Economic Stagnation and the Infrastructure of Care

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Abstract This paper argues that a weakening "infrastructure of care" is an important driver of stagnation in the real economy of high-income countries. I first motivate and define the idea of an "infrastructure of care" in both the paid and unpaid sectors that undergirds economic and societal flourishing. I then show how, through the lens of Baumol's cost theory, the past several decades of the expansion of female educational attainment and educational opportunity, quickly increasing wage returns to skill, and slow-changing gender norms of care have led to a leftward shift in the supply of female care labor that importation of care labor and technological innovations have not been able to adequately address. I show how this weakening and undiversified "care infrastructure" in both the paid and unpaid sectors has stagnating effects on various aggregate outcomes and economic sectors. It has been starkly exposed in the 2020 pandemic with the shutdown of schools and its knock-on effect on labor supply. I argue that the current state of "secular stagnation", with excess demand for savings and zero to negative real interest rates is due to structural forces that are related to a fragile infrastructure of care. I discuss how recent right-wing political movements and conservative institutions react to weakening care infrastructure. Lastly, I call for systematic fiscal investment in the "infrastructure of care". I propose policy principles that seek to diversify care responsibilities, particularly those that help relax gender norms about who can effectively supply paid and unpaid care labor.

JEL Codes:

J16 Economics of Gender, Non-labor discrimination

J22 Time Allocation and Labor Supply

J24 Human Capital, Skills, Occupational Choice, Labor Productivity

Keywords: Secular Stagnation, Fertility, Political Economy, Gender

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In a recent article, Fraser (2016), philosopher Nancy Fraser discussed the inherent contradictions in how different varieties of capitalism treated care work. At the end of her article Fraser posed the following challenge:

"…this crisis [of care] will not be resolved by tinkering with social policy. The path to its resolution can only go through deep structural transformation of this social order. What is required, above all, is to overcome financialized capitalism's rapacious subjugation of reproduction to production—but this time without sacrificing either emancipation or social protection. This in turn requires reinventing the production–reproduction distinction and reimagining the gender order. It remains to be seen whether the result will be compatible with capitalism at all… (117)"

Meanwhile, the political economies of Western liberal democracies have been showing signs of instability. Even before the pandemic, advanced economies all over the world had been experiencing a "secular stagnation"[1] with ample evidence of increased political polarization; on the "left", socialist policy, socialist thought, and activism for racial justice have been gaining in popularity; and on the "right", there has been a rise of populist right-wing movements in Europe and the US. The onset of the 2020 pandemic has only exacerbated these trends, with global output in advanced economies projected experienced permanent declines.[2]

This article responds to Fraser's challenge, and to the political and economic crises that been developing before and during the 2020 pandemic, by building the premise, using standard economic reasoning and concepts, that one of the fundamental instabilities of advanced economies, and an important source of the stagnation before, during, and after the 2020 pandemic, revolves around the supply of paid and unpaid care work in an economy.[3]

I argue that an important and growing stagnation for advanced economies is the increasing fragility and declining productivity of a "care infrastructure" that is critical for not only a nation-state's political concerns about social reproduction[4], but also for its economic growth,

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1 Much has been written about secular stagnation and its causes in mainstream venues. Most simply, it is the structural long-term decline in real interest rates to levels below zero that cause a relative shortfall in investment demand and excess demand for savings, leading to underemployment, that cannot be remedied with traditional monetary policy instruments. The reader can refer to http://larrysummers.com/category/secular-stagnation/ for an archive of writings on the subject by Lawrence Summers, who originally proposed the idea in 2013.

2 See IMF and Economic Intelligence Unit economic forecasts.

3 The other fundamental instability revolves around the global climate change caused by pollution from the overuse of various natural resources. While the focus of this article is about care labor, there are many links between the instabilities around care work and the governance and use of natural resources. This is discussed briefly in the "Policy Recommendations" section.

4 Social reproduction includes activities of culture-making, "soft power", community-building, intergenerational cultural transmission. In this article I classify concerns about fertility that are related to cultural transmission are classified as concerns about social reproduction. I discuss further the definition of social reproduction and its relationship to care infrastructure in Section 3.

sustainability, and resilience. I show evidence that it has been weakening, to differing degrees, among advanced economies, and that it is directly contributing to the stagnation of various aggregate economic indicators. I then show how these insights have clear policy implications for high-income, liberal democratic societies that want to uphold both equality of opportunity and sustainable long-term economic growth.

After defining the related concepts of care work, social reproduction, and a care "infrastructure" (or "care sector"), I adapt Baumol's (1967) theory of cost disease to both the paid and unpaid care sector by highlighting an increasingly scarce factor of production in both economic production and social reproduction – female time.

From another perspective, advanced economies that have undergone "structural transformation" have experienced not only a massive reallocation of labor from industry to service, but also a massive reallocation of female time from unpaid work in the household to the paid sector.

This reallocation occurs through the increasing opportunity cost of female non-working time in an economy experiencing skill-biased technical change with increasingly higher returns to uninterrupted experience in many skill-intensive "nonlinear" occupations in which the returns to uninterrupted experience are greatly increasing and nonlinear[5]. Meanwhile, I show that slow-changing gendered norms of care work[6] interact with these rising opportunity costs to produce various cost stagnations, some of which are accounted for in the increasing share of GDP spent on certain sectors, and others of which are manifested in other indicators.

Recent work has demonstrated how unbalanced sectoral growth can still lead to balanced, sustainable aggregate growth through other compensating mechanisms. However, I depart from these perspectives by emphasizing that a stagnating care sector, both paid and unpaid, suffering a cost disease from the double squeeze of increasing opportunity costs of female unpaid female time and slowly changing gendered norms of care work, is also depressing growth and resilience in other sectors. I provide evidence that this "undiversified" female-dominated care infrastructure of nurturing and educating activities (as opposed to the male-dominated care infrastructure of protection activities[7]) has stagnating effects on other parts of the economy that exacerbates the structural forces contributing to the advanced economies "secular stagnation".

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[5] Analogously, the costs to interrupting labor supply in nonlinear occupations is particularly high, which will be discussed in more detail in Section 4.

6 I also refer to this as the work of social reproduction. I describe this concept in more detail later on.

7 I discuss the different types of "care" activities and sectors in Section 3.

With the help of a few economic models, I sketch out counterfactuals that show that stagnating female labor supply depresses aggregate labor supply, wages, aggregate labor income, and fertility in a way that deepens recessions, slows economic recoveries, and contributes to the aggregate shortfall in the demand side of advanced economies, through increased saving, that keeps equilibrium real interest rates zero or negative and drags down economic growth. I also consider how gendered and racialized norms about care sector work distorts the sorting of individuals into industries and occupations away from efficiency, depressing productivity. (I consider unpaid care work at home as another occupation.)

I then show empirical evidence about aggregate cross-country trends in labor supply, education, fertility, and labor supply that points to the importance of publicly funded support for families in mediating and alleviating the very costly trade-offs working females, particularly high-skill working females, face in choosing to allocate time between paid work and child care. I interpret this is as evidence of how diversifying care responsibilities boosts both employment and fertility. Moreover, the 2020 pandemic reveals how an undiversified care infrastructure in the paid or unpaid sector magnifies negative shocks in the care sector, whether it be in the informal or unpaid sector, or through the paid sector.

I argue that there are hidden (invisible) complementarities in production between the "stagnant" care sector and the "progressive" sectors associated with innovation and economic growth and present suggestive evidence of this. I also argue that if these complementarities do exist, growing GDP shares of the care sector, one effect of Baumol's "cost disease", do not necessarily point to inevitably slowing aggregate growth.

A better understanding of the relationship of care infrastructure to economic growth and resilience, in addition to social reproduction, yields some new insights about conservative institutions and right-wing political movements. The educational and economic empowerment of women in the post-WWII, high income world has had an "unintended consequence" of contributing to increasing scarcity and cost of female time, and I argue that the more recent assertions of gender norms of care labor inherent in conservative institutions, religious communities, and right-wing populist movements is a reaction motivated by this development.

But the unintended consequence of conservative institutions enforcing gendered norms of care is that in contexts where economic growth is based on human capital, it undermines the care infrastructure that undermines its own economic stability and growth. When the deeply held social and cultural beliefs that it is best, most efficient, or even required or expected, for females to do the vast majority of care work in the household or in the workplace, do not change as quickly as the structural change in a growing economy, massive inefficiencies and socio-political tensions arise. Countries concerned about social reproduction that want to

restrict immigration are left with fewer policy tools to stimulate demand and find labor for a rapidly aging population.

The 2020 pandemic involved massive shocks to the health and education sector, both of which form an important part of an economy's care infrastructure, that has caused massive output slowdowns in almost every other part of the economy, and it has forced politicians and policymakers in many high-income countries to recognize the fragility of their care infrastructure.

I argue that high-income liberal democracies that want to promote both equality of opportunity and long-term economic growth need to consider different types of policy principles. I thus describe policy objectives for advanced, high-income democracies whose economic growth relies relatively more on human capital relatively more than physical capital, and who want to uphold both individual liberty and long-term economic growth. These policy objectives are focused on promoting more rigorous measurement and research on the productivity of various parts of an economy's care infrastructure, relaxing gendered and other socialized norms of care work to promote more productive sorting into "care" occupations, and allowing more localized, self-organizing governance modes to reflect the notion that care infrastructure is a common pool resource that often suffers from overuse and exploitation.

This paper's goals are several. One is to articulate the care crisis with terms and concepts that are recognizable to mainstream economists. Another is to explicitly venture into considerations of political economy when considering policy implications for the crisis, a territory studiously avoided by mainstream economic research and policymaking. Thus, I hope to not only provide a more technical and analytical framework to the ideas and functioning of care infrastructure in capitalist economies, but also to provide space and terminology for discussion about the concerns for social reproduction (culture-making) that many conservative institutions and groups are interested in enforcing.

I hope to shift policymaking discourse and thinking about the care sector to think of it as infrastructure that suffers from "market" failures due to its widespread properties as common pool resources, and to encourage. A particularly important goal is to help societies re-imagine how their education, health, criminal justice, law enforcement, and military[8] sectors could be transformed if gendered norms about "care work" were relaxed.

The structure of this paper is as follows. In Section 2, I give a brief review of related literature. In Section 3, I introduce and define the concepts of "care" work, social reproduction, and a "care infrastructure". In Section 4, I describe how Baumol's (1967)

8 In Section 3, I describe why I classify the military, judicial system, and law enforcement, as care sectors.

theory of cost disease is useful for understanding the cost stagnations of the "care sector" and how it relates to growth in other economic sectors. In Section 5, I provide empirical evidence about time trends of various aggregate economic measures in different countries that highlights the role of undiversified care infrastructure. In Subsection 5a, I describe models to sketch out counterfactuals that illustrate how these indicators are related to economic stagnation. In Section 6, I describe how conservative institutions and authoritarian states use conservative ideologies to enforce gendered norms of care labor that serve goals of social reproduction and may or may not serve the goals of economic growth. In Section 7, I describe policy principles for high-income societies that are interested in pursuing both equality of opportunity (individual freedom) and long-term, sustainable economic growth. In the last section, I conclude.

Section 2: Related Literature

This paper is in direct conversation with several areas of scholarship.

AS previously mentioned, Fraser (2016) discusses the fundamental contradictions inherent in different forms of capitalism and its relationship to care work. More broadly, there has already been a great deal of academic work in the social sciences discussing ideas the "care crisis", "time poverty", and "work-life" balance, and I leave the reader to consider Fraser (2016) for relevant references.

This paper is also in close conversation with a body of mainstream economics research linking decisions about household formation, fertility, and labor supply to macroeconomic outcomes; a thorough review of this literature can be found in Doepke and Tertilt (2016). This paper also builds on the premise that family economics and macroeconomics are intimately related; specifically, it builds on the recognition that changes in family structure have important repercussions for determining aggregate labor supply and savings.

Household structure, specifically, the prevalence of nuclear vs extended families or monogamous vs polygynous marriage) changes the incentives to supply labor, affects motives for saving and acquiring education, and determines possibilities for risk sharing.[9] Particularly relevant is the literature that families consist of multiple members and that the interaction between these multiple members is important.[10] Specifically, there is a literature that explores how potential conflicts of interests within the family are resolved has repercussions for what families do, including macro-relevant decisions on variables such as savings, education, fertility, and labor supply.

This paper departs from this mainstream literature by recognizing that concerns for both economic production and social production are intimately related, at least implicitly, if not explicitly; it attempts to legitimize the idea that concerns for social reproduction can and should affect a nation-state's economic policy-making.

From a political economy perspective, this paper is in conversation with and complementary to a forthcoming book by political economist Nancy Folbre titled "The Rise and Decline of Patriarchal Systems" (Folbre 2021). This article shares the objectives of Folbre (2021), which is to integrate arguments about identity and intersectionality to political economy so that there is more of a focus on economic structure. Like Folbre (2021), the goal of this article is to help form the basis of policy (and political) discussions that can forge new coalitions and

[9] This is in contrast to typical macroeconomic models ignore the family and instead build on representative agent modeling that abstracts from the presence of multiple family members, who may have conflicting interests, who might make separate decisions, and who may split up and form new households.

[10] This literature examines both horizontal interactions in the family, ie, between husband and wife, and vertical interactions, ie, between parents and children. Family members may have different interests, resources, and abilities.

alliances based on principles of economic opportunity and justice. Folbre (2021) also documents the weakening of capitalist societies' "care infrastructure", and focuses on the forces behind gender inequality, and provides a more thorough overview and history of the "care infrastructure" embedded in various patriarchal institutions.

Section 3. Defining Care Work and Care Infrastructure

In this section, I introduce the concepts of care work, social reproduction and the idea of a care "infrastructure"[11]. I argue that care infrastructure reduces costs for many parts of the economy, and discuss why this care infrastructure can be thought of as a common pool resource, and discuss why it should be measured and analyzed.

I define care labor as all the human labor (as opposed to non-human labor) involved in providing a balance of nurture, challenge and protection that contributes to the expansion of another human's (or group of humans') holistic capacities, including physical, intellectual, social, and emotional flourishing.

Obvious examples are direct care of dependents. A parent caring for an infant or young child through feeding, touch, interaction, and providing protection is an obvious example of care labor. The emotional labor involved in the act of listening and engaging with another human being's emotions or thoughts as an example of care labor, and those who are trained to provide these services professionally are care workers. Specifically, those who professionally engage with another individual's emotions could be called therapists or counselors. Those who engage in the intellectual development of another person, either as a teacher or professor, as engaging in education, which I consider a type of care work, as it develops skills, a type of human capital. A specific set of healthcare workers are also care workers – nurses contribute to the nurture, protection, and development of health/physical capital.

Health care and education are a type of care work, as is work involved in helping other humans remain physically fit. Emotional labor that that is performed for other humans in close and intimate relationships are also a type of care work.

Departing from other definitions, I also classify work involved in the protection of humans, as care work. Thus, I classify the work of military operations, law enforcement work, and judicial systems care work for the community.

The optimal balance of nurture, challenge, and protection, might be different for different people, and imbalances can occur. Too much discipline and challenge could become unproductive abuse, and too much nurture can lead to stagnation. Not enough discipline, challenge, or nurture would be neglect. Military and law enforcement personnel can abuse other humans in an attempt to uphold other concerns for social reproduction.

If caregiving is a balance of encouragement and nurture and healthy challenge, then a teacher challenging a student with specific questions in class, or a mentor challenging her mentee, or

[11] I will also refer to this "care infrastructure" as a "care sector" to facilitate the use of "care infrastructure" in economic analysis.

a physical trainer challenging her client to work out more, are all forms of care work, just as a counselor provides mental health care to her clients also provides a form of care. I note that activities of mentorship, apprenticeship, and training can be thought of as educational and skill-building activities, and are thus forms of care work. College counselors, guidance counselors, professional mentors, academic mentors, are all a type of care worker. Religious leaders and houses of worship are an important part of a society's care infrastructure, often participating in all of the activities described above. Civil society organizations and nonprofits that are performing care work can also be considered part of a "care" sector.

Care labor is a subset of social reproduction, which includes culture-making work that includes community-building, the arts, and "homemaking".

I note that ideas about the inherent value of social reproduction activities that are orthogonal to economic concerns fall outside the boundary of most mainstream economics work, and are usually discussed in political science, political economy, and other fields. While house work and child care have been incorporated in mainstream economics as falling under household production, activities of culture-making and cultural transmission have only been considered in the context of its influence on outcomes of interest, such as female labor supply and fertility (Fogli and Veldkamp 2011; Fernández 2013; Alesina, Giuliano, and Nunn 2013), not as activities of inherent interest.

For the purposes of economic measurement, I define the care sector, and a care "infrastructure", as a sector that is primarily concerned with social reproduction. This are sector, of "infrastructure", consists of various occupations and industries. Unpaid care work is labor, and the homemaker is an unpaid occupation should be included in economic measurement and analysis.

Education and health care sector are services sectors in an economy that can be classified as part of a care infrastructure. In addition, sectors involved with human protection are care sectors. Law enforcement and military personnel defending communities are a type of care personnel, and the military, law enforcement, and justice system, are "care sectors", as justice is a process of care for communities. A state's military and the agencies that preserve "national security" is a part of the care infrastructure that protects financial assets, physical assets, and human capital – human lives and well-being. In that vein, public administration is also a part of the "care sector", as its various functions include access to education, health, justice, and social services.

Within the care sectors, there are subsectors that are more focused on care than the others, and I will argue these subsectors are suffering from more stagnation. Within the education sector, work can be divided into "care" activities, administration, and "research and

development". In tertiary institutions, "care time" could be the contact time between the educators, administrators, and the students. Time spent on organizing programs for students are a type of care work, and faculty and graduate student time spent on research that does not involve training or mentoring activities would not be care work. Mentorship and teaching activities would be considered care work.

Within the healthcare sector, nurses and primary care doctors with more face-to-face time interacting with the patient are performing care work, while the time spent by radiologists looking at charts would not be care work; rather that work would be more accurately classified as technical non-care services. Health educators, administrators, and anyone spending face-to-face time with patients would be performing care work. Surgeons performing 10-minute or 5-hour surgeries are not performing care work; rather their work would be technical non-care work. Physical therapists and aides performing manual labor to help a patient heal are performing care work. Personal trainers spending their time with clients are a form of care work.

Given these definitions of care work, the lack of equal access to justice and economic and political opportunity by subpopulations of people can be thought of as unequal "care" offered to these subpopulations. The lack of mentorship and professional opportunities for females and minorities in majority-ethnicity male fields is form of a "neglect". Worser treatment of minorities and the poor by law enforcement is a form of unequal access to care. With highly unequal access to these types of care, these processes can eventually be considered abuse and neglect.

I argue that this care sector is an "infrastructure" because it lowers costs at a massive scale for other parts of the economy, similar to how a physical transportation infrastructure, or a utilities infrastructure, lowers costs of production for both businesses and households. Transportation infrastructure reduces the costs of trade over larger distances, and reduces time and financial costs for not commuters and visitors. Road infrastructure reduces the costs of trade across regions.

Similarly, "care infrastructure" contributes to productivity by lowering the costs of various localized or idiosyncratic shocks—greater skill, education, and emotional capacities contributes to flexibility and resilience in times of crisis and shock; better health care systems help the rest of economy and society weather health shocks, like a pandemic; better justice and law enforcement systems improve the well-being and productivity of individuals, households and communities.

And, just as physical infrastructure involves large, upfront fixed costs that are directly or indirectly paid for through future cost savings in other parts of the economy, care

infrastructure also involves large, upfront fixed costs that can also be directly or indirectly paid for through cost savings.

However, while physical infrastructure is often debt financed by federal, local, and municipal entities, various other types of "care infrastructure" is financed through other means. I also note that "care infrastructure" is much more labor intensive than physical infrastructure.[12]

I also argue that many aspects of care infrastructure can be thought of as common pool resources which should be governed and managed within a more local social-ecological framework in addition to top-down regulations.

Common pool resources are typically thought of as goods consisting of a natural or human-made resource system, such as fish in a lake, or an irrigation system, whose design makes it impossible to exclude potential beneficiaries from obtaining benefits from its use. Unlike pure public goods, common pool resources face problems of congestion or overuse. It usually consists of a core resources, such as water or fish, which defines the stock variable, while providing a limited quantity of extractable fringe units, which defines the flow variable. The core resource needs to be protected or nurtured in order to allow for its continuous exploitation, and the fringe units can be harvested or consumed.[13]

Just as waters can be overfished due to non-cooperation of fish users, various parts of an economy's care infrastructure are vulnerable to congestion and overuse. Hospital beds can be "over-used" during a pandemic due to non-coordination of potentially infectable humans, and judicial time can be "over-used" due to non-cooperation of potential plaintiffs.

I will argue that various parts of the paid and unpaid care infrastructure in the U.S. and other advanced economies are subject to "resource collapse" because of the conditions that care work and care services fall under. Nobel-prize winning political scientist Elinor Ostrom writes that "the prediction of resource collapse is supported in very large, highly valuable, open-access systems when the resource harvesters are diverse, do not communicate, and fail to develop rules and norms for managing the resource", which I argue applies to the increasingly scarce and valuable resource of female care time, a resource in which the harvesters (firms, families, social networks, social organizations) do not communicate and

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[12] It should also be noted that the ecosystem of funding and building physical infrastructure is particularly male-dominated – male politicians and male bankers approve loans to male-led regional government officials to fund construction of infrastructure that employs primarily males. This may have something to do with why many economies were more likely to label physical infrastructure work as "essential" while various types of care work were not considered essential.

[13] The reader is referred to the work of Elinor Ostrom for in-depth investigations into the governance of common pool resources (Ostrom 2009; 1990).

fail to develop rules and norms for managing a resource that is not thought to have constraints.[14]

Therefore, just as natural ecosystems can be exploited and weakened, so can a care infrastructure. Societies can exploit existing resources, such as forcing care workers to over-burden themselves by underpaying them or overworking them, or both, similar to how energy can be extracted from non-renewable fossil fuels. But as with both consuming fossil fuels and overburdening care workers, this strategy has its dangers, as once these resources have run out, there may be no other resources to provide care or energy at the scale that is needed. The time spent 'caring' for oneself and other people cannot be substituted, and is a very slowly renewable resource, such as varieties of plant life, soil ecosystems, bodies of water, etc. Many police officers are burned out by the overuse of some of their services. [15]

One important difference between common pool resources and "care infrastructure" is that measurement of the availability of typical common pool resources is much easier and more prevalent for natural resources. It is easier to estimate the number of fish or deer in an area rather than the available hours of care labor in a local region.

The current pandemic also highlights this difficulty of measurement, as it is difficult to predict and track the number of available local hospital and clinic resources during a pandemic with unpredictable courses of the disease.

In a later section, I will use this concept of care infrastructure to describe a future research and policy agenda surrounding care work.

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[14] Ostrom, Elinor. "A general framework for analyzing sustainability of social-ecological systems." *Science* 325, no. 5939 (2009): 419-422.

15 However, there are ways to manage this resource collapse. Ostrom also writes, "the dire predictions, however, are not supported under conditions that enable harvesters and local leaders to self-organize effective rules to manage a resource or in rigorous laboratory experiments when subjects can discuss options to avoid overharvesting".

Section 4. Baumol's Cost Theory and the Stagnation of the Care Sector

In this section I adapt Baumol's theory of cost disease to the paid and unpaid care sector to describe to illustrate the particularly strong stagnation of this sector. The key intuition for this model is that the opportunity cost of female care time has risen in response to expanding economic opportunity while the time it takes to care for other humans in the paid and unpaid care sector has remained stagnant. Meanwhile, the time it takes to produce other goods and services has dramatically decreased. I then review recent work demonstrating how unbalanced sectoral growth can still lead to balanced aggregate growth through other compensating mechanisms.

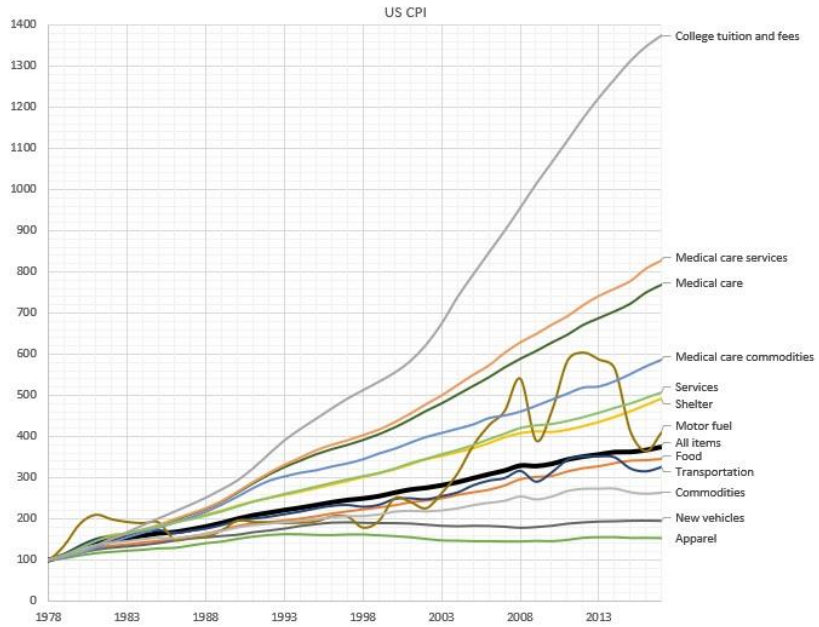
Baumol's (1967) cost disease theory starts from the premise that productivity growth is inherently more difficult to achieve in the production of labor-intensive services, called the "non-progressive" sector, than in the production of goods, labeled the "progressive" sector. With these two sectors competing for factors of production in the same factor markets, the relative cost of producing service output inevitably rises. However, if the demand for services is income inelastic and price elastic, these trends would not pose a problem, as the share of services in nominal GDP (gross domestic product) would decline.

He and other researchers found the opposite to be true, finding that services garner an increasing share of nominal output in the U.S. – the share of U.S. expenditure on health and education had been increasing over the past several decades, consistent with the idea that demand for healthcare and education is income elastic and relatively price inelastic[16]. A prediction is that aggregate productivity growth (equal to the nominal output share weighted-average of sectoral productivity growths) must steadily decline.

To illustrate this, Figure 1 shows how the relative prices of different goods and services has evolved in the U.S. in the past 4 decades; college tuition and medical care prices, part of the "non-progressive" sector, have skyrocketed relative to goods produced in the "progressive" sector.

[16] Higher income leads to increased demand for education and healthcare in terms of both quantity and quality. Increasing quality usually corresponds to higher prices.

Figure 1. Relative Prices of Different Goods and Services in the U.S. since 1978



Source: U.S. Bureau of Labor Statistics, CPI

Meanwhile, Figure 2a shows how health spending, in terms of USD per capita, has been increasing for all of the high-income OECD countries, with the U.S. as a particular outlier. Figure 2b shows health spending as a share of GDP. The fact that health spending[17] has been increasing as these advanced economies grow reflects not only the increasing demand from each country due to their aging population (and increases in income over time), but also the fact that demand for health-care is price-inelastic enough to contribute to the increasing share of GDP. Indeed, it is difficult to think of good substitutes for health care as a whole.

[17] Health spending measures the final consumption of health care goods and services (i.e. current health expenditure) including personal health care (curative care, rehabilitative care, long-term care, ancillary services and medical goods) and collective services (prevention and public health services as well as health administration), but excluding spending on investments. Health care is financed through a mix of financing arrangements including government spending and compulsory health insurance ("Government/compulsory") as well as voluntary health insurance and private funds such as households' out-of-pocket payments, NGOs and private corporations ("Voluntary"). This indicator is presented as a total and by type of financing ("Government/compulsory", "Voluntary", "Out-of-pocket") and is measured as a share of GDP, as a share of total health spending and in USD per capita (using economy-wide PPPs).

Figure 2a. OECD Total Health Spending, US dollars/capita, 1970-2019

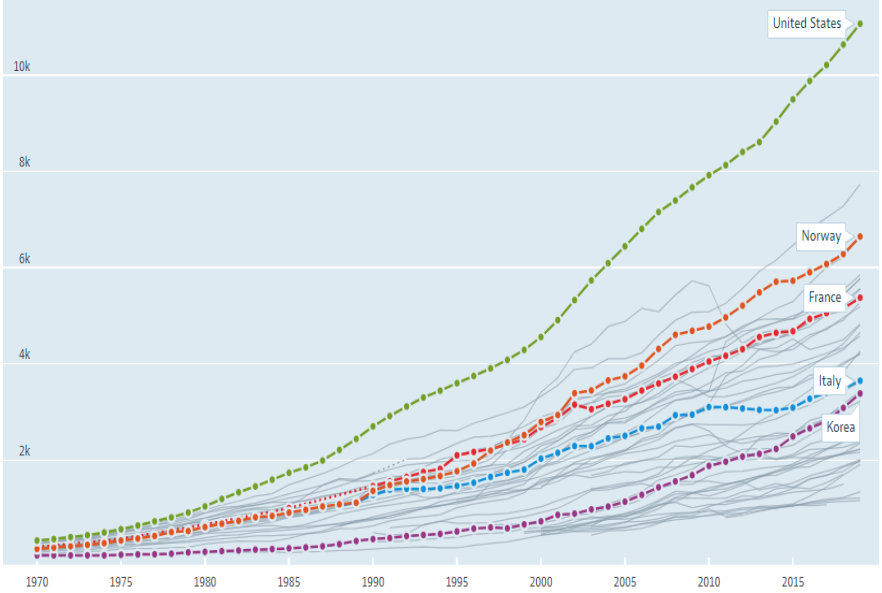
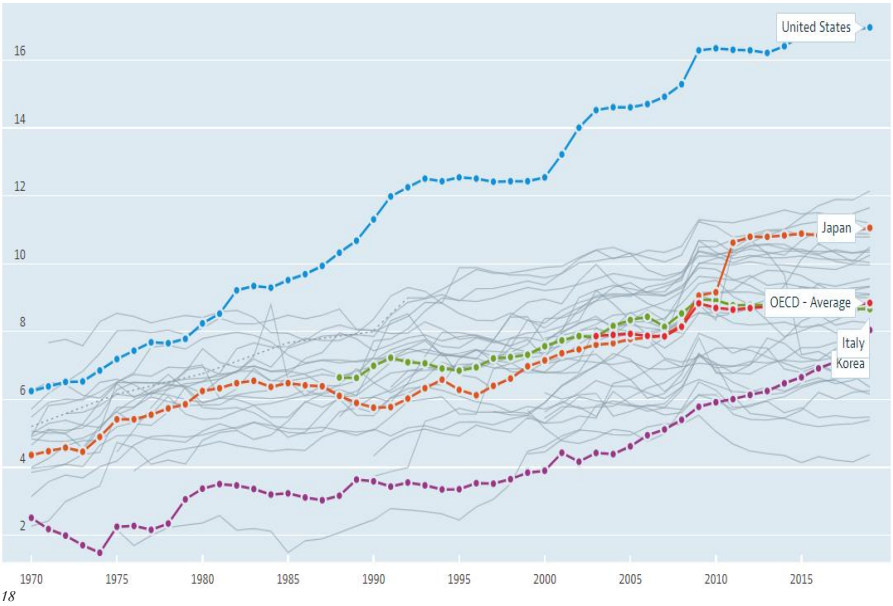


Figure 2b. OECD Total Health Spending, % of GDP (right), 1970-2019



Source: OECD (2020)[18]

The cost disease theory also seems to be affecting education. Appendix Figure A1 and A2 show that education spending per student has also been increasing for all OECD countries at all levels of education, suggesting that demand for education is relatively price-inelastic. Appendix Figure A3 shows that as a share of GDP, it has been remaining relatively stable for all of the countries, likely reflecting the declining student share of the population in these predominantly aging societies.

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[18] *OECD (2020), Health spending (indicator). doi: 10.1787/8643de7e-en (Accessed on 26 December 2020).*

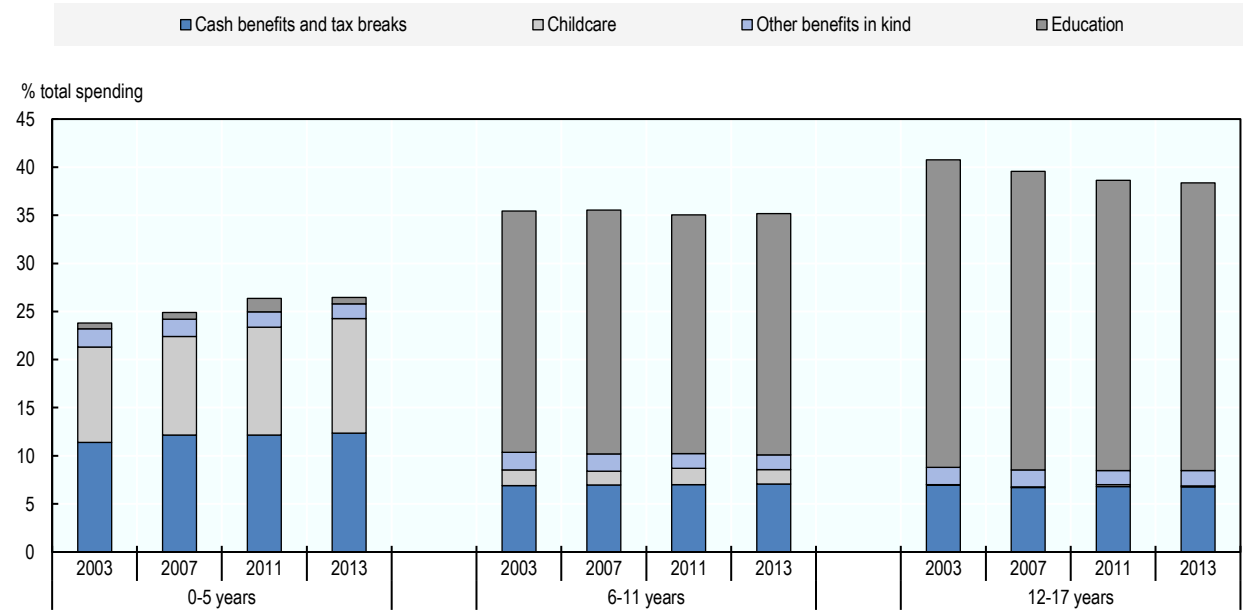
Baumol's work has also cited the municipal government, the performing arts, various personal services, and restaurants as examples of the non-progressive sector.

One of the main arguments of this paper is that the care sectors that employ more female time, a sector that overlaps with many of the service sectors Baumol named, is stagnating more from the cost disease relative to other service sectors. The second main argument, discussed in the next section, is that this stagnation is interacting with other parts of the paid and unpaid economy to depress growth.

First, I present below some suggestive evidence of the cost disease; then I adapt Baumol's theory to trends in female economic empowerment to explain these trends.

Figure 3 shows the composition of public spending on family benefits and education by child age category, a sector that overwhelmingly employs females. It shows that in the decade between 2003 and 2013, spending on the youngest age group, 0-5 years, has been growing relatively larger at the expense of spending for older children. This is striking when considering that total fertility in the OECD countries has been declining during this period (Figure 10). Appendix Table A1 also shows that most OECD countries have been spending much more on education in terms of GDP share between 2000-2015, even as tertiary spending as share of GDP is only very gradually increasing.

Figure 3. OECD Public Spending on Family Benefits and Education, by Child Age



Source: OECD Social Expenditure Database and OECD Education Database

Note: Bars show OECD average public spending on family benefits and education (primary and secondary) by age, as a percentage of total public spending on family benefits and education for children aged 0-17 years, 2003 to 2013. The indicator is calculated using the Age-Spending Profiles methodology used in Doing Better for Families (OECD, 2011).

Meanwhile, the male-dominated "protection" subsector of care infrastructure has been declining as a share of GDP. Figure 4 shows public expenditure on law, order, and defence sectors of various OECD countries as a share of GDP. With the exception of the U.S. and countries with missing data, every country's spending share on this sector has declined or remained roughly the same.

Figure 4. Public Expenditure on Law, Order, and Defence, % of GDP, 1996-2007

Source: OECD Factbook 2010

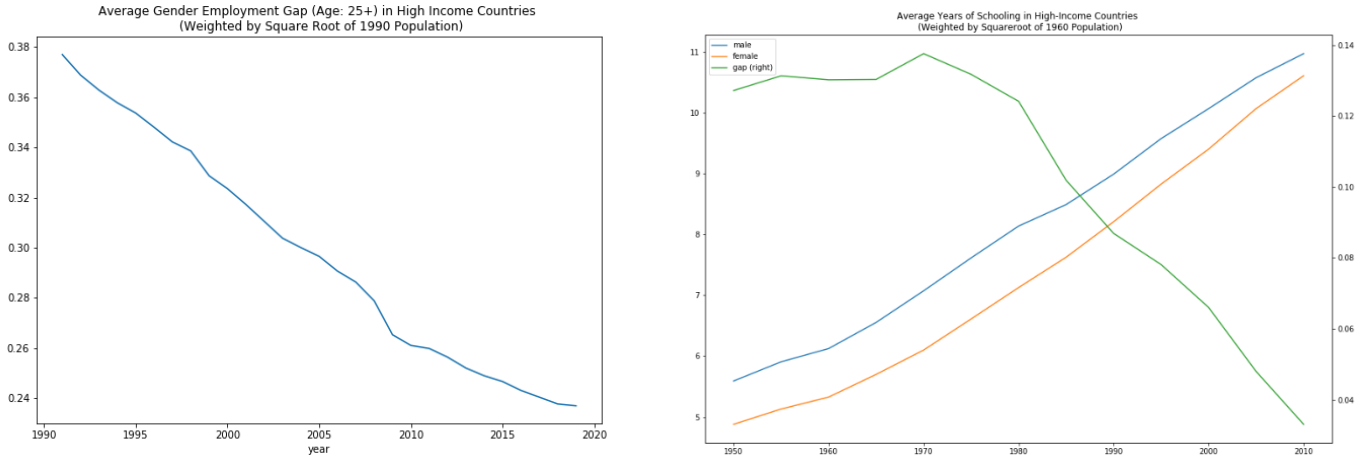
I adapt Baumol's theory of cost disease to the care sector, both paid and unpaid, by pointing out two fundamental economic facts.

First, the opportunity costs of unpaid female time has increases as females have accumulated more human capital that is rewarded in the labor market. Relatedly, the opportunity costs of unpaid female time are particularly high for the highest-educated females due to very high, nonlinear returns to uninterrupted experience in high wage, high growth "nonlinear" occupations.

The source of rising female opportunity costs is the expansion of female educational attainment among developed economies and a corresponding expansion of female employment that raised the opportunity cost of unpaid female time.

Figures 5a and 5b shows relative female educational attainment and the employment gender gap for a sample of high-income countries. (There is a large literature discussing why gender gaps in educational attainment have not only closed, but reversed, which is not discussed here.) We see that as female educational attainment has rapidly approached male educational attainment, even reversing the gap in certain countries, gender employment gave also fallen. It seems that increasing female relative educational attainment and increasing attachment to the labor force go hand in hand; as females have become more educated, they have spent more time investing in their skills and careers.

Figure 5a and 5b. Educational Attainment and Employment Gender Gaps, High Income Countries, Age 25+

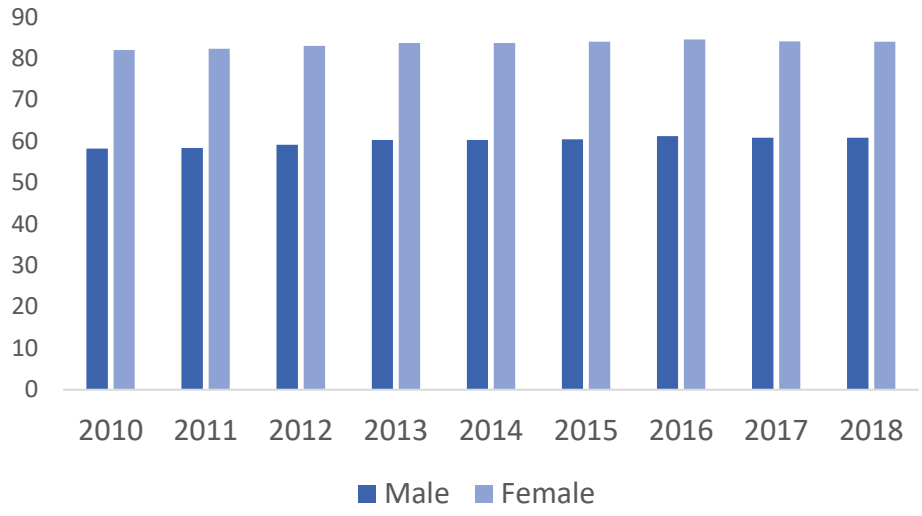


Source: ILO.

Notes: Selected data of high-income countries as classified by the World Bank. Average values are calculated using square root of 1990 population as weights for each country. See technical appendix for more details.

This massive entrance of females into the paid workforce is part of the "structural transformation" that most developed economies have experienced. In addition to the secular reallocation of labor across sectors from manufacturing to the service sector, there has been another type of structural transformation taking place. Because of expanding female economic opportunity, these charts show there has also been a secular reallocation of female labor from unpaid work, most likely in social reproduction activities such as childcare and housework and community-building, to paid work in the service sector. Figure 6 shows the OECD country average of the share employed in the service sector by gender. In the past decade, the share of employed females in the service sector has held steady at over 80%.

Figure 6. Share of Employed in Service Sector, OECD Average

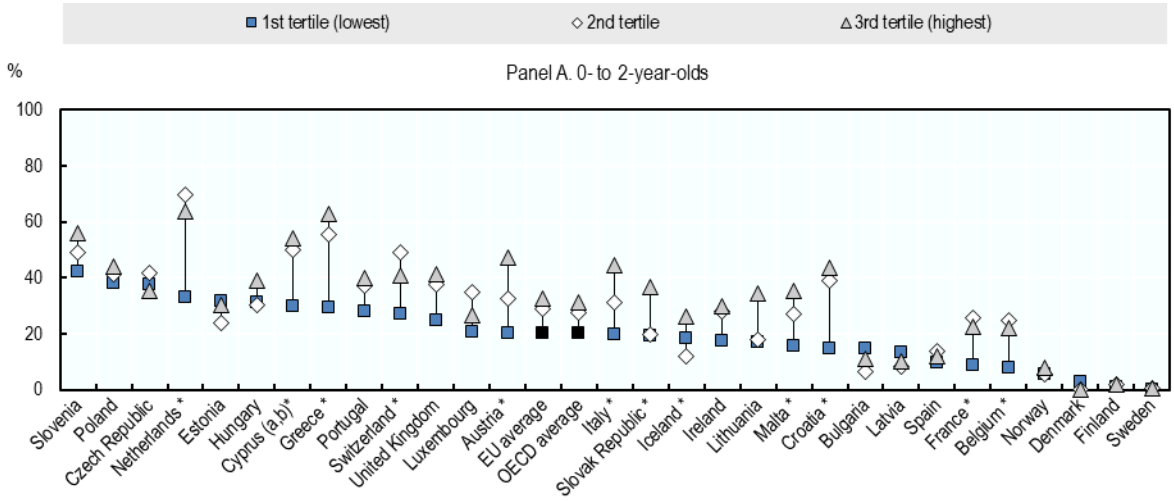


Source: OECD (2020), Annual Labour Force Statistics, Employment by Activities and Status, https://stats.oecd.org/ (accessed on 26 Dec 2020).

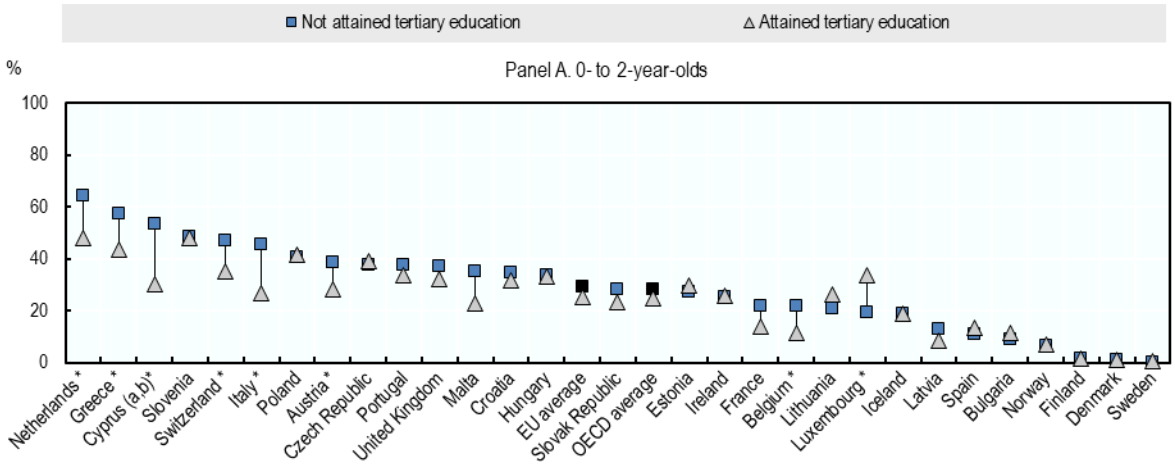
Meanwhile, as females have entered the workforce, the opportunity cost of their time for childcare and other unpaid work has increased. Figure 7 below shows the use of informal childcare (unpaid childcare provided by parents, extended family, or friends) during a typical week for children 2 years old or under by disposable income tertile (Panel A) and mother's education (Panel B) for a selection of OECD countries. Panel A shows that the lowest income tertile is least likely to use informal childcare, while the higher income tertiles are more likely to use informal childcare, which suggests that higher-educated mothers are more likely to give informal childcare. However, Panel B shows that this is the not the case. Tertiary-educated mothers are *less* likely to use informal childcare. This contrast illustrates the substitution effects at work where more highly-educated female time is more expensive in terms of opportunity cost. Whereas those not tertiary-educated are more likely to use informal childcare (which includes own time for child care), those who are tertiary-educated are less likely to use informal childcare. This could reflect two similar mechanisms; that tertiary-educated mothers find the opportunity cost of pulling back from work too high, and also that their extended family and friends, who are also more likely to be highly-educated, are less available for childcare due to higher opportunity costs of unpaid work.

Figure 7. Use of Informal Childcare during a Typical Week for 0-2 year old Children by Mother's Education and Disposable Income Tertile

Panel A. Proportion (%) of children using informal childcare arrangements during a typical week, by age group and equivalised disposable income tertile, 2017



Panel B. Proportion (%) of children using informal childcare arrangements during a typical week, by age group and mother's education level, 2017



Source: OECD; EU SILC

*Note: Data for Malta and Switzerland refer to 2014, and for Iceland to 2015. 'Informal' childcare here refers to unpaid care, usually provided by a grandparent of the child or by other relatives, friends or neighbours. It excludes any care that is paid for regardless of who is providing the paid-for care. Mother's education level based on whether or not the reported mother of the child has attained tertiary education (highest level of education attained at ISCED 2011 levels 5-8). The education level of the female household head is used if there is no mother in t-he household, and then of the father (or male household head) if there is no mother or female head in the household. In countries marked with an *, differences in usage rates across groups are statistically significant at p<0.05.*

Another important dimension adding to the rising opportunity cost of unpaid female work is the nature of quickly rising returns to uninterrupted work in certain sectors of advanced economies. A recent paper using U.S. data documents that experience premia have increased

more for skill-biased "nonlinear" occupations such as finance, law, and technology, for both genders, and part-time penalties for nonlinear occupations have increased. Tables 1a,b,c show the experience premia over time for linear and nonlinear occupations, the penalties for part-time work, and the college-share of workers in the two types of occupations. It also shows that experience premia stagnates for linear occupations.

Table 1. Skilled, Nonlinear Occupations have higher costs to work interruption, excerpted from Jang and Yum (2020)

Table 1a. Experience Premiums over time, by gender and occupation

	1976-1985	1986-1995	1996-2005	2006-2015
Female				
Nonlinear occ.	.0942	.1365	.1544	.2403
Linear occ.	.0575	.1173	.1532	.1556
Male				
Nonlinear occ.	.3370	.3502	.3203	.3166
Linear occ.	.1768	.2522	.2307	.2244

Table 1b. Part-time penalties over time*

	1976-1985	1986-1995	1996-2005	2006-2015
Female				
Nonlinear occ.	-.1989	-.2200	-.1657	-.1707
Linear occ.	-.0652	-.0929	-.0579	-.0792
Male				
Nonlinear occ.	-.1614	-.2582	-.1853	-.2335
Linear occ.	-.1289	-.2177	-.1771	-.1455

Table 1c. Share of college-educated workers, by occupation over time

	1976-1985	1986-1995	1996-2005	2006-2015
Female				
Nonlinear occ.	.3658	.3986	.4446	.5499
Linear occ.	.0943	.1485	.1985	.2779
Male				
Nonlinear occ.	.3623	.4356	.4732	.5243
Linear occ.	.0646	.0968	.1215	.1646

Source: Current Population Survey, excerpted from Jang and Yum (2020)

*Notes: *Part-time is defined as hours less than 25 weekly hours. Age, Education, Race, Industry, and number of children under age 5 are controlled for. All estimates are highly statistically significant.*

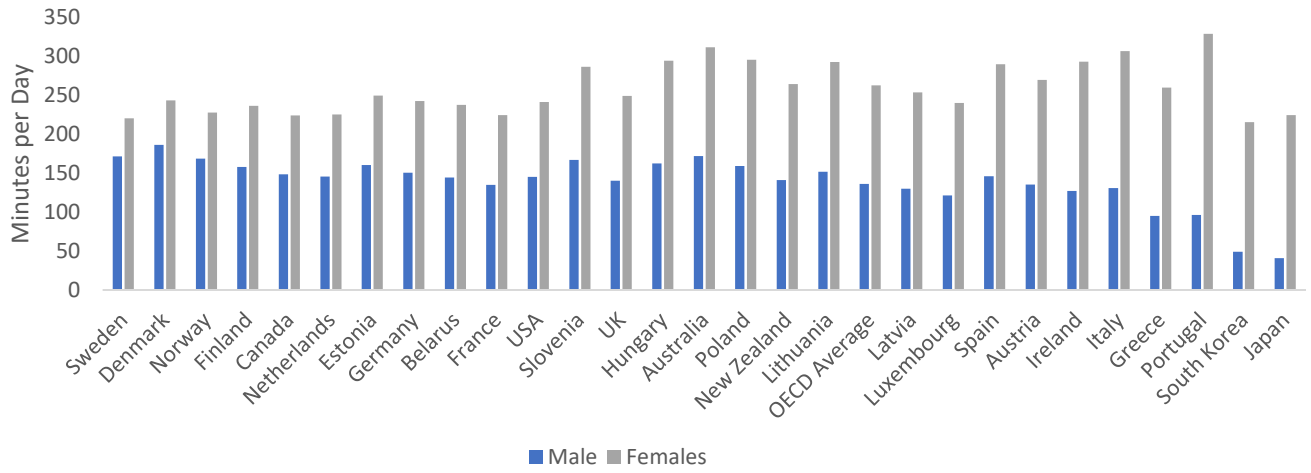
These tables help explain some empirical facts that Jang and Yum (2020) focus on, which are that female labor supply has been expanding primarily on the intensive margin even while female employment overall stagnates.

Given these tables and the continuing, ever-increasing returns to experience working in particular sectors, this shows that for skilled females selecting into nonlinear occupations, the opportunity costs of not working are even higher and rapidly increasing.

The second fact is that the time it takes to raise a productive human being according to a constant, minimal standard has *not* decreased. There has been no technology made available that significantly decreases the amount of human attention and care time a newborn baby or child needs for proper emotional, intellectual, or psychological development. While families have allocated or outsourced care work to others, the actual amount of care time that a human needs, for a given minimal amount of development, and holding other idiosyncratic heterogeneities constant, has not changed.

Meanwhile, in the midst of this rapid change, gender norms of care work have remained largely unchanged. Figure 8 shows average male and female time spent on unpaid work for OECD countries and Figure 9 shows the male and female utilization of paid parental leave in OECD countries. Both data support the idea that females remain the primary caregivers, even in the Scandinavian countries with the most gender-egalitarian family policies and labor market outcomes.

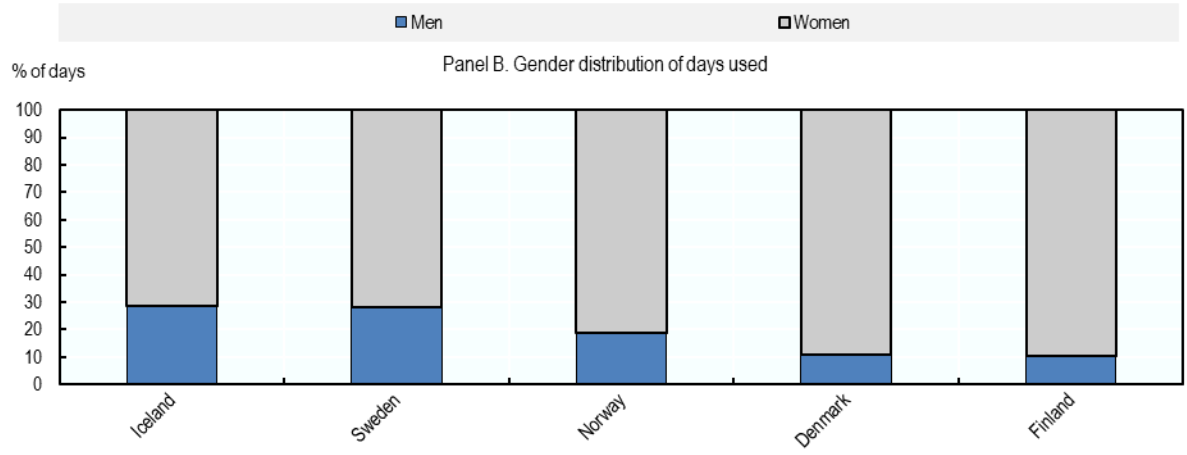
Figure 8. Average Daily Time Spent in Unpaid Work in High-Income Countries, ordered by gender imbalance



Source: OECD

Notes: Countries are ordered from left to right in order of the relative gender difference of time use in unpaid work. Countries on the left report the lowest gender imbalance in unpaid work time, while countries on the right report the greatest gender imbalance.

Figure 9. Duration of Paid Leave for Men and Women in Scandinavian Countries



Even more convincing evidence about the strength of gender norms in care labor is recent evidence from the U.S. showing that females strategically lessen work hours or select into lower-paying occupations to maintain gender norms of earning less than their husband, failing to earn their maximum potential income (Bertrand, Kamenica, and Pan 2015).

I argue that these slowly changing gender norms of care have been interacting with these rapidly increasing opportunity costs of time for females to yield rapidly declining fertility, particularly among higher-educated females[19], contributing to both the rapidly aging population of advanced economies and increasing inequality in household income and wealth, which are both factors that economists cite as major structural forces contributing to the excess demand for savings and the lack of demand for investment that characterizes advanced economies' secular stagnation.

Figure 10 shows the rapidly declining fertility in high income countries, as classified by the World Bank. If a minimally productive human being is an output good, then one of the most important factors of production for this service is human time. In fact, many societies would argue the most critical factor of production is female time. Many argue female time is most needed for the rearing of babies and younger children. Female time and attention is best suited for feeding a baby, nurturing a toddler, etc.

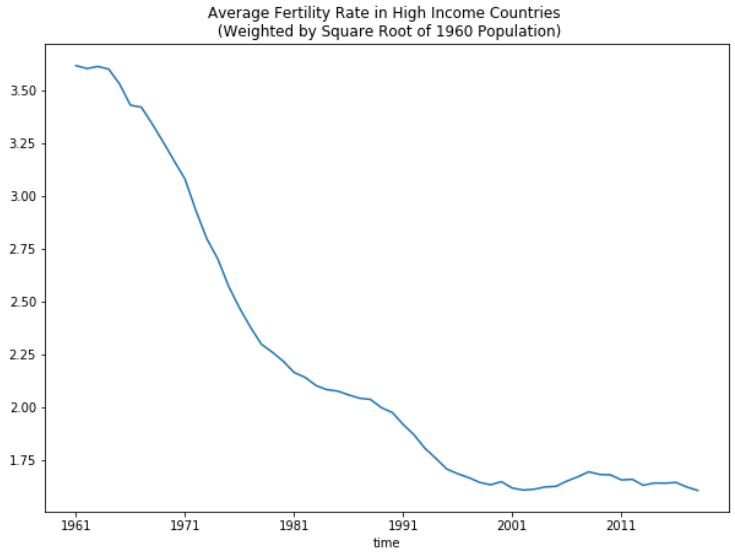
Additionally, it is not as if high-education, high-opportunity cost households have endogenously lower preferences for children. Assuming that "quality" of child matters, the standard interpretation of lower fertility as households become relatively richer, or as

[19] de la Croix and Doepke (2003) studies how cross-sectional differences in fertility rates from differences in education contribute to growth.

economies grow relatively richer, is that households simply trade off number of children higher "quality" of children. There is ample evidence that children, holding preferences for quality fixed, are a normal good. Various studies have noted the procyclicality of fertility in various economies (Coskun and Dalgic 2020; Andersson 2000), and the current pandemic's chilling effect on fertility in high income countries is perhaps the most salient example (*The Economist* 2020).

Baudin, de la Croix, and Gobbi (2015) develops a model of fertility that incorporates the high opportunity cost of childrearing time and estimates that, in the U.S., 8.1 percent of females remained childless because of the high opportunity cost of child rearing.

Figure 10. Total Fertility Rate in High Income Countries



Source: World Bank; Ramey (2009)

Given the increase in the opportunity costs of female time, it seems raising babies and young children become ever more expensive in societies that do not coerce females into childbearing and childcare[20], and this is the driving intuition behind declining fertility as countries develop, undergo structural transformation, and become richer.

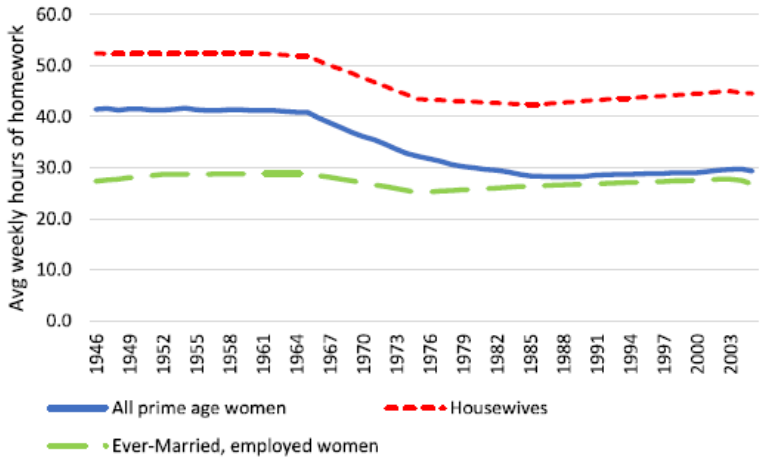
Technological advancements have responded the demand to save time at home. The advent of dishwashers and vacuum cleaners was thought to be able to contribute to female economic empowerment. Low-skilled female labor started to be hired in higher-income households to help with home maintenance and childcare.

But these innovations in technology and policy have not been able to "liberate" females from still performing the majority of time spent on childcare and home maintenance. Figure

[20] In Section 6 I discuss strategies conservative institutions use to maintain an affordable care infrastructure to promote fertility.

11 shows that while average weekly hours of home production declined substantially for all prime-age women in the U.S., it is due to the fact that more and more women become employed rather than remaining housewives in the late 1960s and 1970's. When these average weekly hours of home production are decomposed, we see that there has only been a slight decline in home production hours for housewives, and the weekly home production hours for ever-married employed has remained stagnant over the decades.

Figure 11. Average Weekly Hours of House Work, U.S.



Source: Jang and Yum (2020)

The stagnation in hours spent in home production shows that technology and labor outsourcing can only do so much. Economic historians argue that these labor-saving technologies simply raised the standards of cleanliness, showing that demands for "cleanliness" are not income inelastic. But I argue this these trends can also be explained because there are two structural, stronger stagnations at work – the stagnation in the number of care hours it takes to develop human beings, and stagnation in gender norms of care work.

Developing a productive person, holding quality standards constant, regardless of whether you define it in terms of the intellectual, emotional, spiritual or physical capacities, takes about the same amount of time as it did generations ago. There are still few "innovations" that can reduce the time to raise children beyond a certain point, and that very strong gender norms of care work remain. And various social science literature has shown the durability of gendered cultural norms in determining female labor force participation (Alesina, Giuliano, and Nunn 2013).

Further, the fundamental stagnations behind this cost disease are magnified for high human capital, high income, high-opportunity-cost parents. For parents who want to raise highly skilled children, the demands of the labor market pressure parents to investing in even more education, a particularly expensive demand in the U.S. given the quickly increasing costs of education shown in Figure 1.

The effect of expanding female educational and economic opportunity on increasing opportunity costs of unpaid female work has effects on not only unpaid work in fertility and social reproduction, it also has effects on the paid care sectors, not only in education and health, but in the child care sectors. More expensive female time contributes to the more expensive prices in the services of education and health care, and also to persistent shortages.

In the U.S., where childcare is mostly provided in the private market, center-based childcare costs have risen with real estate prices and wages. There are always shortages of spots in higher-status schools staffed by educators with signals higher quality. Real estate prices capitalize increased quality of education (Bayer, Blair, and Whaley 2020). At large tech firms, childcare centers are staffed by Ph.D.-educated females, and there is persistent oversubscription.

Within the care sectors of education and health, the subsectors that are more focused on direct care work are suffering from more "cost disease". In tertiary institutions, maintaining the same faculty to student ratio involves either higher costs, or if not higher costs, decreasing the ratio so that students receive less effective "care" time. In the healthcare sector, one of the main tools of cost reduction in the health care system is to minimize the amount of medical staff time given to a person, particularly more expensive doctor and specialist time.

And so 'care work' in the unpaid and paid care sectors has become relatively much more expensive because, fundamentally, the amount of human time it takes to care for, develop, educate, or train a person to a given level of "quality" has not decreased, and to the extent this type of care work is reserved for females, the supply curve of that time has shifted left and up due to increasing opportunity costs from expanded educational and economic opportunity.

The care shocks induced by the pandemic through the shutting down of educational institutions and the overburdening of the health care system only highlight the growing scarcities and difficult tradeoffs that households and societies are making in terms of where and how to allocate labor and resources to adjust. Because the time-intensive (labor-intensive) care work of educating, caring, nurturing, and nursing back to health, centered on

female labor, is so difficult to automate and becoming more difficult to outsource[21], it is considered "essential" and paying for it adequately becomes more and more expensive.

"Progressive" Services vs. "Stagnant" Services. A recent paper inadvertently illustrates that within the service sector, it is the care sector that is suffering most of the cost stagnation. A recent article, Sen (2020), in its analysis of the service sector and the validity of Baumol's cost disease, makes a consequential distinction within the classification of the service sector.

Sen (2020) demonstrates that distinguishing between the progressive-plus-business services industry from the stagnant-business services industry within the service sector is important in understanding why aggregate growth will not slow, contrary to the dire predictions of the Baumol model. In fact, this decomposition shows that for the U.S., the progressive service sector has been the greatest source of growth in the U.S. economy from 1947-2007.

It argues that the existence of service subsectors with high-productivity growth rates, i.e. progressive services which are concentrated in business services, and their substitutability with other sectors in the economy, explains why aggregate growth rates need not decline. It also argues that substitutability of progressive service sectors and stagnant service sectors contributes to cross-country productivity differences, and it is the structural change between the service subgroups, not that among agriculture, industry and services, that shapes aggregate productivity differences across countries.

It finds that a model consistent with these stylized facts predicts that Baumol's cost disease would depress aggregate productivity growth rates less in the future for developed countries.

An important result of this new classification of the service sector is that it shows that the care sector comprises most of the "stagnant" service sector. Table 2 below shows Sen (2020)'s classification of service sub-sectors into progressive or stagnant closely corresponds with the extent that the sector is comprised of care work. (Social reproductive work of arts, writing, and other activities of culture-making are classified as the care sector, as I discussed in Section 3).

[21] Explicit or implicit importation of cheaper female labor has been a policy solution for many advanced economies, but there exists growing political backlash to this importation from right-wing populist movements with a concern for stagnating wages for the less-skilled native population and stagnating fertility in their own ethnic or racial group.

Table 2. Service Sub-Sector Characteristics

ISIC Code	Name of services sub-Sector	Progressive or Stagnant?	Care Sector?
G	Wholesale and Retail Trade	Progressive	No
H	Transportation and Storage	Progressive	No
I	Accommodation and Food Service Activities	Mixed	Mixed
J	Information and Communication	Progressive for subset (Post and Telecommunication)	N for Post and Telecommunication; N/A for other
K	Financial and Insurance Activities	Progressive for Subset (Financial Intermediation)	No
L	Real Estate Activities	Likely Progressive	No
M-N	Professional, Scientific, Technical, A	Progressive	Largely No
O	Public Administration and National Def	Stagnant	Y
P	Education	Stagnant	Y
Q	Health and Social Work	Stagnant	Y
R	Arts, Entertainment and Recreation	Stagnant	Y
S	Other Service Activities	N/A	N/A

Source: Sen (2020), WORLD KLEMS, author's calculations
Notes: Service sub-sectors according to the ISIC Rev. 4

To understand the progressive vs. stagnant distinction more clearly, progressive service subsectors that experience high productivity growth do so because they benefit from advances in automation technologies, often referred to as artificial intelligence or machine learning. A large share of tech company business falls under progressive services. Various parts of commercial and retail financial services have experienced productivity growth in terms of automated systems, automated investment advising, robo-advisers, etc. Various legal functions, such as document discovery have experienced high productivity growth due to advances in natural language processing. Accounting services have become increasingly automated.

In fact, service companies can also be divided into progressive and stagnant. The ride-sharing companies are a combination of progressive services and stagnant services. Those involved in developing the digital platform for matching riders and drivers are in the progressive service sector, and their wages benefit from this. The drivers themselves are in the stagnant service sector, and their wages do not benefit from this—it still takes the same amount of time, roughly, to drive a person a given distance.

Meanwhile, the stagnant service sector is mostly comprised of the care sector, the parts of the service sector that do not benefit from these technological advancements. As I have argued previously, care work cannot be made more 'efficient' (i.e. made less costly) through outsourcing, robots, machines, artificial intelligence, or algorithms.

With these service sector classifications, Sen (2020) concludes that Baumol's theory of cost disease is not as important as thought for dragging down aggregate growth rates; he finds it generates only minor declines in aggregate productivity growth rate and accounts for a small share of the productivity growth slowdown once accounting for the distinction between "progressive services" and "stagnant services". The paper also concludes that structural change between the service subgroups, not that among agriculture, industry and services, that shapes aggregate productivity differences across countries.

Two important assumptions behind Sen (2020)'s conclusions is that a stagnating service sector does not affect the other sectors; progressive cum business sector is separate from the stagnant sans business services sector, and the progressive and stagnant service sectors are substitutable enough so that that aggregate growth is not affected.

While I welcome the distinction in service classifications that Sen (2020) has made, and also agree with the idea that the structural change between the service subgroups will shape aggregate productivity differences across countries, I disagree with these two assumptions. I argue that the unpaid and paid care sector has productivity effects on other parts of the economy, both simultaneously and in the future, which I will show in the next section, and I argue that the care sector is quite imperfectly substitutable with the progressive service sectors.

Care work is extremely unlikely to ever become close to becoming progressive, i.e. have high productivity growth rates, as care labor is not easily substitutable with other sectors in the economy and does not benefit as much from automation technologies. One clear example is education. The pandemic has caused an increase in demand for online teaching and online classes, and the result has been to discover how online classes are not good substitutes for in-person classes for most students.

Because of this imperfect substitutability, I argue a stagnating care sector will become a relatively more important factor in contributing to slowing productivity growth rates and greater economic stagnation.

In fact, many parts of the stagnant care sector is most likely complementary with the progressive sectors of the economy. An obvious example is education. If education services were made more efficient, so that it takes less time to educate a person to a certain level, or it costs less to educate a person to a certain level, there would be productivity increases in any

part of the economy in which human capital is an important input, particularly the human capital-intensive technology sectors.

Other arguments for balanced growth. There have also been other recent papers arguing that the unbalanced sectoral growth does not necessarily lead to inevitable economic slowdown. Two well-published papers describe alternative models of the economy that generate unbalanced sectoral growth but that are still consistent with aggregate balanced growth.

The model presented in Acemoglu and Guerrieri (2008) highlights a natural supply-side reason for nonbalanced growth related to Baumol's (1967) thesis. In this theory, the capital-intensive sector grows faster than the rest of the economy, but because its relative prices decrease its price-weighted value grows at a slower rate the rest of the economy. Capital and labor are then continuously re-allocated away from the more rapidly growing sector. This is similar to the assumption that Sen (2020) has made, in terms of assuming a minimum substitutability of capital and labor.

Another article, Young (2014), describes a theory of structural transformation that provides new insight into the cost disease of services. Young (2014) points out that average productivity statistics are based on the fundamental assumption that each new worker is qualitatively the same as every old worker. However, if workers are heterogeneous in both tastes and abilities, and if workers self-select into industries based upon these unobservable characteristics, this model can also generate a situation where a sector becomes less productive as it becomes larger, as the type of workers present when an industry is small may not be the same as when the industry becomes large, and vice versa.

If workers self-select into industries based upon their relative productivity in different tasks, and comparative advantage is aligned with absolute advantage, then the average efficacy of a sector's workforce will be negatively correlated with its employment share. The paper's estimates suggest that the view that goods and services have similar productivity growth rates is a plausible alternative characterization of growth in developed economies.

However, neither of these papers incorporate how related decisions over occupational choice, time use, labor supply, fertility, and savings contribute to declining fertility and other forces that contribute to secular stagnation.

In the next section, I will present evidence about how an undiversified, and fragile care infrastructure has stagnating effects on the rest of the economy.

Section 5. The Impacts of undiversified infrastructure of Care and its relationship to Economic Stagnation; Economic Inefficiency of Gendered Care Infrastructure

In this section, I show how, unlike recent work demonstrating how unbalanced sectoral growth can still lead to balanced aggregate growth through other compensating mechanisms, a stagnating paid and unpaid care sector due to an undiversified care infrastructure has stagnating effects on other parts of the economy that contribute to the current "secular stagnation".

I first summarize recent evidence relating stagnating female labor supply with slower economic recoveries. I then describe a few other models and mechanisms that can help explain why stagnating female labor supply is associated with slower economic recoveries.

I argue that if one assumes that the care subsectors and the care infrastructure are "complementary" to growth in other sectors, this can help explain these results.

Then I describe a microeconomic model used in Adda, Dustman, and Stevens (2017), hereafter known as ADS (2017), that connects decisions about time use and labor supply with various outcomes, including occupational choice, wage evolution, fertility, and savings.

They show that females incorporate their expectation of work interruptions into their occupational choice decisions. Knowing that one will need to take time off from work affects female decisionmaking by lowering their propensity to enter higher wage, higher return "abstract" (nonlinear) occupations. The occupational sorting of females out of abstract occupations into manual and routine occupations, which are usually concentrated in the care sector, is a form of occupational and industry crowding that depresses productivity growth, introduces greater fragility in care supply chains and magnifies the negative effects of recessions and other negative economic shocks.

Declining fertility matters because of its effect on household savings rates; lower fertility increases inequality of cross-sectional saving rates which increases the demand for savings. Greater educational attainment and selection into abstract work makes work interruption more costly, and childcare costs are highest for the highly-educated undertaking abstract work. The model demonstrates the forces behind inequality in fertility across mother's education level, and overall declining fertility.

Both declining aggregate fertility and inequality in fertility depress growth. Declining aggregate fertility increases the demand for savings, a force exacerbating other structural forces that have contributed to a worldwide "savings glut" that has led to secular stagnation. Inequality of fertility lowers aggregate educational attainment, which can depress growth.

Lower fertility high income households increase cross-sectional wealth and income inequality, which also increases savings rates and contributes to excess savings.

Then I show cross-country evidence that publicly-provided care infrastructure mediates and alleviates the stagnation in fertility and female labor force participation. I describe a bargaining model outlined in Doepke and Kindermann (2019), hereafter known as DK (2019), that emphasizes the role of childcare burden on the mother to describe how these results can be rationalized.

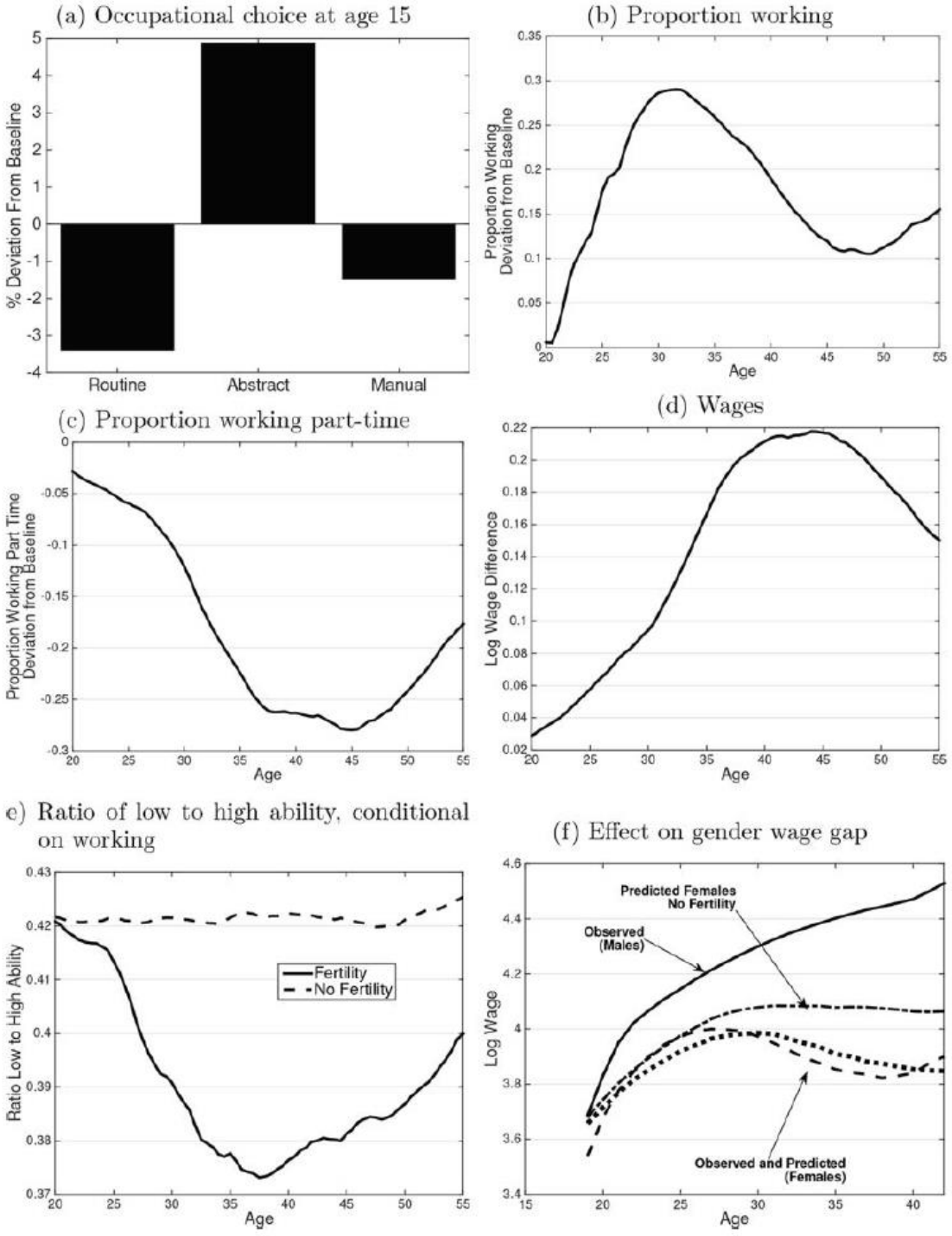
A model that that is helpful for understanding the effects of gendered norms of care labor on various economic outcomes is Adda, Dustman, Stevens (2017), hereafter referred to as ADS (2017). The study outlines a dynamic life cycle model of endogenous labor supply, fertility, and savings that incorporates occupational choices, skill atrophy rates to differ in different occupations and estimates it on West German data.[22] What is innovative about this model is that it allows occupations to differ in their skill requirements and penalties for interruptions. Occupations are classified into three categories; abstract, routine, and manual.

The model allows females, who assume they are going to shoulder the care burden, to make occupational and fertility choices that minimize the costs of career interruption by either lowering fertility and/or choosing occupations that do not penalize career interruptions.

Figure 12, excerpted from ADS (2017), illustrates well the wage and career costs of fertility. It estimates their lifecycle model using German data under two scenarios; one in which females incorporate costs of fertility into their decision-making about occupation, labor supply, and savings, and one in which females assume themselves to be infertile. Another interpretation is the difference in outcomes if females did not need to worry about pulling back labor supply for childcare reasons. Panel (a) shows that more females would select into "abstract" occupations, which include the high-paying, high-growth "nonlinear" occupations, if they did not need to worry about childcare; (b) and (c) show that more females would be working during prime career-building years, less would be working part-time; (d) shows that wages would be higher over the entire lifecycle, and (e) shows that the gender wage gap would be much smaller. Their model estimates that by the time mothers retired at age 60, they would have, on average, 22 percent less work experience per child because they are more likely to participate in part-time work.

[22] The study follows women born in West Germany between 1955 and 1975 who attend lower- and intermediate-track schools and then enroll in an apprenticeship training scheme after school completion.

Figure 12. The Effect of Fertility on Outcomes, excerpted from ADS (2017)



Source: ADS (2017), Fig. 3

Note: The different panels display the difference in outcomes between a baseline scenario and one in which a woman knows that she is infertile.

Females with the potential to pursue highly skilled, abstract occupations face the greatest career costs from fertility.

ADS (2017) also decompose the career costs of children into various components and find that about three-quarters of the cost is due to reduced or intermittent labor supply and the remaining costs are due to lower wages from lost investments in skills and skill atrophy.

This descriptions of the tradeoffs in this rich model are at the heart of the economic stagnation plaguing advanced economies whose female time is becoming more expensive. From the perspective of an economic planner who wants to encourage both more labor supply and greater fertility among the highly educated, a highly-educated female who will not have reliable childcare options makes decisions that always introduce direct or indirect costs to growth. She can either decide to enter a high-earning "abstract" or "nonlinear" occupation but decides to have less children than a counterfactual where childcare is more easily available, contributing to greater inequality of fertility cross-sectionally, and depressing aggregate fertility. Indeed, in the U.S., with the least amount of care infrastructure for families and the only OECD country with no federally required parental leave policy, many highly-educated females are increasingly deciding to remain childless in the U.S. (Baudin, de la Croix, and Gobbi 2015).

ADS (2017) also use their lifecycle model to evaluate the multi-faceted effects of a pro-natalist cash transfer policy that provides a cash transfer at birth of 6000 Euros for the birth of every child. They find that the policy induces females to have their children earlier, but does not affect the total number of children per woman.

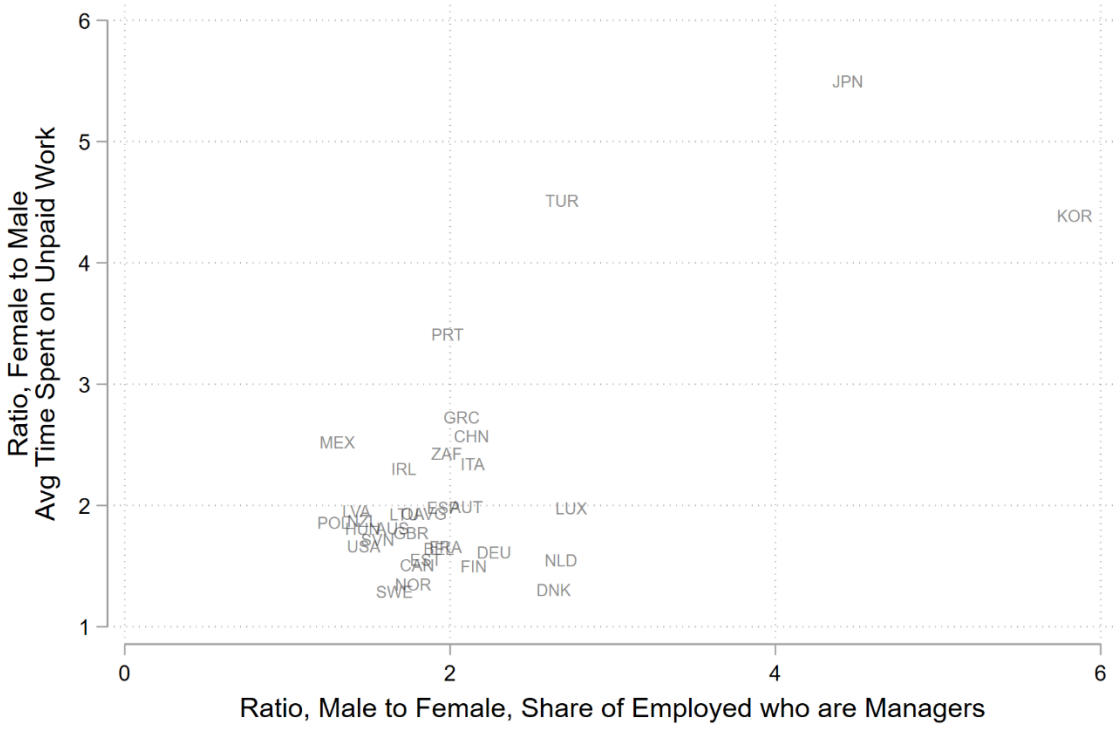
In fact, there are various other "unintended" consequences that are not supportive of economic growth. The effect of the cash transfer policy reduces to half its size after 8 years and close to zero after 20 years, so that there is declining effect per government dollar spent over time. It also induces women to spend more time out of work, translating to less skill, and moderately increases part-time work. In addition, the proportion of women opting for a routine or manual job increases. (However, a positive effect of the policy is that less savings need to be accumulated, allowing females to have children earlier).

One basic intuition of this model is that care burdens will generate inefficiencies through several mechanisms: declining fertility for the highest-skill households, introducing inequality of wealth, income, and fertility cross-sectionally, which all increase demand for savings relative to demand for investment and consumption; decreased and intermittent labor supply that raises production costs and decreases overall skill accumulation in the

economy; and depressed occupational sorting females into high-return, abstract, "nonlinear" occupations, which decreases productivity in those sectors.

Cross-country evidence is suggestive of the relationship between gendered norms of care work and diverse representation in occupations. Figure 13 shows, for a sample of high income countries, the relationship between a measure of strength of gender norms in care work, the ratio of female to male time spent in unpaid work, and a measure of relative female representation in management, the male to female ratio of the share employed who are managers. The Scandinavian countries, the U.S. and Canada are at the lower left region of the plot, reflecting more gender egalitarian time spent in unpaid work and female representation in management, while Japan and South Korea are at the far right, with the largest gender differences in time spent in unpaid work and representation of females in management.

Figure 13. Gender Gaps in Unpaid Work and Share of Employed who are Managers



Source: OECD and author's calculations

Another powerful illustration of the positive effects of occupational diversification is a recent study, Hsieh, Hurst, Jones, and Klenow (2019), that estimates the improvements to productivity from reductions in gender and racial barriers into selection into various occupations. They find that between 20%-40% of growth in aggregate market output can be

attributed to the "convergence" of in occupational distributions as more females and non-whites entered occupations that were formerly dominated by white men.

Another cost of occupational crowding of females into certain sectors, whether it be a paid care sector with lower costs to interruption and also lower wage and skill growth, is that negative sectoral shocks, whether in the paid sector, or the unpaid sector, can magnify shocks in both the paid sector and in aggregate households.

This is because the crowding of females into the care sector creates fragilities in the supply of care. Economies that import cheaper female labor for domestic and care work, it creates a fragile global supply chain that can disrupted by trade shocks, immigration shocks, or a pandemic that deepen economic contraction. These females balance paid care work with the care responsibilities in their own families. For example, a low-income woman of color and/or a recent immigrant balances the competing demands of paid nanny work to provide care for a richer household's children and the social reproduction (care) responsibilities in her own family. A female professional nurse or senior care home worker who needs to not only physically and emotionally care for patients, but also for her own household. When there are shocks in the supply of care labor, households and economies that are dependent on this labor experience deeper economic shocks. In the case of the pandemic, with the shutdown of schools and implicit destruction of the market for nannies, both the low-income/immigrant females and the client households suffer, magnifying the economic shocks.

Gender Wage Gaps and Child Penalties. Recent research on gender wage gaps point to the increasingly important role of child penalties. Bertrand, Goldin, and Katz (2010), using administrative data from a highly-ranked business school, show that there are no gender differences in the evolution of earnings for MBA graduates once career interruptions have been accounted for. A recent paper using administrative data, Kleven, Landais, and Søgaard (2019) shows convincingly that the gender wage gap has decreased and that the remaining gender gap is mostly due to labor supply interruptions due to care responsibilities.

Another consequence of undiversified care infrastructure is procyclical fertility. A recent article, Coskun and Dalgic (2020), demonstrates a link between the cyclicality of male-and female-dominated industries and fertility dynamics. I argue that this cyclicality is derived from two related factors. First, females are more likely to sort into counter-cyclical service sectors, especially care sectors. Secondly, females bear more of the care burden, so that when female industries are growing, fertility does not increase. Perhaps the most salient evidence of the cyclicality of the gendered infrastructure is that a variety of sources report dramatic drops in fertility in high-income countries.

Pro-cyclical fertility, which leads to fertility declines during recessions, also has the effect of driving up long-term savings rates, further exacerbating the excess demand for savings in the current low interest rate environment.

Revelations from the 2020 pandemic. The economic implications of undiversified care infrastructure in amplifying shocks are clearly seen in the example of the 2020 pandemic, which has given the high-income world an unforgettable reminder of the fragility of the care infrastructure in their economy. A torrent of articles in the mainstream press have been written about the particularly pitiful plight of working mothers who have been forced to pull back from their job, or even job-searching, because of the lack of safe childcare options (Brooks 2020).

Gendered care infrastructure is inefficient because it creates a fragile system in which costs are magnified when there is a care shock. The shutdown of schools means that primary caregivers, who are mostly female, are responsible for childcare. If they cannot find alternate arrangements, they cannot work. Meanwhile, during the pandemic, the workers that were in the most need to reduce mortality were the female-dominated medical stuff such as nurses, nurse practitioners, and medical assistants. To the extent that females are both primary caregivers and *also* in care subsectors that are in highest demand during the pandemic, there are more offsetting negative effects from lost labor supply due to the shutdown of schools.

Table 3, excerpted from Bayham and Fenichel (2020), shows that a significant share of U.S. healthcare workers, have significant care responsibilities at home, particularly the female-dominated subspecialties near the top of the list. Thus the pandemic has shown how fragile the US female labor supply is to care shocks.

Table 3. Childcare obligations of health-care professions in the U.S.

	Sample size in CPS (number of records)	Workers with children aged 3–12 years	Workers unable to meet child-care obligations with non-working adult or older sibling	Single-parent workers	Number of workers (thousands)
Nurse practitioners	2165	32·6% (30·3–34·8)	22·3% (20·4–24·3)	2·4% (1·7–3·2)	220 (209–230)
Physician assistants	1154	29·9% (27·1–32·8)	20·5% (18·1–23·0)	3·2% (2·1–4·4)	133 (124–141)
Diagnostic-related technologists and technicians	3472	30·1% (28·3–31·8)	19·2% (17·7–20·7)	4·8% (4·0–5·7)	348 (335–362)
Nurse anaesthetists	322	35·4% (29·4–41·5)	18·9% (14·0–23·8)	2·9% (0·7–5·1)	29 (26–33)
Medical assistants	5176	35·2% (33·7–36·7)	17·8% (16·7–19·0)	10·6% (9·6–11·5)	578 (561–596)
Physicians and surgeons	9827	29·9% (28·9–30·9)	15·6% (14·8–16·5)	1·6% (1·3–1·9)	1018 (996–1040)
Registered nurses	31 370	27·6% (27·1–28·2)	15·0% (14·6–15·5)	4·9% (4·6–5·2)	3154 (3120–3189)
Emergency medical technicians and paramedics	1810	23·7% (21·5–25·8)	14·6% (12·8–16·4)	4·6% (3·6–5·6)	198 (188–208)
Medical records and health information technicians	1747	26·8% (24·4–29·1)	13·9% (12·1–15·8)	6·1% (4·8–7·4)	170 (161–179)
Clinical laboratory technologists and technicians	3105	25·5% (23·8–27·3)	13·8% (12·4–15·2)	5·5% (4·5–6·4)	317 (305–330)
Licensed practical and licensed vocational nurses	6346	29·3% (28·1–30·6)	13·8% (12·8–14·8)	9·7% (8·9–10·6)	667 (648–685)
Other health-care practitioners and technical occupations	1328	27·0% (24·3–29·7)	13·6% (11·6–15·7)	3·0% (1·9–4·0)	137 (128–145)
Medical scientists	1634	26·0% (23·6–28·5)	13·4% (11·6–15·3)	2·4% (1·6–3·2)	168 (159–177)

Health diagnosing and treating practitioners, all other	341	23·9% (18·8–28·9)	12·8% (8·8–16·8)	4·2% (2·1–6·3)	35 (31–39)
Nursing, psychiatric, and home health-care aides	18 085	31·6% (30·8–32·4)	12·8% (12·2–13·3)	14·7% (14·1–15·4)	1998 (1967–2029)
Medical and health services managers	6448	25·3% (24·1–26·5)	12·8% (11·9–13·7)	4·8% (4·2–5·5)	644 (627–662)
Health practitioner support technologists and technicians	6291	26·8% (25·6–28·1)	12·4% (11·5–13·4)	8·3% (7·6–9·1)	671 (653–690)
Respiratory therapists	990	27·2% (24·0–30·3)	12·2% (9·9–14·6)	4·3% (2·9–5·7)	108 (100–115)
Miscellaneous community and social service specialists, including health educators and community health workers	830	22·3% (19·0–25·6)	10·9% (8·6–13·3)	5·9% (4·2–7·7)	75 (69–81)
Recreational therapists	99	11·7% (4·7–18·8)	3·7% (0–7·8)	3·8% (0–8·1)	10 (8–12)

Data are % (95% CI) unless otherwise specified. CPS=US Current Population Survey.

Table: **Child-care obligations by health-care profession**

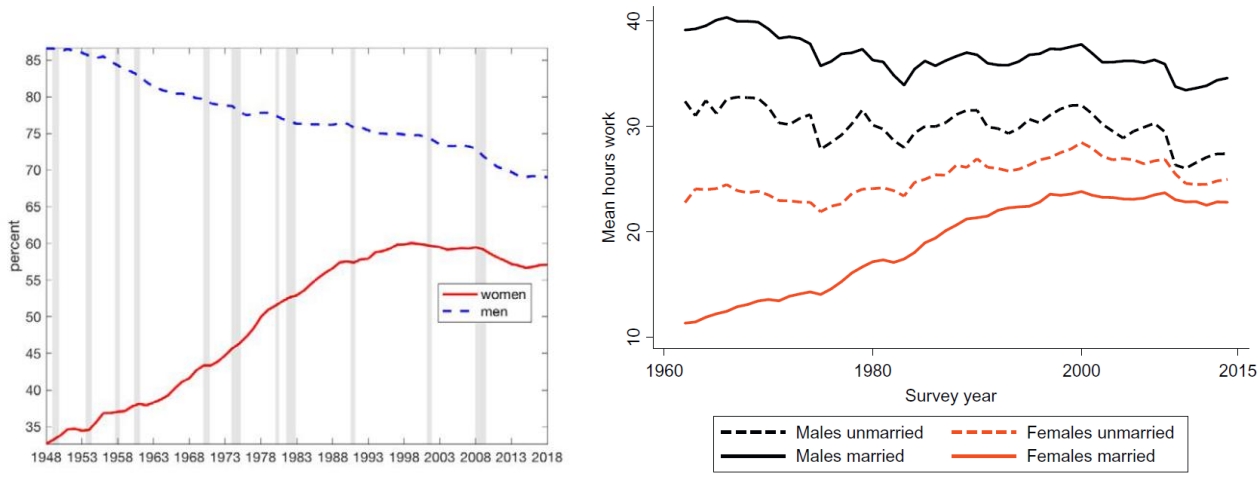
Source: excerpted from Bayham and Fenichel (2020)

Researchers have also begun to model the macroeconomic consequences of the mass school shutdowns that have occurred in high-income countries around the world, which I highlight because of their greater reliance on human capital for economic growth in these economies. Jang and Yum (2020) study a dynastic overlapping generations general equilibrium model where parents are linked to children through multiple transmission channels to study how school closures affect aggregate dynamics, inequality, and intergenerational mobility over time and across cohorts. They find that *lower substitutability* between public and parental investments induces *larger* damages in the aggregate economy and overall lifetime incomes of the affected children, particularly older children, hinting at the cost-effectiveness of public investments.

The Stagnation of Female Labor Supply and Economic Recovery. The depressing of female labor supply due to gendered norms of care labor also has impacts that are broader than lower wages and lower skill accumulation for females. Recent work demonstrates that the stagnation of female labor supply contributes to the deepening of recessions, slows economic recovery, and lowers male wages.

Albanesi (2019) documents the rising, and then stagnation, of female labor supply in the U.S. since the 1960s. Figure 14a shows the female labor force participation rate steadily increasing from 1948 before leveling off in the 1990s. Figure 14b shows that this increase in labor supply in terms of weekly hours worked is driven by the entrance of married females into the labor force.

Figure 14a,b. Civilian Labor Force Participation rate by Gender (left) and Average Weekly Work Hours by Gender and Marital Status (right)



Source: Current Population Survey;Albanesi (2019)

The study also documents that there was sluggish growth in employment in the aftermath of recessions, also known as "jobless recoveries", starting in the early 1990s, when female labor supply began stagnating. Albanesi (2019) then parameterizes a dynamic stochastic general equilibrium model on the data and estimates counterfactuals of various aggregate outcomes assuming that female hours continued to increase in the 1990s and onwards at the same rate that it was growing before the 1990s.

She finds that a continuing trend in female hours would have reduced have reduced the decline in aggregate hours during the 2001 and 2007-2009 recessions by about one third andwould have substantially increased the growth in aggregate hours in the recovery. Moreover, both output and aggregate hours would have experience substantial growth in the late 1990s and mid 2000s expansions, whereas they were stable in the data. Finally, continued growth in female hours would have *increased* the level and growth rate of male wages, as her model finds that higher female hours determine a rise in the marginal product of male wages. Albanesi (2019) concludes that her finding suggest that the flattening of female participation since the early 1990s negatively impacted U.S. economic performance both in terms of trend and business cycle frequencies.

As females continue accumulating more human capital and skills, the short- and long-term costs of missing female labor supply, and missing babies, will only continue to increase. Especially in the current moment, when a growing share of economic growth is concentrated in the abstract, nonlinear technology related occupations, females face ever greater implicit economic costs to fertility within institutions that are closer to solving the problem of limited commitment.

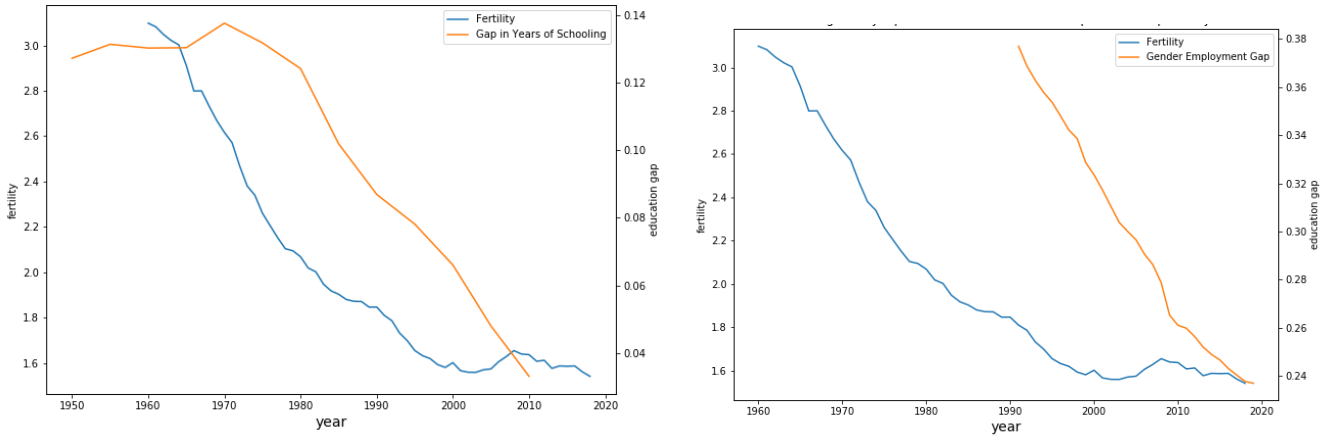
That Albanesi (2019) is able to detect complementarity between female labor force participation and male wages is also suggestive evidence of another linkage: the complementarity between care sector employment and wages in the innovation/progressive sectors. Just as expansion in the employment in education can lead to growth in the skilled service sector, expansion in female employment that is disproportionately represented in the "stagnant" care subsector of services can also lead to growth in the progressive "innovation" sectors.

Cross-country differences in time trends that point to the role of public care infrastructure. I now present empirical evidence about cross-country differences in time trends in aggregate outcomes that points to the role of publicly funded "care infrastructure" in mediating and alleviating the inevitable stagnation of fertility and female labor force participation in skill-biased advanced economies.

In addition, this evidence seems to rule out alternative mechanisms that have been used to explain the relationship between these aggregate outcomes. I conclude this section with comments on how time trends in self-reported female well-being relates to this evidence.

First, in high income countries, as designated by the World Bank, both the gender gap in education and employment have declined as fertility has declined. Figure 15a and 15b show these aggregate trends. The left chart, showing the aggregate trends of high-income countries, seems to illustrate the traditional Quantity-Quality ("Q-Q") tradeoff. As females catch up to males in educational attainment, households prefer higher "quality" children, so fertility decreases. But the right chart suggests that there may be another trade-off happening– females are spending more of their time in market work, and may be having less children because they don't have as much time to raise children. This can be called the "time-scarcity" explanation. But this doesn't disprove the Q-Q theory – the two mechanisms can be both, but it is difficult to distinguish between the two mechanisms when explaining declining fertility, as highly educated households that prefer higher "quality" children may also have less time to care for children.

Figure 15a,b. Fertility and Education Gender Gaps (left) and Fertility and Gender Employment Gaps in High Income Countries (right)

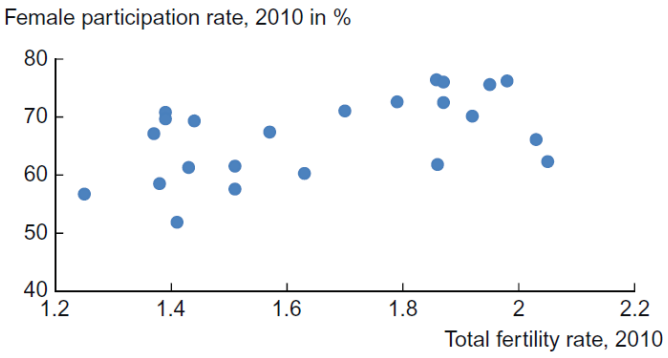


Source: World Bank; ILO; Barro and Lee (2013); Author's calculations

But cross-country trends show variation in these outcomes that is consistent with the role of publicly funded care infrastructure in mediating and alleviating trends.

First, the cross-country variation of labor force participation and fertility among the high-income countries cannot be explained by the simple mechanism of different shares of females across different countries choosing to specialize in work versus raising children. Figure 16 below, excerpted from Doepke, Matthias, and Tertilit (2016), shows a scatterplot of the female labor force participation rate and total fertility rate in 2010. Within the European OECD countries, higher female labor force participation is actually found in the *higher fertility* countries. This does not support the time-scarcity or Quantity-Quality explanations, as these countries are all high income and highly educated.

Figure 16. Fertility vs. Labor Force Participation across European OECD countries.



Source: Excerpted from Doepke, Matthias, and Tertilit (2016); OECD LFS sex and age indicators and world development indicators

However, the logic for these cross-country patterns in fertility and LFP can be elegantly rationalized by a model described in Doepke and Kindermann (2019), hereafter referred to

as DK (2019). It describes a model of bargaining over fertility with limited commitment that emphasizes how the distribution of the costs and benefits of fertility within the household affects fertility. The key to this model is limited commitment in which one partner is not able to properly compensate the other partner for foregoing future labor market options and losing bargaining power by having a child. When care responsibilities are concentrated on the mother only, as opposed to other family members or government or private sector provision, it makes it harder to reach a stable agreement to have a baby and, all else equal, the fertility rate will be lower compared to a society with a more equitable distribution of the costs and benefits of having children.

DK (2019) find that in European countries with exceptionally low fertility rates, women bear a disproportionately large share of the burden of caring for children. They also find that it is precisely in the countries where men do the least amount of house work that the fertility rate is the lowest, and where women are especially likely to be opposed to having another child.

Indeed, DK (2019) find that cross-sectional differences in fertility declines and employment changes for females with young children depend on the level of childcare burdens falling on women.[23]

I now highlight the role of publicly funded care infrastructure in mediating and alleviating the relationship between fertility and employment by comparing countries with different levels of "care infrastructure" for working families. I use a typology developed in Gauthier (2002) to classify high income economies by the level of "family policy" support.

Table 4 below summarizes a typology of "family policies" Western countries that describe how much support is provided to families from the private or public sectors, and gender divisions of care labor. Countries in the "Southern European" and "Liberal" category offer the least amount of cash support and support for working parents, though the "Liberal" countries also typically provide more cash support for families in greater need, have more developed private sector provision of child care.

23 Another paper that formalizes and demonstrates this insight is Rocha and Fuster (2006), which focuses on differences in labor market frictions across countries. Using a quantitative model, they find that in countries where unemployment risk is high, women both work less and are more likely to postpone births.

Table 4. Typology of Family Policies in Western High-Income Countries as of the Late 1980s and Early 1990s

Policy regime	Overall characteristics	Cash support	Support for working parents	Countries
Social-Democratic	Characterized by universal state support for families, and a high commitment to gender equality.	Medium-level of cash support for families in the form of universal cash benefits, but high level of other forms of support that result in low levels of child poverty.	High-level of support provided to both parents. Combines long parental and childcare leaves with extensive childcare facilities.	Denmark Finland Norway Sweden
Conservative	Characterized by a system of state support for families that tends to vary according to the parents' employment status, and that also tends to be driven by a more traditional view of the gender division of labour.	Medium-to-high level of cash support.	Medium-level of support. Relatively long parental and childcare leaves (in some countries), but more limited childcare facilities.	Austria Belgium France Germany Ireland Luxembourg Netherlands
Southern European	Characterized by a high degree of fragmentation along occupational lines, and a mix of universal and private services and benefits. It is also a regime characterized by no national guaranteed statutory minimum income scheme.	Low level of cash support that results in high levels of child poverty.	Low level of support.	Greece Italy Portugal Spain
Liberal	Characterized by a low level of support for families that tends to be targeted at families with greater needs, and that leaves room for market forces, especially with regard to the provision of childcare facilities.	Low level of support for all families, relatively higher for families in greater need.	Low level of support. Responsibilities for childcare provision given to parents and the private sector.	Australia Canada Japan New Zealand Switzerland U.K. U.S.A.

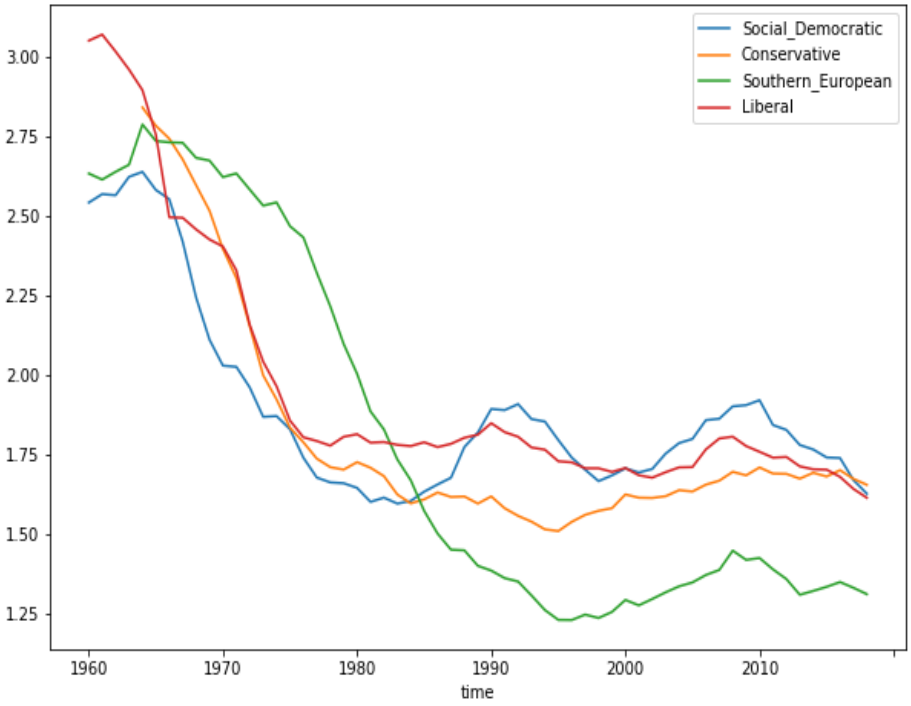
Source: excerpted from Gauthier (2002)

The US is particularly notable in its lack of support families. OECD cross-country data shows that the US is the only OECD country with no national policy on parental leave, and is also the only country in which a significantly larger share of middle-aged people report a higher lack of social support than elderly people[24].

Figure 17 compares fertility rates of High-Income Western countries by family policy regime shows further evidence of the role of care infrastructure in affecting fertility rates– Southern European countries, with both low care infrastructure and low rates of low-skilled immigration, have the largest drop in fertility rates.

[24] https://data.oecd.org/healthrisk/lack-of-social-support.htm

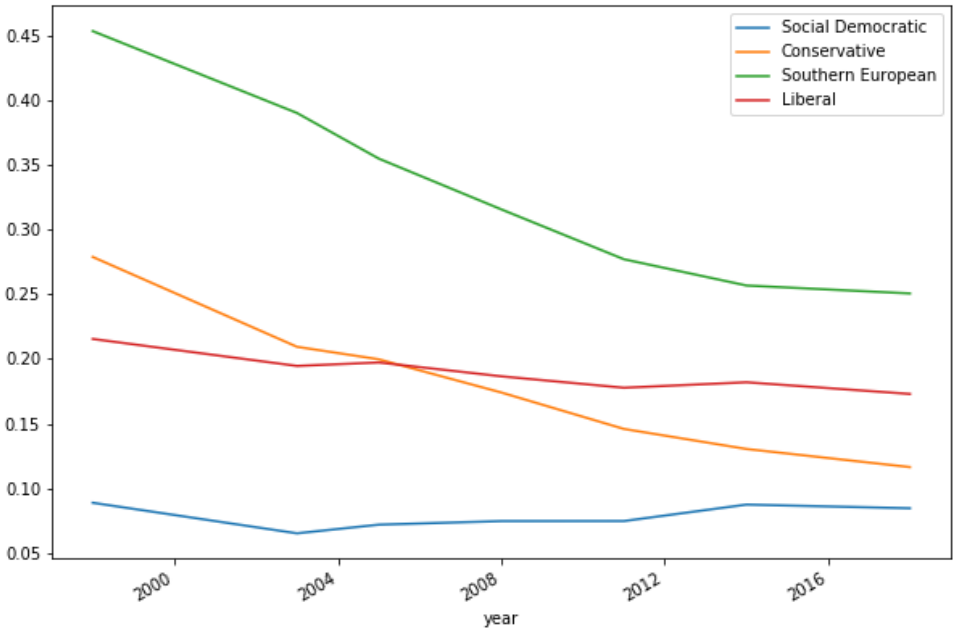
Figure 17. Fertility in High Income Countries by Policy Regime



Source: World Bank; author's calculations
Note: Weighted averages calculated with square root of 1960 population.

Previously, Figure 14b showed that the stagnation in female hours was from married women. I analyze a comparable measure across the Western high income countries, the gender gap in employment among those who are "married", which includes those in domestic unions and cohabitation, shows that the gender employment gap for "married" people is highest among the countries with the lowest amount of family policy support, and lowest among the countries with the greatest family support, the Social Democratic countries. In fact, the gender gap in "Conservative" countries has declined further than the gender gap in "Liberal" countries even though one could argue that the gender norms in those countries are more conservative than in the liberal countries. Meanwhile, the gender gap among married in "Liberal" countries remains stagnant. The gender gap in married employment has been declining but remains the highest in the Southern European countries.

Figure 18. Average Gender Employment Gap of "Married" Individuals in High Income Countries by Policy Regime



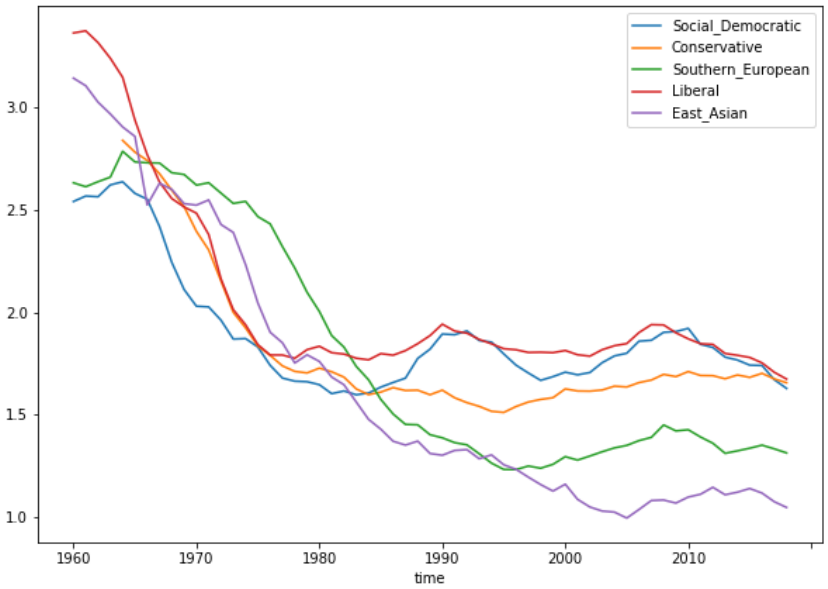
Source: ILO; author's calculations
Note: "Married" includes those in domestic unions or cohabitation. Weighted averages calculated with square root of 1960 population.

High Income East Asia

High income East Asian economies, which include Japan, Taiwan, Hong Kong, Singapore, Japan, and South Korea are particularly illustrative examples. Their economies have experienced amazing economic growth and increases in educational attainment since the 1960s. Meanwhile, all of these high income East Asian countries uphold strong Confucian social norms dictate that females are the primary caregivers for both the young and elderly.

Figure 19 compares the fertility rates of High-Income East Asian countries with the Western countries previously discussed. Fertility in these countries has dropped even more than the lowest fertility Southern European countries.

Figure 19. Fertility in High Income Countries by Policy Regime, including East Asia



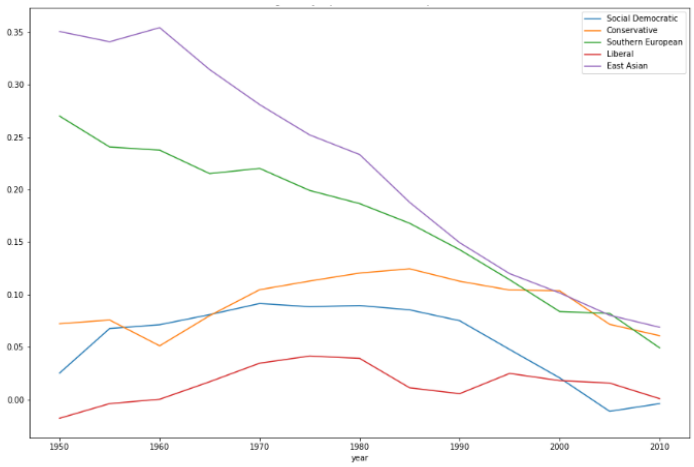
Source: World Bank; author's calculations
Note: Weighted averages calculated with square root of 1960 population.

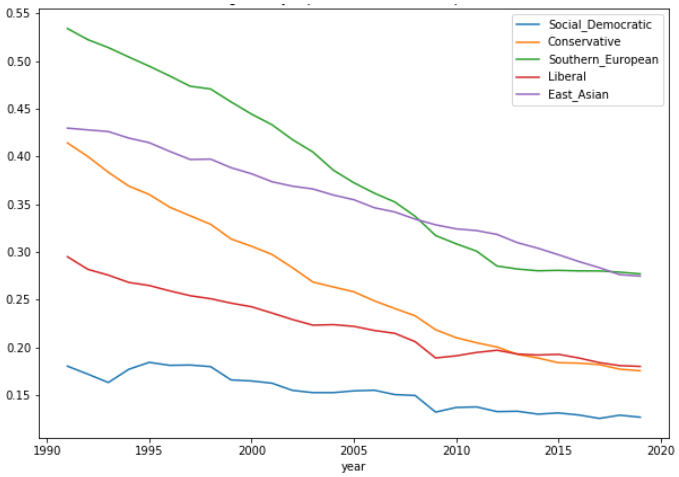
In these societies the declines in marriage rates are also closely tracking the declines in fertility. As marriage is even more closely tied with childbearing in these Confucian-influenced East Asian societies, the response of highly educated females is to select out of not only childbearing, but also marriage.

These trends could also be a window into the future for China. Anecdotal evidence about increasingly expensive markets for childcare in China, a nation with quickly rising female educational attainment and declining fertility rates, is in line with the predictions of this model.

There are also several pieces of evidence for the East Asian countries that contradict the time scarcity hypothesis, which explains that there is lower fertility because of more educated females. Figure 20a shows the trends in the gender gaps in years of schooling since 1960, and Figure 20b shows the average gender employment gap for the various groups of countries.

Figure 20 a,b. Average Gender Gap in Years of Schooling by Policy Regime (left) and Average Gender Employment Gap by Policy Regime (right)





Source: ILO; Barro and Lee (2013); Author's calculations
Note: Weighted averages calculated with square root of 1960 population.

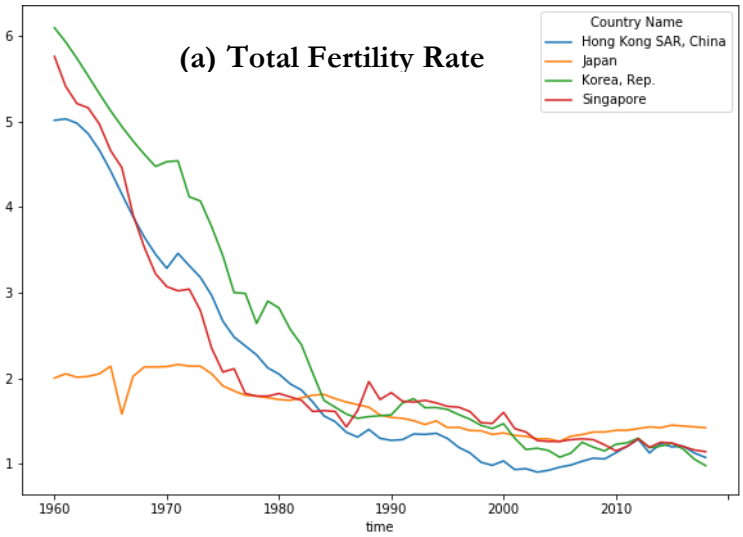
East Asian gender gaps in education are higher than the Liberal and SD countries, showing that female relative educational attainment is not the highest. Secondly, East Asian employment gender gaps have most recently remained higher than any other Western country with the exception of the Southern European countries. In fact, the most recent data shows that high-income East Asian is comparable to Southern European countries in terms of the gender employment gap, the group of European countries with low family policy support and less immigration. In both measures, East Asia is comparable to the Southern European categories.

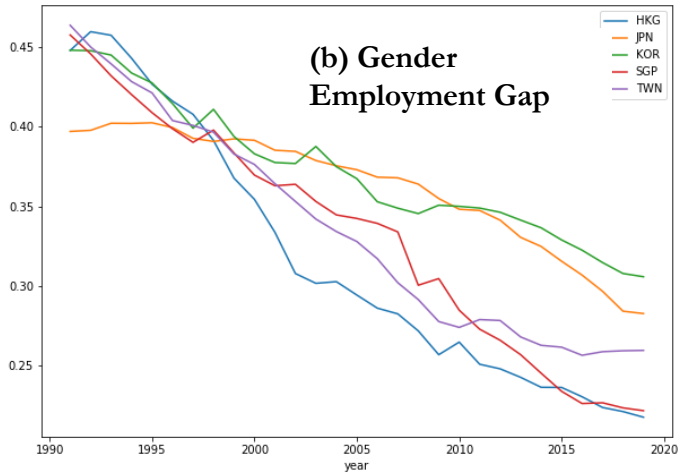
I argue that the undiversified care infrastructure from highly gendered norms of care labor encoded in these Confucian culture countries is behind this. Indeed, Figure 8, showing the ratio of female to male time spent in unpaid work, shows that Japan and South Korea have the highest ratios of female to male time spent in unpaid work.

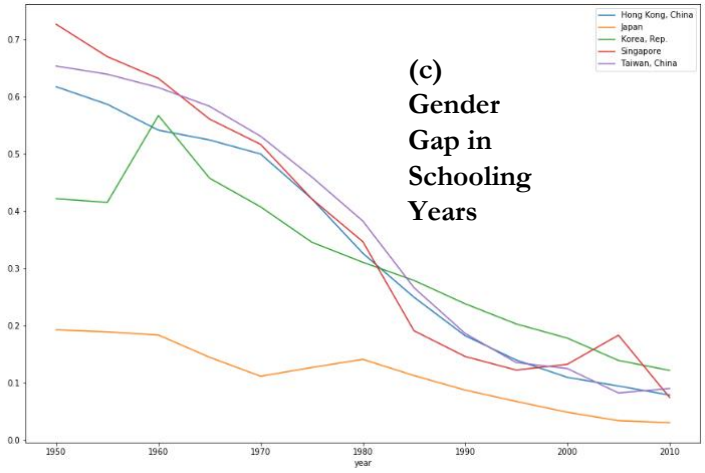
Comparing fertility and education gender gaps in High Income East Asia with those in Southern European, Social Democratic (SD), and "Liberal" countries is also illuminating. While the Social Democratic and Liberal countries have the highest relative female educational attainment, they also have the highest fertility. For the SD countries, this is attributed to their generous public care infrastructure; for the Liberal countries, this can be attributed to immigration and inequality of fertility.

Within the High-Income East Asian countries, South Korea is of special interest. Among these countries, South Koreas has the lowest fertility (top panel), the largest gender employment gap (lower left panel), and gender gap in years of schooling (lower right). Various media have noted that South Korea has the lowest fertility rates in the world, shown in Figure 21a.[25] Social movements have been noted about a "birth strike" and South Korea's #NoMarriage trend. It is clear that there is a role for publicly funded care infrastructure in alleviating the pressures on female time. I now turn to how conservative ideologies and institutions relate to the problem of stagnating care infrastructure in a society.

Figure 21a,b,c. Fertility (a) Gender Gap in Schooling Years (b) and Gender Employment Gap (c) for High Income East Asian Countries







[25] An example of a recent article is https://thediplomat.com/2020/02/south-koreas-population-may-have-already-peaked/

Section 6. Conservative Ideologies, Social Reproduction, and Care Infrastructure

In this section, I draw out a new interpretation about the strategies of conservative institutions and authoritarian states that enforce gendered norms of care labor. I also argue that concerns about the social reproduction of particular cultures, groups, ethnicities, etc. needs to be integrated into technical and economic policymaking to address the fundamental concerns about social reproduction that many citizens have.

Preservation and reproduction of conservative institutions through enforcing strict gender norms of care. I argue that enforcing gendered norms of care labor that is fundamental to most conservative ideologies and institutions can be interpreted as a strategy for preserving the supply of care infrastructure to ensure social reproduction, usually though biological reproduction. Conservative ideologies that emphasize explicit gender roles can be interpreted as social strategies to make sure that female care labor remains free, relatively plentiful, or if not free, underpaid. Recent right-wing reactions can be seen as a strategy to shift society towards greater supply of care.

Enforcing gender norms of care labor is a softened version of more ancient practices of preserving care infrastructure – enslaving women from vanquished or defenseless groups. Not so long ago, societies that found themselves with a shortage of female care labor could solve this problem by conquering other people groups and forcing the vanquished females to perform unpaid or underpaid care labor.

The strategy of enforcing gendered care labor is optimal in situations when having a larger, less-educated population is beneficial for the survival or wealth of a particular nation or culture. In the past, having more men who would presumably serve as soldiers would mean greater probability of victory in warfare. Having a greater supply of less educated labor might also mean greater short-term economic growth for elites.

DK (2019) points out that a limited commitment problem that does not allow husbands to fully compensate wives for the various costs they bear when bearing and raising children leads to drops in fertility. The Catholic Church and other conservative social institutions have attempted to ameliorate that problem with two strategies. One strategy is forbidding divorce, or at least making it extremely costly. Another strategy is to develop the social infrastructure of the Church to help provide the infrastructure of care through Catholic schools and churches, nuns, and priests, so as to raise young Catholics who can then reproduce Catholic norms and doctrines.

From Confucian East Asian social norms exhorting wives to leave their families to reside with her husband's family to care for children bearing her husband's family name and her in-laws, to traditional gender norms of motherhood and femininity found in countries heavily

influenced by the Roman Catholic church, these long-lasting social institutions have preserved the supply of care labor and "care infrastructure" by emphasizing that females' primary work is that of care work involved in social reproduction. For the Catholic traditions, females who opt out of marriage and motherhood, nuns, are still doing the work of social reproduction by doing other types of social reproductive work – the education of future Catholics, and work in service and preservation of Catholic doctrines.

I also note that, in equilibrium, religious and conservative institutions that rely more on biological lineage to reproduce their culture must enforce stricter gender norms.

Meanwhile, on the other hand, liberal capitalist societies, if they are not careful, are in danger of exploiting and weakening the infrastructure of care it depends upon for long-term innovation and economic growth, just as many capitalist systems are in danger of societal collapse by over-exploitation of the earth's natural and non-human resources, which are themselves embedded in their own ecosystems. As others have noted, such as philosopher Nancy Fraser, capitalist economies have a tendency to self-sabotage itself by exploiting the invisible, often unpaid care work that comprises a community and society's 'infrastructure of care'.

Social reproduction goals and implicit social contracts. An implication about the existence and long-term stability (up until now) of conservative institutions and cultures is that neoliberal discourse among analysts, politicians, and policymakers about economic growth that is divorced from concerns about social reproduction is risky, as policy that inadvertently weakens an economy's care infrastructure and sacrifices the objectives of social reproduction risks political and social instability. This weakening of care infrastructure can violate unwritten social contracts made between a government and its people that are more fundamental than maximizing economic growth. The reality is that many nations and cultures are quite concerned about social reproduction, and possess the view that economic production should serve the priorities of social reproduction, even at the expense of economic growth.

For policymakers and social planners solving a constrained optimization problem, economic production should be subordinate to basic social reproduction goals along various local surfaces, or sometimes over the global parameters. Or in other words, it is more important to preserve a minimal level of social reproduction than to maximize some combination of growth and stability.

Right-wing populist movements in the U.S., U.K. and other European countries are reacting to recent economic developments that are depressing both economic growth and fertility by reaching back to historical precedents of enforcement of gendered, unpaid care work. A

likely strategy for preserving care infrastructure, in their view, is to enforce traditional gendered norms of care labor by building institutions and norms that deliberately limit female economic opportunity.

As I noted before, there is an evolutionary logic for this. Not so long ago, greater population leads to greater group success. More soldiers lead to greater military strength, more workers leads to more output (and cheaper labor), and greater military strength leads to more workers and more output.

The history and presence of long-lasting conservative norms and institutions, and the recent rise of right-wing populist movements in the U.S., UK, and a few European countries reflects deep social concerns about social reproduction that may be perhaps more fundamental to the social contract of most Western, liberal, democratic market economies than short-term or even medium-term economic mobility and growth that most economic policymakers want to openly admit.

A common interpretation of the recent rise in "right-wing" populist views in the U.S. and European nations is that it is a reaction to financial globalization that has left behind less-educated people, particular less-educated white men. I observe that this rise in right-wing populism is not just about underemployment of less-educated white men; it is also about socio-economic forces that have frayed the care infrastructure of the economy in a way that threatens deeply held interests in social reproduction. The ideas of social reproduction may vary across country, whether it be in the interests of "white American capitalism" or Christian European cultural ideals.

Thinly-veiled pronatalist policies in Liberal countries that want to increase fertility and maintain gendered roles of care labor: Restricting access to family planning; criminalizing abortion, prohibiting females from military combat roles; funding male work (physical infrastructure, fossil fuel infrastructure, military, law enforcement) We can also interpret the fundamentalist ideologies around banning abortions among conservative and religious groups in the U.S. as a type of pro-natalist strategy advocated by a subset of the population.

Anti-immigration policy is another manifestation of concerns about social reproduction. These are concerns for nations who also value social reproduction, as that prevents unlimited immigration of individuals from poorer nations. What is widely perceived as a demographic crisis is a crisis of social reproduction, not an essential crisis of global demographics. It is not a coincidence that Italy, a European country with the lowest rates of fertility, also harbors some of the strongest anti-immigrant political views.

Analogous movements in European countries are driven by similar forces. These include UK's Brexit movement, the rise of AfD in Germany, an actively Euroskeptic party, and growing Euroskepticism and anti-immigration sentiment in Italy. [26]

Meanwhile, countries like China have created a state-controlled capitalism that explicitly subordinates economic production to social reproduction. Right-wing populist movements in various high income Western countries are similar to the China model in that their discourse wants to use economic production to serve social reproduction.

China, a global hegemon, is a unique example of an authoritarian regime that has recently been struggling with fast-declining fertility rates. It is a political economy in which forces of market capitalism are used to serve the interests of the ruling Chinese Communist Party and its growing influence makes explicit what has been implicit policy in other settings. In fact, China's model of state capitalism might be the "optimal" solution for a constrained optimization problem in which the objective function heavily weights the social reproduction of Chinese Community Party ideals in the current macroeconomic and geopolitical context. Famously, China coerced families to limit their fertility in order to serve economic growth objectives, which happened to align with their social reproduction objectives. Now, more recently, with fertility rates falling more quickly than expected, China has been trying to push pro-natalist policy and rhetoric to serve their social reproduction objectives. Because of China's embedded Confucian cultural logics, the regime cannot imagine anything other than strict gender roles in caregiving, and have begun implementing pro-natalist "sticks and carrots" boost fertility.

The interaction of gendered care norms with the composition of economic growth. I next note that enforcing gendered norms of care labor that preserve care infrastructure is less costly for economies that do not depend on human capital for their economic stability and growth. Some conservative political economies and institutions don't have much costs, as their economic ecosystem don't depend on human capital. Table 5 below shows fertility rates and economic composition of high income, high fertility economies as classified by the World Bank.

[26] An interesting exception to the rise in populist movements is Japan. On a per capita basis it is doing well because of low fertility rates. Immigration-wise, it lets in very few people. There is no backlash against military because haven't fought in wars; even those soldiers sent to Iraq kept safe. Perhaps more importantly, social media is kept out of political space in Japan and there are lower adoption rates of social media platforms.

Table 5. Characteristics of High Income, Higher Fertility Countries

Country Name	Income Category	Fertility Category	Fertility Rate	Composition of Economy	Evidence of Pronatalist Policy
Bahrain	High	EDD	2.0 (2018)	Petroleum sector accounts for about 85% of Bahraini budget revenues	Unknown
Israel	High	EDD	3.1 (2018)	Major economic sectors are high-technology and industrial manufacturing	Yes; sophisticated
Panama	High	EDD	2.5 (2018)	Services in trade and finance, and shipping incl. Panama Canal	Unknown
Saudi Arabia	High	EDD	2.3 (2018)	Petroleum sector accounts for roughly 87% of Saudi budget revenues.	Unknown

Source: World Bank, CIA World Factbook

The only countries that can maintain relatively high fertility and high income are countries in which the economy does not depend on human capital, or maintains very targeted pronatalist policies which provide a comprehensive care infrastructure for subsets of the population to maintain very high fertility

This suggests a link between the long-lasting nature of extremist ideology enforcing strict gender norms and access to natural resources – oil-fueled ideologies. OPEC countries maintain communities practicing strict gender ideologies; conservative Christian ideologies are upheld by oil-related business people and American deniers of climate change often also self-identify as "Christian"; the current Anglican Archbiship of Canterbury was a former oil executive. This links the desire to exploit natural resources with the desire to socially reproduce a society that maintains strict gender norms of care; this is the only way it can be maintained.

The exception is Israel, which maintains a sophisticated pro-natalist welfare state and also subsidizes unique subpopulations of citizens who do not work and have very high fertility rates.

Overall, I argue that preserving care infrastructure through enforcing gender norms of care labor, while citing social reproduction goals, can enhance productivity under certain conditions, and detract in others. Sometimes preserving care infrastructure through

enforcing gender norms of care labor, while citing social reproduction goals, happens to further the goals of economic growth; or at least comes at no perceivable cost.

But for those economies that do not depend on natural resources for state wealth, and rely more on human capital, investing in care infrastructure would be productivity-enhancing, while enforcing gender norms of care labor would be productivity-detracting.

Implications for Western, liberal political economies. While social conservatives in the both Western and non-Western societies discuss the defraying of 'traditional values' and 'traditional marriages' and mount political movements around these values, I argue that the ongoing project of Western liberal democracies is to develop a coherent political philosophy and realized institutional care infrastructure that promotes greater economic efficiency and resilience. This is done by promoting an agenda of inclusion of people from different backgrounds and supports their goals for social reproduction. This includes opening up opportunities for people from different backgrounds to enter occupations and industries that were normally closed off from them to not only ensure socio-economic mobility, but also to ensure long-term innovative capacity for the economy.

The weakening of the infrastructure of care happens when something else is held inflexible or inelastic – specifically, the deeply held social and cultural beliefs that females are best suited, on the margin or absolutely, to providing care work; this point motivates the policy principles I outline for high-income Western liberal democracies.

I argue that limiting female opportunity is not only antithetical to most Western political philosophies, it is also inefficient for economies that depend on human capital and leads to economic stagnation.

An example of this is modeled in Doepke and Tertilt (2009). It develops a model showing how allowing women's political empowerment is in the interests of patriarchy when an economy is experiencing greater income and wage returns to education and which needs females to be more educated to be able to better educate their own and other children.

But for democratic capitalist countries who are interested in lifting themselves out of long-term stagnation or pandemic depression, the solution is a fundamental shift in thinking and priorities about the importance of care infrastructure.

In the current historical moment, with the female share of human capital at its highest ever and with no signs of slowing and the production of the highest value goods and services requiring more human capital, pursuing conservative social and political ideology is an unstable equilibrium for generating care infrastructure to keep fertility high. This is because females in conservative societies have the means to opt out of the institutions of traditional

marriage and motherhood, two institutions that are closely connected, with the starkest example being South Korea.

The mixture of conservative religion and a liberal, Western, democratic state will not bring about a favorable equilibrium. A state that only uses religious institutions or other conservative institutions to provide care infrastructure is not a going to produce the desired equilibrium; those who do not adhere to religious doctrine are then left at a disadvantage in terms of access to care infrastructure. To the extent the more highly skilled do not adhere to religious doctrine, the more inequality in fertility this will produce, which exacerbates the forces of secular stagnation.

Governments can provide care infrastructure, not necessarily to promote religious ideology, but to promote the various goals of individual freedom, and economic and political stability. For both philosophical reasons and economic reasons, I argue that Western liberal democracies must be involved in organizing and funding care infrastructure. Doing so would fulfill both the political philosophies of equal access to opportunity and improve long-term economic growth.

Family policy in Scandinavian countries that promote both aggregate labor supply and fertility, which weakens the forces behind secular stagnation, can serve as useful guides and interesting counterfactuals for other Western democratic economies. The "Liberal" countries, with higher rates of immigration and higher structural inequality, also need to consider the role of structural racism and other mechanisms of structural inequality when considering their conditions of secular stagnation.

Gendered care infrastructure hurts not only economic growth but also the interests of social reproduction by depressing fertility rates. This is an irony when considering that the original logic behind gendered norms of care labor is to maintain a care infrastructure that preserves higher fertility rates. But, inevitably, when females begin to receive more opportunity through increased rights, access to education, and access to wage-earning opportunities, this increased opportunity occurring with care responsibilities focused on females has consequences.

In the next section, I discuss policy principles and policy recommendations for Western liberal democracies interested in promoting both individual liberty and economic growth, and who are willing to loosen gendered norms of care labor to pursue those goals.

Section 7. Policy Principles.

In this section, rather than putting forward specific policy recommendations, I outline some policy principles, that would help guide policymakers in building a "care infrastructure" that would help lift advanced economies out of stagnation.

The goal of these principles would be to diversify the burden of unpaid care work that would in the long term, reduce various financial and economic costs in the aggregate economy, such as loss of skills during interruptions; losses from inefficient sorting into occupations; lost future earnings opportunities, and economic stagnation from too low-fertility and too-high savings rates.

More specifically, the counterfactual I consider is the social planner problem that would allocate care responsibilities in the economy to minimize costs of skill accumulation and occupational sorting so that sorting is closer to true comparative advantage, costs from disutility derived from preferences, and the costs of skill atrophy (lost returns to linear occupations), given realistic initial conditions of stocks of physical and human capital, *without regard to gendered or other socialized norms of caregiving*.

Most policy counterfactuals take as given the social norms about who should bear the care burdens in a family, extended family, or local community. Rather than holding constant gender norms of who sorts into paid and unpaid care work when optimizing economic policy, should either specify norms of care labor as a choice variable to optimize, or allow individuals to sort into care labor by a measure of true comparative advantage, rather than through social norms.

However, depending on one's perspective, the "downside" is that this optimization has more degrees of freedom, and has more potential solutions. Perhaps there could be several local optimums, and more than one global optimum. But because of path dependence, it may be very costly to move beyond local maxima.

Diversifying care work responsibilities across sectors, whether it be the public sector, private sector, or informal arrangements, and across subpopulations that adheres to productivity-focused comparative advantage in care labor, rather than social norms, should improve both aggregate growth and social reproductive outcomes like fertility.

Governments, communities, and employers all have a role to play in improving the real productivity of the economy and lifting economies, firms, and households out of stagnation.

The following policy principles would encourage a reallocation of the distribution of care responsibilities in an economy and society in a more sustainable and productivity-enhancing

way, unlock growth, spur investment, directly and indirectly, through spillovers to other parts of the economy.

Government spending is key to lifting advanced economies out of stagnation in the current zero to negative real interest rate environment. Given the prevailing macroeconomic environment of secular stagnation even before the pandemic, and with the depression of aggregate demand in the current pandemic, government spending, and in particular infrastructure spending, is considered key to one of the main policy recommendations for advanced economies to address secular stagnation, particularly in the current period of pandemic recession[27].

In the midst of this unprecedented pandemic recession, mainstream economists are reconsidering their views about monetary and fiscal policy. In a time of stagnation that has been widely acknowledged by economists of all different leanings, most economists are calling on advanced economies to use fiscal policy, as continued sub-zero to real interest rates limit the ability of central banks to stimulate aggregate demand through interest rate reductions and quantitative easing. High-profile economists are calling for massive fiscal stimulus[28].

fiscal policy and government spending were the proper tools to address economic stagnation before the pandemic, and these tools are even more important with the pandemic.

Signs of macroeconomic stagnation were noticed before the pandemic happened, with mainstream economists noting the decreased effectiveness of traditional monetary policy tools, and the increasing importance of fiscal policy, i.e. government spending (Summers 2015; Eggertsson, Mehrotra, and Summers 2016).[29]

In the current environment of zero to negative neutral interest rates, which is projected to remain low for much longer than previously forecast before the arrival of the pandemic, systematic fiscal investment in the "infrastructure of care" would not only stimulate the economy in the short-term, but also be as productive or more productive than physical infrastructure investments.

The typical argument against massive fiscal investment is that while low interest rates mean fiscal spending for health care, pensions, climate change, etc. is cheaper, they also leave

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27 "Infrastructure and private investment are the best ways to both minimize the risk of secular stagnation and raise demand", writes Lawrence Summers in Summers (2015).

28 A recent example is a working paper titled "A Reconsideration of Fiscal Policy in the Era of Low Interest Rates". (https://www.brookings.edu/wp-content/uploads/2020/11/furman-summers-fiscal-reconsideration-discussion-draft.pdf)

29 There have been many articles and research papers written about the importance of fiscal intervention during secular stagnation. Also see various articles written by *The Economist* and the *Economist Intelligence Unit*.

governments dependent on loose monetary policy and vulnerable to rising interest rates, should they ever return. Because of zero or even negative natural rates (the rate that balances savings and investment without a prolonged recession or boom), central banks are deprived of their traditional tool for fighting recessions, that is, lowering short-term interest rates. Even central bank bond-buying will be of limited effectiveness because interest rates are so low. Macroeconomists overwhelmingly agree that economic recovery hinges on the willingness of governments to provide an adequate fiscal response.

But various economists have pointed out the pre-pandemic and post-Great Recession environment of zero to negative interest rates and low inflation leaves very few tools for traditional monetary policy that central banks use to stimulate demand. With real interest rates at zero or negative, central banks cannot lower interest rates any more. Further, central banks have already carried out quantitative easing measures that still have not stimulated demand and investment and reduced savings rates, and there is little room remaining for QE measures. Summers and other economists broadly agree in the importance of fiscal policy, i.e. government spending, to stimulate demand and reduce saving.

Investment in care infrastructure is more productive in ecosystems and economies in which human capital is the most important factor of production. A second policy principle is that investment in care infrastructure is more productive in ecosystems and economies in which human capital the most important factor of production. Richer models and estimates of household family labor supply and bargaining show that direct transfers to caregivers, usually in the form of transfers to females in developing countries, are beneficial when human capital is the most important factor of production in an economy. Doepke and Tertilt (2011) develop a noncooperative bargaining model of the household showing that targeting transfers to caregivers may be beneficial or harmful depending on the economywide production function. They find that transfers are more likely to be beneficial when human capital, rather than physical capital or land, is the most important factor of production. Indeed, they find transfers to women lead to an increase in spending on children at the expense of a decline in savings rates – a desired outcome for high income countries experiencing a secular stagnation with savings demand too high resulting in zero to negative real interest rates and low inflation. On a micro scale, it is not a coincidence that skill-intensive, high-wage firms spend a lot on care infrastructure for their employees and their employees' families.

Policies that are able to relieve the care responsibilities for very young children will be particularly productivity-enhancing. These types of programs will promote overall health and education levels, lessen inequality, and have a high return, in addition to relieving care burdens. In fact, many economists argue that investment in early childhood care and

education in underprivileged contexts suffer no tradeoff between efficiency and equality. Affordable, easily accessible early education, which also doubles as a form of child care has been carefully studied by researchers from various disciplines, and the results unanimously show long-lasting effects for children from less-resourced households.

For economies that suffer from high inequality, publicly provided care and education for early childhood will produce more growth than relying on the private sector. There are many models showing that high levels of differential fertility across education and income levels reduces growth, and there is much public debate surrounding the extent to which this is depressing growth in advanced economies. de la Croix and Doepke (2004) build and calibrate a model showing that when inequality is high, fertility differentials will depress growth; public education dominates private education in increasing growth. For high-income economies with high inequality and too-low real interest rates, government spending on early childhood care and education will be among the highest return infrastructure investments that can be chosen.

Invest in measurement and research about the productivity of various care subsectors and their spillover effects to other parts of the economy to ensure effective spending on care infrastructure. There is not enough research, measurement, and understanding about how the full care infrastructure affects the rest of the economy, particularly the "progressive" sector that is associated with innovation and economic growth. While there is research on how increasing access and quality of healthcare and education has positive effects, there is not enough research on how effective criminal justice systems, law enforcement, mentorship programs, and other types of care ecosystems contribute to productivity in other sectors of the economy.

Measurement and research should be subsidized by a government that is first concerned about "seeing" the mostly invisible infrastructure of care and, secondly, concerned about efficient investment.

Better measurement about the productivity of the care sector and its spillover effects would allow (force) an economy and society to "see" the underlying infrastructure of care that undergirds both economic production and social reproduction. How does a state "see"? By its "statistics" – the word statistics is actually derived from "state".

Suggestions to begin would include a systematic classification of occupations into the care, tracking of the number of employees and sex ratio of these occupations, and developing holistic productivity estimates for various care subsectors that can be defined as intersections of occupations and industries.

This would be applied to not only health and education, the subject of a much labor economics research, but also police departments, criminal justice systems, counterterrorism and domestic security agencies. The measurement of care work could even be decomposed into different types of tasks, with wages and selection into tasks similarly commensurate. For example, there can be routine care work, manual care work, and abstract care work. Thus, an analytical agenda would be to track the wages of different occupations that are comprised of different proportions of care work to estimate a wage for these different types of care work.

Care infrastructure policies and programs can then be held accountable to real improvements in productivity in households and the rest of the economy. With objective measurements of care labor and care sector productivity, gendered and socialized norms of care that lead to undiversified care infrastructure are more easily loosened.

Research on the productivity effects of care infrastructure would likely be interdisciplinary, and must be subsidized. For example, the research and wisdom collected from Elinor Ostrom's research on self-governance of common pool resources should be integrated into policy making about care infrastructure. Because care and the care sector is an interdisciplinary endeavor, rigorous interdisciplinary collaborations must be encouraged.

Investment in care infrastructure should be evaluated on its ability to diversify care responsibilities for primary caregivers. A third policy principle is that care infrastructure should be evaluated based on how much time it is able to free up because it relieves workers some subset of the care responsibilities. Care infrastructure would give working parents, particularly working mothers, more time, as opposed to money, is more effective. This is because time is the marginally more scarce and less substitutable resource, relative to money, and would be more effective in increasing aggregate labor supply, particularly for skilled caregivers (usually females) engaged in abstract work. It would boost aggregate labor supply, improve competition in the skilled labor market, and have positive spillovers.

Explicit or implicit pro-natalist policy in the form of cash transfers for children, universal basic income (unconditional cash transfers), and a "living" wage/income can serve goals of social reproduction and fiscal stimulus quite well, but are likely not as efficient (productive) in increasing both fertility and economic productivity in other sectors as care policies and programs that more directly relieve and diversify the care responsibilities of primary caregivers.

In addition, given the current environment of too much demand for savings, income transfers are at risk of increasing savings rather than being spent on productivity-enhancing inputs if proper care infrastructure is not in place – if there are no realistic alternative to child care available, then households would just save the money. And, based on the previous

ADS (2017) model, the productivity effects would be particularly large for primary caregivers trained in abstract and skilled work who can select into occupations that generate highly nonlinear returns to working attachment.

For high skill females, the government can encourage the private sector to provide more child care-related benefits through subsidies and tax breaks.

Targeted programs by employers or governments to make childcare affordable and accessible for parents, particularly females, in nonlinear occupations could be relatively more effective. These could be requirements and funding to provide access to nearby daycare centers close to workplaces, either directly or indirectly. I also note that a common argument against directly subsidized childcare is that the additional tax revenue generated by the increase in maternal LFP is not sufficient to cover the costs of expanding subsidized child care, and I argue this can be alleviated for the targeting of benefits to the subpopulation of highly skilled workers in "abstract" occupations.

Government-funded and supported care infrastructure policies and programs should work to relax, rather than reinforce and reproduce, gender and other social norms around care work that are not related to safety and productivity indicators. This policy principle is the most politically sensitive, as it touches on very fundamental ideas and discourse within the social reproduction aims of various culture and nation-states. These are necessarily difficult discussions because doing this often conflicts with the social reproduction goals of many conservative ideologies and institutions. For reasons of efficiency and productivity these norms need to be loosened in favor of allowing individuals to select into occupations according to real comparative advantage. Allowing individuals to select into sectors by true comparative advantage, rather than traditional gender norms of caregiving, would improve productivity in all sectors, including the household production sector in which the work of social reproduction is done.

Well-intentioned policies that have "unintended consequences" of de jure or de facto reproducing and reinforcing gendered norms of care work will not be as effective in addressing stagnating fertility and growth in the long-term. One noted example of this is either more generous parental leave given to mothers or parental leave given to fathers that are opt-in policies. These policies depress female labor supply and in equilibrium, induce employers to recruit, hire, and promote childbearing-age females at lower rates. They also depress female representation in the competitive leadership positions in the "nonlinear" innovation sectors.

A notable example is how Japan and Korea, with among the lowest fertility rates in the world, also have the longest paid father-specific leaves among high-income countries, at

around 12 months (52 weeks) [30]. Meanwhile, the gender rate in take-up of parental leave rate is dismal, as father-specific leaves are not mandatory; in Japan, only around 3% of employed new fathers in Japan take advantage of the leave.[31]

Both men and women need to more equally represented in the work of care, particularly of the unique isolation and emotional needs of men in patriarchal societies or 'macho' subcultures. the nature of care services towards competitiveness and value not only improves the number of male applicants for social work jobs, it also improves the quality of the applicant pool. The most vulnerable people in society are veterans, male, mentally ill and homeless.

But the public discourse around these issues can be difficult, as gendered norms of care work relate to issues about "toxic masculinity", which is controversial concept.

These recommendations align with other social theorists calling for a fundamental rethinking of who can do care work must also accompany this government investment and involvement in the care infrastructure, and I argue there is economic merit to this "social engineering". There is a growing body of research showing how lowering discrimination against women and minorities in different sectors of the economy since the 1960s helped long-term US productivity growth; this logic can be used to show that re-imagining men to be a critical part of care infrastructure can improve real economic productivity. For example, one recent paper suggests that shifting.

But for democratically run countries to uphold both freedom and economic resilience and growth, the population must agree to the relaxing of gendered norms of care work.

Care infrastructure that exhibit properties of common pool resources must be carefully managed as common pool resources. Policymakers should actively collect and learn from the various examples of those who have studied the various governance strategies for managing common pool resources, or from local community examples directly. Studying examples of effective ways in which local police departments, judicial systems, health care networks, care cooperatives, etc. is important. non-renewable natural resources are collectively governed, for inspiration on how to manage, govern, and strengthen an economy's care infrastructure.

Therefore, the design, funding, and governance of care infrastructure should draw from the best research around both local and top-down governance of common pool resources.

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[30] According to the OECD Family Database

[31] Nakazato, H., Nishimura, J. and Takezawa, J. (2018) 'Japan country note', in Blum, S., Koslowski, A., Macht, A. and Moss, P. (eds.) International Review of Leave Policies and Research 2018. Available at: http://www.leavenetwork.org/lp_and_r_reports/

Towards those ends, national government policy should empower subnational governments while maintaining and enforcing minimum standards. The role of the federal government is to help subnational and local communities organize and fund care, and these minimum standards should relate to ensuring that gendered, racialized, and other social norms norms of care work that are unrelated to productivity indicators should be relaxed. Government support for gender- and race-neutral care would go a long way towards relaxing the gender norms. Just as the hiring and deployment and skilled knowledge labor should be race-neutral, gender-neutral, etc. outside of the minimal requirements for the job, so should the hiring and deployment be neutral to these characteristics for paid care labor.

But this neutrality to gender, race, and other identity categories is "radical" in that it fundamentally redefines the social spaces in which individual and collective agents operate. It is also "radical" in that it can shape the bargaining power of groups and individuals that belong to them. These policies will also have the effect of equalizing access to care infrastructure. Just as improving and equalizing access to economic opportunities like education, jobs, and healthcare is a wise long-term investment in a developed economy, so much improving and equalizing access to care resources.

Nurturing and supportive care services and workers should be embedded in the "discipline and punish" care subsectors in prober balance. The ecosystems of law enforcement and criminal justice system should include the proper balance of "nurture" activity. Judicial processes are often extremely inefficient, generating large legal and emotional costs for everyone involved. Furthermore, judicial time discriminating between cases and situations is a common pool resources, and it can be abused.

Care workers in this context can be used to lift the strain on judicial services. These could include mediators and conflict resolution experts that would be integrated into the legal process.

There should be "care reservist" workers who are already trained to be deployed within local infrastructure of emergency first response for efficiency response to localized disaster and emergency situations. This happens to align with some of the policy priorities of a well-known US-based activist movement called "Defund the Police". Indeed, the demands of protesters earlier in 2020 over racial inequality in the treatment of the black community by local police can be interpreted as a demand that the care infrastructure provided by the police serve the black community better. From the perspective of care infrastructure, demands to "defund the police" in favor of more funding for social and health services is simply a re-allocation of funding from one type of care infrastructure towards another. It is important to learn from principles of self-organizing governance for these goals of equal access to justice and opportunity to be realized.

Professional mentorship in all sectors, particularly for under-represented groups is a valuable type of care work, and can be turned into an "infrastructure". There has been work showing positive productivity-enhancing consequences for certain affirmative action policies in hiring, and I argue that affirmative action policies that had long-lasting positive consequences did so because it created an "infrastructure" of professional networks that opened opportunities for under-represented groups. Another example is the positive consequences of mentorship on publications and successful grant applications for female assistant professors in economics (Blau et al. 2010).

Section 8. Conclusion

The pandemic has laid bare the fragile infrastructure of care that underlies every advanced economy. Meanwhile, with real interest rates at zero or negative currently, and low interest rates in the foreseeable future, traditional policymaking tools of central bank and monetary authorities have been rendered relative effective. Government spending to stimulate demand and labor supply is vital.

Looking past the immediate spending needed to shore up the short-term health and education infrastructure to help economies recover, I argue that the marginal impact of every dollar spent on care infrastructure targeted towards working parents with young children might be higher or just as high as the marginal dollar spent on public/transport infrastructure and "green economy infrastructure, especially in the low-infrastructure context of the U.S.

There would be numerous positive productivity effects and start a virtuous cycle of growth. Government spending on care infrastructure would generate clear improvements on the determination of the level and volatility of employment, the factors shaping the national savings rate, the sources of macroeconomic inequality, and the origins of economic growth. Bringing about more available and affordable education and childcare options for families could improve female labor supply elasticity, and thus gender wage gaps, as there is growing suggestive evidence that child care and education availability are behind greater inelasticity of labor supply for females for particular firms.

There could even be observable improvements in measures of innovation in the "progressive" sectors of the economy.

In the longer term, advanced economies must begin to measure and analyze the role of care infrastructure in supporting innovation and long-term, sustainable economic growth.

At stake are not just productivity surges in other sectors of an economy, but also issues of national security, domestic stability, political legitimacy, and international influence; maintaining and developing an infrastructure of care is as critical to national security as maintaining technological dominance from a military perspective. National security depends on trust between the governing and the governed, and that trust can only be created if the social contract between the governing and the governed includes a proper infrastructure of care.

References

Adda, Jérôme, Christian Dustmann, and Katrien Stevens. 2017. "The Career Costs of Children." *Journal of Political Economy* 125 (2): 293–337. https://doi.org/10.1086/690952.

Albanesi, Stefania. 2019. "Changing Business Cycles: The Role of Women's Employment." w25655. Cambridge, MA: National Bureau of Economic Research. https://doi.org/10.3386/w25655.

Alesina, Alberto, Paola Giuliano, and Nathan Nunn. 2013. "On the Origins of Gender Roles: Women and the Plough *." *The Quarterly Journal of Economics* 128 (2): 469–530. https://doi.org/10.1093/qje/qjt005.

Andersson, Gunnar. 2000. "The Impact of Labour-Force Participation on Childbearing Behaviour: Pro-Cyclical Fertility in Sweden during the 1980s and the 1990s." *European Journal of Population / Revue Européenne de Démographie* 16 (4): 293–333. https://doi.org/10.1023/A:1006454909642.

Barro, Robert J., and Jong Wha Lee. 2013. "A New Data Set of Educational Attainment in the World, 1950–2010." *Journal of Development Economics* 104 (September): 184–98. https://doi.org/10.1016/j.jdeveco.2012.10.001.

Baudin, Thomas, David de la Croix, and Paula E. Gobbi. 2015. "Fertility and Childlessness in the United States." *The American Economic Review* 105 (6): 1852–82.

Baumol, William J. 1967. "Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crisis." *The American Economic Review* 57 (3): 415–26.

Bayer, Patrick, Peter Q. Blair, and Kenneth Whaley. 2020. "The Impact of School Finance Reforms on Local Tax Revenues." *AEA Papers and Proceedings* 110 (May): 416–18. https://doi.org/10.1257/pandp.20201112.

Bayham, Jude, and Eli P Fenichel. 2020. "Impact of School Closures for COVID-19 on the US Health-Care Workforce and Net Mortality: A Modelling Study." *The Lancet Public Health* 5 (5): e271–78. https://doi.org/10.1016/S2468-2667(20)30082-7.

Bertrand, Marianne, Claudia Goldin, and Lawrence F. Katz. 2010. "Dynamics of the Gender Gap for Young Professionals in the Financial and Corporate Sectors." *American Economic Journal: Applied Economics* 2 (3): 228–55. https://doi.org/10.1257/app.2.3.228.

Bertrand, Marianne, Emir Kamenica, and Jessica Pan. 2015. "Gender Identity and Relative Income within Households *." *The Quarterly Journal of Economics* 130 (2): 571–614. https://doi.org/10.1093/qje/qjv001.

Blau, Francine D., Janet M. Currie, Rachel T. A. Croson, and Donna K. Ginther. 2010. "Can Mentoring Help Female Assistant Professors? Interim Results from a Randomized Trial." *American Economic Review* 100 (2): 348–52. https://doi.org/10.1257/aer.100.2.348.

Brooks, Kim. 2020. "Opinion | Feminism Has Failed Women." *The New York Times*, December 23, 2020, sec. Opinion. https://www.nytimes.com/2020/12/23/opinion/coronavirus-women-feminism.html.

Coskun, Sena, and Husnu Dalgic. 2020. "The Emergence of Procyclical Fertility: The Role of Gender Differences in Employment Risk," 38.

Croix, David de la, and Matthias Doepke. 2003. "Inequality and Growth: Why Differential Fertility Matters." *The American Economic Review* 93 (4): 1091–1113.

———. 2004. "Public versus Private Education When Differential Fertility Matters." *Journal of Development Economics* 73 (2): 607–29. https://doi.org/10.1016/j.jdeveco.2003.05.005.

Doepke, M., and M. Tertilt. 2016. "Chapter 23 - Families in Macroeconomics." In *Handbook of Macroeconomics*, edited by John B. Taylor and Harald Uhlig, 2:1789–1891. Elsevier. https://doi.org/10.1016/bs.hesmac.2016.04.006.

Doepke, Matthias, and Fabian Kindermann. 2019. "Bargaining over Babies: Theory, Evidence, and Policy Implications." *American Economic Review* 109 (9): 3264–3306. https://doi.org/10.1257/aer.20160328.

Doepke, Matthias, and Michèle Tertilt. 2009. "Women's Liberation: What's in It for Men?*." *The Quarterly Journal of Economics* 124 (4): 1541–91. https://doi.org/10.1162/qjec.2009.124.4.1541.

———. 2011. "Does Female Empowerment Promote Economic Development?" In . Policy Research Working Papers. The World Bank. https://doi.org/10.1596/1813-9450-5714.

Eggertsson, Gauti B., Neil R. Mehrotra, and Lawrence H. Summers. 2016. "Secular Stagnation in the Open Economy." *American Economic Review* 106 (5): 503–7. https://doi.org/10.1257/aer.p20161106.

Fernández, Raquel. 2013. "Cultural Change as Learning: The Evolution of Female Labor Force Participation over a Century." *American Economic Review* 103 (1): 472–500. https://doi.org/10.1257/aer.103.1.472.

Fogli, Alessandra, and Laura Veldkamp. 2011. "Nature or Nurture? Learning and the Geography of Female Labor Force Participation." *Econometrica* 79 (4): 1103–38. https://doi.org/10.3982/ECTA7767.

Folbre, Nancy. 2021. *The Rise and Decline of Patriarchal Systems*. Verso Books.

Fraser, Nancy. 2016. "Contradictions of Capital and Care." *New Left Review* 100 (August): 99–117.

Gauthier, Anne H. 2002. "Family Policies in Industrialized Countries: Is There Convergence?" *Population* Vol. 57 (3): 447–74.

Hsieh, Chang-Tai, Erik Hurst, Charles I. Jones, and Peter J. Klenow. 2019. "The Allocation of Talent and U.S. Economic Growth." *Econometrica* 87 (5): 1439–74. https://doi.org/10.3982/ECTA11427.

Jang, Youngsoo, and Minchul Yum. 2020. "Nonlinear Occupations and Female Labor Supply Over Time," 56.

Kleven, Henrik, Camille Landais, and Jakob Egholt Søgaard. 2019. "Children and Gender Inequality: Evidence from Denmark." *American Economic Journal: Applied Economics* 11 (4): 181–209. https://doi.org/10.1257/app.20180010.

Ostrom, Elinor. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge University Press.

———. 2009. "A General Framework for Analyzing Sustainability of Social-Ecological Systems." *Science* 325 (5939): 419–22. https://doi.org/10.1126/science.1172133.

Ramey, Valerie A. 2009. "Time Spent in Home Production in the Twentieth-Century United States: New Estimates from Old Data." *The Journal of Economic History* 69 (1): 1–47.

Rocha, José María Da, and Luisa Fuster. 2006. "Why Are Fertility Rates and Female Employment Ratios Positively Correlated Across O.e.c.d. Countries?*." *International Economic Review* 47 (4): 1187–1222. https://doi.org/10.1111/j.1468-2354.2006.00410.x.

Sen, Ali. n.d. "Structural Change within the Services Sector, Baumol's Cost Disease, and Cross-Country Productivity Differences," 138.

Summers, Lawrence H. 2015. "Demand Side Secular Stagnation." *The American Economic Review* 105 (5): 60–65.

The Economist. 2020a. "The Eternal Zero," October 8, 2020. https://www.economist.com/special-report/2020/10/08/the-eternal-zero.

———. 2020b. "The Pandemic May Be Leading to Fewer Babies in Rich Countries," October 28, 2020. https://www.economist.com/international/2020/10/28/the-pandemic-may-be-leading-to-fewer-babies-in-rich-countries.

Young, Alwyn. 2014. "Structural Transformation, the Mismeasurement of Productivity Growth, and the Cost Disease of Services." *The American Economic Review* 104 (11): 3635–67.

Appendix – Figures and Tables

Figure A1. OECD Education Spending, Tertiary, USD/student, 1995-2016

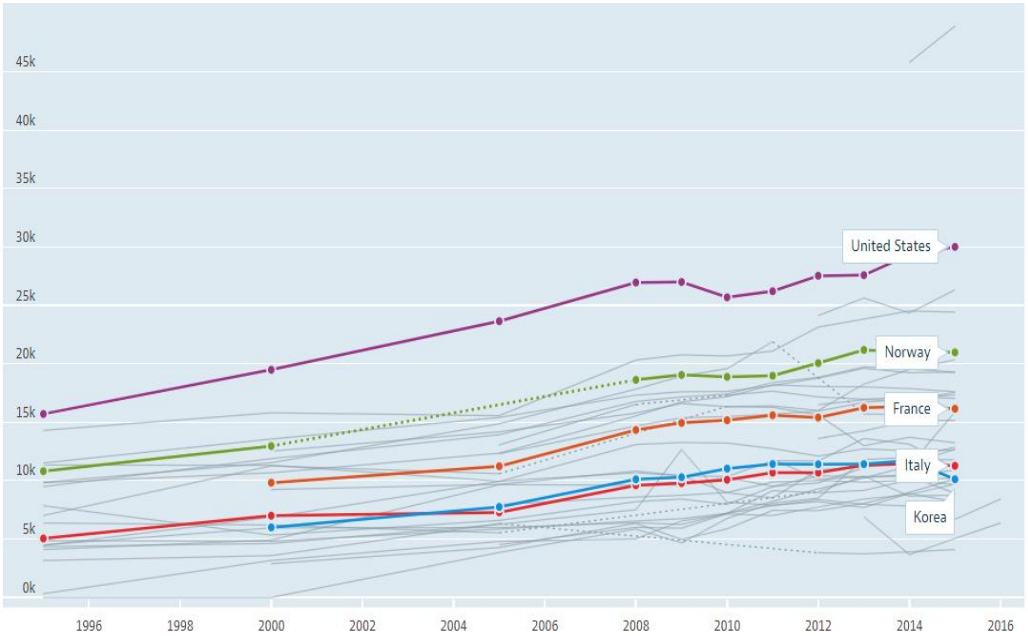
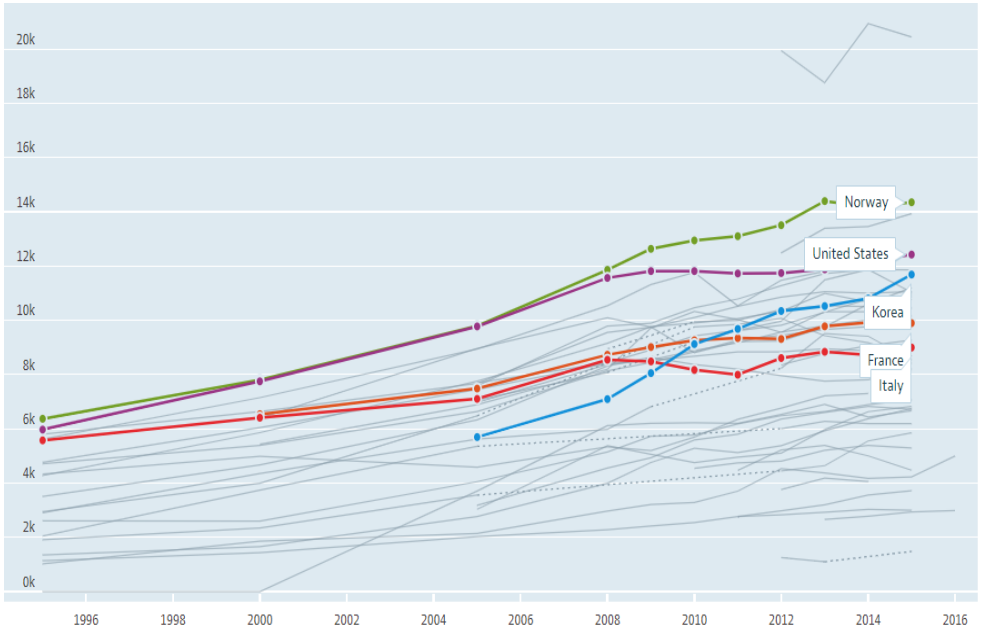
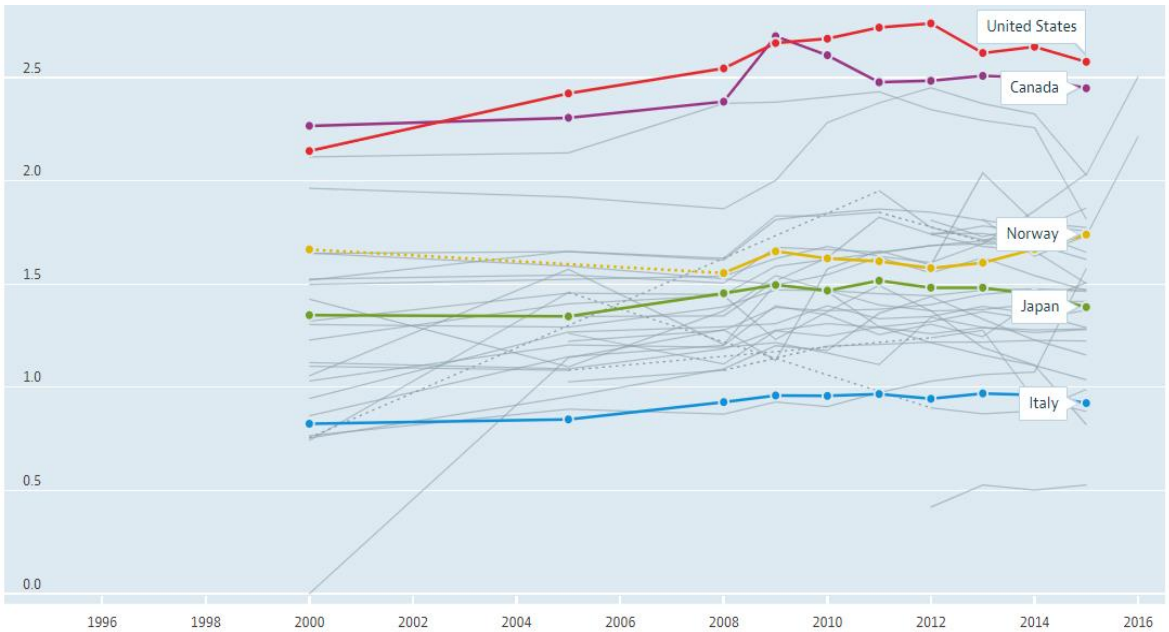


Figure A2. OECD Education Spending, Primary to Post-Secondary Non-Tertiary, USD/student, 1995-2016



Note: Education spending covers expenditure on schools, universities and other public and private educational institutions. Spending includes instruction and ancillary services for students and families provided through educational institutions. Spending is shown in USD per student and as a percentage of GDP.

Figure A3. OECD Education Spending, Tertiary, % of GDP, 1995-2016



Source: OECD (2020), Education spending (indicator). doi: 10.1787/ca274bac-en (Accessed on 26 December 2020)
Note: Education spending covers expenditure on schools, universities and other public and private educational institutions. Spending includes instruction and ancillary services for students and families provided through educational institutions. Spending is shown in USD per student and as a percentage of GDP.

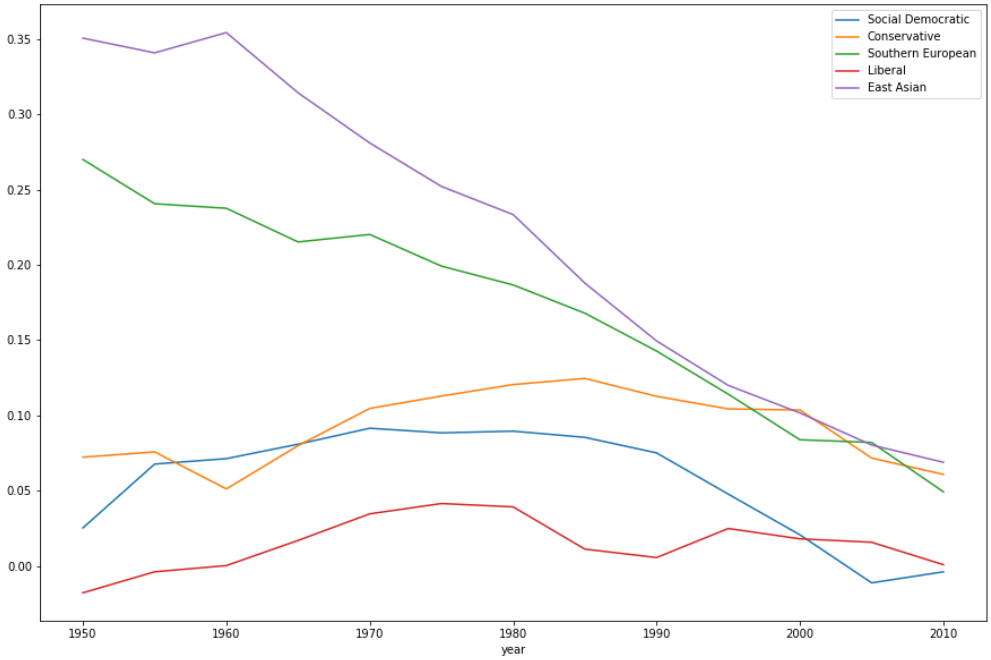
Table A1. Total public spending on early childhood education and care, in per cent of GDP, 2000-2015

Country	2000	2005	2010	2015	2000-2015 change
Korea	0.08	0.15	0.62	0.95	1084%
Latvia	0.08	0.09	0.76	0.76	857%
Lithuania	0.09	0.67	0.79	0.79	757%
Estonia	0.12	0.26	0.34	0.76	525%
Poland	0.23	0.28	0.48	0.61	165%
Iceland	0.81	1.14	1.58	1.80	121%
Chile	0.25	0.27	0.43	0.55	120%
Norway	0.69	0.76	1.21	1.33	93%
Austria	0.27	0.28	0.45	0.51	90%
Germany	0.33	0.37	0.46	0.60	82%
Netherlands	0.33	0.53	0.84	0.60	82%
Luxembourg	0.41	0.39	0.53	0.74	81%
Turkey	0.08	0.10	0.15	0.15	81%
New Zealand	0.53	0.57	0.93	0.94	79%
Australia	0.38	0.38	0.52	0.66	74%
Belgium	0.49	0.61	0.67	0.82	67%
Sweden	1.00	1.23	1.49	1.60	60%
Japan	0.29	0.31	0.35	0.44	50%
Ireland	0.22	0.28	0.48	0.32	50%
Czech Republic	0.31	0.32	0.39	0.44	43%
Israel	0.56	0.61	0.72	0.79	40%
Portugal	0.28	0.37	0.39	0.38	39%
Mexico	0.41	0.53	0.56	0.56	38%
Hungary	0.59	0.68	0.65	0.73	24%
Finland	0.93	0.90	1.03	1.13	21%
Slovak Republic	0.42	0.39	0.41	0.50	18%
Spain	0.43	0.42	0.54	0.50	16%
Italy	0.48	0.50	0.52	0.56	15%
France	1.25	1.20	1.21	1.32	5%
United Kingdom	0.64	0.76	0.77	0.65	1%
Denmark	1.37	1.32	1.24	1.23	-11%
United States	0.39	0.33	0.38	0.33	-16%
Slovenia	0.60	0.53	0.49	0.49	-19%

Source: OECD Social Expenditure Database

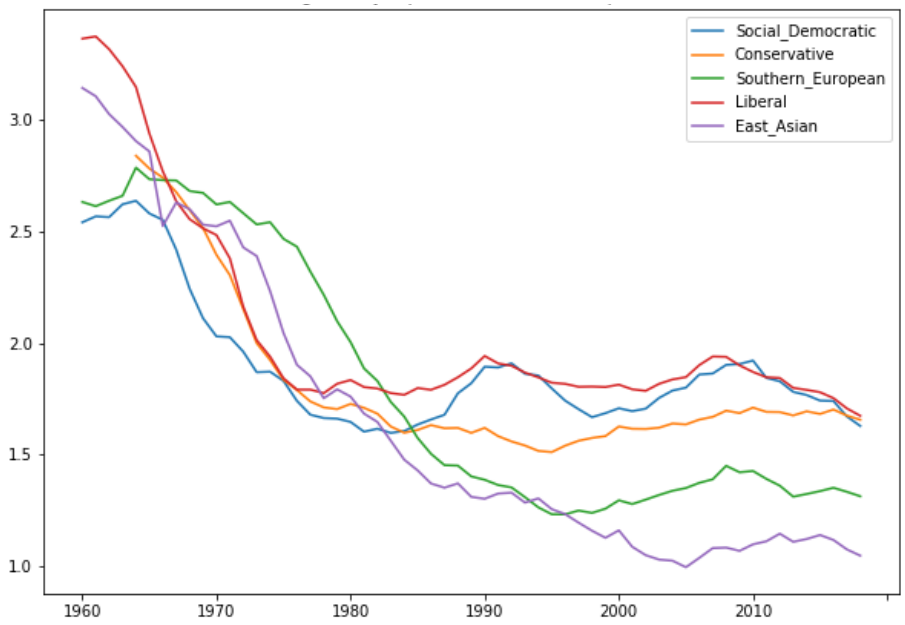
Note: Canada, Greece, Switzerland not available. In some countries local governments play a key role in financing and providing childcare services. Such spending is comprehensively recorded in Nordic countries, but in some other (often federal) countries it may not be fully captured by the OECD social expenditure data.

Figure A4. Average Gender Gap in Years of Schooling in High-Income Countries by Policy Regime



Source:
Note: Countries are weighted by square root of 1960 population.

Figure A5. Fertility in High Income Countries by Policy Regime



Source:
Note: Countries are weighted by square root of 1960 population.