, Israel, Saudi Arabia, and the UAE) and/or the nine countries that were experiencing lowest-low or near lowest-low fertility (TFR < 1.35) when they hit HDI 0.8 (Czechia, Greece, Hungary, Italy, Lithuania, Poland, Slovakia, Slovenia, and Spain). Removing the former is warranted because they had not completed their initial expected transitions from high birth rate to low birth rate regimes when they crossed the given development threshold. Removing the latter is warranted because one would expect their TFRs to increase over time due to decreases in tempo distortion alone and/or the abatement of any related socioeconomic shocks (Goldstein, Sobotka, and Jasilioniene 2009). If the former countries are removed, a 0.05-unit increase in HDI above 0.8 correlates with a 0.003 change in TFR (n = 36, 95% CI: –0.045, 0.053). If the latter countries are removed, the association is –0.092 (n = 31, 95% CI: –0.173, –0.036). If both sets of outliers are removed the association is –0.054 (n = 27, 95% CI: –0.098, –0.010). These associations do not indicate a strong relationship between HDI and TFR at very high levels of development.

There is also no evident long-term association when the original countries and newcomers are examined separately. For the original countries, a 0.05-unit increase in HDI above 0.8 correlates with a –0.025 change in TFR (n = 27, 95% CI: –0.070, 0.024). For the newcomers, the association is –0.046 (n = 13, 95% CI: –0.249, 0.099). If one removes the newcomers that had not yet reached sub-replacement fertility or were experiencing near lowest-low fertility when they reached HDI 0.8, the association is –0.001 (n = 6, 95% CI: –0.148, 0.119). However, the sample sizes for both the newcomers (n = 13) and the newcomers minus the outliers (n = 6) are too small to yield useful correlations.

A crude sensitivity test shows that my results are not an artefact of using HDI 0.8 as a threshold. Using HDI 0.775, 0.825, 0.850, or 0.875 as a threshold also yields only very weak results.

This negative finding is heavily influenced by the significant declines in TFR between 2010 and 2018 (Figure 1). Through 2010, a 0.05-unit increase in the HDI for the original countries was associated with a 0.052 increase in the TFR (n = 27, 95% CI: –0.002, 0.096). Through just 2008 there was even a slightly stronger average effect, due to trends in the HDI (mean = 0.057, 95% CI: 0.001, 0.105). However, the correlation through 2008 still does not suggest the sort of long-term, robust association that might have been hoped for – especially given the very large advancement in development represented by a 0.05-unit increase in HDI above 0.8.

An ultimate explanation of the fertility declines between 2010 and 2018 may lie in the global recession at the start of that period. Persistent economic uncertainty can depress fertility and fertility intentions (Testa and Gietel-Basten 2014; Comolli 2017;

Fahlén and Oláh 2018; Seltzer 2019). If uncertainty has driven the TFR declines over the last decade, this may mean that temporal socioeconomic patterns have a far greater effect on fertility at very high levels of development than continued development does. If so, Easterlin's (1973) cyclical fertility model may warrant revisiting.

Tempo distortion can be ruled out as the source of this trend. Of the 40 countries that reached HDI 0.8 by 2010, the Human Fertility Database (HFD) has tempo-adjusted TFR data between 2010 and at least 2015 for 23 of them. Of these 23 countries, 21 showed tempo-adjusted TFR declines between 2010 and the most recent year of data. The median change in tempo-adjusted TFR over the available period was –0.125, and the population-weighted mean change was –0.191 (n = 23). This is consistent with the fact that birth postponement in developed countries has continued but not accelerated in recent years (Philipov 2017).

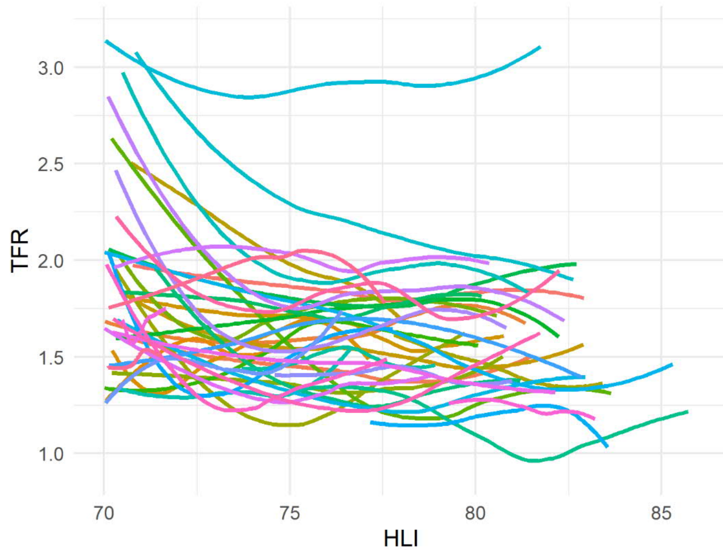
A mere change in the composition of the set of very high-development countries is also not the issue. The newcomers in my sample are all from eastern Europe, southern Europe, Latin America, and the Arab states, and they are consequently more likely to display a stalled gender revolution and consequent economic double burden on prospective mothers. However, I found a negative result for all subsets of highly developed countries in my sample. The ultimate and proximate causes of these declines require specific and extensive study.

3.2 HLI–TFR associations

Using the HLI as a measure of development also yields no clear evidence for sustained fertility rebounds at high levels of development. Figure 2 shows the moderately smoothed HLI–TFR trajectories of the 41 non-overlapping jurisdictions in the HMD, plus trajectories for Singapore, Cyprus, and Malta. I show their trajectories above an HLI of 70. Benchmarks of development are much less established for the HLI than the HDI, but 70 seems to be a lower bound for a high level of development. That level of the HLI was first reached in 1966 by Iceland, Norway, and Sweden, and has more recently been reached by Bulgaria (2003), South Korea (2003), Ukraine (2010), and Russia (2011).

This figure contributes an interesting finding: for almost all levels of the HLI above 70, there has been at least one jurisdiction at that level of the HLI with a TFR at almost every level between 1.2 (i.e., lowest-low fertility) and 2.0 (i.e., near-replacement fertility). This fact immediately suggests that there is no strong relationship between development and fertility at very high levels of development. The longer historical availability of the HLI reveals this in a way that the HDI cannot. Almost all high levels of development have seen at least one major jurisdiction with extremely low fertility and one with what is relatively high fertility for the developed world. This is true even apart from jurisdictions with anomalously high fertility given their level of development, e.g., some of the Nordic countries in the 1970s and Israel today.

Figure 2: HLI–TFR trajectories of the HMD countries, plus Singapore, Cyprus, and Malta (n = 44), truncated at HLI > 70 and smoothed with a loess fit



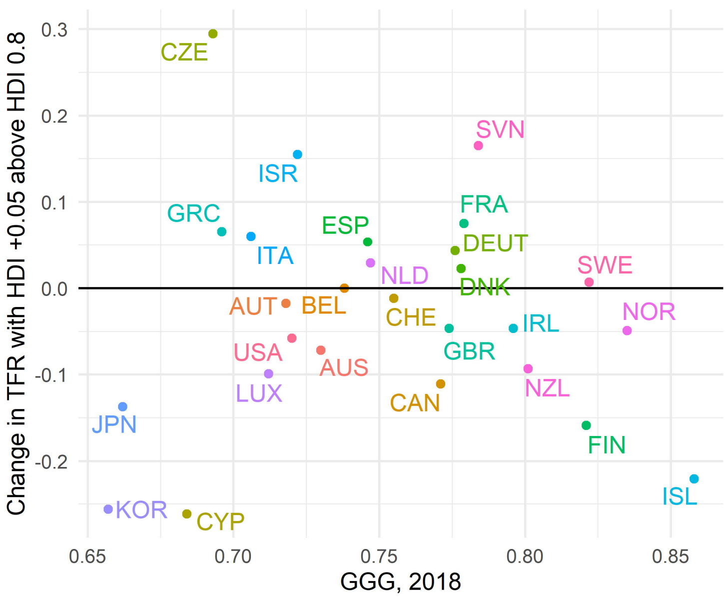
Longitudinal correlation analysis of HLI versus TFR also supports the suggestion that there is no strong relationship between fertility and development at high levels of development. For jurisdictions with at least ten years of available data, a 5-unit increase in HLI above 70 is associated with a mean change in TFR of –0.174 through the most recent available year (n = 41; 95% CI: –0.249, –0.105). Excluding the jurisdictions with TFRs above replacement when they reached HLI 70 brings that association to –0.093 (n = 30; 95% CI: –0.158, –0.026). Meanwhile, a 5-unit increase in HLI above 72.5 or 75 is associated with a mean TFR change of –0.069 (n = 39; 95% CI: –0.142, –0.002) or –0.075 (n = 35; 95% CI: –0.163, 0.011), respectively. Excluding the jurisdictions with TFRs above replacement when they reached that respective HLI brings those associations to –0.015 (n = 32; 95% CI: –0.080, 0.048) and –0.065 (n = 33; 95% CI: –0.148, 0.020), respectively. None of these correlations suggest a strong effect.

3.3 The role of gender equality

Furthermore, the most recent data also does not support Myrskylä, Kohler, and Billari's (2011) revised suggestion that (only) countries with very high levels of human development and gender equality would tend to see fertility decline reversals. As a reviewer of this article pointed out, this is not surprising given the declines in TFR in the Nordic countries over the last decade.

Figure 3 shows the change in period TFR associated with a 0.05-unit increase in the HDI above HDI 0.8 for the original countries versus the GGG for those countries in 2018. This plot shows no clear association between fertility trends and gender equality at high levels of HDI. The association on the y-axis is negative for most highly developed countries, no matter their level of gender parity and development. This directly contradicts Figure 5 in Myrskylä, Kohler, and Billari (2011), which plots the same variables through 2008, albeit using slightly different HDI threshold years. Therefore, the most recent data does not support either of the key findings by Myrskylä, Kohler, and Billari (2009, 2011) on this topic.

Figure 3: GGG in 2018 versus the change in period TFR associated with a 0.05-unit increase in HDI above HDI 0.8, for the original countries (n = 27)



4. Conclusion

Current paradigms of population fertility are somewhat divided between those that suggest that fertility should rise at very high levels of societal advancement (e.g., Anderson and Kohler 2015; Lappegård 2020) and those that do not (e.g., Lesthaeghe 2020). My analysis suggests that there is no strong or clear relationship between high-level increases in development and changes in fertility, nor a similar relationship mediated by levels of gender parity. I have introduced a new perspective to this debate by including the HLI as an informative, complementary measure of development. However, through examining trends in that novel measure and updating the previous analyses by Myrskylä, Kohler, and Billari (2009, 2011), I conclude that the steep sub-replacement fertility declines of the last decade mean that very high levels of human development are no longer associated with fertility rebounds.

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