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Abortion, Contraception and Non-Marital Births: A Revision and Reinterpretation of the Akerlof-Yellen-Katz Model of Pre-Marital Sex and Men’s Responsibilities

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Abstract: In a well-known and widely-cited paper, Akerlof, Yellen, and Katz (1996) proposed a novel and counter-intuitive explanation for the rise of non-marital births in the U.S. that emphasized the way in which improved birth control and legalized abortion altered social norms about the responsibility of men to their unmarried partner’s pregnancy. Despite the authors’ own policy recommendations, the paper is regularly cited by social conservatives to show that measures to restrict sex education and access to contraception and abortion are based on respected social science research. I argue that this use of the paper’s findings stems from what were, in retrospect, unfortunate modeling assumptions about “types” of women and their motivations concerning pregnancy. I then show that a modest reformulation of their model, based on far more reasonable “types,” generates precisely the same results, but with radically different policy implications.

JEL Codes: J31, J312, J313, J316

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I. Introduction

In a famous and widely-cited article, Akerlof, Yellen, and Katz (1996) proposed a novel explanation of the increase in the proportion of births that were non-marital among US women in the late 20th century. In the two decades preceding the publication of their article, the non-marital birth ratio had risen from about 10% to nearly one-third. Most prior research had emphasized economic incentives in the particular form of welfare benefits (Murray 1984) and/or the relatively bleak marriage market prospects facing some women, especially those in minority communities (Wilson 1987); for empirical efforts to assess these arguments, see Duncan and Hoffman (1990), Moffitt (1992), and Lundberg and Plotnick (1995). Akerlof, Yellen, and Katz (hereafter, AYK) correctly noted the weak explanatory power of these explanations and, instead, emphasized a change in the social norm concerning the responsibility of a single male to the unplanned pregnancy of his unmarried partner. AYK presented a theoretical model of the “negotiation process” between single men and women about pre-marital sex and the man’s responsibility in the event of a pregnancy and then showed how those negotiations and the resulting social norm plausibly changed with the introduction of more reliable female-controlled contraceptives (i.e., the pill) in the 1960s and the legalization of abortion in 1973. In the AYK model, contraception and abortion counterintuitively increased the proportion of births that are non-marital by reducing male commitment via “shotgun marriage” to a pregnant partner.

The policy implications of this model have had a curious life. AYK are very specific that an “attempt to turn the technology clock backward ...would almost surely be both undesirable and counterproductive” (p. 314). But despite this, their paper is regularly cited in conservative policy writing as support for doing exactly that. For example, social conservatives have used the article and its

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1 A Google search for references to “Akerlof, Yellen, and Katz non-marital” yields 19,200 results (search conducted September 17, 2014).
2 The ratio continued to rise through the 1990s and early 2000s at a slower rate. Since 2008 the rate has stabilized at about 40%. A substantial portion of non-marital births now are to cohabiting couples.
conclusions as evidence in support of Catholic teachings on restricting access to contraceptives, abortion, and sex education; see, for example, Wilcox (2008a). The article is also prominently cited by abstinence-focused advocacy groups; see, for example, testimony by the Executive Director of the Abstinence & Marriage Education Partnership opposing a sex-education bill in the Illinois State Legislation (Phelps, 2013), conservative critiques in The National Review of the Affordable Care Act for its coverage of FDA-approved contraceptives (New, 2013; Pfundstein, 2011), and a discussion in the Washington Post about the recent sharp decline in the teen birth rate in Colorado (Sullivan, 2014). All of these articles emphasize the conclusion of AYK about the negative role of contraception and abortion, and then argue that the solution is to restore a more traditional social order by restricting access to contraception or comprehensive sex education.

The reason that AYK’s paper has been able to be used in this way reflects what I argue is, in retrospect, an unfortunate modeling assumption. Like any theoretical model, the AYK model simplifies reality in order to identify, isolate, and illuminate critical elements and relationships. In this case, the critical simplification is to classify women into two types, based exclusively on the cost to them of a pregnancy and where this cost is understood as the impact of a pregnancy on her net utility. Some women have high costs (negative net utility) and others have low or negative costs (zero or positive net utility). In the AYK model, the single mothers welcome a birth, even if they would prefer a husband, too. There is, in the context of the model, not much to do to assist them other than a major restriction in access to contraception and abortion, i.e., turning the clock back. The conservative policy implications follow directly.

I argue, however, that this particular simplification in the AYK model was only one of several that could have been used to generate the central result about the effect of abortion and contraception on non-marital births. One could just as well—or better, in fact—identify the two groups of women in
terms of their monetary or psychic costs of utilizing contraception or abortion and/or their effectiveness in doing so. As I show below, the central results of the revised model are exactly the same as in AYK, but the interpretation and policy implications are completely different. I also argue that these alternative classifications have a more solid empirical basis in the real world. What I propose here, therefore, is a minor reformulation of the AYK model that leads to a major re-interpretation of its policy implications. In my reformulation, clear concrete policies other than “rolling back the clock” are indicated as a way to assist single mothers and thereby potentially reduce the incidence of non-marital births.

I first review the basic AYK model and its implications. Then I present alternative versions based on differences in costs of contraception and/or abortion or in the efficacy of use. This provides a clearer and more plausible result that is more descriptive of contemporary pregnancies to single mothers and more appropriate for policy debate and action. As re-interpreted, the AYK model is no longer subject to co-option and distortion of its core message.

II. The AYK Model

In the AYK model, single men and women involved in a romantic relationship engage in strategic bargaining over whether to have pre-marital sex and the man’s responsibility to his partner in the event of a pregnancy. Women are assumed to act first by choosing one of three strategies: 1) declining to have sex before marriage; 2) having sex, but only after extracting a (shot-gun) marriage promise in the event of a pregnancy; and 3) having sex, but without a marriage promise. Men can accept those terms or they can reject them. If they reject the demand, they break off the relationship and each party then searches for another partner in the next time period who will offer or accept terms more to their liking.

The bargaining is modelled using game theory to identify the payoffs to each party of any pair of strategies. Equilibrium—a social norm—exists when both men and women are choosing strategies that
are optimal, given the optimal choices of the other party.\(^3\) Intuitively, if most women demand a marriage promise, then men will likely accept it, because the alternative is to continue searching for a partner in an environment in which most other women also demand a marriage promise. But in that case, the value to the men of a future relationship is likely to be no better than the current one and the “reject” strategy is likely to be inferior since it involves the loss of the current relationship and bearing search costs. Conversely, if most women do not demand a marriage promise, then men will not accept one if the woman they are involved with makes one, since they are confident that they can find a partner who will not make such a demand. They will, therefore, be better off, even net of search costs, by rejecting the demand.

AYK analyze this model with two types of women in two environments—before and after the introduction of improved contraception and the legalization of abortion. By assumption, Type I women have high pregnancy costs (i.e., high disutility of pregnancy); presumably, they have bright prospective careers that would be derailed or reputations that would be tarnished by a pregnancy or they are otherwise not ready for motherhood. Also by assumption, Type II women have negative pregnancy costs (i.e., positive utility); they want to become mothers, preferably married mothers, but mothers in any event. All men are identical; they prefer to have sex with their partners without making a marriage promise, but are willing to do so if that is the price of having sex. In a sense, this is no more than keeping their options open, since they are always free to marry their pregnant girlfriend even without having made a promise in advance. All men also have identical costs of a shotgun marriage and that cost is less than the benefit of a sexual relationship, also assumed to be identical across men. So the men always prefer to make a marriage promise than to be abstinent.

\(^3\) Technically, this describes a Nash equilibrium.
AYK show that in an environment without access to contraception and abortion, Type I women would refuse to have pre-marital sex without a marriage promise, because the costs for them are too high. Type II women are willing to have sex without a promise because they want to have a child, so a man could refuse to give a marriage promise to a Type I woman, break off the relationship, and attempt to find a Type II woman. But a man’s probability of finding such a woman depends on the ratio of Type I women to Type II women. If the ratio is sufficiently high, then this probability will be low; for example, if 80% of women are Type I and 20% Type II, then the probability of finding a Type II women is just 25% (20%/80%). AYK show that if the ratio of Type I to Type II women is high enough, then all women will demand marriage promises—including the Type IIs—and all men will make such a promise. The men do so because they are unlikely to do any better—there aren’t enough Type II women—and in the meantime, they lose the benefits of the current relationship. The Type IIs also demand a marriage promise because they know that the men will accept it.

In this equilibrium, pre-marital sex with a marriage promise is the norm (or at least the norm among couples who are sexually active pre-maritally), so shot-gun marriages may be common and non-marital births uncommon. This was a typical pattern in the 1960s, when 60% of all single pregnant women married before the birth of their child (Bachu 1999) and 30% of brides had a birth within eight and a half months of their marriage (Cahn and Carbone 2010). Note that in this equilibrium the Type II women benefit from the decisions of the numerically-dominant Type I women.

Once contraception and abortion are available, however, the equilibrium changes. Type I women will uniformly adopt the contraception or abortion options because of their high pregnancy costs. They no longer demand a marriage promise before engaging in pre-marital sex, because they do not need one; they can readily avoid either a pregnancy via contraception or a birth via abortion. In contrast, Type II women will not use contraception or abortion even though it is available, because they
are not seeking to avoid a pregnancy. They would prefer to continue asking their partners for a marriage promise, but now the men will no longer accept it, because they can now readily find a Type I woman who will not demand such a promise. This, in turn, changes the decision-making of the Type II women. Knowing that the men will not accept a marriage demand, they no longer make one. They engage in pre-marital sex without contraception or a marriage promise. Some will, therefore, become single mothers.

In the process, the equilibrium or social norm has shifted from one with widespread marriage demands, frequent shot-gun marriages, and relatively few non-marital births to one with no marriage demands, no shot-gun marriages, and far more non-marital births. Men are no longer obligated to marry their partners if they become pregnant. As births switch from marital to non-marital, the non-marital birth ratio rises. Note that the Type II women are worse off and the men are better off than before the advent of contraception and abortion.

Policy Implications. The policy implications of this model have had a curious life. AYK write (p.314, emphasis added) “From a policy perspective, the attempt to turn the technology clock backward by denying women access to contraception is probably not possible, and even if it were possible, it would almost surely be both undesirable and counterproductive. In addition to probably reducing the well-being of women who use the technology, along with that of men, such measures could lead to yet greater poverty. In the new equilibrium in which sexual abstinence is rare and the stigma of out-of-wedlock motherhood is small, denial of access would probably increase the number of children born out of wedlock and reared in impoverished single-parent families. On the contrary, efforts should be made to ensure that women can use the new technologies if they choose to do so.”

The problem is that these policy implications do not flow naturally from their model. In fact, they don’t flow at all from the model; they are completely ad hoc. Since the model shows that access to
contraception and abortion contributed to the rise in non-marital births by undermining the bargaining power of women, it is natural to conclude that the way to restore a more traditional and conservative social order with more marriage and fewer non-marital births is to restrict access to contraception and abortion. In terms of policy, the results of AYK are regularly cited as evidence of the deleterious effects of the availability of contraception/abortion, as research support for abstinence-only sex education programs and proposals to otherwise restrict sex education, and to critique the expansion of contraceptive coverage through the Affordable Care Act. See, as examples, Wilcox (2008a), Phelps (2013), New (2013), and Pfundstein (2011), all of which specifically cite AYK’s results. The paper is also cited in Catholic social science writing as evidence that the church’s injunction against contraception and non-marital sex are justified by social science research as critical for maintaining the primacy of the family (Wilcox 2008b).

**A Reformulation.** The AYK model is insightful and deservedly famous, but it has, in retrospect, weaknesses that have made it susceptible to misinterpretation. I do not mean these criticisms as criticisms of the model *per se* nor of the authors, who rank among the most eminent of economists. Social scientists understand well the purposes of a simplifying model. It is never the verisimilitude of a model that makes it valuable, but rather its insights. Still, I think in this case, AYK made an unfortunate choice in populating their model with particular “types” of women and in assuming away relevant issues that could just as easily have been used in the model to define these types.

First, and most importantly, AYK assume that pregnancy costs, understood as the net utility or disutility of a non-marital birth to a woman are the only difference between the two types of women and this assumption ultimately drives all the results in the model. As a consequence, it is hard to have too much sympathy for the single mothers: they want to get pregnant (because they have negative pregnancy costs) and they do, although now they do not end up with a husband, which they would have
preferred. Second, AYK assume that both contraception and abortion are uniformly inexpensive and widely available and thus are always chosen and used when it is advantageous or utility-maximizing to do so. In outlining the behavior of Type I women, they write that “pregnancies will be terminated by abortion if this option is available at sufficiently low cost” (p. 293, emphasis added), which they implicitly assume it is. While they do not say so explicitly, the same argument also applies to contraception. Ignoring prices and demand is unusual in an economics model, but the emphasis of the model lay elsewhere and they were writing in a time when abortion was more widely available and with fewer restrictions than today.

By making differences in pregnancy costs or utility the sole difference between the two groups of women in their model, AYK assumed away a vast set of policy-relevant differences that could just as readily and more realistically have been used to distinguish the two types of women. For example, women could have been categorized into “types” defined by the monetary or psychic costs they face in using abortion or contraception, differences in their access to contraception and abortion, and/or differences in their efficacy of use of contraception and abortion. I show below that each of these yields the exact same result as the AYK model, but with vastly different policy implications.

I think the specific modeling choices made by AYK were, in retrospect, unduly influenced by an attempt to place the contraception-abortion revolution in the historical context of technological change that creates winners out of adopters and losers out of non-adopters. In several places, including even in the abstract of the paper, they invoke and emphasize an odd historical analogy to 19th century English hand-loom weavers that may strike most readers as unexpected in a paper focused on pre-marital sex, abortion, and contraception. The hand-loom weavers failed to adopt the new power-weaving technology when it became available and they suffered as a result of technological change. AYK want to show that some women were similarly made worse off by the technological changes of improved
contraception and legal abortion. But, as I show below, the same result could have been achieved if all women were alike in the first period or differed in a way that was irrelevant then, but relevant later, such as differences in access, price, or efficacy of use.

Consider, then, several modest revisions of the AYK model. Unlike in AYK, let all women have the same non-marital pregnancy costs and let those costs be large enough that in the time period before reliable female-directed contraception and legal abortion, no women will agree to have pre-marital sex without a marriage promise. Men recognize the magnitude of the costs and thus are willing to accept the marriage demands, rather than terminate the relationship. The first-period equilibrium result is exactly the same as in AYK, except for the irrelevant detail that Type II women are not protected by the presence of Type I women. That is an inessential difference, because the critical comparison is the difference between the two equilibriums, not the reasoning behind the period one equilibrium with two types of women. Whether shot-gun marriages occur because all women demand a marriage promise or just a critical mass is irrelevant.

After the introduction of more reliable, female-directed contraception and the legalization of abortion, let there now be two types of women who differ in terms of their monetary and/or psychic costs of utilizing contraception or abortion and/or their effectiveness in doing so. These differences were irrelevant in the first period when contraception and abortion were not viable options. I continue to assume that pregnancy costs are the same for both groups. Thus, for example, Type I women could be women who have no moral objection to contraception and abortion, while Type II women have moral objections. Or Type I women could have access to low-cost contraception and/or abortion and Type II women could lack this access. Or, as a third example, Type I women could use contraception effectively, while Type II women do not use it effectively, because of lack of knowledge or other lifestyle issues.
The post-contraception and abortion equilibrium in these modified models is conceptually similar to the one in AYK where pregnancy costs differ. Consider the first reformulation, in which a relatively small minority of women (Type II) has substantial moral objections to the use of contraception or abortion. The Type I women, who have no such objections, utilize contraception and/or abortion and thus no longer demand a marriage promise before engaging in pre-marital sex. The Type II women do not utilize contraception or abortion. They can, however, no longer meaningfully demand a marriage promise, because they are out-numbered by the Type I women and the men will, therefore, reject a marriage demand and terminate the relationship if they make one. Some of these women will have pre-marital sex, become pregnant, and have non-marital births, exactly as in the AYK model.

In the second reformulation, Type I women have ready access to inexpensive contraception and abortion, but Type II women do not. The differences could, for example, reflect differences in insurance coverage or state-level abortion law and accessibility. While some forms of birth control, such as condoms, are relatively inexpensive, others are quite costly and, importantly, the costly ones are far more effective. IUDs cost from $600 to $800, an injection of Depo-Prevaro costs $75 every three months, hormonal implants cost approximately $600, and the patch costs $50 per month (estimates from www.Bedsider.com). Failure rates vary enormously: condoms have a one-year failure rate of 18% in actual use, while IUDs and hormonal implants have a failure rate of less than 1%.

The Type II women in this reformulation have no moral objection to contraception or abortion and would use them if they were less expensive, but because of issues of price and/or access, they do not. Or they may use less expensive, but less reliable forms of contraception. Again, in the new equilibrium, the Type I women no longer make a marriage demand and, as a consequence, the Type II women are pressured to have sex without a marriage commitment. Some of them inevitably end up as

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4 See Boonstra and Nash (2014) for details on current state policy changes affecting abortion access.
single mothers. In this version, the women who have non-marital births are those for whom affordability is particularly important. This is consistent with observed statistics on non-marital fertility. For example, in 2011, data from the American Community Survey show that the proportion of births that are non-marital declines sharply with age, income, and education. Women in families with incomes under $25,000 had more than one-third of all non-marital births (Shattuck and Kreider, 2013).

Finally, in the third reformulation, no women have moral objections to contraception and abortion and all have potential access to contraception that is reliable in ideal use and that is low enough relative to their income and their preferences that they would use it. Type I women are able to use contraception effectively, but Type II women are not. They may lack knowledge of recommended practices involving the use of contraceptives or have the knowledge, but lack the ability or lifestyle necessary to follow a regime carefully, so that in practice, the contraceptive failure rate is well above its ideal rate.5 Birth control pills, diaphragms, and condoms are obvious examples of methods that are reasonably inexpensive and have a relatively low failure rate with ideal use, but a much higher failure rate in practice; ideal and actual one-year failure rates are, respectively, 1% and 9% for the pill, 6% and 12% for a diaphragm, and 2% and 18% for the condom (Trussell 2011).6 Or Type II women may not act on a pregnancy aggressively enough to secure a timely abortion or they may live in an area where abortions are restricted or distant. Once again, the new equilibrium is the same: Type I women utilize contraception and/or abortion and do not make marriage demands before engaging in pre-marital sex. Some Type II women have non-marital births because they can no longer obtain a marriage promise and do not use contraception or abortion effectively enough to prevent a birth.

5 This is entirely plausible. In 2008, nearly 70% of all pregnancies to women age 20-29 were reported as mistimed or unwanted by the women themselves (Zolna and Lindberg 2012).
6 These are one-year failure rates. Aisch and Marsh (2014) present failure rates through 10 years. Even with ideal use, the five-year failure rate for the diaphragm is 27%. Five-year failure rates in actual use are 63% for condoms, 47% for the diaphragm, and 28% for the pill.
The appropriate policy responses to these three versions of the AYK model are different from each other and especially from the original AYK model itself. To repeat: in the AYK model, Type II women want to get pregnant and they do so, but now without the benefit of the somewhat reluctant husband they would otherwise have had. Other than attempting to change their own view of their pregnancy costs, i.e., convert them into Type I women, there is not very much that can be done for them except for the extreme policy of returning contemporary Type I women to the Type I women of decades ago by eliminating their access to contraception and abortion. It was, after all, only the presence of the original Type I women in the era before contraception and abortion that helped the Type II women obtain husbands.

In the first reformulation with moral objections to abortion and contraception, little can be done other than trying to change the preferences of Type II women, which is probably inappropriate, as well as difficult. As a practical matter, this version probably accounts for a relatively small proportion of women. Surveys indicate that most women, including Catholics, utilize some form of contraception. Analysis of the National Survey of Family Growth (NSFG) shows for 2006-2008 that 68 percent of Catholic women at risk of pregnancy used “highly effective” methods, and 15 percent used less reliable (barrier) methods (Jones and Dreweke 2011). 98 percent of Catholic women have ever used contraception, compared to 99 percent for all women. Feelings about abortion are stronger and certainly some women would not choose an abortion.

In the second reformulation with price and/or access differences, the obvious policy response to the non-marital births is to address price and access issues. These women have sufficiently high pregnancy costs that they would prefer not to have a birth if they had access at a price they could afford. There is no need to turn back the clock. Indeed, the Affordable Care Act includes provisions that address this issue by requiring all FDA-approved contraceptives to be covered by insurance without co-
pay. The Supreme Court decision in Burwell v Hobby Lobby, which allowed some closely-held family corporations to avoid providing coverage for religious reasons, has opened up some important potential exceptions to this.

In the third reformulation, the obvious policy response is to provide information and education on the effective use of contraceptives and/or provide enhanced access to contraceptive modes that are less demanding of the user, e.g., long-acting reversible contraceptives (LARCs). Effective sex education that emphasizes the correct use of contraceptives is an obvious policy intervention; see Jaccard (2010) for a thorough discussion. The Affordable Care Act provision noted above is another critical policy, since it includes coverage for LARCs with no co-pay. Results from the Contraceptive Choice project in St Louis show that women using LARCs had unintended pregnancy rates that were 1/20th the rates of women using the pill, patch, and ring, which are themselves among the more effective contraceptives (Peipert et al. 2012). This version of the model interacts with the second version, since the contraceptives that are most effective and require the least of the user are also more expensive.

III. Summary and Discussion

Akerlof, Yellen, and Katz’s model of bargaining between the sexes about pre-marital sexual relations and men’s responsibilities in the event of an unplanned pregnancy is widely-cited and justifiably so. The model shows how the dual technological changes of improved female-controlled contraception and the legalization of abortion plausibly contributed to an erosion of the old system in which men acknowledged responsibility for their unmarried pregnant partner. “The sexual revolution,” they wrote, “by making the birth of a child the physical choice of the mother, makes marriage and child support a social choice of the father” (p. 281, emphasis in original). Their formal analysis is predicated on the classification of women into two types, one of which affirmatively welcomes a pregnancy and ends up as a single mother when the social norm changes following these technological changes.
Despite the authors’ own explicit policy suggestions, the article and its findings have been cited with regularity by social conservatives and by some sympathetic social scientists as evidence that contraception and abortion unleashed social forces that ultimately undermined marriage and increased non-marital births. In doing so, they are taking advantage of the modeling weakness of the paper, especially the division of women into two types based on the costs to them of a birth and the implicit assumption that contraception and abortion are widely available, affordable, reliable, and effectively used. The AYK model does, in fact, place the responsibility for the breakdown of the traditional order on the contraception and abortion revolutions, so reversing it is a natural policy implication.

I show that modifying the original AYK model modestly to define “types” in terms of differences in monetary and psychic costs of utilizing contraception and abortion or differences in the efficacy of utilizing them yields exactly the same results, but with utterly different policy implications. This “typing” makes considerable real-world sense: access to reliable affordable contraception and to abortion varies widely, as does the efficacy of use of less and more expensive contraceptives. The policy prescriptions that flow naturally from my reformulation involve ameliorating differences in price, access, and efficacy, rather than turning back the clock.
Bibliography


