Fertility Regulation in an Economic Crisis

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August 2011

Abstract

Substantial international aid is spent reducing the cost of contraception in developing countries, as part of a larger effort to reduce global fertility and increase investment per child worldwide. The importance for fertility behaviors of keeping contraceptive prices low, however, remains unclear. Targeting of subsidies and insufficient price variation have hindered prior attempts to estimate the effect of monetary and non-monetary contraceptive costs on fertility behavior. Using longitudinal survey data from the Indonesia Family Life Survey, we exploit dramatic variation in prices and incomes that was induced by the economic crisis in the late 1990s to pin down the effect of contraceptive availability and costs as well as household resources on contraceptive use and method choice. The results are unambiguous: monetary costs of contraceptives and levels of family economic resources have a very small (and well-determined) impact on contraceptive use and choice of method.

This research was supported by the William and Flora Hewlett Foundation, the Robert Wood Johnson Foundation Health & Society Scholars Program and the Eunice Shriver Kennedy National Institute for Child Health and Human Development R01HD40384. We are grateful to David Canning, Monica Das Gupta Jinyong Hahn, Joe Hotz, Eduardo Maruyama, Doug McKee, Jack Molyneaux, Elaine Murphy, Marcos Rangel, T. Paul Schultz, John Strauss, an associate editor and an anonymous referee for many helpful comments.

I. Introduction

Governments and donor organizations devote substantial resources to making family planning services widely available and affordable, in the belief that effective use of family planning leads to increased investments in children and higher per capita income in low income countries. In 2008, governments, multilateral organizations, private foundations, and non-governmental organizations spent roughly $3.1 billion on the provision of family planning services in developing countries, but estimates suggest that fully meeting needs for effective contraception would have cost an additional $3.6 billion (Singh et al. 2009). The benefits of planning families wisely are large, but the cost of supplying services is high, and so understanding how couples respond to contraceptive prices is important.

From a user's perspective, the "price" of family planning encompasses not only the fees that are paid, but also the acquisition and evaluation of information about contraceptive methods and the quality and availability of services (Schultz, 1969). Substantial infrastructure investments since the 1960s have made family planning information and services widely accessible across the globe. Accordingly, attention has shifted towards service prices as a key policy lever for achieving program goals. On the one hand, prices are often heavily subsidized so that couples have access to affordable contraception. On the other hand, user fees defray family planning program costs and contribute to assuring the quality of services.

Striking the right balance between family planning program cost recovery versus affordability for clients is key and depends critically on the responsiveness of couples' contraceptive choices to variation in the prices of contraceptives. The fact that contraceptives are heavily subsidized in developing countries presumably reflects the perception that contraceptive use would decline dramatically if prices were allowed to increase. There is remarkably little scientific evidence that speaks to whether this is correct. We address this important open question by examining the impact on contraceptive use of price changes in Indonesia between 1997 and 2000.

Indonesia is well suited for this research for at least three reasons. First, over the last forty years, the Indonesian government has invested heavily in the provision of family planning services throughout the country, and is widely credited with making access to services broadly available and, thereby, contributing to significant reductions in fertility during this period (Hull, 2002).

Second, the financial crisis during the late 1990s was accompanied, in Indonesia, by dramatic changes in the real prices of modern contraceptives along with significant shifts in the relative prices of different contraceptive methods (Molyneaux, 2000). This unprecedented price variation was driven by three factors. First, as the financial crisis unfolded, the collapse of the Indonesian rupiah

was followed by a ten-fold increase in annual inflation in 1998 with prices stabilizing thereafter. Second, the ability of the Indonesian government to subsidize contraceptives was severely curtailed not only because of the decline in real resources in the public sector but also because government budgets were set in nominal terms well before the onset of the crisis. Third, the extent to which a contraceptive method is tradable and the size of domestic stocks on hand at the beginning of the crisis affected both the timing and magnitude of changes in the real prices of contraceptives as the financial crisis unfolded. Broadly speaking, injectable contraceptives are largely imported and, on average, their prices tracked inflation. In contrast, pills are domestically produced, albeit with imported inputs; price increases lagged inflation so that between 1997 and 1998, on average, real prices of pills fell by about 25%. Thereafter, as stocks were depleted, the real prices of pills rose to substantially above their 1997 levels. At the same time, because of reduced subsidies, the gap between private and public prices narrowed, particularly for pills.

It is the combination of these increases and decreases in real prices over time, changes in the relative prices of different methods and changes in the relative prices of contraceptives obtained from private and public suppliers, that is exploited in this research to estimate the price elasticity of demand for contraceptives. We treat these changes in prices as exogenous to contraceptive choices, at least in the short run, because the financial crisis and ensuing changes in the real price of contraceptives were largely unanticipated. The setting thus provides considerable purchase for isolating the causal effect of price changes on both contraceptive use and method choice. Further, after several decades of sustained economic growth, real resources in the hands of households fell, on average, by around 15% in 1998 and we harness this large, unanticipated decline in resources to measure the impact of real income shocks on contraceptive choices.

The third reason that the Indonesian crisis is a good context is that we exploit unusually rich longitudinal data designed to identify the impact of prices on contraceptive demand, among other questions. The Indonesia Family Life Survey (IFLS) contains not only individual-level information on contraceptive choices and household resources, but also comprehensive information on the array of community-level prices that each individual faced, as well as detailed characteristics of the family planning distribution network at the community level. IFLS is an ongoing survey that has been following individuals since 1993. Immediately after the first re-survey in 1997, we designed and implemented a special re-survey of a sub-sample of respondents in 1998 to directly assess the impact of the financial crisis. A follow-up of all respondents was conducted in 2000 and again in 2007.

The combination of all these factors provides a unique opportunity to pin down the effect of changes in contraceptive costs and household resources on contraceptive behavior. We find that very large changes in prices of contraceptives have little impact on the decision to use contraceptives or

on method choice, even among the poorest couples. This is an important result which suggests that reductions in subsidies for contraceptives are likely to be accompanied by, at most, modest changes in the contraceptive behavior of couples. We also find that as household resources decline, couples are more likely to use contraceptives although, as with prices, the effect is small in magnitude.

The next section provides the conceptual framework for this research and describes our empirical strategy. It is followed by a discussion of the context, data and empirical results.

II. Conceptual framework and empirical approach

Given the importance for policy of providing credible estimates of contraceptive price effects, many studies have sought to quantify the relationship between contraceptive price changes and demand for contraceptives. When national-level family planning programs were introduced, contraceptives were typically provided free of charge. Early research focused on the impact of charging small amounts for contraceptives. Most studies suggest either that demand for free contraceptives is little different from demand for contraceptives with a low price tag, or that demand is higher if users pay a small amount for contraception, perhaps because of distrust of free commodities, or because higher prices signal higher quality (see Lewis, 1986, for a review).

A few studies have assessed consumers' sensitivity to variation in prices that is randomly assigned. An early study, in Taiwan, reports that the number of new pill acceptors was twice as large in a town that introduced pills at $0.13 per strip relative to a town in which the price was set at $0.26 per strip (Cernada,1982). More recently, Bratt et al (2002) report on an experiment with contraceptive pricing in Ecuador, in which 15 clinics raised their prices for IUD insertions and revisits by different amounts. While their results suggest that IUD usage responds modestly to price changes, it is difficult to draw firm conclusions because the elasticity of demand is estimated very imprecisely with the 95% confidence interval for the elasticity ranging between zero and one.

A key advantage of these studies is that prices were changed specifically to measure the impact on demand. However, the implementation of randomized variation is not straightforward. Bratt et al (2002) describe some of the sources of contamination that arise in their study: some clinics failed to follow pricing instructions, others implemented prices assigned to another group and others refused to participate after randomization. Further, most of the randomized studies on the impact of prices on contraceptive demand have been conducted in a limited number of sites which contributes to their low statistical power and raises questions about external validity.

Other studies use a quasi-experimental design comparing behavior before and after changes in prices, often for contraceptive supplies provided through social marketing programs. In Bangladesh, for example, sales of socially marketed condoms fell by 46% in the year after a 60%

increase in prices was imposed (Ciszewski and Harvey, 1994). Although prices of pills distributed through the social marketing program rose as well, the change in pill sales was far more muted.

An important issue that affects interpretation of results from these experimental and quasi-experimental studies is that changes in demand for commodities are reported from the perspective of the supply point at which the prices changed. Although demand for particular commodities or services fell at specific supply points, it is not clear whether users switched to other providers or to other methods. If contraceptive suppliers, or contraceptive methods, are good substitutes for one another, then a change in the price of one method at a particular supplier may result in a large change in source of supply or method choice, but in little or no change in overall contraceptive prevalence. Thus, it is difficult to draw conclusions from these studies about the impact of price changes on overall contraceptive prevalence or method mix.

Addressing these concerns requires information on individuals, their use of contraceptives and information on prices for multiple methods and provider types. As a theoretical foundation to model this process, we draw on an economic model of consumer demand applied to contraceptive choice (Rosenzweig and Schultz, 1996; Schultz, 1997a).

Couples make choices over their lives that affect both the timing of births and completed family size. These decisions have powerful implications for the couples' own well-being and that of their families. For example, decisions about investments in children — and thus child quality — may partially depend on the total number of children born and on the timing of births. Children may also impact household well-being less directly. On the one hand, children will absorb resources because of their consumption needs and need for time spent raising those children. On the other hand, children may contribute to household well-being by providing labor services, reducing vulnerability to risk through spatial or occupational diversification, altering the distribution of power within the household, increasing security in old age, and generating economies of scale in home production and consumption. Given the magnitude of the lifetime costs and benefits of having a child, we assume couples consider the future when making reproductive decisions.

Contraceptive use and choice of contraceptive method are fundamental mechanisms by which a couple influences total fertility and birth spacing. Assume couples consider preferences regarding the timing, quantity, and quality of children, economic resources and prices, and the long term consequences of childbearing when making decisions regarding contraceptive use:

$$C_{imt} = f_t(\, p^c_{mt},\ p_{mt},\ x_{mt},\ x_{imt},\ \varepsilon_{imt}) \qquad [1]$$

where C_{imt} is use of contraception (or a particular method) by couple i, in community m, at time t.

The vector of prices for contraceptives, p^c_{mt}, includes prices of each of the methods available to the couple. Prices are the same within a community but vary over time. We define contraceptive

prices broadly since contraceptive behaviors may be influenced by variation in the availability, quality and efficacy of contraceptives, availability, distance to and quality of services associated with contraceptives and the user fees for the contraceptives themselves. As a convenient shorthand, we refer to all of these influences as "prices" of contraceptives. Prices of all other goods in the community are p_{mt} , and other community-level characteristics such as infrastructure are x_{mt} . Characteristics of the couple, x_{imt} , include household resources as well as socio-demographic characteristics such as age and education. Unobserved characteristics of the couple and the community, ε_{imt} , include, for example, tastes, health and fecundity of the couple, levels and quality of resources in communities and effectiveness of community leaders in extracting resources from the central government.

Holding utility constant, a price increase will result in either a decrease or no change in the quantity demanded. But utility does not remain constant in the face of a price change. Price increases reduce the purchasing power of those who buy contraceptives, because maintaining the same level of contraceptive use has become more expensive. The effect on demand of this change is theoretically ambiguous. If the reduction in income induced by the price increase results in increased contraceptive demand, and if the magnitude of this effect more than offsets the utility-constant price effect, then, in theory, a price increase could result in increased demand. While the direction is theoretically ambiguous, in general we expect contraceptive use to decline or stay the same as the (monetary or non-monetary) cost of obtaining contraceptives increases.

On the one hand, spending on contraceptives is typically small compared with the substantial lifetime costs and benefits of having a child. This suggests that even a sizeable increase in the monetary price of contraceptives may have little impact on the decision to use contraceptives. On the other hand, if households are liquidity constrained, large price increases may result in substantially reduced use of contraceptives. Moreover, if prices decline but are expected to rise in the future, then couples may stock up now. In these cases, demand may be very responsive to prices. Clearly, the magnitudes of the effects of prices on contraceptive choices are fundamentally empirical questions.

Studies have estimated linearized approximations to the contraceptive demand function [1]:

$$C_{imt} = \alpha_0 + \alpha_1 p^c_{mt} + \alpha_2 p_{mt} + \alpha_3 x_{mt} + \alpha_4 x_{imt} + \mu_i + \mu_m + \upsilon_{imt} \qquad [2]$$

where, for expositional ease, unobserved heterogeneity ε_{imt} is separated into three additive components, $\mu_i + \mu_m + \upsilon_{imt}$. The couple-specific effect, μ_i , captures time-invariant differences across couples in lifetime resources, fecundity, tastes for contracepting, family size and so on. The community-specific effect, μ_m , reflects differences across communities that do not change over time such as fixed levels of health and non-health infrastructure, economic and social resources as well as

permanent differences in prices that arise, for example, from differences in transportation costs to distributors. Finally, υ_{imt} captures all other unobserved heterogeneity that varies over time.

Most econometric studies in the literature have relied on cross-section data to estimate contraceptive demand functions and there is substantial variation in estimated price effects. For example, Schwartz et al (1989) report that higher prices for a particular method are generally associated with significantly lower probabilities of choosing that method in Jamaica, the Philippines and Thailand but find little evidence of switching methods in response to price differences. In contrast, using data from the Philippines, Akin and Rous (1997) find that method price is not statistically significantly associated with contraceptive choice. They conjecture that this may be due to measurement error in prices swamping estimated price effects although the differences across studies may also reflect heterogeneity in study populations and study settings. It is possible that it may be attributed to the empirical methods themselves. In particular, there are legitimate questions about whether the reasons underlying spatial variation in contraceptive prices observed in cross-section data may affect interpretation of estimated price effects (Rosenzweig and Wolpin, 1986).

For example, it makes sense for policy makers to target family planning program subsidies to the places where the impacts will be largest. If the goal is to increase contraceptive use, then subsidies will tend to be targeted to communities where contraceptive prevalence is low. Studies that fail to take into account non-random placement of family planning subsidies will yield upwardly biased estimates of the impact of prices on contraceptive prevalence. This may explain the observation that higher prices are sometimes associated with greater use (Lewis, 1986).[1]

The nature and direction of non-random program placement is likely to vary from context to context. In some cases, family planning programs may be disproportionately allocated to areas where health services are well-developed and contraceptive use is high, possibly for political reasons or because well-connected advocates for resources are more likely to live in areas with more resources. In those instances, estimated price effects will be negatively biased.

Without an understanding of the processes that underlie geographic variation in prices of contraceptives, it is difficult to know how to interpret estimated price effects based on cross-section data. Contraceptive price outcomes reflect the decisions of multiple actors including users, producers, sellers, non-government organizations and government agencies. Both variation in market structure and the nature and extent of family planning subsidies across contexts potentially contribute to the heterogeneity in estimated price effects in the literature.

[1] Molyneaux and Gertler (2000) suggest family planning services have been targeted in this way in Indonesia where cross-section studies document that contraceptive use is lowest in areas with the strongest family planning programs (Lerman et al, 1989; Molyneaux, Pandi and Wibisono, 1990; Wirakartakusumah, 1988).

It is evident from [2] that a legitimate empirical concern arises if a covariate in the model is correlated with an unobserved factor that affects contraceptive demand. This is the case in the examples described above, since family planning program resources, which are not observed, affect prices of contraceptives which, in turn, affect use. To the extent that the allocation of family planning resources across communities is fixed, in relative terms, over time during the study period, its impact on estimates of price effects will be absorbed by the community fixed effects, μ_m, in which case estimated effects in [2] will be unbiased. This approach amounts to examining the association between changes in prices and changes in contraceptive use, which calls for longitudinal data at the community level. More generally, models that include community fixed effects will provide unbiased estimates of price effects as long as all unobserved variation that affects contraceptive use is common within each community and fixed across time. These methods have not typically been applied to estimate the impact of prices on contraceptive use, although the strategy has been used to address the more general question of how family planning program inputs impact fertility in Indonesia (Gertler and Molyneaux, 1994; Pitt, Rosenzweig and Gibbons, 1993) and Thailand (Schultz, 1997b). None of these studies documents a strong link between family planning program inputs and fertility.

The assumption of community-specific fixed effects is not innocuous. For example, assume that some people within a community (say the poor) have access to subsidized services while others do not. If the composition of these groups changes (because of an economic shock, for example), it is unlikely that unobserved heterogeneity can be treated as fixed within communities. The same issue arises if people who move (into or out of the community) have different attitudes towards contraceptive use relative to those who do not move. This might arise, for example, if movers and stayers have different tastes for numbers of children or for investments in the human capital of their children. To avoid potential complications that arise with endogenous migration, the community effect, μ_m, identifies the location, m, of the couple at the beginning of the study.

In fact, the economic crisis was accompanied by geographic mobility, with poorer families with more children tending to move to rural and lower cost locations after the collapse of the Indonesian economy. In order to directly address these concerns, the empirical models estimated below include couple-specific fixed effects, μ_i, which absorb all unobserved characteristics of couples that do not vary during the study period. This underscores the value of repeated observations on the same couples in IFLS.

Estimates of price effects based on these models will be unbiased if there are no unobserved characteristics that change during the study period that also affect contraceptive use and prices (or any other covariate). Arguably the most serious threat to this assumption is the fact that Indonesia has

a history of effectively targeting family planning subsidies to assure maximum impact. The next section describes unique features of the Indonesian financial crisis that mitigate this concern.

III. Context

Notwithstanding the economic crisis of the late 1990s, socioeconomic development in Indonesia has improved significantly over the past four decades. From 1967 to 1997 Indonesia's per capita gross domestic product (GDP) increased by almost 5 percent per year. Fertility declined from 5.9 in the late 1960s to 2.8 in 1997 — a fall ascribed to several different factors: economic growth, rising levels of education and women's labor force participation, increases in age at marriage, and a strong national family planning program (Gertler and Molyneaux, 1994; Hull, 2002).

Indonesia's National Family Planning Coordinating Board (BKKBN) has won numerous accolades and is often cited as a model for family planning programs in the developing world (Hull, 2002; Warwick, 1986; World Bank, 1990). BKKBN coordinates activities designed to provide a full range of contraceptive services at a high level of quality and to reduce fertility (Hamidjoyo and Chauls, 1995; UNFPA, 1998; Wilopo, 1997). Central objectives include promoting the small family norm, educating women about family planning, recruiting village-level family planning volunteers, and working with the Ministry of Health (MOH) to distribute contraceptives and to organize outreach efforts (Hugo et al, 1987; Suyono, 1988; United Nations, 1991).

For much of the 1970s and 1980s, contraceptives were available free of charge. Beginning in the late 1980s the "Blue Circle" social marketing campaign encouraged users to purchase contraceptives from the private sector (which routinely charges for services), while the "KB Mandiri" (family planning self-motivation and self-sufficiency) movement pushed users to pay small fees for methods subsidized by the government (Jensen, 1996; BKKBN, 1998; Sihombing, 1994). These programs had an impact: by 1997 over half of all contraceptors relied on the private sector for supplies, and only 16% received contraceptives for free (Central Bureau of Statistics, 1998).

Oral contraceptives, injections, implants, intrauterine devices, male and female sterilization, and condoms are all available in Indonesia. Methods that require a clinical setting, such as implants and IUDs are available from government health centers (physician-headed clinics that provide subsidized primary health care), private practitioners (doctors, midwives, and nurses), and government and private hospitals. Methods that do not require a clinical setting are available from health centers and private practices as well as at commercial pharmacies and community-based distribution points. Community-based distribution of family planning has long been a hallmark of the Indonesian program. Early on, BKKBN hired family planning fieldworkers from local communities to cultivate new acceptors and distribute those resupply methods that require no medical training. As

use grew, fieldworkers could no longer handle resupply. Local volunteers were recruited to administer village posts that distributed condoms and pills supplied by family planning fieldworkers (MOH, 1990; Shiffman, 2002). These "Integrated Service Posts" (*posyandu* or community health posts) take place once per month. They are organized by neighborhood volunteers and attended by reproductive-age women and children under five. Ideally the posts are also attended by health center staff and family planning fieldworkers. If trained health workers are present the posts provide contraceptive injections. Otherwise oral contraceptives and condoms are available (Kosen and Gunawan, 1996).

Indonesia's well-organized system for making family planning widely available was dealt a harsh blow by the economic crisis of the late 1990s. At that time, family planning policy discussions centered on BKKBN's ability to supply contraceptives. Frankenberg, Sikoki and Suriastini (2003) establish that while users changed providers from whom they obtained contraceptives, between 1997 and 1998, there was very little change in overall contraceptive use. In this paper, we examine the short and longer-run impact of price and income shocks on contraceptive choices.

The Indonesian Rupiah came under pressure in the latter part of 1997, falling from around Rp2,400 per US$ in July to about Rp4,800 by December of that year. In January 1998, the Rupiah collapsed, to Rp15,000 per US$, and continued to fluctuate wildly in value for much of the rest of the year, stabilizing around Rp10,000 per US$ (Frankenberg, Thomas and Beegle, 1999). President Suharto resigned in early 1998. Sharp increases in prices accompanied the financial and political chaos. Estimates by Statistics Indonesia put annual inflation at about 80% in 1998 while GDP per capita declined by 13% that year. Thereafter, prices and the exchange rate stabilized and by 2000 the growth rate in GDP had rebounded to 5% per year. (Strauss et al, 2004).

Prior to the crisis, oral contraceptives were produced by BKKBN or by domestic pharmaceutical companies using a combination of local and imported inputs. A domestic stockpile of imported inputs and assembled pills at the onset of the crisis, along with the government prioritizing the use of subsidized foreign exchange for the procurement of raw materials so that the domestic pharmaceutical industry could maintain production (Lieberman, Juwono and Marzoeki, 2001), enabled providers to hold rises in prices for oral contraceptive below the inflation rate in the short run. Thus, while nominal prices rose between 1997 and 1998, on average, the real price of oral contraceptives declined by 25%. These effects were not long-lasting. As domestic stocks were exhausted, new inputs were imported, subsidized foreign exchange dried up and production costs rose, so the real price of oral contraceptives increased between 1998 and 2000.

In contrast, there was minimal domestic production of injectable contraceptives, which were generally imported as finished goods, so domestic stocks were limited. As a result, on average, prices kept in line with inflation through the study period.

The prices paid by users were also affected by reductions in the real value of public subsidies. BKKBN has a track record of successfully allocating family planning resources towards those areas with greatest need through a process of local and national meetings that take place at several geographic levels over the course of the year preceding resource allocations (Molyneaux and Gertler, 2000). The allocations for 1998 were determined in the first half of 1997, prior to the crisis, and those allocations were not changed in response to the crisis. Since the allocations were set in nominal terms, as inflation rocketed, the real value of these subsidies collapsed. The Indonesian government sought donations of contraceptive commodities from development organizations to delay increases in prices at public providers (UNFPA 1998).

The crisis was accompanied by very large declines in income for most households: on average, real wages declined over 40% between 1997 and 1998. We include time-varying household resources, measured by household expenditure per capita (PCE), in the models. This serves two purposes. Controlling PCE will assure that estimates of price effects are not contaminated by income effects and the models provide estimates of the impact of income shocks on contraceptive use.

The empirical models measure the impact of crisis-induced changes in contraceptive prices and income on contraceptive use and method choice for the same couples before and after the crisis. The couple-specific effects included in the models absorb time-invariant factors that might affect contraceptive choices such as long-run resource availability, education, fecundity and tastes as well as the longer-run allocation of resources for family planning and health infrastructure and services, to the extent these effects can be treated as linear and additive. Estimates of price and income effects will be unbiased under the assumption that there are no other unmeasured time-varying factors that affect prices, family resources and contraceptive use.

This assumption is plausible for changes between 1997 and 1998 but is more controversial several years after the onset of the crisis. By 2000, families had adjusted their lives in response to the economic shock. Public family planning resources may have been redirected towards the areas that were particularly hard hit by the economic downturn, or towards particularly price-sensitive areas. To the extent that targeting was not directed towards people who were more (or less) inclined to use contraceptives, our estimates for changes between 1997 and 2000 will not be contaminated by the policy choices. With this caveat in mind, we present estimates of price and income effects as the crisis unfolded and over the longer term with the latter providing insights into the timing and duration of behavioral responses to the crisis.

IV. Data

IFLS is a longitudinal survey that has elicited health and socioeconomic information from a sample of Indonesian households for over fifteen years. The first wave, IFLS1, was conducted in 1993 and interviewed 7,224 households across 13 Indonesian provinces. The first follow-up, IFLS2, was conducted in 1997 and re-interviewed at least one household member from 94% of households interviewed in IFLS1. In 1998, IFLS2+ was designed and implemented specifically to capture the immediate impacts of the economic crisis. The sample consisted of all respondents interviewed in a sub-sample of about one-quarter of the original IFLS enumeration areas.[2] IFLS2+ re-interviewed at least one household member from 99% of the eligible households interviewed in IFLS2. The third wave, IFLS3, was conducted in 2000 and included the entire sample of IFLS respondents. At least one person was re-interviewed from 96% of those households interviewed in IFLS1 or IFLS2.

For the purposes of this paper a key strength of IFLS is that, in addition to detailed information about respondents' use of contraceptives and their resources, data are collected on infrastructure, resources, and services at the community level.[3] Data on the monetary and non-monetary costs of contraceptives are obtained from a sample of government, private, and community facilities that provide services in the area. Health facilities that were visited and interviewed were selected from lists compiled from household survey respondents' answers to questions about their own use and knowledge of facilities – including facilities that are not located in the community. In each community, staff at the most frequently mentioned government, private, and community facilities were interviewed. Additional facilities listed by the household respondents were selected at random with weights reflecting the frequency with which the facility was reported by respondents and staff as those facilities were interviewed.[4] In 1998 interviewers were instructed to interview staff at the same facilities that were in the 1997 wave. If a facility could not be recontacted, interviewers added a new facility based on a recommendation from the community leader. In 2000 the sampling procedure used in 1997 was repeated. Approximately 12 facilities are interviewed per IFLS community and these data are aggregated to the community level in order to provide a detailed picture of the availability and service charges of contraceptives faced by IFLS respondents.

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[2] The sample of enumeration areas for IFLS2+ was drawn in two stages. First, 7 of the original 13 IFLS provinces were selected and, second, within these provinces, enumeration areas were purposively selected to match the IFLS sample as closely as possible. The households selected for IFLS2+ cover the full spectrum of socioeconomic status and economic activity represented in the larger sample and achieve over 80% efficiency.

[3] A community is defined as a *desa* (village) in rural areas or *kelurahan* (neighborhood) in urban areas. At baseline, IFLS covered 313 communities of which 90 were included in IFLS2+.

[4] Sampling from a list of providers compiled from household respondents avoids imposing an arbitrary catchment area boundary. In each community the geographic area from which facilities are drawn is the area that is relevant for a random sample of individuals (those who respond to our household survey) who live there. The facility need not be located within the administrative boundary that defines the village, although in many cases it is.

Results, presented in Table 1, distinguish private practices, health centers and health posts. To measure the immediate impact of the financial crisis, comparisons are drawn between 1997 and 1998 for those communities included in IFLS2+ (Panel A) and between 1997 and 2000 for all IFLS communities to provide insights into longer term changes (Panel B).[5] For each facility type, if any facility in the community provides the method, it is assumed to be available. Service charges, or prices, are calculated separately, by provider type, for oral and injectable contraceptives. The prices cover the median user charges for three months of supply – that is, three strips of pills (for oral contraceptives) or a 3-month shot (for injectables) from the provider type in the community.[6] All prices in the tables are denominated in thousands of Rupiah and converted to December 1996 Rupiah using a monthly, regional consumer price index published by Statistics Indonesia.[7]

Oral and injectable contraceptives were effectively universally available from both private providers and health centers in 1997 and there was very little change in availability from these providers through the crisis. Pills were available from health posts in about 85% of communities in 1997 and 1998 but in only two-thirds of communities by 2000. This is the only significant decline in availability at the community level. Injections were available from health posts in about half the communities throughout the study period.

Whereas availability was little affected by the crisis, this is not the case for prices. The economic crisis was accompanied not only by large changes in the real costs of contraceptives, but also substantial shifts in the relative costs of methods by provider type. On average, between 1997 and 1998, in real terms, the median price of oral contraceptives from private practices declined by over Rp1,000 (or 25%) and by over Rp500 (or 31%) from health centers. This reflects the impact of domestic production and having stocks on hand when inflation rocketed in 1998. Health posts do not maintain their own stocks and, as public subsidies declined, prices at health posts tracked inflation. During the same period, the prices of injectables, which were largely imported, also tracked inflation. In 1998, oral contraceptives were subsantially less expensive than injectables for every provider.

[5] Columns 1 and 5 differ because the former is based on the subset of communities in IFLS2+ and the latter is based on all IFLS communities. None of these differences in availability or service charges is significant.

[6] Median prices are conditional on the method being available in both years. If availability or median service charge is missing for a community, we impute using the value observed in that same community in the previous (or subsequent) wave. This happens in up to five communities for the 1997-1998 panel, depending on the method and facility type, and in up to ten communities for the 1997-2000 panel. When availability or service charge is missing in both waves, we impute the value using the sample mean. This happens for no more than two communities, regardless of method and facility type. Regression models include controls identifying imputed values.

[7] The index is based on prices collected from urban centers (44 cities across the 27 provinces of Indonesia) and is generally regarded as the best available price index. Inflation in rural areas in 1998 may have been slightly higher than inflation in urban areas, which will potentially overstate price increases. The rural-urban differences are estimated to be no more than 5% (Thomas et al, 1999) and, to a large extent, will be absorbed by the fixed effects in the regression models.

In sharp contrast, between 1998 and 2000, the real prices of oral contraceptives reversed course as costs of production rose. On average, the median price from private practices rose by nearly 50% between 1998 and 2000 which translate into a 10% real increase in the price between 1997 and 2000. With lower public subsidies, prices rose more in the public sector and, on average, between 1997 and 2000, the median price increased by over 20% in health centers and by over 50% in health posts. These changes represent very large increases in real prices. Reduced subsidies also affected the price of injectables at health posts (where they rose 20% in real terms) while prices from other providers changed little. In real terms, contraceptives were more expensive by 2000 relative to before the crisis. Each of these differences, but one (injectables from health centers), is significant.

Underlying these average changes is considerable heterogeneity in the changes in median prices across communities in Indonesia. The distribution of the percentage changes by method and provider type are presented in Appendix Table 1. At the 25th percentile, real prices of oral contraceptives, taken overall, declined by 41% between 1997 and 1998 but did not change between 1997 and 2000. At the 25th percentile, injectable prices declined by 5% between 1997 and 1998 and by 3% between 1997 and 2000. At the 75th percentile, real prices of oral contraceptives rose by 10% between 1997 and 1998 and by 137% between 1997 and 2000 while injectable prices rose by about 25% in both periods. Whereas one-quarter of communities experienced a real price increase for oral contraceptives between 1997 and 1998, prices rose in three-quarters of the communities between 1998 and 2000. For injectable contraceptives, around two-thirds of communities experienced a real price increase in both periods.[8]

[8] Measurement error is a legitimate concern in studies that use survey data. IFLS is designed to minimize measurement error of prices. We do not rely on prices paid by consumers which reflect the outcomes of choices of individuals including the decision to purchase contraceptives, the outcome of primary interest in this study. Rather, prices for specific contraceptives are collected from a sample of facilities that are used by respondents in the community and the median of the price of each method from each provider type is treated as the community-level price faced by the consumer. In the 1997 wave, for example, this amounts to over 1,800 median prices which are calculated using 11,401 prices collected in the community surveys. Few population-based household surveys allocate the level of resources and manpower used in IFLS to collect price data. To provide an empirical evaluation of the quality of the price data, community-level prices are compared with prices reported in the household survey by women who had purchased contraceptives. While the household and community surveys are conducted independently by different teams of interviewers, it is possible they share a common bias. Therefore, prior to making these comparisons, prices of contraceptives reported in the 1997 wave of IFLS are compared with prices reported in the 1997 Demographic and Health Survey (DHS) which is a completely independent survey. DHS was not collected in 1998 or 2000 and so no comparisons can be made for those years. The distributions of prices for (a 3 month supply of) the pill and a (3 month) injectable are reported in panel A of Appendix Table 2. The DHS and IFLS distributions are almost identical. The mean price of the pill in IFLS is Rp2,152 and Rp2,155 in DHS; mean prices of injectables are Rp4,400 and Rp4,450 respectively. The differences are not statistically significant. Panel B of the table compares the distributions of the IFLS individual-level prices with the community-level prices for each method and provider type in 1997 and 2000 (all measured in 1997 Rupiah). DHS does not record provider type and so it is not included in these comparisons. Since the individual prices reflect actual purchases whereas the community prices reflect the menu of prices faced by each consumer, the distributions should not be identical – but they

In sum, the crisis was accompanied by a dramatic, immediate and presumably unanticipated shift in the relative cost of available contraceptive methods, with oral contraceptives becoming much less expensive relative to injectable contraceptives during the first year of the financial crisis. Over the longer run, service charges for oral contraceptives caught up so that there was an overall increase in the real price of using contraception. While service charges are lower at public than private facilities, the government was unable to shelter public facilities from the increasing cost of contraception so the private-public gap declined over the study period.

Panel 1 of Table 2 provides evidence on whether these shifts in prices were accompanied by changes in contraceptive use and method mix. We focus on women who were age 15 through 49 and married at the time of each survey. Women interviewed in both 1997 and 1998 (in the sub-sample of IFLS2+ communities) are included in Panel A, and all eligible women interviewed in IFLS in 1997 and 2000 are included in Panel B.[9]

Overall, contraceptive use hardly changed, with about 6 out of every 10 women using any contraceptive method in each survey year. Underlying this stability are some modest changes in method use and sources of contraceptives. At the onset of the crisis in 1998, changes in the fraction of women using pills or injections were statistically insignificant, but a small, statistically significant increase occurred in the use of other methods.[10] These trends continued, and between 1997 and 2000, the use of pills and injections each declined by about 1.5 percentage points while 3 percent of women switched into IUDs and implants. These changes are all statistically significant.

There was also a movement away from public providers (health centers and health posts) towards private providers. The decline in the fraction of women who obtained contraceptives from health centers was rapid (taking place between 1997 and 1998 when availability changed very little but prices rose relative to the private sector) and the decline at health posts occurred after the onset of the crisis (between 1998 and 2000, when availability also declined).

Prices were not the only thing that changed dramatically during the crisis – household resources also collapsed. As shown in panel 2 of Table 2, on average, real monthly household PCE fell by about 17% during the first year of the crisis and remained constant in real terms for the following two years. This is an unprecedented and arguably unanticipated decline in resource availability for the average Indonesian. As shown in Appendix Table 1, the crisis did not affect

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should be close. They are. We conjecture that measurement error in prices collected at the community level is not likely to be driving our results.

[9] Of 15-49 year old married women interviewed in 1997, 96% were re-interviewed in 1998 and 91% were re-interviewed in 2000. Extending the sample to include those not interviewed in each pair of waves has no substantive impact on the magnitude or statistical significance of the estimates.

[10] In 1997, intra-uterine devices (IUDs) accounted for about 50% of the other methods; implants and female sterilization accounted for about 20% each.

everyone equally. At the 25th percentile, real PCE declined by 34% between 1997 and 1998 and by 29% between 1997 and 2000. However, at the 75th percentile, real PCE rose by 35% between 1997 and 1998 and by 56% between 1997 and 2000.

It is useful to put the magnitude of the contraceptive prices in perspective. On average, real household PCE was over Rp130,000 per month in 1997, while sample average community-median contraceptive service charges ranged between about Rp500 and Rp1750 per month of service, depending on the type of facility and contraceptive used. In other words, the typical contraceptive service charge in 1997 ranged from between 0.4% and 1.3% of household PCE.

Given the very large changes in prices and resources, and the muted changes in contraceptive use, Tables 1 and 2 suggest the price and income elasticities of demand for contraceptives are very small. We turn next to multivariate regression models to directly measure these elasticities.

V. Regression results

Regression estimates are presented for empirical models designed to identify the effects of contraceptive prices and household resources on both overall use of contraception and on method choice. The main results, reported in Tables 3 and 4, are based on linear probability models that exploit the longitudinal dimension of IFLS. Estimates in Panel A of each table use the sub-sample of respondents interviewed in 1997 and 1998 and measure the effect of unanticipated changes in contraceptive prices that arose because of the crisis. Results for the full sample of respondents, interviewed in 1997 and 2000, are reported in panel B of each table.

All models include a couple-specific fixed effect so that the estimates should be interpreted as the impact of innovations in prices and incomes on contraceptive choices. More generally, the fixed effects absorb time-invariant unobserved heterogeneity that might contaminate estimated price and income effects including a couple's fecundity, tastes and fertility goals as well as the placement of reproductive health services and the geographic distribution of family planning subsidies.

Following Table 1, contraceptive prices are construed broadly to include whether a specific method is available in the community as well as the community-level median service charge for that method (conditional on it being available). Table 3 reports results for community-level prices of pills and injections; Table 4 distinguishes the source of each of these methods.[11] Because the distribution

[11] To mitigate potential contamination due to endogenous migration, each couple is assigned to the community of residence at baseline. Price data are not available for other communities since the facility surveys are conducted in only the baseline communities. (It would be extremely difficult to mount the facility survey in the destination community of every migrant.) By 1997, 7% of female ever married household members aged 15–49 lived outside an IFLS community. Among those interviewed in both waves, 3% moved away from IFLS communities between 1997 and 1998, while 6% moved away between 1997 and 2000.

of prices is long-tailed, and because some prices are zero, the regressions include the square root of prices (which approximates a logarithmic transformation for positive prices).[12]

All standard errors and test statistics are based on bootstrapped estimates with 1,000 replications which take into account the clustered nature of the sample design. These estimates are used to calculate the multi-equation test statistics for joint significance in Tables 3 and 4.

In general, greater availability of methods should result in either higher use or no change in use whereas higher service charges should result in either lower use or no change. Predictions are more complicated for method-specific use. An increase in the service charge for a particular method, holding constant the prices of all other methods, should result in either a decline in use of that method or no change. Under the reasonable assumption that methods substitute for one another, there will either be no change in use of other methods or a compensating increase in use as couples switch to the relatively less expensive method.

A. Prices, availability and contraceptive use

Column 1 in each panel of Table 3 displays the estimated effects of availability and the square root of service charges on contraceptive use (relative to not using any method). The second set of columns in each panel displays estimates from seemingly unrelated regressions of the effect of contraceptive prices on the demand for oral, injectable, and other contraceptive methods, where no method is the omitted group.[13]

Large swings in contraceptive prices around the time of the crisis had only small effects on contraceptive use. Specifically, changes in the service charges for pills and injections had no statistically significant impact on overall use of contraceptives (column 1 of each panel) or on method choice (columns 2.1 through 2.3 of each panel) either individually or taken together (as indicated by the χ^2 likelihood ratio tests statistics for joint significance at the foot of the table).[14]

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[12] As an additional measure of access to services, (and thus prices, broadly construed,) all regression include distance to the nearest family planning service provider (overall, in Table 3, and by type of provider in Table 4). All the estimated coefficients on this distance indicator are small and none is statistically significant. The distance effects are identified by changes in distances between study years which are small and driven mostly by changes in availability of services. The latter effects are reported in the tables. Additional community-level controls in the models are the price of rice, whether the community has a market, telephone service, bank, public transport, paved roads or sewerage system and the fraction of households in the community that have electricity. Household level controls are whether the husband was co-resident at the time of the interview, whether the interview was conducted by proxy and whether the respondent had moved from the baseline community.

[13] Other contraceptive methods include IUD, diaphragm, condom, sterilization, and traditional methods. All models are based on ordinary least squares and so, by construction, for each covariate, the estimates in columns [2] sum to the estimate in column [1]. Our conclusions are substantively the same for logit models.

[14] The null that all own- and all cross-price effects are zero is tested against the one-sided alternate that at least one own-price effect is negative and/or at least one cross-price effect is positive. (Gourieroux, 1982; Wolak,

None of the estimated effects of changes in prices between 1997 and 1998 is substantively large. The price effects are even smaller between 1997 and 2000.

No change in availability of contraceptives occurred between 1997 and 1998 (and so those controls are not included in the models in Panel A), and only small changes in availability occurred between 1997 and 2000. None of these changes is statistically significant (individually or jointly), although these estimates are poorly determined.

Table 1 established substantial heterogeneity in changes in prices and availability of contraceptives by provider-type within the IFLS communities. It is possible that by ignoring this heterogeneity, we have masked adjustments to changes by users. This possibility is explored in Table 4, which distinguishes prices and availability by source.

B. Provider-specific prices, availability and contraceptive use

Neither overall contraceptive use nor method choice was affected by changes in the service charges for or availability of pills or injections between 1997 and 1998, either individually or taken together. All the estimated price effects are small in magnitude and statistically insignificant.

Between 1997 and 2000, changes in prices are significant predictors of contraceptive use and method choice. With reduced public subsidies, the price of pills rose substantially at health posts which resulted in a statistically significant reduction in use of contraceptives which is mostly manifest in reduced use of injectables. While no other price changes had a significant impact on overall use of modern methods, they did affect method mix. At health centers, higher prices of pills resulted in shifts towards injectables while higher prices of injectables resulted in substitution out of injectables. Higher pill prices from private providers resulted in substitution towards pills and other methods. All the estimated price effects are small in magnitude and similar to those for 1997/1998 but, with the larger sample size in the 1997/2000 sample, we have the power to detect statistically significant but substantively modest effects of large changes in prices.

Recall that pill availability in health posts declined considerably between 1997 and 2000 with 17% of communities no longer having a health post that stocked pills. We estimate that those in communities where pills were no longer available experienced a 6.6 percentage point reduction in the use of modern methods – split almost equally between pills and injections. This result should be interpreted cautiously. While it is plausible that this reflects the causal effect of availability, we cannot rule out that changes in supply between 1997 and 2000 responded to changes in demand.

Real household resources declined by about 15% between 1997 and 1998 and remained depressed through 2000. This unprecedented decline in resources was accompanied by an increase in

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1987.) Because theory is imposed, this test is more powerful than a two-sided alternative (that price effects are not zero). Inferences about prices with the one and two-sided alternatives are the same in all of our models.

the fraction of couples using contraceptives both immediately and over the longer term. While the magnitude of the increase is modest – around 0.6 percentage points – it is significant for the longer time period (and larger sample) and for the use of injections as well as other (non oral) methods. For a small fraction of women, reduced resources resulted in greater efforts to control fertility.

In sum, the evidence from Indonesia is unambiguous. Dramatic declines in household resources and substantial changes in the prices of contraceptives by method and source are accompanied by very small changes in use and method mix. The price and income effects are not only small but also estimated with sufficient precision to rule out substantively important effects of large changes in contraceptives prices on use and method mix.

C. Alternative specifications

Between 1998 and 2000, the real price of injections remained relatively stable while the average price of pills almost doubled in real terms. On the one hand, by comparing contraceptive use before and after the onset of the financial crisis, we may be missing responses to these price changes. On the other hand, while it is plausible to assume price shocks between 1997 and 1998 that arose because of the financial crisis were not anticipated, price changes between 1998 and 2000 are more predictable and do not provide as clean an identification strategy. With this caveat in mind, we have estimated the same models using respondents who were interviewed in 1998 and 2000 and find the estimated coefficient estimates for price and income changes between 1998 and 2000 are indistinguishable from those reported in Tables 3 and 4 for changes between 1997 and 1998 and between 1997 and 2000, respectively. One of 24 price changes between 1998 and 2000 has a statistically significant effect on demand for contraceptives or method choice which, for a 5% size of test, is the number we would expect if the test statistics were generated randomly.

An important challenge in the empirical literature on contraceptive demand has been purging estimates of potential bias due to couple-specific unobserved characteristics, such as fecundity, that drive the decision to use modern contraception methods. To address this concern, the regressions discussed above include individual fixed effects. In all the models, the fixed effects are jointly significant (with p-values < 0.0001) although estimates of price and income effects in models that replace couple fixed effects with community-level fixed effects are very similar to (and not significantly different from) those reported in Tables 3 and 4. The same applies when we include only province fixed effects in the models. This suggests that it is the shocks spawned by the financial crisis that are the key for identification of the price and income effects in our models.

Assumptions about the distribution of errors in the empirical models are not critical for our conclusions. For example, in probit models (with province fixed effects) the marginal effects of changes in (the square root of) pill and injection prices on contraceptive use in 1997/2000 are -0.017

(se=0.02) and 0.011 (se=0.03), respectively. Nor does the way that prices are specified affect the conclusions. Using prices, rather than their square root, the pill and injection price effects in a linear probability model for 1997/2000 are -0.005 (se=0.01) and -0.001 (se=0.01), respectively. Restricting attention to those respondents who have never moved from the baseline community yields the same conclusions about price and income effects. The 1997/2000 price effects are -0.007 (se=0.02) and 0.002 (se=0.03) for pills and injections, respectively. All of these estimates are very close to the comparable estimates in Table 3, which are -0.015 (se=0.02) and 0.006 (se=0.03) for pills and injections respectively.

D. Heterogenous effects.

The results in Tables 3 and 4 may hide heterogeneous responses across couples to the changes that occurred around the onset of the crisis. For example, couples who were hardest hit by the crisis may have responded differently from other couples. To explore this possibility, the fixed effects linear probability models have been re-estimated with interactions for whether the female in the couple reported (in 1998) that over the past 12 months their life had changed in ways that made them better or worse off (relative to experiencing little change). We find no differences in the responsiveness to price changes across these groups.

Responsiveness to price changes in 1998 may depend on expectations about whether changes around the time of the crisis were temporary or permanent. Fixed effect models were re-estimated with interactions for whether individuals reported (in 1998) that they expected the current bad times to improve significantly within the next 12 months. We find no evidence this group is more or less sensitive to prices relative to those who perceived the changes as more permanent.

More generally, it is possible that price responsiveness is greater among those with fewer resources and those for whom the costs of contraceptive failure are greater. We have explored whether effects of changes in service charges vary with three socio-economic and demographic characteristics of the couples: the age of the woman, her education and household PCE. Between 1997 and 1998, there is no evidence of heterogeneity in responsive to price changes across these characteristics. Between 1997 and 2000, only two of the interactions are significant. First, relative to younger women, older women are more responsive to changes in the price of pills as they switch into more permanent methods of limiting fertility. Second, better educated women do not respond at all to changes in the prices of pills whereas less educated women do (coefficient estimate is -0.057, standard error is 0.025). This does not appear to reflect resource constraints as there are no differences in responses to prices across the distribution of household PCE.

The speed of transmission of the financial crisis differed across the archipelago, hitting first the urban areas and later rural, food-producing areas. The models have been estimated separately for

urban and rural households. Again, our overall conclusions are not affected and, only five of 128 estimated price effects and two of 88 estimated effects of availability are statistically significant at 5% size of test. These are less than the numbers we expect by chance. With that in mind, we find that in rural areas, changes in prices have no statistically significant impact on contraceptive use. Higher pill prices resulted in switching into other methods (between 1997 and 1998) and into both injections and other methods (between 1997 and 2000). The effects are small in magnitude. In urban areas, there was no effect of price changes between 1997 and 1998 but as pill prices rose between 1997 and 2000, there was a small and statistically significant decline in use of injections, no impact on pills or other methods, and thus a similarly small decline in overall contraceptive use. This counter-intuitive result possibly reflects the impact of changes in the allocation of public subsidies in urban areas.

VI. Conclusions

Previous attempts to estimate the sensitivity of contraceptive prevalence and method mix to changes in the price of contraception have not produced conclusive estimates, largely because of insufficient price variation and the targeting of contraceptive subsidies in ways that bias standard estimation strategies.

Indonesia provides an excellent laboratory in which to pin down the effects of contraceptive prices and household resources on use of modern methods and on method choice. Household resources fell, on average, by 15% as a result of the financial crisis in the 1990s and this induced a small, but precisely estimated, increase in contraceptive use.

The crisis also induced large, and largely unanticipated changes in both the real and relative prices of contraception. Specifically, as it unfolded, the financial crisis resulted in about a 25% decline in the real price of oral contraceptives while injectables tracked the inflation rate so that oral contraceptives became less expensive relative to injectables. This was followed, between 1998 and 2000, by the real price of oral contraceptives almost doubling while the price of injectables remained relatively stable. As public subsidies declined in real terms, particularly between 1998 and 2000, the price of contraceptives from public health posts rose substantially more than those obtained from private practices.

In spite of all of this turmoil in prices, we find little evidence of sensitivity to contraceptive prices with respect either to overall use or to method choice, particularly in the period immediately following the onset of the economic crisis. Contraceptive behaviors are slightly more responsive to prices over the longer term, between 1997 and 2000, although the effects remain small in magnitude. The price effects are estimated with sufficient precision to rule out that the impact of increasing service charges would have a substantial impact on contraceptive use. That said, directions of the

effects are largely consistent with *a priori* expectations. Lower availability or higher charges for a particular contraceptive method results in small declines in use of that method, limited switching into substitutes and, overall, very modest reductions in contraceptive use.

Evidence from the Indonesian financial crisis indicates that prices and incomes are not key barriers to the use of modern methods of contraceptives by couples in the country. Reductions in subsidies for contraceptives are unlikely to result in anything but very modest changes in contraceptive choices at the population level, at least over a three year time horizon. With the evidence marshaled here, it is difficult to project what would happen over a longer horizon.

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Table 1: Availability and service charges of pills and injections, by facility type at the community level

Method	Provider type	A: 1997/1998 Panel				B: 1997/2000 Panel			
		1997 [1]	1998 [2]	Change [3]	% [4]	1997 [5]	2000 [6]	Change [7]	% [8]
Availability (% communities have)									
Pill	at a private practice	100.0	97.8	-2.2		98.1	99.0	1.0	
		(0.0)	(1.6)	(1.6)		(0.8)	(0.6)	(1.0)	
	at a health center	100.0	98.9	-1.1		98.7	98.1	-0.6	
		(0.0)	(1.1)	(1.1)		(0.6)	(0.8)	(1.0)	
	at a health post	87.8	87.8	0.0		85.0	68.4	-16.6	
		(3.5)	(3.5)	(4.2)		(2.0)	(2.6)	(2.9)	
	any source	100.0	100.0	0.0		99.4	99.7	0.3	
		(0.0)	(0.0)	(0.0)		(0.5)	(0.3)	(0.6)	
Injection	at a private practice	100.0	100.0	0.0		98.7	99.7	1.0	
		(0.0)	(0.0)	(0.0)		(0.6)	(0.3)	(0.7)	
	at a health center	97.8	98.9	1.1		98.1	99.4	1.3	
		(1.6)	(1.1)	(1.9)		(0.8)	(0.5)	(0.9)	
	at a health post	48.9	52.2	3.3		43.5	43.8	0.3	
		(5.3)	(5.3)	(6.4)		(2.8)	(2.8)	(3.4)	
	any source	100.0	100.0	0.0		99.7	100.0	0.3	
		(0.0)	(0.0)	(0.0)		(0.3)	(0.0)	(0.3)	
Service charge (median at community level)									
Pill	at a private practice	4.58	3.42	-1.15	-25	5.25	5.76	0.52	10
		(0.41)	(0.29)	(0.38)		(0.22)	(0.16)	(0.20)	
	at a health center	1.75	1.20	-0.54	-31	1.63	1.98	0.35	21
		(0.14)	(0.10)	(0.14)		(0.07)	(0.08)	(0.09)	
	at a health post	1.35	1.40	0.04	4	1.49	2.26	0.78	52
		(0.15)	(0.14)	(0.18)		(0.09)	(0.12)	(0.13)	
	all sources	2.18	1.62	-0.57	-26	2.14	3.23	1.09	51
		(0.17)	(0.10)	(0.15)		(0.08)	(0.10)	(0.10)	
Injection	at a private practice	4.71	4.92	0.21	4	4.73	4.94	0.20	4
		(0.13)	(0.11)	(0.13)		(0.07)	(0.05)	(0.06)	
	at a health center	3.79	3.80	0.01	0	3.75	3.83	0.08	2
		(0.18)	(0.13)	(0.21)		(0.10)	(0.10)	(0.14)	
	at a health post	2.92	3.00	0.08	3	3.24	3.88	0.64	20
		(0.28)	(0.30)	(0.30)		(0.19)	(0.20)	(0.22)	
	all sources	4.06	4.31	0.24	6	4.00	4.41	0.41	10
		(0.12)	(0.09)	(0.15)		(0.06)	(0.05)	(0.07)	
Number of communities		90				313			

Notes: Prices measured in thousands of 1996 Rupiah. (Standard errors in parentheses)

Table 2: Contraceptive use and method choice by women

	A: 1997/1998 Panel				B: 1997/2000 Panel			
	1997 [1]	1998 [2]	Change [3]	% [4]	1997 [5]	2000 [6]	Change [7]	% [8]
1. % women using contraceptives								
Any method	57.4	59.0	1.6	3	60.1	60.0	-0.1	0
	(1.3)	(1.3)	(1.2)		(0.7)	(0.7)	(0.8)	
1.1 By method								
Pill	21.0	21.5	0.5	2	16.6	14.9	-1.7	-10
	(1.1)	(1.1)	(0.9)		(0.6)	(0.5)	(0.6)	
Injection	21.0	20.1	-0.9	-4	23.6	22.1	-1.5	-6
	(1.1)	(1.1)	(0.9)		(0.6)	(0.6)	(0.7)	
Other	15.5	17.4	2.0	12	19.9	23.0	3.1	16
	(1.0)	(1.0)	(0.7)		(0.6)	(0.6)	(0.5)	
1.2 By provider type								
Private practice	21.6	21.9	0.3	1	25.3	28.9	3.6	14
	(1.1)	(1.1)	(1.1)		(0.7)	(0.7)	(0.7)	
Health center	16.6	12.0	-4.6	-28	14.1	12.4	-1.7	-12
	(1.0)	(0.9)	(1.0)		(0.5)	(0.5)	(0.6)	
Health post	7.3	8.2	0.9	12	5.7	4.4	-1.3	-23
	(0.7)	(0.7)	(0.8)		(0.3)	(0.3)	(0.4)	
Other	12.6	11.0	-1.5	-13	10.3	13.9	3.6	35
	(0.9)	(0.8)	(1.0)		(0.5)	(0.5)	(0.6)	
2. Household resources								
per capita expenditure	115.7	95.9	-19.8	-17	133.6	113.2	-20.4	-15
(Rp 000 per month)	(6.5)	(2.8)	(5.6)		(10.0)	(2.1)	(9.8)	
Number of women	1,378				4,462			

Notes: Means (and standard errors).

Table 3: Effects of contraceptive prices and household resources on use of contraceptives and method choice
Service charges and availability measured at community level

Covariates	A: 1997/1998 Panel				B: 1997/2000 Panel			
	Use any method? [1]	Method choice Pill [2.1]	Injection [2.2]	Other [2.3]	Use any method? [1]	Method choice Pill [2.1]	Injection [2.2]	Other [2.3]
Community level								
Service charge of method (square root)								
Pill	0.038	0.019	-0.009	0.027	-0.015	-0.019	-0.010	0.014
	(0.029)	(0.027)	(0.019)	(0.014)	(0.016)	(0.011)	(0.014)	(0.012)
Injection	-0.022	0.051	-0.055	-0.019	0.006	-0.021	0.016	0.012
	(0.051)	(0.044)	(0.029)	(0.037)	(0.029)	(0.018)	(0.024)	(0.023)
[1] if method available								
Pill	.	.	.	.	-0.244	-0.315	-0.133	0.203
					(0.371)	(0.311)	(0.459)	(0.250)
Injection	.	.	.	.	0.378	0.302	-0.044	0.121
					(0.310)	(0.289)	(0.391)	(0.191)
Household level								
ln(PCE)	-0.028	-0.005	-0.004	-0.018	-0.036	0.009	-0.030	-0.015
	(0.021)	(0.018)	(0.015)	(0.012)	(0.011)	(0.009)	(0.010)	(0.007)
Joint tests (p values of X^2 test statistics)								
Prices	0.30		0.08		0.32		0.16	
Availability					0.32		0.54	
Prices and availability					0.42		0.31	
Sample size	2,756				8,924			

Notes: Bootstrapped standard errors in parentheses below coefficient estimates take into account clustering of households. Joint tests for all price effects are zero against at least one own-price effect is negative and/or one cross-price effect is positive. All models include couple fixed effects along with distance to nearest provider, price of rice, whether community has a market, telephone service, bank, public transport, paved roads or sewerage system; fraction of households in the community that have electricity, whether the husband was co-resident at the time of the interview, whether the interview was conducted by proxy and whether the respondent had moved from the baseline community.

Table 4: Effects of contraceptive prices and household resources on use of contraceptives and method choice
Service charges and availability measured at community level by provider type for each method

		A: 1997/1998 Panel				B: 1997/2000 Panel			
		Use any method?	Method choice			Use any method?	Method choice		
			Pill	Injection	Other		Pill	Injection	Other
		[1]	[2.1]	[2.2]	[2.3]	[3]	[4.1]	[4.2]	[4.3]
Square root of service charge for method by provider type									
Pill	Private Practice	-0.013	-0.011	-0.004	0.002	0.015	-0.001	-0.007	0.023
		(0.026)	(0.019)	(0.017)	(0.015)	(0.013)	(0.009)	(0.011)	(0.009)
	Health Center	0.036	0.017	-0.013	0.032	0.012	-0.007	0.035	-0.016
		(0.034)	(0.029)	(0.022)	(0.022)	(0.014)	(0.011)	(0.014)	(0.011)
	Health Post	0.047	0.030	0.008	0.009	-0.044	-0.013	-0.030	-0.002
		(0.026)	(0.023)	(0.021)	(0.016)	(0.013)	(0.011)	(0.011)	(0.011)
Injection	Private Practice	-0.041	-0.027	0.004	-0.018	-0.070	-0.018	-0.037	-0.015
		(0.093)	(0.071)	(0.067)	(0.063)	(0.041)	(0.032)	(0.041)	(0.033)
	Health Center	-0.028	-0.004	-0.019	-0.005	-0.005	0.011	-0.023	0.007
		(0.034)	(0.026)	(0.024)	(0.022)	(0.013)	(0.010)	(0.010)	(0.011)
	Health Post	0.008	-0.055	0.029	0.034	0.014	-0.002	0.002	0.014
		(0.055)	(0.039)	(0.030)	(0.038)	(0.015)	(0.011)	(0.013)	(0.011)
[1] if method available, by provider type									
Pill	Private Practice	0.179	0.136	0.042	0.001	-0.073	-0.024	-0.045	-0.004
		(0.212)	(0.159)	(0.108)	(0.092)	(0.081)	(0.060)	(0.074)	(0.075)
	Health Center	0.023	0.078	-0.061	0.007	-0.003	0.017	-0.011	-0.009
		(0.232)	(0.180)	(0.137)	(0.113)	(0.047)	(0.039)	(0.047)	(0.039)
	Health Post	-0.027	-0.038	0.030	-0.019	0.066	0.039	0.033	-0.005
		(0.067)	(0.058)	(0.048)	(0.042)	(0.022)	(0.020)	(0.020)	(0.019)
Injection	Private Practice	.	.	.	.	0.031	-0.050	0.026	0.055
						(0.125)	(0.106)	(0.134)	(0.160)
	Health Center	0.053	0.005	0.078	-0.030	-0.026	-0.001	0.025	-0.050
		(0.157)	(0.120)	(0.113)	(0.089)	(0.054)	(0.053)	(0.062)	(0.055)
	Health Post	-0.038	0.096	-0.068	-0.065	-0.012	-0.001	0.015	-0.026
		(0.117)	(0.086)	(0.069)	(0.080)	(0.033)	(0.024)	(0.031)	(0.023)
ln(HH per capita expenditure)		-0.033	-0.008	-0.003	-0.022	0.037	0.009	-0.031	-0.015
		(0.022)	(0.018)	(0.015)	(0.013)	(0.011)	(0.010)	(0.011)	(0.007)
Joint tests (p values of X^2 test statistics)									
Prices		0.42		0.55		0.00		0.00	
Availability		0.65		0.83		0.02		0.09	
Prices and availability		0.71		0.84		0.01		0.00	
Sample size		2,756				8,924			

Notes: See Table 3.

Appendix Table 1 : Distribution of changes in real prices of contraceptives and real household resources

	A. % change between 1997 and 1998				B. % change between 1997 and 2000			
	Percentile			%	Percentile			%
	25	50	75	increased	25	50	75	increased
1. Changes in community level prices of contraceptives								
1a. Pill								
By source								
at private practice	-49.6	-25.1	9.6	30	-20.4	23.4	99.2	61
at health center	-51.8	-39.8	-11.2	18	-46.9	6.1	93.3	55
at health post	-44.9	-16.9	45.1	45	-18.5	30.3	104.5	66
Overall	-41.2	-31.3	9.9	28	0.0	48.2	137.2	74
1b. Injection								
By source								
at private practice	-8.9	6.3	20.3	59	-5.3	4.5	19.2	63
at health center	-18.8	0.6	37.8	50	-29.4	2.8	41.1	54
at health post	-19.3	4.6	28.7	54	-0.6	11.2	47.6	68
Overall	-5.1	7.9	25.2	64	-2.7	8.0	28.1	68
2. Changes in household-level resources								
Per capita expenditure	-34.2	12.7	35.0	46	-28.7	32.7	56.1	54

Appendix Table 2 : Distributions of prices of contraceptives

A. Comparison of individual-level prices reported in 1997 IFLS and 1997 DHS

	Source	Sample size	Percentile 25	Percentile 50	Percentile 75	Mean	Standard error
1. Pill	IFLS	4324	1.050	1.500	3.000	2.152	0.037
	DHS	3680	1.500	1.500	3.000	2.155	0.028
2. Injection	IFLS	3240	3.500	4.000	5.000	4.400	0.022
	DHS	4602	3.500	4.500	5.000	4.450	0.023

B. Comparison of individual-level and conmmunity-level prices collected in 1997 and 2000 IFLS

Method	Data source	1997 IFLS Percentile 25	1997 IFLS Percentile 50	1997 IFLS Percentile 75	1997 IFLS Mean	2000 IFLS Percentile 25	2000 IFLS Percentile 50	2000 IFLS Percentile 75	2000 IFLS Mean
1. Pill									
A. Private Practice	1. Individual	2.250	3.000	6.600	5.202	3.525	4.935	7.050	5.726
	2. Community	2.041	4.123	8.054	5.247	3.617	5.510	7.454	5.764
B. Public health center	1. Individual	0.900	1.500	3.000	1.813	1.410	2.115	2.820	2.122
	2. Community	0.813	1.379	2.464	1.630	0.838	1.493	2.921	1.981
C. Public health post	1. Individual	0.750	1.500	3.000	1.624	1.410	2.115	2.820	2.183
	2. Community	0.662	1.359	2.199	1.489	0.890	2.009	3.419	2.265
2 Injection									
A. Private Practice	1. Individual	3.500	5.000	6.000	5.400	3.760	4.700	5.405	4.843
	2. Community	4.085	4.550	5.077	4.735	4.474	4.716	4.977	4.937
B. Public health center	1. Individual	3.500	4.000	5.000	3.996	3.290	4.230	4.700	3.997
	2. Community	2.729	3.637	4.531	3.750	2.889	3.800	4.580	3.828
C. Public health post	1. Individual	3.000	3.500	4.250	3.742	3.525	3.760	4.700	3.914
	2. Community	2.643	3.212	4.482	3.245	2.685	3.976	4.721	3.880

Notes: Prices in 1997 Rp000s. Pill prices for 3 month supply. Injection prices for 1 3-month injection.