Economic Foundations of Contraceptive Transitions: Theories and a Review of the Evidence

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Abstract. We review the foundations of the economic development-contraception nexus, focusing on the pathways through which economic factors drive contraceptive adoption and change. We investigate the channels through which the relationship between economic development and contraceptive dynamics are mediated. Using global data, we document the correlations between economic development and contraception transitions over time and across geographies. We briefly examine the evidence of the role of fertility, both desired and realized, as a central pathway through which the relationship has been historically theorized and empirically verified. We also discuss a range of mechanisms through which economic development drives contraceptive use independently from fertility decline. Finally, we assess the state and quality of evidence of these relationships and propose directions for future inquiry.

Keywords: contraception; economic models; fertility; family planning; contraceptive transition; development

1. Introduction

Contraception, fertility, and economic development are inextricably linked. While some of the links between these variables are well documented, there continues to be debate regarding the directionality of these relationships and the mechanisms that drive them. A large body of evidence has examined pathways from social and economic development to fertility, whereby contraception and family planning play a mediating role in this relationship (Canning and Schultz, 2012; Cleland et al., 2006; Guinnane, 2011). On the other hand, social and economic development may increase incomes, augment markets, and change social norms, all of which in turn may alter the demand for contraception even when fertility preferences remain constant (Abiona, 2017; Agha et al., 2021; Dettling and Kearney, 2014; Haider and Sharma, 2013; Herbert, 2015; Lovenheim and Mumford, 2013; McKelvey et al., 2012). Moreover, the relationship between contraception and development may be bi-directional, as has been highlighted by a large literature exploring the extent to which fertility change has contributed to economic development (Ashraf et al., 2013; Bloom et al., 2003; Bloom and Williamson, 1998; Coale and Hoover, 1958; Joshi and Schultz, 2007; Karra et al., 2017; Kelley and Schmidt, 1995; Lee and Mason, 2011).

We describe the links between economic development and contraceptive transitions through the lens of economic theory. To focus on the role economic development plays in contraceptive transitions, we focus on the literature describing the unidirectional channels by which economic development does (or does not) drive contraception dynamics; while we have acknowledged the bi-directional relationship, our treatment of the role of contraception on economic development in this effort is cursory. We assess the evidence on these unidirectional mechanisms and discuss the extent to which contraceptive transitions can be reasonably driven by economic development and social change. We then briefly document the empirical correlations between economic development and contraception transitions over time and across geographies, highlighting the dynamic regional variations in the relationship between economic development and contraceptive use, particularly with

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the introduction of modern contraceptive methods over the last 50 to 70 years. Finally, we describe current conceptual and evidence gaps in the literature on the links between economic development and contraceptive transitions, particularly focusing on the omitted role of the utility of contraceptive use that are external to the existing frameworks.

2. Contraception, Fertility, and Economic Development: The Ongoing Debate

2.1. **Working Definitions.** As a means to promote consistency and clarity, we preface this paper with a brief overview of key terms and definitions that we use throughout the paper. For the purposes of this paper, we specifically distinguish contraception from family planning and emphasize that though these concepts are correlated, they are by no means synonymous (even though they are often used as such), nor can one concept necessarily be subsumed into the other. **Family planning** comprises of the universe of educational, medical, and social policies, programs, interventions, and behaviors that effectively enable individuals (men, women, couples, minors, etc.) to *plan their family*, namely, to freely determine the quantum and spacing of their attempts to have children over their lifetimes and to freely select how these unconstrained latent preferences may be achieved. In this sense, contraception is one means through which individuals are able to plan their families, but it is not the only means to do so. With this in mind, **contraception**, in its broadest sense, can be defined as the universe of methods, behaviors, and practices that aim to prevent pregnancy (and not necessarily for the objective to plan a family).[1] Within this universe, contraceptive methods can be classified as either being traditional or modern, with a key distinguishing feature that traditional methods require no direct supply of commodities from providers and are primarily implemented by individual users through the adoption of behaviors (e.g. through abstinence, withdrawal, the tracking of the menstrual cycle with the rhythm method, etc.). In contrast, modern methods of contraception require additional inputs and efforts beyond individual behavior change, such as supply of a technology or commodity and/or implementation support from an external agent (e.g. a health professional or service provider). Recent work by Festin et al. (2016) have provided guidance on the classification of contraceptive methods into modern or traditional methods based on findings from a recent technical consultation conducted by the World Health Organization (WHO) and the United States Agency for International Development (USAID).

We also call for clarification when distinguishing terminology for preferences from demand and choices. Terms such as demand, supply, preferences, choices, intentions, wants, and needs – particularly in relation to fertility, contraception, and family planning – are understood differently across academic disciplines, as well as among policy makers and the general public. In our view, **preferences** are the functional mapping of an individual's unconstrained relational ranking over different alternatives. This view of preferences as a ranking over a set of possibilities in the absence of social, economic, and all other constraints differs significantly from common practice in much of the literature, where preferences are simply understood as what an individual reports they want at a given moment in time, while taking into account their specific circumstances and constraints. In this view of preferences as an ordered ranking of many alternatives rather than a single choice outcome, individuals have both relative preferences over each of the means of fertility regulation (contraception, abortion, frequency of sexual intercourse, etc.) as well as preferences within a given means of fertility regulation (e.g. choice of contraceptive method), and these preferences can vary by

[1] In following Robinson (1997)'s classification of fertility regulation, and for the purposes of this study, we do not include abortion as a contraceptive method and instead define contraception as those methods that need to be used either before or at the time of intercourse to prevent pregnancy. Here, we include emergency contraception, which may be used at the time of intercourse or immediately after, as a contraceptive method.

individual. Since these preferences are a ranking over a set of possibilities, it is completely possible for an individual to express different choices or wants at different points in time as her life situation and constraints change, without inconsistency in her underlying preferences. As part of this discussion, we note the challenges to measurement and the empirical elicitation of preferences[2] as well as the role of dynamics as preferences change over time.[3] We also note the distinction between fertility preferences (preferences over the quantum of births[4] as well as over the timing / spacing of births) from contraceptive preferences (preferences over the decision whether or not to contracept and over the choice of contraceptive method).

In this framework, we note that alternatives are costly, and these costs (broadly defined) may be different for different individuals. Each individual has constraints that may limit the extent to which they may be able to realize an alternative that they prefer without constraints - some alternatives may be infeasible because constraints are binding. An individual's **demand** for an alternative or set of alternatives is her revealed preference (i.e. her observed realized choice of method across feasible methods that could have been chosen) for the alternative in the face of constraints. An individual has a demand for an alternative if she prefers that alternative over all other feasible alternatives given her constraints. An individual does not have a demand for an alternative if: 1) an alternative is infeasible under the constraints that the she faces, or 2) if she reveal-prefers other alternatives that are feasible given her constraints. The **choice** that an individual makes over an alternative is therefore the realization of an individual's demand given her constraints. An individual's **behavior** is the empirical observation of her choice.[5]

2.2. **The Economists' View.** The first and most fundamental descriptions of the linkage between economic development and contraception were proposed through rational choice models of fertility change, most famously from the works of Gary Becker and Richard Easterlin (Becker, 1981; Becker et al., 1960; Easterlin, 1975; Easterlin et al., 1980). A significant portion of this work is founded on the "quality-quantity trade-off"

[2]Specifically, current approaches to estimating contraceptive preferences assume that latent preferences can be captured through the elicitation of stated preferences at one point in time. A large body of research in consumer behavior has shown how the direct elicitation of static measures of preferences are likely subject to significant bias (de Corte et al., 2021). In health, the general literature comparing stated and revealed preferences has found that individuals tend to overstate their valuation of a particular good, service, or outcome (hypothetical bias), which can lead to inconsistent estimates of relative value (Fifer et al., 2014). Other studies have suggested that people are inclined to express attitudes that show social responsibility (Taylor and Brown, 1994), especially when this expression does not result in actions that are binding ("cheap talk") (Kahneman and Knetsch, 1992). This may be applied to fertility preferences. If children are a social good, women may choose to overstate their fertility preference and, in turn, understate their demand for contraception. By the same token, if high fertility is perceived as individually or socially irresponsible, then a woman who may have had a latent preference for future childbearing could instead be guided to overreport her contraceptive preference. Further discussions of these approaches are presented elsewhere (Bachrach and Morgan, 2013; Karra, 2022; Müller et al., 2022).

[3]Studies by (Johnson-Hanks et al., 2018; Sennott and Yeatman, 2012) have shown that a woman's fertility intentions, which affect her contraceptive preferences, likely change over her reproductive lifetime and are sensitive to relatively small fluctuations in her environment. A woman might therefore change her mind about her preferences for both contraception and fertility frequently and over a relatively short time.

[4]Here, and throughout our paper, we distinguish the total number of pregnancies (gravidity) from the total number of births that were of a viable gestational age (parity) from the number of surviving children. When referring to "births" or "fertility" (desired or realized), we typically refer to the number of surviving children, unless otherwise noted. By the same token, we define "fertility" to reflect a woman's *completed fertility* over her entire reproductive lifetime, unless otherwise noted.

[5]Consider the following example of the distinction between preferences, demand, choice, and behavior for contraception, as we define them here. Assume an individual has the option to use an IUD, condoms, or no contraception. Their **preferences** would be the ranking of the three from most to least desired, if all constraints were removed (e.g. each could be instantly provided at no cost, there was no social stigma or pressure over the choice of options, etc.). Their **demand** would be defined as the set of option(s) they would prefer given their constraints. **Choice** is the realization of their demand. Note that demand and choice can be different in the face of supply constraints; for example, if after considering the all the costs and choosing condoms, the individual arrives at the clinic only to find that a hurricane blocked a road and that condoms were not delivered to the clinic, thereby making it impossible for her to procure the method. If the individual chose to use no contraception as a result of condoms not being available, then their demand for contraception and the choice that they realize would not be the same. Finally, **behavior** is the observation of an individual's choice.

theory as defined by Becker and Lewis (1973), which proposes that if children are costly, women and couples will choose to have fewer of them. More formally, as incomes and human capital levels increase, and as time becomes more scarce for women, couples, and families, so too do the opportunity costs of childbearing and childrearing. In addition, broad technological changes in the nature of work have contributed to increasing returns to human capital, inducing parents to invest more in each child, thereby indirectly making each child more costly.(Galor, 2012; Galor and Weil, 1996, 2000). Relatedly, reductions in child mortality over time also have increased the opportunity cost of childbearing as a couple's risk of surpassing their target number of surviving children also increases (Bhattacharya and Chakraborty, 2017). As a result of these factors, women's and couples' desired fertility may decline, and they may choose to use either modern or traditional forms of contraception and family planning to meet their desired fertility (Schultz, 1992, 1997).[6]

As economic theories of fertility are heavily founded on the model of rational choice, much of the literature, and most economic models to date, has focused on how increased contraceptive use by women and couples is driven by their reduced number of desired children, not as a means of reducing accidental pregnancies. (Becker, 1969; Robinson, 1997).[7] Here, reducing the discrepancy between intended and unintended fertility shocks (either positive or negative) would minimally contribute to fertility transition, since it is the fall in desired children which matters most.[8] When taking this idea to its logical conclusion, many economists have argued that the use of contraception would therefore have a limited role in fertility transitions and have favored explanations that identify more fundamental economic drivers of desired fertility choice. If this argument were true, it would imply that contraceptive transitions and fertility transitions may be only weakly associated, and observed correlations between the two processes may more likely be determined by distal factors that relate to cultural and social change, education and economic empowerment (particularly for women), and shifts in economic incentives that shape the desired number of children. These views are presented in Pritchett (1994), who offers a particularly forceful challenge to the effectiveness of contraception and family planning programs in driving variations in fertility. Using cross-country data, Pritchett (1994) concludes that only 5 to 10 percent of differences in fertility levels across countries could be attributed to family planning programs or to a lack of access to contraceptives[9].

Another commonly used piece of evidence for this idea is that fertility transitions in high-income Western countries commenced before the introduction of modern contraception, and therefore could not have been primarily driven by modern contraceptive use, but rather by preceding shifts in desired fertility driven by economic development (Dribe et al., 2017; Guinnane, 2011; Schultz, 1997). In high income countries, modern hormonal methods of contraception that were invented in the 1950s (the pill), 1960s (the copper IUD), and 1980s (the contraceptive implant) were introduced well after these countries had already achieved low fertility. For example, the total fertility rate in the United States was already at 2.17 in 1935, decades before the invention of modern contraception. The broader industrialized world was likely set on paths to achieving

[6]Desired fertility is the total number of children a person would like to have at a given time, including those who have already been born

[7]In fact, most classical economic models of fertility are designed to only consider "planned fertility" since the agent solves the relevant constrained optimization problem, in which fertility is a choice variable, *ex ante*.

[8]While the "fall in desired children" plays the most significant role in the economics literature, the field has traditionally stayed away from commenting on how a desired reduction in *surviving* children is to be achieved; that is, how should couples achieve their desired family size, conditional on currently realized fertility.

[9]A more recent analysis by Günther and Harttgen (2016) has noted a close, almost one-to-one relationship between desired and actual fertility, where one additional desired child was associated with one additional birth. However, the authors also found that unwanted births in Sub-Saharan Africa has remained high but has fallen in other regions, indicating that women and couples in Sub-Saharan Africa are less able to translate their preferences into birth outcomes. Moreover, family planning interventions and programs only are able to partially explain the observed differences between desired and realized fertility.

high income status and lower fertility following the Second World War (Barro and Sala-I-Martin, 2003; Cornia, 2004).[10] For these countries, the use of modern contraception for averting unwanted pregnancies may, in fact, be more linked to outcomes related to family formation, employment, and socioeconomic well-being than for fertility reduction primarily (Sweeney et al., 2015; Zakharov, 2008). Taken together, the evidence from historical and ongoing fertility transitions might imply that countries undergo two phases of transition, each of which is distinguished by how contraception and family planning (broadly defined) may play a different role in facilitating fertility change. In the first phase, the transition of population-level fertility from high fertility (7 or more children per woman) to moderate fertility (3 to 5 children per woman) may be driven by first-order determinants of fertility change, including delays in age of marriage and changes to marital fertility, delays in age of sexual debut, postpartum abstinence and the use of traditional and natural methods of contraception (withdrawal, lactational amenorrhea), and changing socioeconomic conditions, particularly those fertility-related economic factors that alter the opportunity cost of childbearing for women. Where modern contraception and family planning programs may play a more prominent role in fertility change are in the second phase, where aggregate fertility declines further towards replacement rate or lower.

2.3. **Responses to the Economists' View.** Understandably, the proposition that desired fertility dominates unintended fertility (thereby downplaying the role of contraception and family planning programs) is controversial (Bongaarts and Hodgson, 2022; Bongaarts and Sinding, 2009; Casterline, 2009; Cleland and Wilson, 1987; Ibitoye et al., 2022). If a large fraction of births are unintended, then a more effective means to realize fertility preferences through the use of modern contraception would demonstrate that modern contraceptive transitions, through increased supply and the implementation of family planning programs, should be tightly linked to fertility transitions. In many countries, fertility decline and contraceptive uptake have occurred simultaneously. It is intuitive that this should be the case: one of the main – if not primary – functions of modern contraception is to facilitate sexual activity and intercourse that does not result in pregnancy. However, fertility decline is not an inevitable product of modern contraceptive use alone, as contraception can also be used to better time and space pregnancies rather than solely reduce their quantum, prevent sexually transmitted diseases, or even be used for other sexual health benefits beyond pregnancy, such as the regulation of menses or the management of sexual pleasure and functioning. In addition, fertility may also change independently from changes to modern contraceptive practices and behavior, particularly where the costs of other proximate determinants of fertility, including other traditional, natural, or alternate methods of contraception, decline relative to the cost of modern contraceptive use.[11]

While it is intuitive that transitions in modern contraceptive use are fundamentally and primarily linked to fertility decline, it would be shortsighted to assert that: 1) fertility transitions are exclusively a product of modern contraceptive transitions; and 2) the economic drivers of contraceptive transitions are the same

[10] Analyses of fertility declines in Europe in the 19th and early 20th centuries have identified delays in age of marriage / age of first birth and postpartum abstinence, potentially driven by changing economic conditions and urbanization, to be primary determinants of fertility change over and above the role of modern contraception (Dribe, 2009; Schultz, 2001; Szreter and Garrett, 2000; Watkins, 1987; Weir, 1984). The contraceptive methods that were available during this period of structural economic transformation were mainly withdrawal, periodic / rhythmic abstinence, and postpartum abstinence. While condoms and other barrier methods had existed for centuries, they were not used widely until in more recent decades following innovations in their production (Amy and Thiery, 2015; Youssef, 1993).

[11] Robinson (1997) effectively summarizes the ways in which fertility can be controlled, namely 1) the regulation of sexual intercourse; 2) the use of contraception to prevent pregnancy during intercourse; 3) the prevention of pregnancy during intercourse through permanent means; 4) the termination of a pregnancy after it has occurred; or 5) the termination a birth after it has occurred. Each of these modes of fertility control comes with costs. While costs related to most of these modes are relatively unknown, a growing literature has documented the economic and social costs of contraception, demonstrating that these costs to using contraception may be relatively higher than what is estimated, thereby leading to a lower level of demand for contraception (Robinson, 1997; Trussell, 1976; Tshiswaka-Kashalala and Koch, 2018).

as those that drive fertility transitions. As a result, the causal and mechanistic links between economic development, fertility transitions, and contraceptive transitions are not only difficult to disentangle empirically but are also challenging to conceptualize theoretically given the sheer number of possible linkages between them. These challenges are reinforced in a recent review of empirical studies of family planning programs by Miller and Babiarz (2016), who conclude that: 1) the effects of family planning programs on fertility and birth spacing vary substantially, ranging between 5 percent and 35 percent fewer children ever born and 5 to 7 percent longer birth intervals; and 2) the effects of family planning programs on more downstream health and socioeconomic outcomes are modest (if not inconclusive) but potentially meaningful, particularly when compared to other interventions that aimed to improve human capital.

3. Economic Drivers of Contraceptive Change: Concepts

We separate the pathways by which economic development impacts contraceptive change into two typologies: 1) those channels that operate through fertility decline, and 2) those channels that do not. Here, we again emphasize that while economic development can certainly affect fertility and contraception, it is important to recognize that the directionality of these pathways can be reversed. In our theoretical framing, we focus on the unidirectional effect of economic growth on contraceptive use for multiple reasons. First, this review focuses on the economic forces driving contraceptive use; whether contraceptive use drives growth is a related but tangential question to this purpose. Second, contraceptive use has a theoretically important, yet limited, role in promoting economic growth, where studies have highlighted that even the most intensive family planning programs that have been implemented would only close income gaps between rich and poor countries, a 32-fold (or 5-doubling) difference, by one doubling at the most (Karra et al., 2017).[12] Figure 3.1 presents this preliminary theory of change / causal framework.

We first examine the development-contraception nexus by considering the role of fertility, both desired and realized, as the dominant mediating channel. This approach implies that the effect of economic development through demographic transitions may drive both current contraceptive use as well as the current demand for contraception, which in turn affects future fertility and contraceptive behavior. Key channels through which this relationship is defined include:

(1) *The impact of economic development on the epidemiological transition, which contributes to reductions in child and infant mortality and improvements to child health.* These improvements to child health and survival, in turn, shape women's and couples' fertility preferences and desired family size. In following the predictions from economic and demographic models of child mortality on fertility (Barro, 1991; Canning et al., 2013; Lloyd and Ivanov, 1988), parents may reduce their demand for children based on their reduced need to replace children who may die in an environment of high mortality

[12]Both the "Power of the Pill" study by Goldin and Katz (2002), as well as the study by Bailey (2006) directly speak to the effect that (oral) contraception had on fertility decline and women's labor market outcomes (employment, labor force participation) in the United States. Estimates from Bailey (2006)'s analysis indicate that women's labor force participation due to the pill's availability increased by 8 percent. While these estimates are indicative of the contraception-to-economic growth link, we caveat these findings with two observations. First, the relatively large effect of the pill (and other modern methods) on women's labor market outcomes has primarily been observed in formal labor market settings where the trade-off between childbearing and work for women is likely high. Findings from contexts where women are primarily engaged in informal labor, and where women's work may be more easily coupled with childcare, suggest more modest, and even insignificant, effects. Second, the findings from Bailey (2006) and Goldin and Katz (2002) are based on estimates from younger women who had not yet completed fertility when they were observed. In following approaches described in Karra et al. (2017) and Ashraf et al. (2013), who interpolated findings from the Philippines, the authors estimate that lifetime female labor supply declines by 2 percent for each additional birth, of which a part of that fertility decline may be attributable to contraceptive use. Taken together, we conclude that these studies provide modest evidence of the effect of contraception on longer-term economic growth.

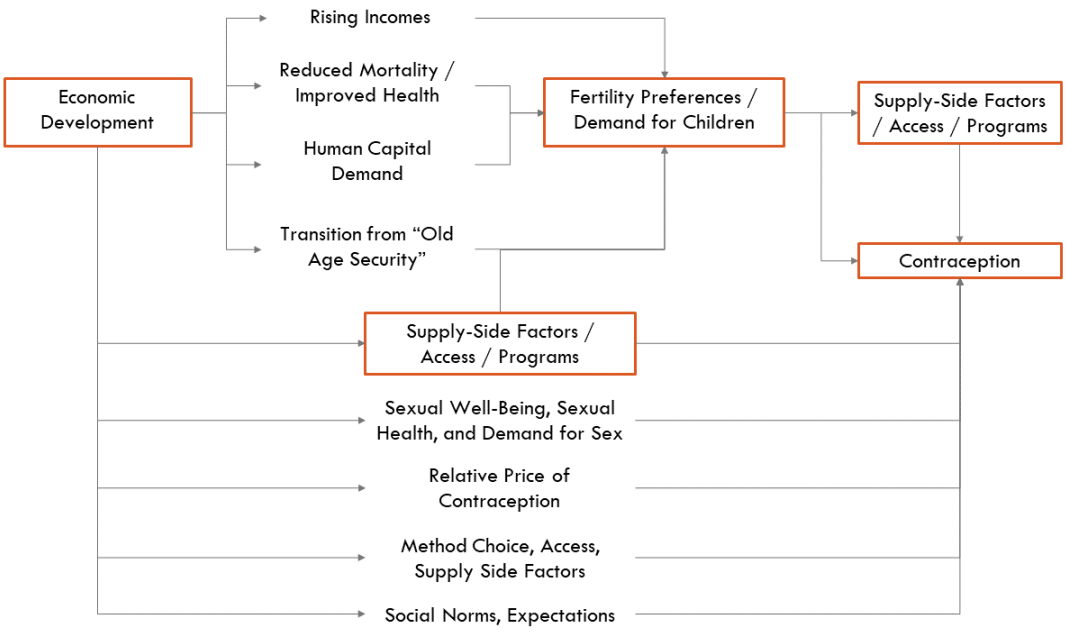

FIGURE 3.1. Theory of Change - Economic Development to Contraception, via Fertility Preferences and the Demand for Children

and poor child health (the replacement effect); and b) their reduced preference to bear more children than they ultimately want to have out of fear that fewer will survive than they anticipate (the insurance effect[13]). These updated beliefs and expectations around fertility, in turn, impact demand for contraception and contraceptive behavior. The role of child survival on the demographic transition through fertility and, in part, contraceptive behavior has been empirically documented, most recently in an analysis by Bhattacharya et al. (2023) who find that a one percent increase in child survival leads to a fertility decline of 1.2 percent and an increase in modern contraceptive use by 0.4 percent.

(2) *The substitution between child quantity and "quality".* The rise in demand for human capital in production, particularly during industrialization, urbanization, and structural transformation, implies a movement away from labor-intensive production to capital-intensive and skill-based production. This increase in demand for skilled labor induces households to increase their investment in their own human capital as well as their children's human capital (Herrendorf and Schoellman, 2018; Lewis, 1954; Porzio et al., 2021), which in turn increases the cost of raising a child. In addition, the increased human capital investment per child may contribute to preferences for child quality as well as to the cost of investing in children. As a result, a quality-quantity trade-off in fertility is observed (Becker and Lewis, 1973), which increases the demand for (and use of) contraception.

(3) *A reduction in precautionary childbearing*, and in particular, a transition away from childbearing as a means of insurance in old age (the "old-age security hypothesis") (Willis, 1979; Zhang and Nishimura, 1993).[14] In the absence of capital markets which permit inter-temporal lending and

[13]More specifically, there exists a precautionary demand for children whereby women and couples may be risk averse with respect to their expected number of surviving offspring and therefore hold a "buffer stock" of children in a high-mortality environment) (Ben-Porath, 1976; Galor, 2012).

[14]This is similar to the "insurance effect" noted above, except that this mechanism runs solely through the desire for old age support in the absence of capital markets, while the former deals with the desire for a certain number of surviving offspring more generally in the context of an uncertain mortality environment. The current mechanism can be linked to the mortality environment, but not necessarily.

borrowing, children serve as an asset that permit parents to transfer income to old age. Hence, the establishment of capital markets in the process of development has reduced this motivation for rearing children, contributing to the contraception and subsequent demographic transition (Nugent, 1985).

(4) *Changes to the opportunity cost of childbearing, particularly for women.* Rising incomes and improved economic conditions may result in the following two outcomes. On the one hand, if the rise in incomes is driven by expanded economic opportunity (increased labor force participation, employment, rising wages, etc.), particularly for women, then these changes would drive the opportunity cost of childbearing up, which may lead to a substitution effect whereby women may choose to forego childbearing, and therefore increase their contraceptive use in favor of other productive activities. On the other hand, the rise in income may also create a wealth effect, where women and couples may be able to afford to have more children and therefore choose to have more children, reducing their demand for contraception. Finally, increased economic development may come with more robust social welfare programs, which may more easily allow parents and especially mothers to combine childbearing and productive activities, thereby increasing desired fertility. Examples include increased access or provision of childcare services, or parental leave programs. Inasmuch as these developments increase demand for children, contraceptive use may decline.

Taken together, most economic models of contraception that operate through fertility set up the decision problem as one where the trade-off in having another child depends on the marginal cost of having another child relative to the marginal benefit that each child brings to parents, in which a child is valued as a means of old-age security, a source of labor, another means of support, or as a direct source of utility and welfare (e.g. happiness) (Galor, 2012; Galor and Weil, 1996, 2000). In contrast to the demographic theory on fertility, most of the economic frameworks used to conceptualize the contraception (family planning)-fertility relationship may be categorized into two types, namely household demand models as presented by Becker (1969), Becker and Tomes (1976) and Pollak (2003), and synthesis models as presented by Easterlin (1978) and Easterlin et al. (1980). In household demand models, in which child quality and quantity are explicitly accounted for as arguments of the household utility function, family planning (which is mainly conceptualized through the operationalization of contraception) decreases the cost of a couple's ability to optimize their fertility, which in turn raises the price of having children relative to child quality (i.e. the "quality-quantity trade-off").

3.1. **Operationalizing Fertility Preferences: Contraceptive Demand.** As a starting point, we turn to the classic synthesis model of fertility by Easterlin (1975), which delineates the links between fertility preferences and the demand for contraception. In the Easterlin framework, parental utility is a function of consumption, fertility, and expected contraceptive effort, which is an argument that represents the disutility faced from contraceptive use (Montgomery, 1987). In the model, contraceptive preferences are distinct from (though linked to) fertility preferences. This distinction has significant implications for how the demand for contraception, and the calculus around contraceptive choice given a couple's fertility preferences, may be independently interpreted from the demand for children.

Beyond Easterlin, very few economists have attempted to separately model the demand for contraception beyond simply assuming it is perfectly related to the demand for children. Identifying the demand for contraception requires an analysis of contraceptive preferences across both the extensive (the decision whether or not to contracept) and intensive (choice of contraceptive method, conditional on choosing to contracept) margins. Decision-making across both of these margins are shaped by both the set of alternatives that are

available to women and couples, as well as the costs and constraints that these agents face when they make choices over alternatives.

If such a model were created, the costs of contraception would optimally be broadly defined to include a range of constraints that women and couples face, including: a) information constraints, which comprise both a lack of information as well as prior beliefs around contraception, either generally or more specifically around particular methods; b) access constraints for those methods that require supply, which include the cost and opportunity cost of commodities, physical barriers to access (mobility barriers, transport costs, waiting times at facilities), and other supply-side constraints (stock-outs, poor service quality, etc.); c) costs that are realized from using contraception, including method-specific side effects, complications, ease of reversibility of the method, and risks to health (including risks to future fertility); and d) a wide range of barriers to decision-making even when information and availability are accounted for, including household bargaining over contraceptive choice and spousal discordance, social norms and stigma against contraceptive use, restrictive social norms and normative opposition, and behavioral constraints (e.g. procrastination, hyperbolic discounting, etc.).[15] Decision-making around contraception is complicated by the variation in available contraceptive methods, with methods differing across a range of attributes and features[16], to the extent that no single contraceptive alternative strictly dominates all other alternatives across all attributes for all types of women.

Additionally, theories of contraceptive demand would benefit from a concrete structure of contraceptive choice and behavior that is founded on the following principles. Firstly, preferences for and choices over contraception are identified through an assessment of the utility and costs of contraception, both broadly defined. Specifically, women and couples assess the expected welfare gained from contraception over a broad range of outcomes that extend well beyond fertility alone, including: 1) the risk of unwanted pregnancy (beyond fertility, such as health or mortality risks), 2) the convenience for spacing and postponement of pregnancy between children, 3) the risk of sexually transmitted infections and other adverse health outcomes from sexual intercourse, 4) sexual satisfaction and well-being (such as the utility derived from sex, and how it varies by method choice). The marginal utility gained from contraceptive across these outcomes would be weighed against the costs of contraception as defined above, both overall as well as by method type. Given the range of method attributes and the variation in attribute features for each method, the impacts of each method choice on outcomes are also expected to vary across women. To this end, a deeper exploration of how some of these attributes are revealed and characterized through decisions about method choice is warranted.

4. Economic Development and Contraceptive Transitions: Evidence

4.1. **Transitions through Fertility Change.**

4.1.1. *Macro-Level Evidence:* Empirical evidence of the development-contraception nexus that operates through the demographic transition present a complex story. A number of researchers have documented the secular increase in the use of contraception, due, in part, to supply-side factors that contribute to improved access to contraception. Economic demographers, however, remain skeptical of the relevance and impact of increased contraceptive access, supply, and use on modern fertility transitions (Richard Easterlin's work

[15] A broader discussion of these costs of contraception is presented in Miller and Babiarz (2016).

[16] Examples of method-specific attributes or features include: effectiveness at preventing pregnancy, ease of use, risk of side effects, duration of effectiveness / permanence, need for re-supply, need for clinical intervention, and partner dependence, among others.

being the exception). This skepticism was reinforced by Pritchett (1994)'s study but has been more recently questioned by Lam (2011) in his presidential address at the annual meeting of the Population Association of America. Lam (2011) uses data from 185 DHS surveys for 74 countries, a considerably larger set of surveys than Pritchett (1994) used, and investigate changes in desired and actual TFR. He finds that while desired fertility fell by an average of 0.038 births per year, the TFR fell by 0.060 births, implying that 47 percent of the average decline in the TFR may be attributed to harnessing better ways to achieve fertility targets and not just from changes in desired fertility. These findings may be rationalized and reconciled through an innovation-adjustment modeling approach (Bhattacharya and Chakraborty, 2017) where the mechanisms of action through which desired fertility and contraception impact fertility, either independently or jointly, may be disentangled. In particular, conditional on a contraceptive method, variations in TFR seem to be driven by changes in desired fertility (due to income growth, better child survival, increases in the demand for human capital, etc.). Over time, changes in the availability and adoption of alternative, more effective or efficient contraceptive methods may account for an increasingly significant part of TFR declines. With this said, however, the onset of the fertility decline likely stems from factors other than just the availability of contraceptives through contraceptive transitions alone (including others identified in Bongaarts' proximate determinants framework).

In low- and middle-income countries in particular, the transition to modern contraceptive use may be more directly linked to fertility reduction and economic well-being, particularly over the second phase of the fertility transition. Examples from the "Asian Tiger" countries in East and Southeast Asia have identified export-oriented growth, openness to trade, and foreign direct investment, combined with the concurrent expansions of family planning programs, increases in contraceptive use, and declines in fertility to be catalysts in the development process (Bloom and Williamson, 1998; Cleland, 2012; Li et al., 2018). Following East Asia, South Asia's transition to lower fertility was also, in part, due to family planning efforts in the 1970s and 1980s, including campaigns and incentives that promoted female sterilization and smaller families (Bloom et al., 2011; Tsui, 2013). In Sub-Saharan Africa, contraceptive transitions are observed more recently, with significant variation across countries and regions (Canning et al., 2015). Moreover, the role of family planning and contraception as a means to space births may better inform current and likely future trends in the region, where reported desired fertility is higher than in other settings (Baah et al., 2013; Canning et al., 2015; Westeneng and D'Exelle, 2011; Yeakey et al., 2009). The potentially significant contribution of birth spacing to fertility change in Sub-Saharan Africa has been documented by scholars, who have noted that both the lengthening of birth intervals and the postponement of births may explain patterns in fertility decline in the region (Casterline and Odden, 2016; Timæus and Moultrie, 2008).

4.1.2. *Micro-Level Evidence:* Recent empirical studies have estimated the impact of economic drivers on contraceptive adoption and change by exploiting spatial and variation in contraceptive prices, changes to women's socioeconomic conditions, and other shocks. Using data from Indonesia, McKelvey et al. (2012) estimate the effect of changes in contraceptive costs and household resources on contraceptive behavior. The authors find that large changes to contraceptive prices and decreases to household resources following an economic crisis had little impact on both the decision to use contraceptives and on contraceptive method choice, even among the poorest couples. Similarly, studies in Tanzania and Ghana found that contraceptive use, and, in the case of Tanzania, the use of traditional methods such as abstinence and the rhythm method, to increase as a result of adverse agricultural and income shocks; this increased demand for contraception could be attributed to the shift in women's and couples' demand for delaying and limiting childbearing

during periods of economic hardship (Abiona, 2017; Alam and Pörtner, 2018). Recent findings from Ashraf et al. (2014) show that household bargaining over fertility is particularly important because most methods of contraception are perfectly observable only to women. The introduction of contraceptives that are privately targeted to women, without requiring an explicit consent from their husbands or partners, can lead to large increase in their use and reduction in fertility[17]. Relatedly, Munshi and Myaux (2006) and others have noted the importance of social norms in driving individual reproductive behavior. Using data from Bangladesh, the authors find that a woman's contraception decision responds strongly to changes in contraceptive behavior by others in her village who belong to the same religious group; on the other hand, changes in aggregate contraceptive behavior among women who live in the same village, but who belong to a different religious group, have little to no impact on behavior. Finally, evidence from a field experiment in Malawi, which provided pregnant and postpartum women with a two-year package of family planning and reproductive health services, found that the provision of free contraceptives and supplemental services (transport to the clinic, coverage of contraceptive-related side effects, etc.) not only increased women's contraceptive use but also lowered their likelihood of short birth spacing (Karra et al., 2022)

In reviewing the empirical evidence, the extent to which contraception accounts for fertility change may be entirely country specific; moreover, the proximate determinants of that change may likely vary from region to region. Unlike 19th century Europe, women's changing status in emerging economies may have as much of a role on the how social and economic benefits accrue to ease access to and use of contraception. With this said, however, it bears repeating that access to contraception by itself may not be effective at promoting use and generating demand – rather, other (both proximate and distal) factors that lower the demand for children may play more fundamental roles.

4.2. **Transitions Beyond Fertility Change.** In the context of economic development, either at the macro or micro levels, the linkages between contraception and economic development are most commonly conceptualized and identified through the lens of fertility. However, the development-contraception nexus can also be realized through a number of alternative mechanisms that are independent of fertility, both desired and achieved. Alternative channels include:

(1) *Income effects that may be independent of fertility*, whereby increases in income and improved economic conditions directly relax credit constraints and improve purchasing power of all goods, including contraception. As a result, these improvements can be seen to drive the increase in demand for and utilization of contraception even when holding fertility preferences and family size constant. Limited evidence from studies of cash transfer programs have shown generally positive, but modest, impacts of such transfers on contraceptive use (Bastagli et al., 2019), while recent randomized controlled trials of family planning interventions have shown increased contraceptive use as a result of either partial or full subsidization of contraception and coverage of related family planning services (Anukriti et al., 2022; Karra et al., 2022; Tran et al., 2018, 2020)

(2) *The changing nature of sexual partnerships and the demand for sex*, which are reshaped in the face of economic development and social secularization, leading to changes in demand for contraception independently from – or in tandem with – changes in fertility behavior. In the sociological literature, most of these effects have been explored in the context of the drivers of the second demographic transition (Lesthaeghe and Surkyn, 2007). These behaviors include a disassociation of traditional

[17]Although, such an intervention may not necessarily be welfare-improving for either women or couples, given that women may be compelled to hide their contraceptive use from their partners, which may erode trust within the couple, exacerbate anxiety and stress, and contribute to intra-household conflict.

partnership formation and childbearing, driven by cultural shifts toward postmodern attitudes and norms such as individuality and self-actualization (Van de Kaa, 1994). As a result, the demand for sex and the demand for children become more tenuously linked, leading to changes in contraceptive demand independently of fertility shifts.[18] These forces may still be at play even in a purely economic framework. For example, as incomes increase, time and monetary resources spent on basic necessities shrink, increasing the demand for other goods and activities, including sex. If the quantity and quality of sexual experiences are desirable, and if contraception plays a role in satisfying either, economic development will likely be accompanied with a contraception transition through economic forces alone, decoupled from fertility.

The links between contraception and sex have been tangentially incorporated in synthesis models that have introduced utility gained from frequency of intercourse and disutility gained from contraceptive use and from infant mortality. Here, family planning interventions (either through family planning programs or through other mechanisms) and contraception are perceived as technological innovations that reduce the disutility associated with contraception while allowing for more frequent intercourse for a given fertility rate (Miller, 2010). Although the relationship between contraception and sex is intuitive, there is little empirical evidence of the interplay between sexual well-being and satisfaction, including sexual pleasure and partnerships, and contraceptive decision-making (Higgins and Hirsch, 2008; John et al., 2015).[19]

(3) *Increased contraceptive use that are driven by other welfare related outcomes that are not directly captured by income.* A number of non-contraceptive benefits have been identified from contraceptive use, most notably the prevention of HIV and other sexually transmitted infections from the use of condoms and barrier methods (Davis and Weller, 1999). In addition, the use of oral contraceptives and hormonal contraceptives like the IUD have also shown to treat heavy menstrual bleeding, dysmenorrhea, pelvic pain, acne, and endometriosis and even may lower the risk of endometrial cancers (Adeyemi-Fowode and Bercaw-Pratt, 2019; Williams, 2000). These additional health and welfare impacts that are conferred through the use of contraception may be sufficient cause to increase contraceptive use independently of fertility as incomes rise.

5. Descriptive Evidence of the Contraception-Development Nexus

While there is considerable debate surrounding the mechanisms that shape the associations between economic development, proxied most often by income measures, and contraceptive use – including the direction of causality – the existence of a positive association is beyond dispute.[20] To narrow our empirical focus

[18]This potential independence between contraceptive use and intention to conceive among women and couples can be observed through: 1) discordance in use, where women and couples may use contraception even when they have no (indirect or direct) intention of averting a preventing a pregnancy; or 2) discordance in intention, where women and couples who seek to avert pregnancy may also have no desire or demand for contraception (Fennell, 2014; Higgins and Hirsch, 2008).

[19]On the other hand, there is the relatively larger literature examining the potential impact of specific contraceptive methods, particularly the condom and (to a lesser degree) hormonal methods, on sexual pleasure (Fennell, 2014; Higgins and Wang, 2015; Randolph et al., 2007; Smith et al., 2014).

[20]In what follows, we present simple associations between these two variables. Establishing the causal impact of development on contraceptive behavior is notoriously difficult for multiple reasons. First and foremost, development is a notoriously ambiguous term, which to some is restricted to discussions of income levels, while to others encompasses a larger set of factors such as the provision of public goods, the functioning and efficiency of governments, legal rights, and to others to even include cultural traits, such as the realization of aspirations, shifts in the perceptions of women in society, or freedoms more generally. Each of these characteristics may directly and causally affect contraceptive decision-making, but in different ways and in different magnitudes. Second, exogenous shifters of variables are difficult to come by, particularly at the macro level when economies are complex, intertwined, and create winners, losers, and heterogenous effects within populations. Third, commonly used instruments such as the introduction of government policies, which typically have a clear before, after, and target population, often face multiple

on the relationship between income and contraception, we provide simple country-level visualizations of the relationship between contraception use and time by income group, and contraception use and income itself. Figure 5.1 presents contraceptive use over time across four groups of countries: high-income countries (countries with an income per capita of $12,695 or higher), upper-middle income countries (countries with an income per capita between $4,096 and $12,695), lower-middle income countries (countries with an income per capita between $1,046 and $4,096), and low income countries (countries with an income per capita lower than $1,046). Use is defined as the fraction of women of reproductive age 15-49 using any method of contraception (traditional, modern, or folkloric), from the United Nations 2022 *Family Planning Indicators* dataset, which are created from a Bayesian hierarchical model combined with country-specific time trends.(Alkema et al., 2013; Kantorová et al., 2020; United Nations, 2022).

As seen in Figure 5.1, there are clear and distinct patterns of contraceptive use over time and by income groups that suggest a strong and persistent relationship. Average contraceptive use generally increases by income group and over time, with two important exceptions. The only income group for which contraceptive use has not increased is in high income countries, where contraceptive use has been similarly high since the 1970s. In addition, since the early 1990s contraceptive use has been higher in upper-middle income countries than in high income countries.

Figure 5.2 eliminates the dimension of time and simply presents the relationship between log income and contraceptive use.[21] This figure consists of 7,971 country-year observations from an unbalance sample of 169 countries between 1970 and 2019. The most striking feature of this figure is the stability of the income-use relationship across income levels. The estimated slope of the trendline corresponds with a 14.2 percentage point increase in contraceptive use as income doubles. Further applying this estimate implies that moving from the average income and contraceptive use levels of the average low-income country in our sample ($1,691 and 25.8%, respectively) to the income of the United States ($58,543) would yield a predicted increase in contraceptive use to 74.8%. This is comparable to, though slightly higher, than the level of contraceptive use that is observed in the average high-income country in our sample in 2020 (at 69.4%).

Since these are simple associations that pool observations across space and time, one may wonder whether this association is driven by differences in contraceptive use across countries rather than within countries over time. For example, it could be the case that European countries would have had higher contraceptive use at all levels of income relative to sub-Saharan Africa, and therefore the income-use relationship is driven by cross-country differences rather than by economic development. This is particularly concerning given that upper-middle income countries' contraceptive use has plateaued at higher levels of contraceptive use in spite of having lower incomes. However, the empirical data suggests that this does not seem to be the case. Controlling for these country-specific levels and estimating country-specific associations yields an average association of an 11.4 percentage point increase in contraceptive use as income doubles, compared with a 14.2% increase overall. This suggests that the income-use relationship is driven by changes in income within countries rather than across countries, and that moving from the income of a low-income country to that of the US, for example, should increase contraceptive use to 66.7%.

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competing channels by which economic development affects contraceptive choice. For example, consider a malaria bed net distribution policy as in Wilde et al. (2020). Bed net distributions could affect labor productivity and increase economic development, possibly increasing demand for contraception. However, the introduction of bed nets also makes individuals less sick, which may increase fecundity or sexual activity and, in turn, also increase contraceptive use, conflating the association between two positive mechanisms. In addition, bed net distribution could contribute to child health and reduce child mortality, each of which could change the quality or quantity of desired surviving children, as well as the number of pregnancies needed to achieve this number, affecting both fertility and contraceptive choice directly.

[21] Income per capita estimates are obtained from the Penn World Tables (Feenstra et al., 2015).

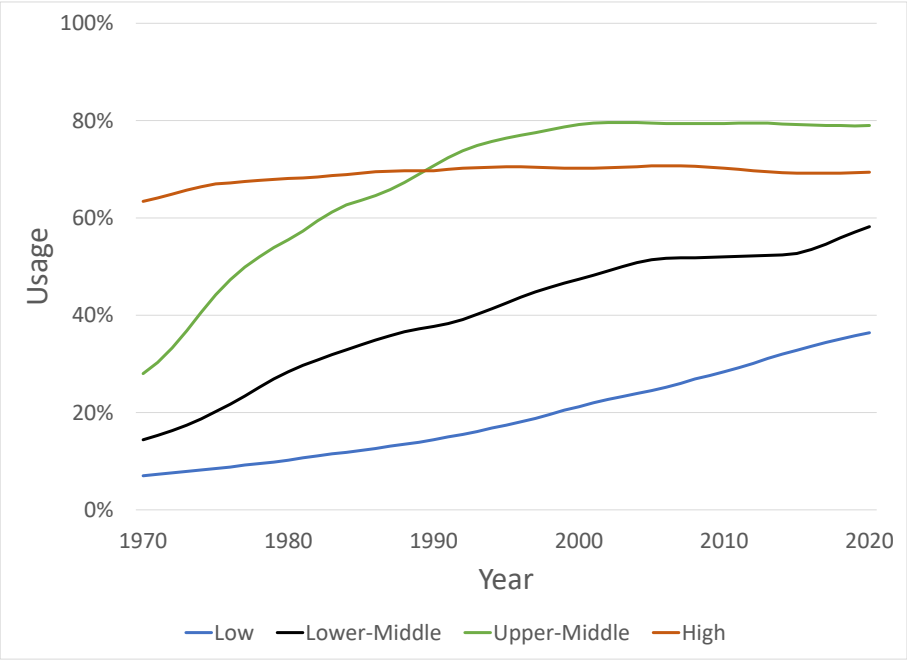

FIGURE 5.1. **Contraceptive Use Over Time: Any Method, by Country Income Group.** Use is defined as the fraction of women (generally between 15-49, with some variation) who report using any contraception method (traditional, folkloric, or modern) from the UN Family Planning Indicators Dataset 2022. Income groups are defined as by the World Bank in 2021. Reported values represent the arithmetic average over all countries in the same, where, missing contraceptive use values between two observed years at the country level were imputed linearly. Data points not reported in the figure were truncated due to too few reported values.

The relationship between income and contraceptive use is driven by modern methods. In Figures 7.1 and 7.2 in the Appendix, we show that modern method use is strongly correlated with income, while traditional contraceptive methods are not. In fact, a high prevalence of traditional method use is only a middle-income country phenomenon – countries at the lowest and highest income levels both experience very low levels of traditional method use. This suggests that rising incomes may be associated with increased use of contraception – both modern and traditional – and then at high levels of income modern methods continue to increase while traditional methods are crowded out. As was the case with overall use, the increase in modern method use also is driven by within-country changes rather than across countries.[22]

6. Conclusions

The links between contraception and development are complex. While a cursory exploration of the trends in contraceptive use and measures of economic development over time find a strong and consistent correlation,

[22]We estimate an association of a 14.2 percentage point increase in modern contraception for a doubling of income overall, vs. an 12.7 percentage point average increase using just within-country variation. This is compared with a 14.2 and 11.4 percentage point increase for all methods as reported previously.

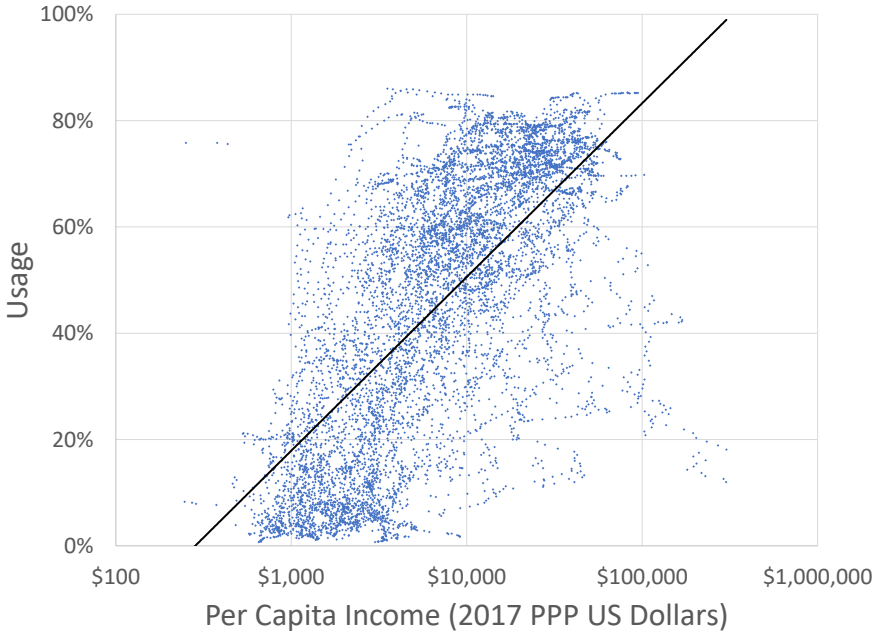

FIGURE 5.2. **Contraceptive Use vs Income: Any Method**. Use is defined as the fraction of women (generally between 15-49, with some variation) who report using any contraception method (traditional, folkloric, or modern) from the UN Family Planning Indicators Dataset 2022. Income per capita is defined are real GDP per capita, output method, using 2017 international (PPP adjusted) dollars from the Penn World Tables 10.1. Observations are at the country-year level.

a closer examination of these findings have shown the relationship to be dynamic, multidirectional, and multidimensional. To date, the significant majority of evidence linking development drivers to contraceptive use and behavior, both theoretical and empirical, have focused on the role of fertility, both desired and realized, as the (singular) mediator in this relationship. We find the mapping between fertility and contraceptive behavior to be both limited and incomplete, particularly when observing that contraceptive use may be driven by a range of demands that are shaped by changes to intimate and sexual relationships, gender roles, empowerment and autonomy, and the demand for sex and sexuality, among others. These drivers of contraceptive demand are either independent of or simultaneously determined by fertility change, yet empirical evidence of their role decoupled from fertility dynamics remains sparse. To this end, this paper calls for efforts that aim to re-examine and expanding the field's understanding of contraceptive demand beyond that which is driven by standard fertility objectives, such as averting an unwanted pregnancy or meeting a target family size or spacing preference.

Empirical evidence of the causal effects of economic drivers on contraceptive use and behavior, either at the macro or micro levels, is surprisingly limited. While the development-contraception nexus has been observed at the macro level, contraception as a variable has almost exclusively been viewed through the lens of fertility, even when fertility objectives may be second-order. Moreover, establishing a causal relationship

with macro data has been challenging. On the other hand, a few experimental or quasi-experimental studies have documented modest causal impacts of cash transfers or income shocks on short-run contraceptive use and method mix, but the long-run impacts or general equilibrium effects of such interventions have not been assessed.

More broadly, we find that the field's understanding of the components and dimensions of contraceptive demand, which would require an exploration of the demand for sex, sexual health, contraceptive preferences, consumer method choice research, and reproductive autonomy, to be limited and understudied. This may be the case because the field has traditionally not viewed contraceptive demand, and the decision whether or not to contracept, as an outcome in and of itself but as a first stage to a larger (fertility-oriented) welfare process. A treatment of contraceptive demand as an outcome may improve our understanding of the choice calculus that women, couples, and societies choose to make when deciding if, when, and how to use contraception.

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7. Appendix

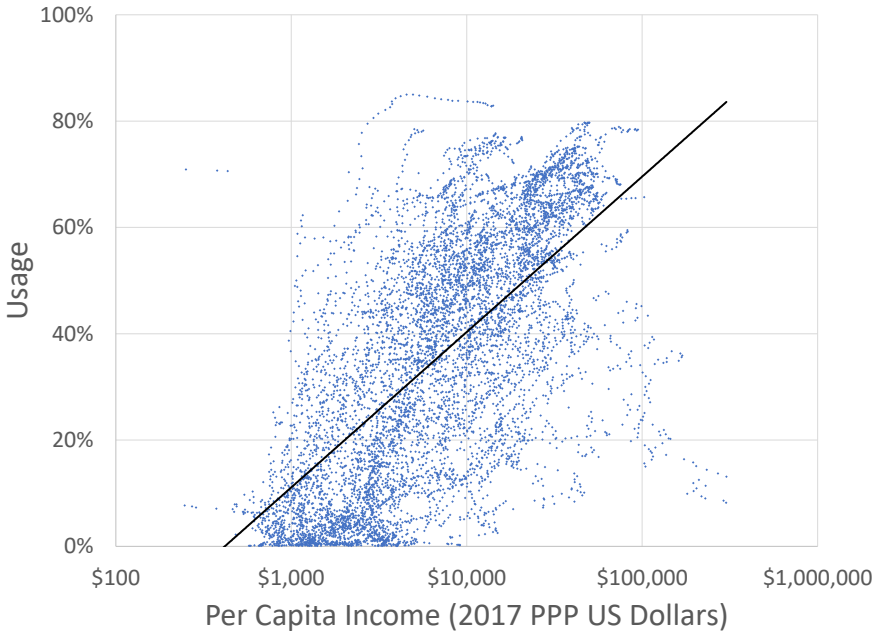

Figure 7.1. **Contraceptive Use vs Income: Modern Method Only**. Use is defined as the fraction of women (generally between 15-49, with some variation) who report using modern contraception methods from the UN Family Planning Indicators Dataset 2022. Income per capita is defined are real GDP per capita, output method, using 2017 international (PPP adjusted) dollars from the Penn World Tables 10.1. Observations are at the country-year level.

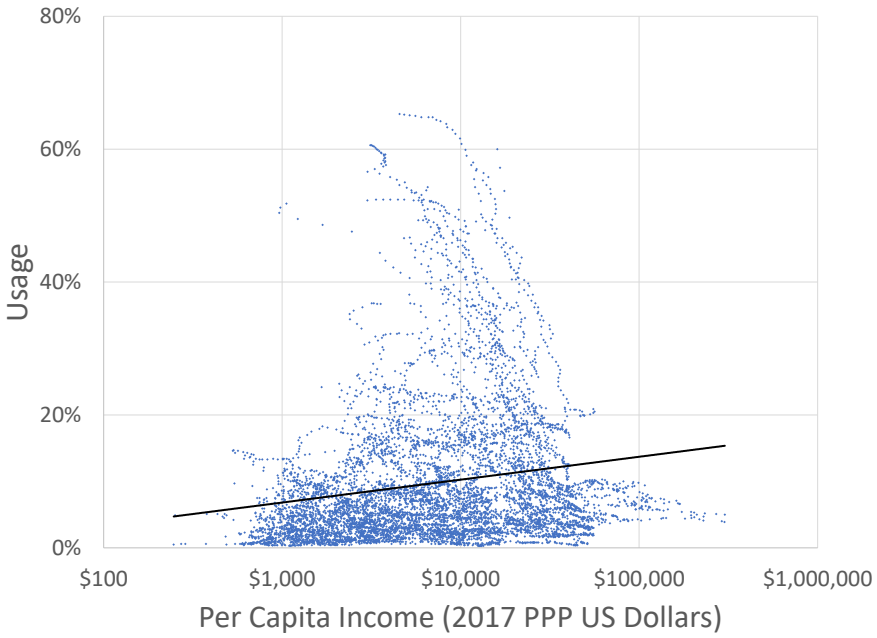

FIGURE 7.2. **Contraceptive Use vs Income: Traditional or Folkloric Methods Only**. Use is defined as the fraction of women (generally between 15-49, with some variation) who report using traditional or folkloric contraception methods from the UN Family Planning Indicators Dataset 2022. Income per capita is defined are real GDP per capita, output method, using 2017 international (PPP adjusted) dollars from the Penn World Tables 10.1. Observations are at the country-year level.