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Gender Effects on Aggregate Saving

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GENDER EFFECTS ON AGGREGATE SAVING:
A Theoretical and Empirical Analysis

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Abstract

This study investigates the hypothesis that shifts in women's relative income, which affects their bargaining power in the household, have discernible effects on household saving, and by extension on aggregate saving due to differing saving propensities by gender. An analytical framework for pooled and non-pooled savings households is developed to examine why women and men's saving propensities may differ and how a change in women's wage earnings relative to men's influences household savings which constitutes a significant component of gross domestic saving. An empirical analysis is conducted using panel data for a set of 20 semi-industrialized economies, covering the period 1975-95. The results indicate that as some measures of women's discretionary income and bargaining power increase, aggregate saving rates rise, implying a significant effect of gender on aggregate savings. These findings demonstrate the importance of understanding gender relations at the household level in planning for savings mobilization and in the formulation of financial and investment policies.

DOES GENDER HAVE ANY EFFECT ON AGGREGATE SAVING?:
AN EMPIRICAL ANALYSIS

I. Introduction

Aggregate saving is an important source of funds for domestic investment and economic growth and thus the question of what determines its level and rate remains a crucial research and policy agenda. Moreover, in the face of volatile flows of external finance, domestic saving has become even more critical for economic development. In particular, the recent financial turmoil in developing countries, brought about by rapid cross-border movements of capital, has led many countries to seriously consider a larger role for domestic saving (excluding net factor income from abroad) as a source of investment funds.[1] Likewise, savings at the household level are important for the welfare of family members in the course of economic development as a means to smooth income, to fund education, for old age support when members become non-earners, and to leave as bequests to children.

In recent years, the debate on the determinants of aggregate saving has shifted from a focus on Keynesian capacity-to-save factors to the question of interest rate sensitivity of saving as well as the influence of age structure of the population.[2] In addition, the possible effects of government policies such as taxation and social welfare policies have been examined.[3]

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[1] Even before the recent turmoil in financial markets and despite liberalization of international financial flows, there was evidence of a correlation between investment and domestic saving rates (Carroll and Weil 1993; Feldstein and Bacchetta 1991; Paxson 1995).

[2] On the effect of interest rates on saving, see, for example, Boskin (1978), de Melo and Tybout (1986), Dornbusch and Reynoso (1989), Fry (1978, 1984, 1996), Fry and Mason (1982), Giovannini (1985), Gupta (1987), and Modigliani (1986). For a review of the literature on the influence of age structure on savings, see Aghevli, Boughton, Montiel, Villanueva, and Woglom (1990), and Masson, Bayoumi, and Samiei (1995).

[3] The literature on this subject has been surveyed by Smith (1990). Many countries tax income from saving differently than income from labor and therefore detailed knowledge of the country's tax code is required to assess

One area that requires further examination is the role that gender relations play in influencing aggregate saving. A small but growing body of literature strongly suggests there are gender differences in saving decisions and in risk attitude, at least in some developed countries.[4] This study contributes to that literature by investigating the role of gender in influencing aggregate saving in semi-industrialized economies. Given their divergent social and economic circumstances within and outside the household, women and men may have differing propensities to save at the household level. Since this constitutes the most significant component of gross domestic saving in many developing countries, changes in household saving critically influences aggregate saving rates. If so, shifts in women's relative bargaining power are likely to affect household saving rates, and by extension, domestic saving rates.

In this paper, we first explore the mechanisms through which gender is likely to affect saving rates. The factors that affect women's and men's propensity to save may be contradictory in their effect. For instance, women's care responsibilities and role in household management may lead to more consumption spending and thus less saving. On the other hand, this responsibility may lead women to save *more* than men for precautionary reasons, due to a stronger perception of the need to smooth family consumption. As a result of these contradictory forces, it is difficult to make predictions based on *a priori* reasoning about gender differences in saving behavior.

Following the theoretical discussion, we present analytical frameworks for exploring the

whether such taxation policy is important in explaining variation in savings rate. Since these data and those pertaining to government budget policies are difficult to obtain, these issues are not considered in our empirical analysis.

[4] See, for example, Bajtelsmit and Bernasek (1996), Bajtelsmit and Van Derhei (1997), Sunden and

determinants of both pooled and non-pooled savings at the household level. The models highlight the effect of gender-related variables on household saving decisions. Based on these models, we derive and test an empirical model of aggregate saving that incorporates gender variables, and controls for a variety of well-established economic, demographic and financial variables. While this paper explores the potential effect of gender relations on saving at the household level, household saving data are unavailable for many countries. Hence the examination of household saving behavior in this analysis is done indirectly through domestic saving which is comprised of household, business, and government saving.[5] We find strong evidence of gender effects on aggregate saving, a result that underscores the importance of understanding gender relations in planning for domestic resource mobilization and in the formulation of financial and investment policies.

II. Gender and Aggregate Saving

The extensive literature on determinants of domestic saving suggests a variety of motives for saving by households, firms, and government. These motives point to a number of key variables that affect the aggregate saving rate which, for ease, can be grouped into those that affect the capacity of agents to save and those that affect their willingness to save. These include the level of per capita income, growth rate of GDP, interest rate, prevalence of financial institutions and the range of availability of financial assets, inflation rate, government taxation and savings and terms of trade. That literature, which we do not review here, is briefly summarized in Appendix A. We simply note here that in our empirical analysis that evaluates the

Surette (1998), Hinz, McCarthy, and Turner (1996), and Hungerford (1999).

[5] Note that domestic saving excludes net factor incomes from abroad.

effects of gender on saving, we draw from the standard models to develop a set of control variables.

Of particular interest, when considering the effects of gender on saving, is the literature on the determinants of household saving. In most aggregate-level studies, the theoretical relationship between saving and key determinants has been attributed to the life cycle hypothesis, interest rate theory, models of strategic bequest and intergenerational transfers, and household models of consumption smoothing. Typically, theories assume either the (independent) individual or the household as the unit of consumption-saving decision, abstracting from any consideration of gender differences in needs or motives to save. Neither has prior research explored the nature of intra-household relations that may influence the household saving rate.

If gender influences household saving behavior, by implication, there may be important macroeconomic effects of changes in gender relations. In this section, we explore the potential link between gender and household saving, and by extension, aggregate saving.

In considering the role that gender relations play in determining aggregate saving, we take the developing country context, which differs in important ways from that of industrialized economies. Households in developing countries on average are poorer and income is likely to be less stable, so that the allocation of income over time faces severe competing pressures that differ in intensity from those in developed economies. Access to financial institutions and the availability of financial instruments are more uneven in developing economies, and this also may affect saving rates. Further, developing countries tend to have shallow social safety nets. This suggests that families must rely to a greater extent on household-level savings and investments in kinship networks as part of their consumption smoothing strategy.

A. Household Decision-Making

Research on household saving generally makes the assumption of either an independent individual or a unitary household that seeks to meet several goals: (1) to provide resources for retirement and bequests; (2) to finance expected large lifetime expenditures, including house purchase and education; (3) to finance unexpected losses of income (precautionary saving); and (4) to smooth the availability of resources over time to maintain more stable consumption (consumption smoothing). While the assumption of an individual or a unitary household may be a convenient one, it overlooks the possibility that, in *non-pooled savings* households, there are gender differences in the relative strength of saving motives between men and women as individual savers. Moreover, it does not take into account that, in *households that pool savings,* the differences in saving motives of male and female household members are likely to bring about negotiation and bargaining which influence the rate of household savings.

B. Evidence from Research in Developed Countries

The literature on gender differences in saving behavior is sparse and has focused primarily on developed countries. That research has found significant differences in individual retirement savings and investment decisions by gender. For example, Sunden and Surette (1998) provide empirical evidence demonstrating that gender and marital status influence investment allocation decisions in the United States. Jianakoplos and Bernasek (1998) examined the evidence on gender differences in risk aversion when an individual's entire portfolio of assets is considered, using the U.S. Survey of Consumer Finances. They found that single women are more risk-averse than single men and married couples. As an individual's wealth increases, the proportion held in risky assets was found to increase but for single women, the effect was

significantly smaller than for single men and married couples. Using a wide range of variables

that measure risk-taking, Palsson (1996), in a study of Swedish households, similarly finds

evidence that women are more risk-averse than men.

A number of studies show that women are more conservative in their investment

decisions than men. For example, Bajtelsmit and Bernasek (1996), looking at United States

private pensions, find that women hold a much higher proportion of their portfolios in fixed

assets than men. Bajtelsmit and VanderHei (1997) also find gender differences in pension

decisions, with women significantly less likely to invest in employer stock and equities than

men.[6] Similarly, Hinz, McCarthy, and Turner (1996) examine the allocation patterns of federal

government workers in the U.S. Thrift Savings Plan and find that women invest their pensions

more conservatively than men. Looking at individual contributions to the 401(K) pension plan in

the U.S., Hungerford (1999) shows that women contribute at a significantly higher rate than men

to their plan.[7]

These studies do not, however, explore *why* risk attitudes and savings behavior differ by

gender. Drawing from an extensive literature in psychology, several studies in the field of

psychometrics suggest that women's attitude toward risk differs from men's and demonstrate that

gender is a powerful determinant of risk attitudes and judgments. For example, Flynn, Slovic,

and Mertz (1994) and Barke, Jenkins-Smith, and Slovic (1997) find in their research on North

American scientists that male respondents tend to judge risks as smaller and less problematic

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[6] The study makes use of individual plan data on 20,000 employees in a single U.S. firm.

[7] The 401(K) plan is based on voluntary participation and workers determine how much to contribute to their pension accounts. In 1993, 401(K) plans accounted for 22 percent of all pension plans.

than do females.[8] This finding is consistent with the previously discussed research on gender differences in attitudes toward financial risk.

Bernasek (2000: 10) argues that such differences in perceived risk result from women's different experiences and perceived vulnerability. Women on average experience greater vulnerability than men since they earn on average less than men, are more likely to care for children and elderly, are more likely to live in poverty, and are less likely to have health insurance and pension coverage in their jobs. They also have less political power than men. Women's tendency to exhibit greater caution and be more averse to risk may then be a rational response to their greater vulnerability and lack of control over their lives.

C. Evidence from Research in Developing Countries

The relevance of the findings of these studies for gendered saving behavior in developing economies is not clear. Structural conditions differ widely, and most saliently, industrialized economies have higher incomes and broader social safety nets that may substantially alter gendered saving behavior. To consider this issue further, we first turn our attention to research on household decision-making and resource allocation in developing countries.

Research suggests that the decision-making process that determines resource allocation is influenced by the relative bargaining power of adults members of the household.[9] A household member's bargaining power in turn depends on the strength of that person's outside options or "fallback position," should a negotiated agreement fail. The strength of an individual's

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[8] Flynn, Slovic, and Mertz (1994) find sizable differences in risk assessments between white males and females, which is not found between non-white males and females. This is explained by the fact that people of color, as white women, experience greater vulnerability than white males.

[9] See, for example, Guyer (1988), Haddad and Hoddinott (1991), and Thomas (1992).

bargaining power is determined by two sets of factors, which include:1) material (economic)

factors internal to the household, and 2) factors external to the household that influence material

well-being. Material factors include owned assets, education, kinship, wages, and employment.

External factors, which we refer to here as Gender Environmental Parameters (GEPs), include

belief systems, political and legal structures such as property rights and divorce laws, and

gendered employment practices (Agarwal 1995; Blumberg 1988; Folbre 1997; Katz 1991a). The

latter factors affect positions in household bargaining since they mediate the actual power that

material resources will confer on an individual in the household.[10] It follows that a relative

improvement in any of the factors that affect an individual's bargaining power should exert an

influence on the allocation of household income among alternative uses.

How do gender differences in bargaining power affect household decisions on the use and

distribution of material resources in the household? The literature on intra-household resource

allocation provides increasing evidence that prevailing gender relations and bargaining power

among household members affect the *types* of expenditures households make, control over use of

income, and other allocation decisions. In contrast to unitary models of household decision-

making, a growing number of studies indicate that women's and men's allocational patterns

differ significantly.

More specifically, a considerable body of evidence indicates that women's propensity to

spend income *under their control* on family provisioning and children's nutrition is greater than

men's (Blumberg 1988; Guyer 1988; Handa 1994; Katz 1991b; Kumar 1978; Quisumbing and

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[10] As Sen (1990) points out, the perception of power is the key link between the potential power conferred upon people by access to economic resources and their use of that power to bargain for outcomes consistent with their interests.

Maluccio 1999; Roldan 1988; Thomas 1992). For example, Kumar's (1978) study in Kerala, India indicates that a child's nutritional level is positively correlated with the size of mother's income as well as food inputs from subsistence farming, and the quality of available family-based child care. Significantly, children's nutritional level does not increase in direct proportion to increases in paternal income.

Likewise in the Beti population of Cameroon, Guyer (1988) found that women, in addition to their food production, spent fully 74 percent of their cash income on supplements to the family food supply, while men spent only an estimated 22 percent of their income on food. Overall, men supplied 33 percent of cash expenditures for food and other household items, while women contributed 67 percent. Similarly, using Brazilian data on 25,000 urban households, Thomas (1992) found that unearned income in the hands of the mother was estimated to have a larger impact on her family's health than income attributed to the father.[11] For child survival probabilities, the effect was almost 20 times greater.

Other studies demonstrate that other sources of women's bargaining power, including women's education and assets, have a significant impact on household expenditure decisions and hence on children's well-being. For example, Thomas and Chen (1993), using household survey data in the United States, Brazil and Ghana, find that the educational status of the mother has a larger effect on daughter's height, while the education of the father has a larger effect on son's height. Doss's (1996) study of Ghanaian households, using data from 1991-92 Ghana Living

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[11] Evidence from developed economies also suggests that income controlled by women is spent differently than income controlled by men. For example, Lundberg, Pollak and Wales (1995) examine the impact of a shift in policy in the United Kingdom from a child tax allowance that was primarily realized as a tax credit in men's paychecks to a child benefit scheme that accrued to women. They find that expenditures on women's and children's clothing increased relative to men's clothing as a result of this change. See also Phipps' and Burton's (1998) study, using Canadian data.

Standards Measurement Survey, shows that the relative level of assets owned by women in urban households significantly affects household expenditure patterns. For urban households, a one percent increase in the share of assets held by women increases the budget share on food to 50.3 percent. Education expenses are found to be positively correlated with the percent of assets held by both urban and rural women, while alcohol, tobacco, and recreation are negatively correlated.

Research on Guatemalan rural households (Katz 1991b) and Mexican urban households (Benería and Roldan 1988) highlights the link between labor allocation, employment and intrahousehold income, and expenditure allocation. Katz (1991b) finds that women in the Guatemalan highlands whose households maintain separate male and female income streams are reluctant to reduce their paid work even in the face of increasing demand for their labor time in other activities. This is because the non-pooled income arrangements enable women to have more income under their control and to allocate this income according to their interests. This suggests a positive correlation between a woman's economic resources and her influence in household decisions such as expenditure allocation. Benería and Roldan (1988) find that, in non-pooling households, labor allocation decisions have direct consequences for how much income will accrue to a given household member.

In households that do pool their incomes, how do women use their economic resources (such as access to employment) in the negotiation process? The bargaining process may be implicit or explicit, with negotiating strategies shaped by the cultural context. Whatever those strategies might be, we may infer more generally from the work of Katz (1991a), Agarwal (1995), and others, that although earning income is not a sufficient condition for claiming control

over its use, a person has a greater chance in having a claim over one's own earnings.

Safilios-Rothschild's (1988) study of rural Honduran households, for example, shows that women's ability to control income and influence decision-making is influenced by gender-associated income disparities. Women's economic contributions are more often allowed to become visible and to lead to control of income when men have economic superiority over women. But when women's income is crucial to household survival, women are less able to translate their economic contribution to higher bargaining power because of the threat to husbands' resistance. Men perceive this as a threat to their masculinity.[12] Similarly, in a study of women outworkers in Mexico City, Roldan (1988) finds that women's access to individual income facilitates re-negotiation of the terms of marital interaction and is associated with greater decision-making power in some areas, including household allocational patterns.

The discussion to this point has focused on how gender and bargaining power interact to influence expenditures within households. What if anything do these findings imply about the role of gender in influencing the distribution of household income between current expenditures and saving? This question has two implicit components. First, do women behave differently than do men in their allocation of income between saving and current expenditures? If so, will improvements in women's bargaining power have any effect on the household's saving rate? More succinctly, we may ask whether changes in sources of women's bargaining power, particularly their wage earnings, affect the average propensity to save and whether this results in a discernible effect on the aggregate saving rate.

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[12] Kabeer (2000) provides similar evidence for Bangladeshi factory women, who tend to downplay the importance of their earnings for family well-being, fearful of threatening male dominance in the household, which might then lead to women being forced to give up their paid jobs.

D. Gendered Determinants of Saving Preferences

Because the options and constraints that women face in developing economies differ from those of men, their saving behavior may also differ. One of the most important purposes of saving in developing economies is for consumption smoothing purposes (Deaton 1990). There may be gender differences in responsiveness to this motive. Men who, by their position in the labor market, are more likely to be beneficiaries of social insurance policies may have less need to fall back on savings for consumption smoothing purposes.[13]

Conversely, insofar as women are less able to rely on state-level programs when income flows are interrupted, they may have a greater incentive to save out of their discretionary income than men.[14] Women may also achieve their consumption smoothing goal by maintaining ties to kinship networks which involves kin exchanges. Savings are required to finance these activities, which serve as a form of insurance or risk spreading to be tapped in economic hard times.

The interplay of life cycle factors and social norms may also have differential effects on individual saving behaviors, though the net effect on willingness to save is unclear. Women are likely to outlive men, a factor that propels them to save at higher rates. Also, the need to raise funds for a dowry may lead women to save more than men of the same age cohort in those

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[13] This is because of men's differential benefits from social protection programs, stemming from their greater representation in formal sector employment. The latter is more likely to provide unemployment insurance, disability and pension benefits, and health coverage than are informal sector or part-time jobs, where women tend to be over represented.

[14] In line with this argument, Callen and Thimann (1997) find evidence that the generosity of social security systems explains a portion of cross-country variations in saving in OECD countries, although they do not consider gender differences in assessing generosity. Further, Brenner, Dagenais, and Montmarquette (1994) provide evidence of a gendered link between uncertainty and aggregate saving in developed economies. They show that the increased probability of divorce caused saving rates in the United States to fall. The abrupt rise in divorce rates led, they argue, to women's greater willingness to participate in the labor force, and to invest in education. It is worth noting, that although financial savings diminished, investment in education or human capital rose. The extent to which these

countries where the dowry system still prevails. Deolalikar and Rao (1998) show that dowry payments in India, which have been increasing in size and incidence in recent years, can amount to several years' worth of household income.

In South Korea, where young women are the primary source of labor in export industries, Kim (1997) found that among their highest priorities in the decision of how to allocate earnings were the goals of saving for a dowry and to finance their siblings' education. Women indicated that to achieve this goal, given their low salaries, they were compelled to skip meals, cut back on other necessities, and live in crowded conditions.

On the other hand, young Taiwanese women are expected to pay their debts to families by remitting a large share of their factory earnings to parents, thus reducing their individual savings. The parents use their daughters' wage remittances to finance their sons' educations, with sons later relied on to support them in old age (Greenhalgh 1985). This family system, which socializes girls into filial piety and indebtedness, results in wide educational gaps between girls and boys, reducing women's ability to save in the future. The effect on current saving is ambiguous, however, since it is not clear that daughters' remittances to parents result in a change in average saving rates.

By contrast, in Java, expectations that young factory women support their families are much weaker. Despite this, Wolf (1988) found that factory women she interviewed saved on average 30 percent of their income for use to redistribute to families in times of distress or to finance their own weddings. These studies suggest that cultural factors influence gendered non-pooled savings behavior, and cross-country variations are likely to be important.

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circumstances are applicable to semi-industrialized economies is, however, unclear.

Financial market conditions also interact with gender norms in influencing an individual's saving behavior. The extent to which financial institutions provide both women and men access to and control over individual accounts without the spouse's permission is likely to have a differential impact on men and women's savings rate. For example, Bangladeshi women are constrained from saving in large sums and in cash since this is likely to attract the attention of male household members who then take control of those savings. In these circumstances, women are more likely to save only in small quantities, for example, by reserving a handful of rice before cooking (Goetz and Gupta 1996).[15]

Access to an informal savings program may also enable women to save money without other household members knowing the amount, thereby increasing control over the savings. As an example of this, Doss (1996) provides a study of women's bargaining power in Ghanaian households where savings frequently take place through *susu*, an informal savings program. In a typical monthly *susu* plan for market women and petty traders, for example, each person contributes daily to the fund, and at the end of the month receives the lump sum of her savings, minus the charge of one day's savings. One of the reasons that many individuals, especially women, participate in *susu* is that this provides a way to save money and to keep those savings within the individual's control. Similarly, studies of informal savings associations in Asia, Latin America, and Africa, such as chit clubs and *ROSCA*s, show that a substantial number of them are formed by women, especially those with independent sources of income. Many of these groups

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[15] An important point is that women may make different choices with regard to the *form* of saving than men, particularly when male household heads have greater control over income or have more experience in dealing with financial markets and institutions. It is likely that women in these circumstances will tend to save less in the form of financial assets (e.g., deposits), and will save more in the form of real assets such as gold, jewelry, and livestock, over which they have greater control. These assets, however, can be misinterpreted as current consumption

are all-female to prevent men from monopolizing the funds (Adams and Fitchett 1992).[16]

Differences in responsibility for children's well-being may also affect saving behavior, and the direction of this effect too is ambiguous. On the one hand, the household bargaining literature implies that women's greater responsibility and willingness to invest in children's well-being will result in an increase in expenditures on children, should women's bargaining power increase. This implies a lower level of savings. On the other hand, women's desire to smooth income to provide economic security for the family, especially for their children, may result in a higher saving rate as women's bargaining power rises.

The literature exploring the likely impact of children on household savings raises an important issue. Conventional wisdom suggests that children act as a substitute for retirement savings in many developing countries. Children help care for their elderly parents, particularly their widowed mothers, which can reduce the incentive to save. Deaton and Paxson (1997) find for Taiwan that if bequests to children are an important motive for saving, the presence of children may raise their parents' saving throughout the life cycle. Alternatively, if parents—and this may be more true for mothers—have strategic bequest motives, they may save more to accumulate assets so as to ensure their children's loyalty and sense of obligation to the parent, particularly in their old age.

Whatever the gender effect on saving propensities, economic and cultural factors generate differences in the capacity of women and men to save. On the economic side, although women's

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expenses.

[16] Further, Gugerty (1999) finds that women in rural Kenya have a greater preference than men for participation in *ROSCAs*. In this case, their greater participation is explained by women's stronger preference to use the savings for the eventual purchase of consumer durables for the household.

labor force participation has been rising in many countries, and in some cases, the gender wage gap has been narrowing, women on average still have lower levels of wealth and earnings than men. This is partially the result of gendered labor market practices in which occupational segregation and discrimination lead to pay inequities with women frequently sequestered in low-wage occupations. Women's lower levels of income have a double effect: they result in fewer resources available for savings and investment (income level effect) and suggest a greater aversion for absolute risk (saving propensity effect).[17]

Women's access to and control over income can affect saving behavior in other ways. Papanek and Schwede (1988) in a Jakarta study show that women are more likely to participate in *arisan*, informal saving groups, if they are employed. Further, increases in women's earnings raise the household's income and can lead to an increase in saving once basic necessities are met. Equally important, higher relative income improves women's ability to influence the amount of saving out of household income since their fallback position and thus bargaining power improves.

Social and gender norms may also influence women's ability to earn and to influence household saving. For example, a study of urban poor households in Honduras shows that the probability of husbands' approval has a significant effect on the wife's labor force participation (Fleck 1998). Further, *purdah* and other similar cultural practices which constrain women's participation in and choice of income-earning activities, may also affect their ability to save.

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[17] Bajtelsmit and Bernasek (1996) found that gender differences in investing and risk-taking can be attributed mainly to discrimination and differences in individual preferences. These influence risk aversion directly or through outcomes such as gender differences in wealth, income, and employment.

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In sum, women's and men's saving behavior may differ because of differences in the degree of economic vulnerability they face and because gender roles and norms cause their economic interests to diverge. This is likely to be the case, whether or not households pool savings. Further, household-pooled savings are influenced by decision-making patterns that depend on relative bargaining power between household members that interact with gendered differences in savings propensities. Gender differences in control over economic resources, including access to outside income, may therefore be influential insofar as shifts in control may influence the balance of power within the household to affect saving decisions.

III. Role of Gender in Influencing Saving Behavior: An Analytical Framework

Based on the discussion in the previous section, to formally specify the effects of gender on household saving rates and, by extension, aggregate savings, we present a simple analytical framework for both pooled and non-pooled savings households.[18] More specifically, we examine why and how a change in women's wage earnings relative to men's may influence household savings. Gender differences in wage earnings have a double effect—the income level effect which increases household income and thereby the level of savings, and the saving propensity effect. It is the second effect that will be explored in this section.

Due to lack of household-level saving data for developing countries and of studies on intrahousehold dynamics with regard to saving behavior, we do not have *a priori* information on which to base a model of saving behavior. We assume, therefore, that there exists a continuum of

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[18] Aggregate household saving is the sum of the saving of all households, single-person and multi-person, in the economy.

possible saving arrangements within households. For purposes of simplicity, we examine two possible (albeit extreme) cases, one whereby individuals make their own decision on how much to save out of their earned income, and the other where household members pool their savings.[19] To represent these two cases, we develop an individual saving behavior model for non-pooled savings households, and a Nash cooperative household bargaining model for pooled-savings households.[20] From this, we derive the determinants of household saving, some of which can be quantified and are incorporated into an empirical model of aggregate saving.

A. Individual or Non-Pooled Savings Model

We assume that each income-earning individual in the household is an economic actor that makes her or his own decision on how much to save.[21] In other words, total household savings is the sum of individual-determined level of savings. We first examine whether, for a given level of income, women are more likely to spend or save than men. Later, we extend the model to consider the effect of gender-based differences in income on household saving rates. The savings function can be written:

$$S^i = a + b^i Y^i, \quad i = F, M \tag{1}$$

where S^i is the level of saving for individual i, a is the level of autonomous saving, which does not depend on the level of income, b^i is the marginal propensity to save, and Y^i is individual

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[19] A more realistic but complicated case involves households that pool their income and negotiate the allocation of income to current expenditures versus savings.

[20] Note that one cannot assume that if households pool their income and have unified budgets, they also necessarily pool their savings. In other words, income and savings arrangements may differ within a given household unit.

[21] The individual saving model presented here follows the work on decisions with uncertainty by Leland (1968) and Sandmo (1970).

income.[22]

Rather than assume, as in standard economic models, that b^i is gender-neutral, we explore

the likelihood that women and men have different savings propensities, i.e., that $b^F \neq b^M$.

The reasons for this difference, as discussed earlier, are varied. For illustrative purposes, and

without loss of generality, we will focus on only three in this model. These are: a) differences in

perceived interest resulting from gender roles and norms *(call this Π)*, and b) differences in

perceived risk resulting from their different experiences, earnings level and vulnerability *(call

this Ξ)*. The difference in perceived interest is reflected in the individual agency function while

the difference is perceived risk is reflected in the degree of risk concerning future income,

defined by the (subjective) probability distribution of future income $f(Y^i_2)$ with mean ξ. We will

explore this point later in the section. Consider the following, simplified individual objective

function in a two-period model: [23]

$$B^i = B(X^i_t, L^i_t), \qquad t = 1, 2 \qquad (2)$$

where B^i refers to a person's *agency*,[24] X^i is a vector of market goods consumed at period t and

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[22] At low levels of income, especially below the minimum required subsistence level, the individual is
likely to dissave or to borrow in which case *a* is negative.

[23] A more complete model would include as an argument in the well-being function a vector of home
production and services that go into social reproduction and maintenance. We recognize the crucial importance of
non-market, home sector of the economy but for simplicity, we ignore it in this and the following cooperative
household bargaining model.

[24] Agency is a broader concept than "well-being" or "utility." While the latter is defined as an abstract
measure of satisfaction, well-being is defined as the physical, social, and mental development of human capabilities
obtained by means of access to and consumption of basic commodities (such as food, health care, education, and
shelter), participation in activities, and access to some level of security and insurance during periods of emergency or
difficult economic times. For a more detailed discussion of this topic, see Floro (1995). Agency, on the other hand,
refers to the notion that a person who may have various goals and objectives other than the pursuit of his or her well-
being. Although there are obvious links between a person's well-being and agency, they are not necessarily closely
connected. For a more detailed discussion of this, see Sen (1990).

L^i is leisure time. Note that here, X^i refers to consumption by individual i, and possibly others, such as children. Gender and social norms influence the person's perceived range of interests by affecting her or his sense of obligation and perception of legitimate behavior. For example, women in India or Cameroon are likely to include children's consumption in their X level. In the first period, X^i_1 is given by:

$$X^i_1 = Y^i_1 - S^i_1 \qquad (3)$$

where Y^i_1 is income in the first period, assumed to be known with certainty and S^i_1 is saving.

Consumption of market goods in the second period is given by:

$$X^i_2 = Y^i_2 + S^i_1 (1 + r) \qquad (4)$$

where Y_2 is future income which is not known in period $t = 1$, and r is the nominal rate of interest, assumed to be known. The individual's beliefs about the level of future income can be summarized in a subjective probability density function $f(Y^i_2)$ with mean ξ. On the basis of this, we obtain the following expected objective function (in the von Neumann-Morgenstern sense). Substituting (3) into (4), we can obtain:

$$X^i_2 = Y^i_2 + (Y^i_1 - X^i_1)(1 + r) \qquad (5)$$

so that the expected objective function is:

$$E[B^i(X^i_t, L^i_t)] = \int B[X^i_1, Y^i_2 + (Y^i_1 - X^i_1)(1 + r), L^i_t] f(Y^i_2) dY^i_2 \qquad (6)$$

where integration is over the range of Y^i_2. Maximizing X^i_2 with respect to consumption at $t = 1$, we obtain the first order condition,

$$D_1 = E[B^i_1 - (1 + r) B^i_2] = 0 \qquad (7)$$

and the second-order condition,

$$D_2 = E[B^i_{11}] - 2(1 + r) B^i_{12} - (1 + r)^2 E[B^i_{22}] < 0. \qquad (8)$$

Differential access to education, gender bias in labor market hiring, promotion and pay as well as gender-based differences in asset ownership and access to other resources, can lead to differences in incomes earned by women and men. In particular,

$$Y^F_t \; < \; Y^M_t \tag{9}$$

If women and men's perceived interests are assumed to be the same, the effect of an increase in income, say of Y^i_1, can be found by implicit differentiation of equation (7):

$$\partial X^i_1 / \partial Y^i_1 \; = \; -\,(1+r)\,E[B^i_{12} - (1+r)\,B^i_{22}\,]\,/\,D_2 > 0. \tag{10}$$

This implies that:

$$B^i_{12} - (1+r)\,B^i_{22} \; > 0, \quad E[B^i_{12} - (1+r)\,B^i_{22}] \; > 0 \tag{11}$$

Note, however, that the sign of equation (10) cannot be determined *a priori* in the case where the perceived interests of men and women are assumed to differ; it is possible that even at lower levels of income, women spend more than men do as a result of sense of obligation or legitimate behavior such as spending for younger sibling's education. On the other hand, women may spend less and save more if there is a socially-defined purpose such as a dowry. In the case, the sign of equation (11) will be ambiguous as well.

We next examine the effects of the differences in men and women's probability density function of future income owing to a vector of gender differences in social, economic, and demographic factors that influence their perceived interest (Π) and perceived risk (Ξ) and hence, their perceived probability distribution of future income. As we shall see later, this has a direct impact on the saving decision in period t =1.

Women's greater economic vulnerability, their principal role in household maintenance and family provisioning, and hence perceived risk and perceived interest will cause women's

probability distribution of Y_2 to differ from that of men. This is demonstrated by two kinds of shifts in men's probability distribution of Y_2. One is an additive shift, θ, which is equivalent to an increase in the mean with all other moments constant. The other is a variance shift, γ^i, by which the distribution is more dispersed (or stretched) around zero. A higher dispersion in the probability distribution of future income, as in the case for women, is equivalent to a stretching of the distribution around a constant mean—that is, a combination of additive and variance parameter changes in men's probability distribution.

For the sake of simplicity, let us examine the effect on present consumption of an increase in the perceived degree of risk concerning future income for one individual. Holding other factors constant, we then test whether an increase in the individual's uncertainty leads to an increase or decrease in present consumption, and hence, a decrease or increase in present savings. Let the expected value of future income for an individual (we now drop the subscript i) be written:

$$E \ [\gamma Y_2 \ + \ \theta] \tag{12}$$

where γ is the variance shift parameter and θ is the additive one. Because $Y_2 \geq 0$, a variance shift around zero will increase the mean. This has to be counteracted by an additive shift in the negative direction in order for the expected value to remain constant. Differentiating (12), the requirement is that:

$$dE \ [\gamma Y_2 \ + \ \theta] \ = \ E[Y_2 \, d\gamma \ + \ d\theta] \ = \ 0, \tag{13}$$

which implies:

$$d\theta/d\gamma = - \ E[Y_2] = - \ \xi \tag{14}$$

We can now substitute (12) into the first order condition (7), and then differentiate present

consumption X_1 with respect to γ, which yields:

$$(\partial X_1 / \partial \gamma) = -1(1/D_2) E [B_{12} - (1 + r) B_{22}) (Y_2 - \xi)] \quad < \quad 0. \tag{15}$$

Equation (15) shows that an increase in perceived risk by women, manifested as an

increased dispersion around future income, is likely to decrease present consumption and hence

to increase present savings. (The proof of this result is set out in Appendix B). That is:

$$\partial S_1 / \partial \gamma > 0.$$

One implication of the results of this non-pooled household savings model is that

individual saving rates are affected not only by the income level and the interest rate in a given

time period, but also by the person's perceived interests (Π) and perceived risks (Ξ). Insofar as

women's perceived interests and risks differ from men's, they are likely to save at a different rate

than men. This implies that an increase in women's *share* of income is likely to affect household

saving rates and, by consequence, aggregate saving rates through the perceived risk effect

(positive) and the perceived interest effect (ambiguous).

Of course, in many cases, household savings are pooled, and the amount of savings out

of income is likely to be determined as a result of a bargaining process between women and men.

The model in the following section takes up this type of household saving pattern.

B. Nash Cooperative Household Bargaining in Pooled Saving Households

We now consider a two-adult household unit which jointly decides how much savings to

set aside. Specifically, saving decisions, as with expenditure allocations, are determined by the

outcome of bargaining between female and male adult members. Saving, therefore, depends not

only on the household's total income, but also on which member earns it. For simplicity, we hold the vector of home production goods and services as constant. Each household member makes choices about time and resource allocation that influence household well-being. In a given period, each member has the following simplified agency function:

$$B^i = B^i(X, S^i, L^i), \quad i = F, M \tag{17}$$

where again X is a vector of market goods and services, S is past saving and L is leisure time. Note that this is a one-period model, with S an argument in the objective function, under the assumption that well-being today is determined not only by current access to market goods and leisure, but also by how much one is able to put aside as a precautionary measure.

Individual savings are determined by current money income Y, the interest rate r, and a vector of gender-differentiated variables $\boldsymbol{\Omega}$ that reflect the individual's perceptions of required future income needs and stability of income sources, such as owned assets, life expectancy, bequests to children, and family law, and can be written:

$$S^i = S^i(Y^i, r, \boldsymbol{\Omega^i}) \tag{18}$$

Measuring savings proportionate to income, we do not have any evidence *a priori* to indicate whether the average female propensity to save (S^F/Y^F) is significantly different than men's (S^M/Y^M). The earlier discussion suggests, however, the possibility that propensities differ, even if income is controlled for, owing to gender differences in the vector of exogenous factors $\boldsymbol{\Omega}$.

If bargaining between women and men breaks down and there is no cooperation, they face the following time and income constraints in a given time period:

$$L^i + \Lambda^i = T^i \tag{19}$$

and

$$w^i \Lambda^i + Q^i = Y = \boldsymbol{p}X + S^i, \tag{20}$$

24

where Λ is paid labor time, T is total waking hours per day (excluding time spent in home production and personal care), w is the market wage rate, Q is non-wage income from assets, including past savings, and $\boldsymbol{p}$ is a vector of market good and services prices.

The decision on whether or not to cooperate depends on the net gain or loss that cooperation confers to each individual.[25] To specify the net gains or loss from cooperation, we write indirect objective functions for women and men which indicate their "threat points" gained independent of cooperation, as:

$$V^i = V^i(w^i, \boldsymbol{p}, Q^i, \boldsymbol{\alpha}). \tag{21}$$

The $V's$ in (20) are influenced by the individual's market wage, prices, assets (including past savings), and a vector of gender environmental parameters (GEPs) $\boldsymbol{\alpha}$.[26]

Women and men choose to cooperate if $B^i - V^i > 0$, that is, if there are gains to cooperation. In the event of cooperation, the household maximizes a joint welfare function:

$$N = [B^F - V^F]^\psi [B^M - V^M]^{1-\psi}, \qquad 0 < \psi < 1 \tag{22}$$

where the parameter ψ reflects female "voice" or bargaining power, and this acquires the value of 0 where there is patriarchal dominance and 0.5 when household decision-making is characterized by equal bargaining power. Households maximize the joint well-being function, subject to

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[25] The nature of the net loss (or gains) from cooperation governs the bargaining process and strongly influences the outcome. It reflects that person's vulnerability or strength in "bargaining," as Sen (1990: 135) puts it.

[26] As noted earlier, GEPs influence the individual's fallback position, should cooperation fail. These include employment and other income-earning opportunities, divorce laws, and access to social support systems. Note that the important distinction between Ω and $\boldsymbol{\alpha}$ is that the former refers to external factors affecting future social and economic well-being, and the latter refers to those influencing current well-being. This does not preclude that some elements of vector Ω may be common to $\boldsymbol{\alpha}$.

household income and time constraints, derived from combining (19) - (20) or:

$$\boldsymbol{p} X + S^{\text{F}} + S^{M} = w^{F} \Lambda^{F} + w^{M} \Lambda^{M} + Q^{F} + Q^{M}. \tag{23}$$

A set of demand functions for the vector of X's, S's, and L's can be derived from the constrained maximization problem as follows:

$$\mathbf{X}^{*} = X \, (p, \, w^{i}, \, Q^{i}, \, r, \, \boldsymbol{\Omega}^{\mathbf{i}}, \, \boldsymbol{\alpha}, \, \psi\,) \tag{24}$$

$$S^{i*} = S^{i} \, (p, \, w^{i}, \, Q^{i}, \, r, \, \boldsymbol{\Omega}^{\mathbf{i}}, \, \boldsymbol{\alpha}, \, \psi) \tag{25}$$

$$L^{i*} = L^{i} \, (p, \, w^{i}, \, Q^{i}, \, r, \, \boldsymbol{\Omega}^{\mathbf{i}}, \, \boldsymbol{\alpha}, \, \psi) \tag{26}$$

Note that demand functions depend not only on prices and income but also on GEPs and the person's individual bargaining power.

Using the above frameworks, in this paper we jointly test two propositions. We test whether women and men have different preferences with regard to saving, as suggested by the individual savings behavior model. Second, we test, from equation (25), whether a shift in women's bargaining power in a pooled-savings household influences the rate of saving out of household income, and hence aggregate saving. Note that if the first proposition does not hold, then shifts in female bargaining power that raise ψ will not affect household saving rates.

IV. Empirical Analysis of Aggregate Saving

The theoretical models outlined in equations (1) - (26) provide the framework for an empirical model of the determinants of household saving rates. The first model indicates why women's saving propensities may differ from men's. It suggests that the effect of women's share of income (or total wage bill) on household saving in the case of non-pooled savings households depends on the relative strength of the positive perceived risk effect and the ambiguous perceived

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interest effect. The second model shows how factors that affect women's relative bargaining

power may influence saving rates in pooled-savings household. In the empirical analysis that

follows, we frame our discussion around these two cases.[27] Before proceeding, however, it is

useful to specify the determinants of "voice" or female bargaining power, ψ, described in the

Nash cooperative bargaining model. As noted, determinants of female bargaining power have

generally been related to women's control over resources, such as assets. The most commonly

used measures are women's share of income and assets at marriage including women's

educational attainment or human capital relative to men's. Proxies for women's fallback position

in terms of income (call this female relative earnings or *FY*), therefore, are required for

estimation of empirical models. One possibility is the economy-wide or aggregate female share

of the total wage (FSHW), measured as the ratio of average female earnings to the sum of

average female and male earnings or:[28]

$$FSHW = [W_F /(W_{F +} W_M)]$$

where W_F and W_M are average female and male earnings, respectively. An alternative measure

of income earning abilities is women's share of the wage bill (WSH), measured as the ratio of

average female to male wages multiplied by women's share of employment or:

$$WSH = RW * \rho$$

where $RW = W_F /W_M$, and ρ is women's share of manufacturing jobs. This measure takes into

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[27] As will be clear below, there is overlap in the factors that raise women's bargaining power in pooled savings households and those that exert a positive effect on women's relative income in non-pooled savings households. If, in both cases, overall, women tend to save more than men, then women's share of the total wage bill will have a positive effect on the aggregate saving rate. The reverse will hold if, overall, women save less than men as a percentage of income.

[28] There are, of course, numerous alternative ways to measure gender wage differences, such as *[Ln (W_M) – Ln (W_F)]*. Experimentation with other measures provided similar results in the empirical analysis.

account not only relative wages but also women's access to jobs.[29] An increase in the size of each

of these variables is expected to produce, on one hand, a positive effect on female bargaining

power in the case of pooled-saving households. On the other hand, it has an ambiguous effect on

the level of present consumption to the extent that women have different perceived interests than

men.

With regard to assets and resources at marriage, a commonly used measure is the gap

between male and female educational attainment or human capital (*DHK*) since this reflects

gender differences in access to potential income and a sense of personal efficacy.[30] A reduced

form equation for the determinants of female bargaining power can be written as:

$$\psi = \psi \overset{(+)}{(FY,} \overset{(-)}{DHK)} \qquad (27)$$

where *DHK* is measured as $HK_M - HK_F$ or the difference between men's and women's

educational attainment. Hypothesized signs are noted above the variables.

We now want to test whether increases in women's share of discretionary income and

bargaining power influence household saving rates. We do this, using aggregate data, and

controlling for other factors that may affect saving propensities. Modifying equation (25) to

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[29] Because we are using aggregate rather than micro-level data, the two variables that we identify as exogenous measures of household bargaining power (*FSHW* and *WSH*) might also be considered to be GEPs, leading to some overlap of ψ and α in the empirical analysis.

[30] It may be questioned whether in fact education affects women's bargaining power within the household in a way not already captured by income. A few studies such as King (1990) explore the relationship between education and decision making power within the household. King proposes that when the educational gap between husband and wife is wide, the wife's role in decision making is limited. An increasing number of studies show that education can alter women's self-confidence, self-esteem and notions about their roles in society but the impact of education is mitigated by a number of social and cultural variables (Archaya and Bennett 1981, Alo and Adjibeng-Asem 1988 and Floro and Wolf 1990). Nonetheless, the availability of employment is perceived to be a necessary ingredient that interacts with the skills and attitude changes produced by education , leading to increased decision making role of women.., Hence, if employment opportunities are greater for more educated workers, again women's bargaining power improves as their educational attainment rises.

represent savings as a share of income, the equation to be estimated is:[31]

$$q_j = \alpha_j + \beta_{1j} PCY + \beta_{2j} ADR + \beta_{3j} FY + \beta_{4j} DHK + \varphi_j \sigma_j + \varepsilon_j \qquad (28)$$

q_j	is saving as a share of income;
PCY	is per capita income;
ADR	is the age dependency ratio;
FY	relative female/male income measure
σ_j	is a vector of country dummies;
ε_j	is the error term; and

α_j, β_{1j}, β_{2j}, β_{3j}, β_{4j}, and φ_j are parameters to be estimated.

In particular, we test here for the determinants of saving as a share of household income, or $q_S = S/Y$. We focus on the effects of relative female bargaining power which influence saving rates in pooled-savings households. Income and age dependency ratios are controlled for, under the assumption that saving rates are influenced in Keynesian fashion by the level of income as well as by life cycle factors. The remaining variables test for the effect of female relative income and, by consequence, bargaining power on saving rates. If $\beta_{3j} = \beta_{4j} = 0$, either female and male propensities to save are identical, and/or households may be unitary decision makers. Conversely, if $\beta_3 \neq \beta_{4j} \neq 0$, then saving propensities differ and changes in female bargaining power influence household saving rates. Note that we do not have data that allow us to distinguish between non-pooled savings versus pooled-savings households. We therefore cannot discern the extent to which whether female relative income and education variables improve ability to save, or bargaining power within the household.

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[31] Unfortunately, we lack data on Q (non-wage income) and the full array of GEPs, which may lead to omitted variable bias. Nor do we have information that would allow us to distinguish between female and male rates of return on assets (r). Inflation and interest rates in equation (25) do not show up in equation (28) but are added as control variables to the basic model sequentially, as is shown below. The $\boldsymbol{\Omega}$ from equation (25) represents the factors that may influence women to save at a different rate than men, given different expectations about future income. If women's and men's $\boldsymbol{\Omega}$'s differ, we would expect them to have differing saving propensities as shown in the non-pooled savings model. We do not, however, have data on $\boldsymbol{\Omega}$.

C. Specification of the Aggregate Saving Model

The empirical model we test uses cross-country time-series data. Absence of reliable cross-country household-level data on saving, however, requires that we use aggregate data sources. We therefore use the domestic saving rate, obtained from national income accounts, which is comprised of household saving, business saving, and government saving as a share of GDP. In order to test an aggregate saving model, we must control for additional factors (discussed in Section II and in greater detail in Appendix A) that influence aggregate saving.

The first model (Model I) adopts the absolute income approach and is equivalent to the household model in equation (28):[32]

$$DSR_{it} = \alpha_o + \alpha_1 FY_{it} + \alpha_2 \ DHK_{it} + \alpha_3 \ ADR_{it} + \alpha_4 PCY_{it} + \theta_{it} \tag{29}$$

where DSR is the domestic savings rate as a percent of GDP, FY is a relative income measure to capture female bargaining power, perceived risks and interests, i is country, t is time, and θ is the random error. (For a complete listing of all variables and their codes, see Appendix C). We test three gender versions of this and subsequent models, using the following measures of *FY*: (1) female share of the wage (*FSHW*); (2) a decomposition of the female share of the wage bill, or the relative female/male wage (*RW*) and the female share of employment (ρ); and (3) the female share of the wage bill (*WSH*).

The second model takes into account life-cycle influences on savings. Here, saving behavior is assumed to depend positively on the growth rate of GDP, which can be decomposed into the growth rate of per capita income (PCY1) and the population growth rate (POP1). We test

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[32] Some studies include a measure of income squared (PCYSQ) to take account of non-linearities. We do not find evidence of non-linearities in our sample, and therefore omit PCYSQ. (See the next section on this point).

both versions, or Model IIa and IIb, respectively as follows:

$$DSR_{it} = \beta_o + \beta_1\, FY_{it} + \beta_2\, DHK_{it} + \beta_3\, ADR_{it} + \beta_4\, RGDP1_{it} + \beta_5\, PCY_{it} + \varepsilon_{it} \qquad (30a)$$

$$DSR_{it} = \zeta_o + \zeta_1\, FY_{it} + \zeta_2\, DHK_{it} + \zeta_3\, ADR_{it} + \zeta_4\, PCY1_{it} + \zeta_5\, POP1_{it} +$$
$$\zeta_6\, PCY_{it} + \varphi_{it} \qquad (30b)$$

The third model expands on Models I and II, incorporating factors that influence the willingness to save. Model IIIa includes a measure of the real interest rate (RIR), which should induce households to save more if the substitution effect dominates the income effect. Also, the degree of financial development, measured as money and quasi money as a share GDP (M2) is employed. Inflation (INF) which acts as a tax on savings and therefore is expected to have a negative sign, is included in the model. Tax revenue as a share of GDP is incorporated (TAXREV) to capture the effect of government saving and taxation on saving. Finally, the natural logarithm of the terms of trade index (TOT) is included, and is assumed to have a positive effect on saving. Model IIIa is:

$$DSR_{it} = \delta_o + \delta_1\, FY_{it} + \delta_2\, DHK_{it} + \delta_3\, ADR_{it} + \delta_4\, PCY_{it} + \delta_5\, RIR_{it} + \delta_6\, M2_{it} + \delta_7\, INF_{it}$$
$$+ \delta_8\, TAXREV_{it} + \delta_9\, TOT_{it} + \eta_{it} \qquad (31a)$$

Finally, Model IIIb augments the life-cycle model and, in addition, includes the same willingness-to-save variables used in Model IIIa or:

$$DSR_{it} = \gamma_0 + \gamma_1\, FY_{it} + \gamma_2\, DHK_{it} + \gamma_3\, ADR_{it} + \gamma_4\, PCY1_{it} + \gamma_5\, RIR_{it} + \gamma_6\, INF_{it} + \gamma_7\, M2_{it}$$
$$+ \gamma_8\, TAXREV_{it} + \gamma_9\, TOT_{it} + \gamma_{10}\, RGDP1_{it} + \upsilon_{it} \qquad (31b)$$

V. Econometric Tests and Results

The sample is comprised of a set of semi-industrialized countries for which gender-

disaggregated wage data are available. The sample was selected from middle-income countries as defined by the *World Development Report 1998*. Future research might usefully expand this data set to include industrialized countries. At this juncture, however, our goal was to examine behavior in countries that were broadly similar in stage of development. The country sample is provided in Appendix D.

A. The Data

The domestic savings rate, as noted above, is measured as a ratio to GDP. GDP is measured in 1985 prices and from this, growth rates are calculated for the sample countries. Per capita income data are from the PENN World Tables and are measured in international prices. The education variables are from Barro and Lee (1996), and DHK is measured as the difference in average years of secondary education attained by males and females 15 and older.[33] The remaining macro-level variables, described above, are from the World Bank's *World Development Indicators* and the IMF and are measured in a straightforward manner.

Wage and employment data are for the manufacturing sector only and are from the International Labor Organization (various years). With regard to the wage data, maximum coverage is from 1975-95, with many countries having shorter coverage. Manufacturing sector employment data are used rather than economy-wide data since coverage for the latter is not as broad, and several countries would have dropped out of the sample.

Some cautions about the data should be noted. First, while the broadest period of analysis is 1975-95, data coverage varies, resulting in variations in sample sizes and thus unbalanced

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[33] Education was alternatively measured as total years of educational attainment by sex. Results, available upon request, are similar to those obtained using years of secondary education.

panels.[34] Second, in most cases, the earnings data are corrected for hours worked, but some are not. Further, these data take into account only women's and men's formal employment and wage earnings in the manufacturing sector, serving only as proxies for economy-wide earnings.[35] There are two reasons this may not be cause for significant worry. First, the panel data estimations capture variation over time, and sectoral gender wage gaps may trend in a similar fashion. Second, any random measurement error in these variables tends to have a downward bias on their coefficients. Therefore any evidence that gender is a significant factor influencing saving rates may actually be understated.

A third note of caution relates to the aggregate saving data which often have problems of consistency and reliability. Since gross domestic data is derived from national income accounts, one may expect measurement errors due to inaccuracies in both investment and balance-of-payments data, producing a downward bias on coefficients as well. As Fry (1995) notes, the caveats regarding data inaccuracies need not necessarily lead to misleading econometric results, provided that the saving data biases are constant over time and the errors are random. In addition, the use of pooled time-series data, which yields a large number of observations, permits behavioral relationships to be detected, even though non-trivial random errors in the data may exist.

Finally, it may be difficult to disentangle the separate effects on saving of the gender education gap (DHK) and earnings shares (FY) on saving since these variables are likely to be

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[34] Hussein and Thirlwall (1999) note, however, that variation in the sample size becomes a useful test of robustness, depending on whether significance of key variables changes as sample size changes.

[35] Consequently, we make the implicit assumption that trends in FY in the manufacturing sector track those in other sectors of the economy.

collinear. Table 1 provides a correlation matrix of the relevant variables. While there is some

evidence of multicollinearity between these variables, education and relative income variables

are not perfect substitutes. This is not surprising since substantial evidence indicates that wage

payments in a number of the countries studied diverge from measured indicators of productivity,

such as education, due to discrimination in labor markets (Behrman and Zhang 1995; Birdsall

and Behrman 1991; Horton 1996; Psacharopoulos and Tzannatos 1992). Further, educational

differences may have implications for men's and women's outside options in the marriage

market while wages reflect chances in the labor market. We therefore chose to include both

variables.

B. Characteristics of Sample Data

Figures 1 and 2 present time series data of the gender variables used in this analysis for

selected countries. The data exhibit substantial variation both across countries and over time in

women's share of the wage and the wage bill. Given this, if there are detectable differences in

saving propensities by gender, we would anticipate a significant effect of the gender distribution

of wages (or the wage bill) on aggregate saving. Table 2 gives summary data on the variables

used in the econometric analysis, averaged for the period 1975-95. Figure 3 provides a look at the

relationship between the dependent variable, the domestic savings rate (DSR), and the level of

per capita income against DSR. The data exhibit a positive relationship, but indicate little

evidence of non-linearities.

C. Econometric Results

The regressions are conducted with panel data to capture the effect of changes in

variables within countries over to time to account for time-varying country-specific effects.

Regressions are estimated using a two-way error components model. The basic model can be summarized as:

$$Y_{it} = \alpha + X_{it}\beta + \upsilon_{it}$$

where the error term υ_{it} has three components:

$$\upsilon_{it} = \mu_i + \lambda_t + \varepsilon_{it}.$$

Here μ_i captures the country specific-effects while λ_t represents time-varying effects. Country (fixed) effects control for unobserved time-invariant differences that might affect saving.

Several issues need to be considered in estimation: stationarity, heteroskedasticity, autocorrelation, and endogeneity. In this analysis, many of the variables are expressed as ratios, and are thus stationary in the long run. Two exceptions are TOT and INF which are transformed into first differences. Heteroskedasticity problems are frequently encountered with cross-sectional data, and therefore our regressions use GLS, with cross-sectional weights derived from the residual cross-sectional standard deviations. While this procedure corrects for heteroskedasticity across countries, a more general form is necessary to allow variances within a cross section to vary over time. This was done by obtaining standard errors in accordance with White's variance-covariance matrix in all regressions. We corrected for autocorrelation using an autoregressive process modeled as an AR(1) with a common country coefficient.

Some right-hand side variables might potentially be endogenous. In particular, the gender variables may be simultaneously determined by the growth rate of GDP. To check for this, Hausmann tests were run on Models I-III with the results indicating no evidence of endogeneity for either gender variable.[36]

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[36] This was done by regressing DSR on all independent variables (the "constrained" model). The "suspect"

Table 3 summarizes the results obtained from the generalized least squares (GLS) estimates of Model 1. Equation 1 estimates the basic absolute income model, which is the same as the household model in equation (28). The coefficient on FSHW is positive and significant, indicating that a higher relative wage for women raises the aggregate saving rate. As expected the education gap has a negative sign, indicating that the wider the gap between male and female secondary educational attainment, the lower the aggregate saving rate. The age dependency ratio coefficient is negative as would be expected, but is insignificant. Finally, the level of per capita income is positive and significant. In equation 2, we decompose the female share of the wage bill into two parts, RW, the relative female/male wage, and ρ, the female share of employment. Each of these variables is positive and significant. In this case, DHK becomes insignificant, but coefficients on the remaining variables are stable. Finally, equation 3 uses the female share of the wage bill, and this is also positive and significant.

The results of estimating the Life Cycle Model (Model II) are shown in Table 4. For Model IIa, which includes the growth rate of GDP as an explanatory variable, in equations 1 and 2, the relative gender income variables, FSHW and RW are positive and significant, while in equation 3, the female share of the wage bill (WSH) is positive but insignificant. PCY is robust to this alternative specification, while again, DHK is only significant and negative in equation 1. RGDP1 is positive and significant in equation 1, but changes sign in equation 2, and is insignificant in equation 3. Model IIb replaces RGDP1 with POP1 and PCY1, and gives results shown in equations 4-6. The gender income variables and PCY are robust to this alternative

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variable (each of the gender variables) was then regressed on all exogenous variables. The resulting fitted values were then added to the constrained model. T-tests of the significance of that variable did not support the hypothesis of endogeneity of gender variables.

specification, while POP1 is negative as would be expected and PCY1 performs perversely or is insignificant.

Table 5 provides the results of testing modified versions of Models I and II. In Model IIIa, we add financial and macroeconomic variables. In equation 1, the coefficient on FSHW is positive and significant but is reduced in size by about one half from Models I and II. PCY continues to perform robustly. All of the financial and macroeconomic variables with the exception of the terms of trade variable (TOT) are significant. Interestingly, the sign on the real interest rate variable is significant but negative, a finding that is consistent with Keynesian and structuralist perspectives. The robustness of the FSHW variable as the sample size changes is notable. DHK, however, changes sign and continues to be insignificant in all versions of Model III. The female share of the wage bill (WSH) does not, however, perform so robustly, nor do its decomposed components (equations 2 and 3). Model IIIb adds RGDP1 as a life cycle variable. The FSHW variable as well as the financial and macroeconomic variables are again robust, but RGDP1 is insignificant. Finally, in equations 5 and 6, again the decomposed FSHW and the WSH are insignificant, and in one case, change signs. Also, the low Durbin-Watson statistic makes the estimates in this equation unreliable.[37]

In sum, two variables perform robustly in all three models in this analysis namely, per capita income, PCY and female share of total wages, FSHW. In Models I and II, WSH as well as its decomposed parts also performed as predicted by the household bargaining model. The insight offered by the results obtained from decomposing the wage share is that even if relative wages remain constant, women's greater access to employment improves their outside options

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[37] Similar results were obtained using PCY1 and POP1 in place of RGDP1.

sufficiently to raise bargaining power and influence saving rates.

The education variable, DHK performed less robustly than the income variables, although this may be in part explained by multicollinearity among these variables. (Running regressions with the education variable as the only bargaining power variable yielded slightly more consistently significant negative coefficients). Table 6 summarizes the econometric results obtained of the gender bargaining power variables.

The preliminary evidence on the role of gender in determining aggregate saving suggests measures of women's access to outside income are likely to raise the aggregate saving rate. The size of the effect is not insignificant. Though it varies in our estimates, consider, for example, the results given in Table 4. There we see that a one percentage point increase in women's share of the wage raises aggregate saving by roughly a quarter percentage point. Similarly, a percentage point increase in women's share of income raises aggregate saving by about one sixth of a percentage point.

These results are suggestive of differential savings behavior at the household level, with women's propensity to save higher than that of males at least for this set of countries. These results are also consistent with a growing body of research that suggests that gender is an important macroeconomic variable, and links this to micro-level, household behavior.

VI. Conclusion

This paper explores the role that gender plays in influencing aggregate saving rates for a set of semi-industrialized countries. These countries have increasingly relied on female labor in their export manufacturing sectors. A question of interest is whether increases in women's wages

relative to men's as well as increases in their share of income have affected aggregate saving

rates. Presupposed in this question is that women and men have differing propensities to save due

to variations in perceived risks and interests and in gender-related external factors that affect

savings behavior.

This paper is exploratory in the sense that little prior evidence existed to indicate whether

higher relative wages and income for women will raise or lower saving rates—whether the effect

will be so negligible as to be undetectable. Preliminary evidence provided here using a panel data

set is consistent with the hypothesis that an increase in women's discretionary income and

bargaining power raises household saving and therefore aggregate saving rates. These results are

of interest in that they imply an aggregate role for micro-level gender relations at the household

level. A deeper understanding of the determinants of saving rates at the household level is

especially useful in planning for savings mobilization and in the formulation of financial and

investment policies.

REFERENCES

Acharya, Meena and Lyn Bennett (1981). "Women and the Subsistence Sector: Economic Participation and Household Decision-making in Nepal," World Bank Staff Working Paper No. 526, World Bank, Washington, D.C.

Adams, Dale and Delbert Fitchett, eds. (1992). *Informal Finance in Low-Income Countries,* Westview Press, Boulder.

Agarwal, Bina (1995). *A Field of One's Own: Gender and Land Rights in South Asia,* Cambridge University Press, Cambridge.

Aghevli, Bijan, James Broughton, Peter Montiel, Delano Villanueva, and Geoffrey Woglom (1990). "The Role of National Saving in the World Economy: Recent Trends and Prospects," IMF Occasional Paper No. 67, International Monetary Fund, Washington DC.

Akyűz, Yilmaz (1991). "Financial Policies for Industrialization and Development: Reflections on Financial Deepening and Efficiency," in Machiko Nissanke and Adrian Hewitt (eds.), *Economic Crisis in Developing Countries: New Perspectives on Commodities, Trade and Finance,* Pinter, London.

Alo, O. and S. Adjebeng-Asem (1988). "Women and National Development: A Socio-Cultural Analysis of the Nigerian Experience." In M. F. Abraham and P. S. Abraham (eds.), *Women, Development and Change: The Third World Experience*, Wyndham Hall Press, Brystol, Indiana.

Bajtelsmit, Vickie and Alexandra Bernasek (1996). "Why Do Women Invest Differently Than Men?" *Financial Counseling and Planning* 7.

Bajtelsmit, Vickie and J. Van Derhei (1997). "Risk Aversion and Pension Investment Choices," in Michael S. Gordon, et. al. (eds.), *Positioning Pensions for the Twenty-First Century*, University of Pennsylvania Press, Philadelphia, pp. 45-66.

Barke, R, H. Jenkins-Smith and P. Slovic (1997). "Risk Perceptions of Men and Women Scientists," *Social Science Quarterly* 78 (1): 167-176.

Barro, Robert and Jong-Wha Lee (1996). "International Measures of Schooling Years and Schooling Quality," *American Economic Review* 86 (2): 218-223.

Behrman, Jere and Zhang, Z (1995). "Gender Issues and Employment in Asia," *Asian   Development Review* 13 (2): 1-49.

Benería, Lourdes and Martha Roldan (1987). *The Crossroads of Class and Gender: Industrial Homework, Subcontracting and Household Dynamics in Mexico City*, University of Chicago Press, Chicago.

Bernasek, Alexandra (2000). "Gender, Risk and Investment: A Feminist Perspective," paper presented at the Annual IAFFE Conference, Istanbul, Turkey, August 15-17, 2000.

Birdsall, Nancy and Jere Behrman (1991). "Why Do Males Earn More Than Females in Urban Brazil: Earnings Discrimination or Job Discrimination," in Nancy Birdsall and Richard Sabot (eds.), *Unfair Advantage: Labor Markets Discrimination in Developing* Countries, World   Bank, Washington, D.C., pp. 147-69.

Blumberg, Rae Lesser (1988). "Income Under Female Versus Male Control: Hypotheses From a Theory of Gender

Stratification and Data From the Third World," *Journal of Family Issues* 9 (1): 51-84.

Boskin, Michael (1978). "Taxation, Saving, and the Rate of Interest," *Journal of Political Economy* 86 (2): S10-S27.

Brenner, R., Marcel Dagenais, and C. Montmarquette (1994). "An Overlooked Explanation of the Declining Saving Rate," *Empirical Economics* 19 (4): 629-37.

Callen, Tim and Christian Thimann (1997). "Empirical Determinants of Household Saving: Evidence from OECD Countries," IMF Working Paper 97/181, International Monetary Fund, Washington, D.C.

Caroll, Christopher and D. Weil (1993). "Saving and Growth: A Reinterpretation," NBER Working Paper No. 4470, National Bureau for Economic Research, Cambridge, MA.

Dayal-Gulati, Anuradha and Christian Thimann (1997). "Saving in Southeast Asia and Latin America Compared: Searching for Policy Lessons," IMF Working Paper 97/110, International Monetary Fund, Washington, D.C.

Deaton, Angus (1990). "Savings in Developing Countries: Theory and Review," in Stanley Fischer and Dennis de Tray (eds.), *Proceedings of the World Bank Annual Conference on Development Economics 1989*, World Bank, Washington D.C.

Deaton, Angus and Christina Paxson (1997). "Growth, Demographic Structure and National Saving in Taiwan," Working Paper for Princeton University, Research Program in Development Studies.

_____ (1998). "Saving and Growth: Another Look at the Cohort Evidence," Working Paper for Princeton University, Research Program in Development Studies.

de Melo James and James Tybout (1986). "The Effects of Financial Liberalization on Saving and Investment in Uruguay," *Economic Development and Cultural Change* 34 (3): 561-587.

Deolalikar, Anil and Vijayendra Rao (1998). "The Demand for Dowries and Bride Characteristics in Marriage: Empirical Estimates of Rural South-Central India," in R. Sudharshan (ed.), *Gender, Population and Development*, Oxford University Press, New Delhi.

Dornbusch, Rudiger and Alejandro Reynoso (1989). "Financial Factors in Economic Development," *American Economic Review* 79 (2): 389-444.

Doss, Cheryl. (1996). "Women's Bargaining Power in Household Economic Decisions: Evidence from Ghana," Department of Applied Economics Staff Paper P96-11, University of Minnesota, July.

Edwards, Sebastian (1995). "Why Are Savings Rates So Different Across Countries? An International Comparative Analysis," NBER Working Paper No. 5097, National Bureau of Economic Research, Cambridge, Massachusetts.

Feldstein, Martin and Philippe Bacchetta (1991). "National Saving and International Investment," in B. Douglas Bernheim and John B. Shoven (eds.), *National Saving and Economic Performance*, Chicago University Press for NBER, pp. 201-226.

Fleck, Susan (1998). "Choice or Bargain? Married Women's Labor Force Participation in Honduras," Ph.D. dissertation, American University, Washington D.C.

Floro, Maria and Joyce Wolf (1990). *The Economic and Social Impacts of Girls' Primary Education in Developing Countries*, Advancing Basic Education and Literacy (ABEL) Project, U.S. Agency for International Development, Washington, DC.

Floro, Maria Sagrario (1995). "Women's Well-Being, Poverty, and Work Intensity," *Feminist Economics* 1 (3): 1-39.

Folbre, Nancy (1997). "Gender Coalitions: Extrafamily Influences on Intrafamily Inequality," in Lawrence Haddad, John Hoddinott, and Harold Alderman (eds.), *Intrahousehold Resource Allocation in Developing Countries: Models, Methods, and Policy,* Baltimore and London, Johns Hopkins University Press for the International Food Policy Research Institute, pp. 263-74.

Flynn, J., P. Slovic, and C. K. Merck (1994). "Gender, Race and Perception of Environmental Health Risks," *Risk Analysis* 16 (6): 1101-1108.

Fry, Maxwell J (1978). "Money and Capital or Financial Deepening in Economic Development?," *Journal of Money Credit and Banking* 10 (4): 464-475.

_____ (1984). "Saving, Financial Intermediation and Economic Growth in Asia," *Asian   Development Review* 2 (1):. 82-91.

_____ (1995). *Money, interest, and banking in economic development,* Johns Hopkins University Press, Baltimore and London.

_____ (1996). "Finance and Growth in Pacific Basin Developing Countries," in Niels Hermes and Robert Lesnick (eds.), *Finance Development and Economic Growth*, Routledge, London, pp. 138-160.

Fry, Maxwell and Andrew Mason (1982). "The Variable Rate of Growth Effect in the Life Cycle Saving Model: Children, Capital Inflows, Interest and Growth in a New Specification of the Life Cycle Model Applied to Seven Asian Countries," *Economic Inquiry* 20 (3): 426-42.

Ghate, Prabhu (1992). *Informal Finance: Some Findings from Asia,* Oxford University Press and Asian Development Bank, Manila.

Giovannini, Alberto (1983). "The Interest Elasticity of Savings in Developing Countries: The Existing Evidence," *World Development* 11 (7): 601-607.

_____ (1985). "Saving and the Real Interest Rate in LDCs," *Journal of Development Economics* 18 (2 and 3): 197-217.

Goetz, Anne Marie and Rina Sen Gupta (1996). "Who Takes the Credit? Gender, Power, and Control Over Loan Use in Rural Credit Programs in Bangladesh," *World Development* 24 (1): 45-63.

Greenhalgh, Susan (1985). "Sexual Stratification: The Other Side of Growth with 'Equity' in East Asia," *Population and Development Review* 1 (2): 265-314.

Gugerty, May Kay (1999). "Preliminary Evidence on Rotating Savings and Credit Associations (ROSCAs) in Kenya: You Can't Save Alone," Mimeo, Harvard University.

Gupta, Kanhaya L. (1987). "Aggregate Savings, Financial Intermediation, and Interest Rate," *Review of Economics and Statistics* 69 (2): 303-17.

Guyer, Jane (1988). "Dynamic Approaches to Domestic Budgeting: Cases and Methods from Africa," in Daisy Dwyer and Judith Bruce (eds.), *A Home Divided: Women and Income in the Third World*, Stanford University Press, Palo Alto, pp. 155-172.

Haddad, Lawrence and John Hoddinott (1991). "Gender Aspects of Household Expenditures and Resource Allocation in the Côte d'Ivoire," Oxford Applied Economics Discussion Paper 112.

Handa, Sudhanshu (1994). "Gender, Headship and Intra Household Resource Allocation," *World Development* 22 (10): 1535-1547.

Higgins, Matthew and Jeffrey Williamson (1997). "Age Structure Dynamics in Asia and Dependence on Foreign Capital," *Population and Development Review* 23: 261-93.

Hinz, Richard, David McCarthy, and John Turner (1996). "Are Women Conservative Investors?: Gender Differences in Participant-Directed Pension Investments," in Michael Gordon, Olivia Mitchell, and Marc Twinney (eds.), *Positioning Pensions for the Twenty-First Century,* University of Pennsylvania Press, Philadelphia, PA, pp. 145-156.

Horton, Susan (1996). *Women and Industrialization in Asia*, Routledge, London and New York.

Hulme, David and Paul Mosley (1996). *Finance Against Poverty*, Routledge, London.

Hungerford, Thomas (1999). "Saving For a Rainy Day: Does Pre-Retirement Access to Retirement Savings Increase Retirement Saving?," Mimeo, Social Security Administration.

Hussein, Khaled and A. P.Thirwall (1999). "Explaining Differences in the Domestic Savings Ratio Across Countries: A Panel Data Study," Working Paper, University of Kent at Canterbury.

International Labour Organization. *Yearbook of Labour Statistics* (various years*),* Geneva.

Jianakoplos, Nancy and Alexandra Bernasek (1998). "Are Women More Risk Averse?," *Economic Inquiry* 36: 620-630.

Kabeer, Naila (2000). *The Power to Choose: Bangladeshi Women and Labour Market Decisions in London and Dhaka*, Verso, London.

Katz, Elizabeth (1991a). "Breaking the Myth of Harmony: Theoretical and Methodological Guidelines to the Study of Rural Third World Households," *Review of Radical Political Economics* 23 (3 and 4): 37-56.

____ (1991b). "Intrahousehold Resource Allocation in the Guatemalan Central Highlands: The Impact of Non-Traditional Agricultural Exports," paper presented at the Latin American Studies Association, Washington DC.

Kim, Seung-Kyung (1997). *Class Struggle or Family Struggle?: The Lives of Women Factory Workers in South Korea,* Cambridge University Press, Cambridge, UK.

King, Elizabeth (1990). *Educating Girls and Women: Investing in Development*, World Bank, Washington, DC.

Kumar, Shubh (1978). "Role of the Household Economy in Child Nutrition at Low Incomes: A Case Study in Kerala," Occasional Paper No. 95, Department of Agricultural Economics, Cornell University, Ithaca, NY.

Leff, Nathaniel (1969). "Dependency Rates and Saving Rates," *American Economic Review 5*9: 886-96.

Leland, Hayne (1968). "Saving and Uncertainty: The Precautionary Demand for Saving," *Quarterly Journal of Economics* 82: 465-473.

Lundberg, Shelly, Robert Pollak, and Terence Wales (1995). "Do Husbands and Wives Pool their Resources? Evidence from the U.K. Child Benefit," Working Paper, University of Washington, April.

Masson, Paul, Tamim Bayoumi, and Hossein Samiei (1995). "Saving Behavior in Industrial and Developing Countries," Staff Studies for the World Economic Outlook, International Monetary Fund, pp. 1-27.

Modigliani, Franco (1966). "The Life Cycle Hypothesis of Saving, the Demand for Wealth and the Supply of Capital*," Social Research* 33: 160-217.

_____ (1970). "The Life Cycle Hypothesis of Saving and Inter-country Differences in the Saving Ratio" in Walter Eltis, et. al. (eds.), *Induction, Trade and Growth: Essays in Honor of Sir Roy Harrod,* Oxford, pp. 197-225.

_____ (1986). "Life Cycle, Individual Thrift, and the Wealth of Nations," *American Economic Review* 76 (3): 297-313.

Modigliani, Franco and Albert Ando (1957). "Tests of the Life Cycle Hypothesis of Savings: Comments and Suggestions," *Bulletin of the Oxford Institute of Statistics,* pp. 99-124.

Neuhouser, Kevin (1989). "Sources of Women's Power and Status Among the Urban Poor in Contemporary Brazil," *Signs* 14 (3): 684-702.

Ogaki, Masao, Jonathan Ostry, and Carmen Reinhart (1994). "Saving Behavior in Low- and Middle-Income Developing Countries: A Comparison," Working Paper 95/3, International Monetary Fund, Washington, D.C.

Ostry, Jonathan and Carmen Reinhart (1992). "Private Saving and Terms-of-Trade Shocks: Evidence from Developing Countries," IMF Staff Papers*,* 39: 495-517.

Palsson, Anne-Marie (1996). "Does the Degree of Relative Risk Aversion Vary with Household Characteristics?," *Journal of Economic Psychology* 17 (6): 771-87.

Papanek, Hanna and Laurel Schwede (1988). "Women are Good with Money: earning and Managing in an Indonesian City" in Daisy Dwyer and Judith Bruce (eds.), *A Home Divided: Women and Income in the Third World*, Stanford University Press, Palo Alto, pp. 71-98.

Paxson, Christina (1995). "Saving and Growth: Evidence From Micro Data," NBER Working Paper No. 5301, National Bureau of Economic Research, Cambridge, Massachusetts.

Phipps, Shelley and Peter Burton (1998). "What's Mine is Yours? The Influence of Male and Female Incomes on Patterns of Household Expenditure," *Economica* 65: 599-613.

Psacharopoulos, George and Zafiris Tzannatos (1992). *Case Studies on Women's Employment and Pay in Latin America,* World Bank, Washington, D.C.

Quisumbing, Agnes and John Maluccio (1999). "Intrahousehold Allocation and Gender Relations: New Empirical Evidence," Gender and Development Working Paper Series, No. 2, World Bank, Washington, D.C.

Roldan, Martha (1988). "Renegotiating the Marital Contract: Intrahousehold Patterns of Money Allocation and Women's Subordination Among Domestic Outworkers in Mexico City" in Daisy Dwyer and Judith Bruce (eds.), *A Home Divided: Women and Income in the Third World*, Stanford University Press, Palo Alto, pp. 229-247.

Safilios-Rothschild, Constantina (1988). "The Impact of Agrarian Reform on Men's and Women's Incomes in Rural Honduras," in Daisy Dwyer and Judith Bruce (eds.), *A Home Divided: Women and Income in the Third World*, Stanford University Press, Palo Alto, pp. 216-228.

Sandmo, Agnar (1970). "The Effect of Uncertainty on Saving Decisions," *Review of Economics and Statistics* 37: 353-60.

Schmidt-Hebbel, Klaus, Steven Webb, and Giancarlo Corsetti (1992). "Household Saving in Developing Countries: First Cross-Country Evidence," *World Bank Economic Review* 6 (3): 529-547.

Sen, Amartya (1990). "Gender and Cooperative Conflicts" in Irene Tinker (ed.), *Persistent Inequalities: Women and World Development*, Oxford University Press, New York, pp. 123-149.

Smith, Roger (1990). "Factors Affecting Saving, Policy Tools, and Tax Reform: A Review," *IMF Staff Papers* 37 (1): 1-70.

Sunden, Annika E. and Brian J. Surette (1998). "Gender Differences in the Allocation of Assets in Retirement Savings Plans," *American Economic Review* 88 (2): 207-211.

Taylor, Lance (1983). *Structuralist Macroeconomics: Applicable Models for the Third World*, Basic Books, New York.

Thomas, Duncan (1992). "The Distribution of Income and Expenditure Within the Household," IFPRI World Bank Conference on Intrahousehold Resource Allocation: Policy Issues and Research Methods, Washington D.C.

Thomas, Duncan and Chien-Liang Chen (1993). "Income Shares and Shares of Income: Empirical tests of Models of Household Resource Allocations," Working Paper, RAND Corporation.

Van Wijnbergen, Sweder (1983). "Credit Policy, Inflation, and Growth in a Financially Repressed Economy," *Journal of Development Economics* 13 (1 and 2): 45-65.

Wolf, Diane (1988). "Female Autonomy, the Family, and Industrialization in Java," *Journal of Family Issues* 9 (1): 85-107.

World Bank (1998). *World Development Indicators*.

Table 1.-Correlation Matrix of Gender Income Variables

	FSHW	WSH	ρ	RW	DHK
FSHW	1.000	0.626	–0.224	0.993	–0.397
WSH		1.000	0.603	0.630	–0.228
ρ			1.000	–0.222	0.121
RW				1.000	–0.394
DHK					1.000

Note: FSHW is female share of the total wage; WSH is the female share of the wage bill; ρ is the female share of manufacturing employment; RW is the ratio of female to male earnings, and DHK is the change in human capital attainment.

Table 2.- Descriptive Statistics of Selected Variables, 1975-95

Country	DSR	RW	Rho	FSHW	WSH	RGDP1	PCY	RIR	INF	M2	POP1	PCY1	ADR	TOT	DHK	Mfg/GDP
Brazil	22.3%	53.3%	25.5%	34.7%	14.8%	3.0%	4000		554.2%	16.2%	2.0%	0.6%	68.6%	113	0.08	29.9%
Chile	20.7%	77.3%	26.5%	43.6%	19.8%	5.3%	3731	15.5%	51.7%	28.8%	1.6%	2.9%	61.5%	114	-0.09	20.3%
Colombia	20.5%	80.0%	40.8%	44.4%	30.0%	4.1%	2990	13.2%	24.4%	17.9%	2.1%	1.8%	72.5%	121	-0.32	21.3%
Costa Rica	21.5%	71.5%	31.3%	41.7%	25.3%	3.6%	3420	5.0%	22.2%	35.5%	2.7%	0.4%	71.7%	111	-0.06	20.0%
Cyprus	18.6%	58.4%	45.3%	36.8%	26.7%	7.0%	6161	1.9%	7.1%	72.1%	0.9%	6.1%	55.3%	99	0.61	15.5%
El Salvador	8.7%	86.8%	41.6%	46.4%	35.9%	1.3%	1934	2.4%	13.9%	30.5%	1.6%	-0.5%	89.0%	0	0.05	18.4%
Greece	16.2%	74.8%	30.8%	42.7%	25.4%	1.8%	6061	4.3%	16.2%	45.0%	0.7%	1.7%	52.7%	104	0.86	25.7%
Hong Kong	33.2%	73.2%	48.5%	42.2%	35.0%	7.3%	10724	0.7%	8.3%	160.7%	1.7%	6.3%	45.9%	0	0.67	18.5%
Indonesia	30.5%	64.9%	46.4%	39.3%	29.2%	6.3%	1524	11.9%	11.6%	24.1%	1.9%	4.7%	72.4%	109	0.14	16.3%
Korea, Rep.	31.4%	48.5%	39.2%	32.6%	19.1%	8.0%	4178	2.8%	11.3%	32.9%	1.3%	7.1%	53.4%	105	1.10	28.8%
Malaysia	34.0%	50.5%	47.3%	33.5%	24.8%	7.0%	4073	4.3%	4.0%	59.1%	2.6%	4.5%	74.7%	108	0.55	21.8%
Mexico	22.6%	79.5%	30.7%	44.1%	26.0%	2.6%	5567	12.6%	42.9%	20.9%	2.2%	1.4%	84.7%	119	0.29	22.2%
Paraguay	19.1%	86.9%	38.8%	46.0%	31.5%	4.7%	2100	8.5%	19.3%	19.8%	3.0%	1.6%	86.6%	121	-0.49	16.4%
Philippines	21.1%	87.0%	46.7%	46.5%	40.2%	3.2%	1728	4.9%	12.4%	27.7%	2.4%	0.2%	78.3%	104	0.04	25.0%
Portugal	18.5%	71.8%	39.5%	41.7%	31.2%	3.0%	5263	3.3%	16.1%	85.3%	0.6%	3.7%	54.8%	96	0.18	29.3%
Singapore	41.3%	54.4%	45.0%	35.2%	24.6%	7.5%	8568	4.1%	3.5%	71.0%	1.9%	5.1%	44.0%	97	0.31	26.7%
Sri Lanka	13.6%	79.6%	41.6%	44.2%	35.9%	4.5%	1814	2.2%	12.0%	27.0%	1.5%	3.2%	64.3%	104	0.35	16.5%
Taiwan	23.1%	64.1%	47.1%	39.0%	29.6%	8.0%	5182	0.0%	0.0%	0.0%	0.0%	6.5%	53.8%	0	1.16	34.5%
Thailand	28.0%	66.6%	42.7%	39.9%	32.0%	7.7%	2565	7.6%	5.5%	51.0%	1.9%	5.0%	67.5%	108	0.15	23.9%
Turkey	16.8%	86.5%	16.7%	46.3%	17.6%	4.0%	3186		53.5%	20.4%	2.2%	1.7%	70.0%	101	0.60	17.6%

Note: Mfg/GDP is the share of manufacturing in GDP. For definitions of remaining variables, see Appendix C.

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Table 3.-Determinants of Gross Domestic Savings: Model I
Absolute Income Approach
Dependent Variable: Gross Domestic Saving as % GDP

	Eq. 1	Eq.2	Eq.3
FSHW	0.247		
	(2.06)**		
RW		0.072	
		(2.06)**	
ρ		0.096	
		(2.77)***	
WSH			0.139
			(1.76)*
DHK	–0.472	–0.046	–0.040
	(–2.94)***	(–0.54)	(–0.44)
ADR	–0.120	–0.127	–0.102
	(–1.13)	(–1.30)	(–0.96)
PCY	0.001	0.001	0.001
	(2.77)***	(3.69)***	(3.67)***
Adj. R^2	0.917	0.932	0.939
DW	1.623	1.554	1.712
N	153	140	140

Note: T-statistics are in parentheses. A triple asterisk (***) indicates $p<0.01$, a double asterisk (**) $p<0.05$, and a single asterisk (*) $p< 0.10$. Fixed effects are not reported here.

Table 4.-Determinants of Gross Domestic Savings: Model II
Life Cycle Approach

Dependent Variable: Gross Domestic Saving as % GDP

	Eq. 1	Eq. 2	Eq. 3	Eq. 4	Eq. 5	Eq. 6
FSHW	0.233			0.262		
	(1.72)*			(2.24)**		
RW		0.070			0.060	
		(2.31)**			(1.97)**	
ρ		0.161			0.139	
		(5.92)***			(4.46)***	
WSH			0.118			0.132
			(1.30)			(4.95)***
DHK	-0.434	-0.050	-0.054	-0.418	0.027	-0.067
	(-2.45)**	(-0.53)	(-0.60)	(-2.11)**	(0.27)	(-0.60)
PCY	0.001	0.001	0.001	0.001	0.001	0.001
	(2.52)**	(2.70)***	(3.53)**	(2.78)***	(3.25)***	(3.69)***
ADR	-0.138	-0.152	-0.133	-0.129	-0.058	-0.067
	(-1.17)	(-1.19)	(-1.06)	(-1.14)	(-0.48)	(-0.60)
RGDP1	0.102	-0.073	0.049			
	(2.21)**	(-4.02)***	(0.95)			
PCY1				0.024	-0.048	-0.050
				(0.79)	(-3.43)***	(-3.69)***
POP1				-1.097	-1.679	-1.635
				(-1.64)*	(-2.57)***	(-2.56)***
Adj. R^2	0.924	0.938	0.925	0.921	0.942	0.941
DW	1.810	1.826	1.374	1.773	1.894	1.764
N	149	139	139	149	139	139

Note: T-statistics are in parentheses. A triple asterisk (***) indicates $p<0.01$, a double asterisk (**) $p<0.05$, and a single asterisk (*) $p<0.10$.

Table 5.-Models IIIa and IIIb: Modified Absolute Income and Life Cycle Models:

	Model IIIa			Model IIIb		
	Eq.1	Eq.2	Eq.3	Eq.4	Eq.5	Eq.6
FSHW	0.142			0.137		
	(2.39)**			(2.38)**		
RW		0.029			0.035	
		(0.96)			(1.07)	
ρ		-0.057			-0.037	
		(-0.67)			(-0.41)	
WSH			0.003			-0.014
			(0.04)			(-0.12)
DHK	1.358	1.450	0.895	1.293	1.558	0.687
	(1.38)	(1.36)	(0.76)	(0.48)	(1.47)	(0.47)
ADR	0.072	0.048	-0.119	0.079	0.102	-0.133
	(0.44)	(0.29)	(-0.63)	(0.47)	(0.60)	(-0.55)
PCY	0.001	0.002	0.002	0.002	0.001	0.002
	(2.04)**	(2.22)**	(3.54)***	(1.72)*	(1.44)	(2.52)**
RIR	-0.236	-0.235	-0.194	-0.238	-0.237	-0.201
	(-3.69)***	(-4.09)* **	(-4.59)***	(-3.74)***	(-4.06)***	(-2.60)**
M2	-0.312	-0.338	-0.300	-0.304	-0.324	-0.275
	(-4.01)***	(-3.03)***	(-2.81)***	(-3.95)***	(-2.79)**	(-2.23)**
TAXREV	0.246	0.212	0.154	0.243	0.222	0.204
	(2.21)**	(2.16)**	(1.47)	(2.22)**	(2.17)**	(1.35)
TOT	1.622	2.190	3.281	2.020	2.605	3.419
	(1.19)	(1.76)*	(2.87)*	(1.62)*	(2.21)**	(1.79)*
INF	0.018	0.016	0.018	0.018	0.016	0.017
	(3.08)***	(2.64)**	(1.99)**	(2.89)**	(2.69)**	(1.36)
RGDP1				0.035	0.037	0.042
				(0.66)	(0.68)	(0.51)
Adj. R^2	0.967	0.966	0.956	0.967	0.965	0.947
DW	2.111	2.112	1.487	2.092	2.111	1.236
N	76	75	75	76	75	75

Note: T-statistics are in parentheses. A triple asterisk (***) indicates $p<0.01$, a double asterisk (**) $p<0.05$, and a single asterisk (*) $p<0.10$. Results using lagged dependent variables instead of an AR(1) correction in all specifications of equations (1)-(6) above generated insignificant coefficients on the bargaining power variables.

Table 6.- Summary of Econometric Results for Gender Bargaining Power Variables

Version	Gender Variable	Model I	Model IIa	Model IIb	Model IIIa	Model IIIb
1)	FSHW	(+) *	(+) *	(+) *	(+) *	(+) *
	DHK	(−)*	(−) *	(−) *	(+)	(+)
2)	RW	(+) *	(+) *	(+) *	(+)	(+)*
	ρ	(+)*	(+)*	(+)*	(−)	(−)
	DHK	(−)	(−)	(+)	(+)	(+)
3)	WSH	(+)*	(+)*	(+)*	(+)	(+)
	DHK	(−)	(−)	(−)	(+)	(+)

Note: Symbol in parentheses is sign of coefficient on variable. An asterisk denotes significance at 10% level or better.

Figure 1.- Trends in Female Share of
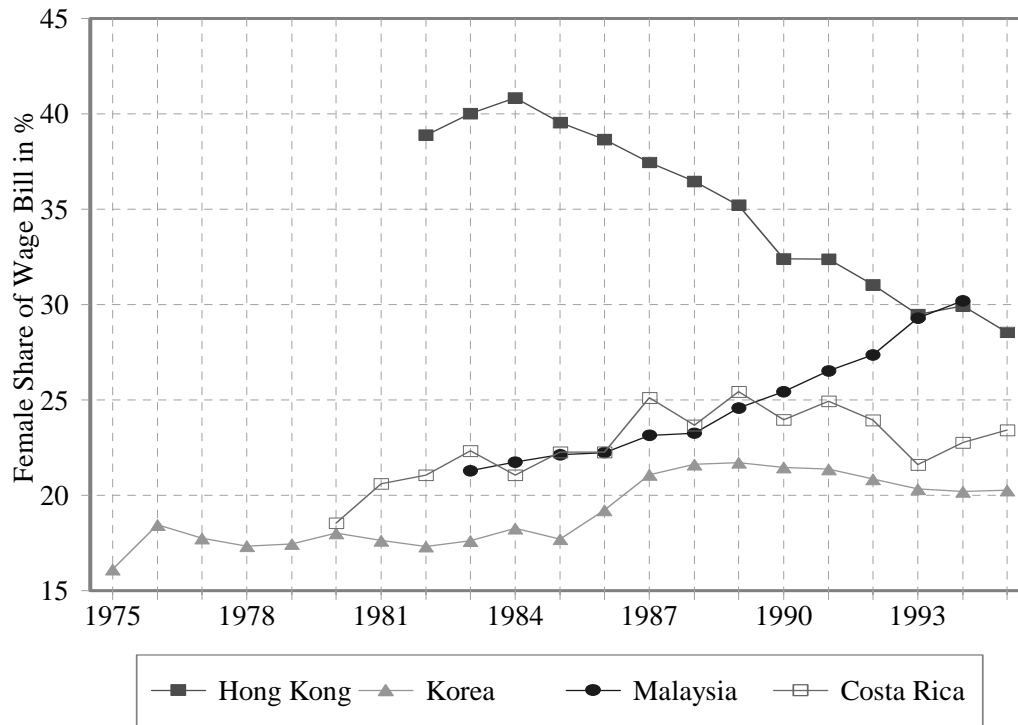Wage Bill in Mfg, Selected Countries

Figure 2.- Female Share of Mfg. Wage, Selected Countries, 1975-95
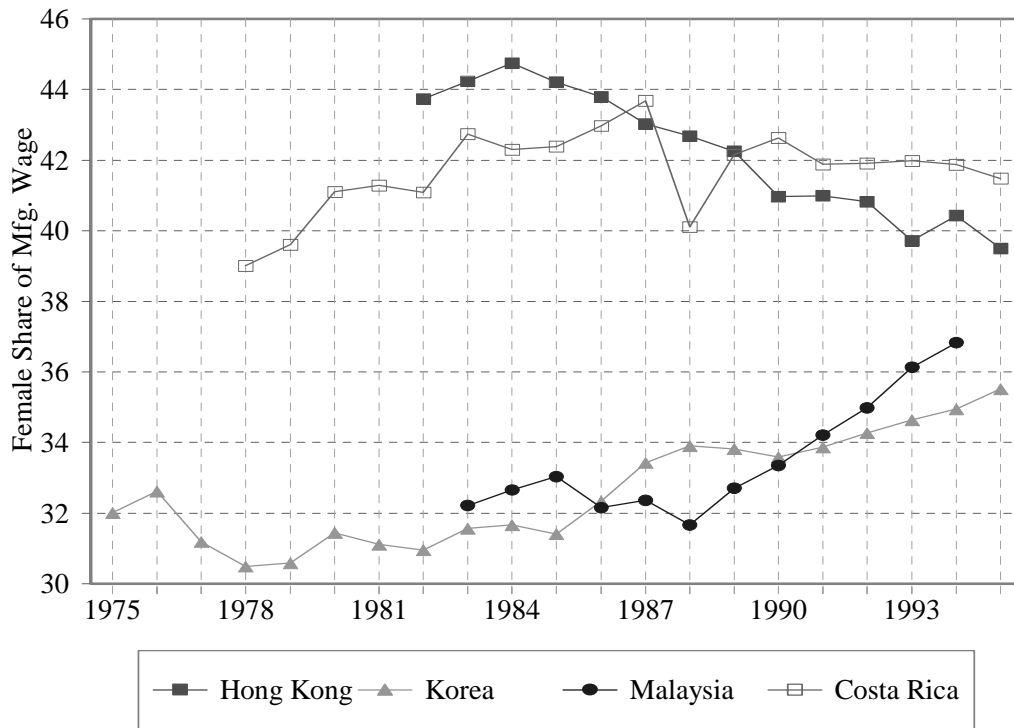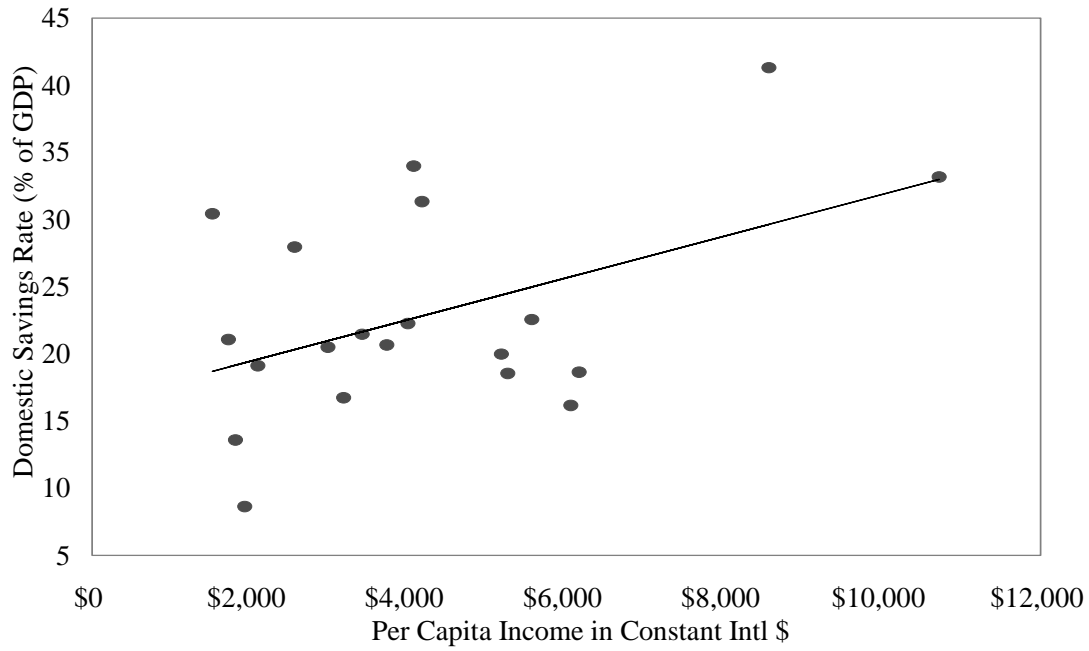
Figure 3.-Domestic Saving Rate and
Per Capita Income, 1975-95

Note: The regression from which the trend line in Figure 3 is derived yielded an R^2 of 0.221 and a t-statistic on the per capita income variable of 2.26.

Determinants of Aggregate Savings: The Standard Model

A. Capacity to Save

Key variables that reflect the capacity to save include the level of per capita income, growth rate of GDP, the rate of growth of per capita income, and the population growth rate. Each of these is discussed below in terms of its relationship to aggregate saving.

1. *The Level of Per Capita Income*

The role of per capita income in stimulating saving stems from the Keynesian link between saving and income, with higher incomes raising the capacity to save. For households living at the subsistence level, the potential for saving is small and likely to be for precautionary and consumption smoothing purposes. A rise in per capita income, however, leads to higher saving rates. Some studies find a non-linear positive relationship between per capita income and saving rates, indicating that saving out of income rises but at a declining rate, as income rises (Hussein and Thirlwall 1999; Masson, Bayoumi, and Samiei 1995; Ogaki, Ostry, and Reinhart 1994).

2. *Growth Rate of GDP*

The theoretical foundation for the link between growth and saving comes from the life-cycle hypothesis (LCH), based on the idea that individuals attempt to spread consumption evenly over their lifetime so that decisions to save are assumed to be a function of total lifetime earnings and the stage reached in the earnings cycle (Modigliani and Ando 1957; Modigliani 1966).[38] A typical behavioral pattern would be dissaving in youth, positive saving in middle-age, and dissaving in retirement. Based on this hypothesis, the rate of growth increases saving because it raises the income of the young relative to that of the elderly (Modigliani 1970).[39]

There are other channels through which growth can positively affect saving, particularly in developing countries (Dayal-Gulati and Thimann 1997). Growth and higher incomes raise more households above the subsistence level, below which they cannot save. To the extent that changes in income levels affect saving propensities positively, then with economic growth, more households will likely have higher marginal propensities to save.

3. *Per Capita Income Growth and Population Growth*

GDP growth can be decomposed into two components: the growth of income per capita and population growth. Similar to GDP growth, per capita income growth is presumed to exert a positive influence on aggregate saving since it implies that as income rises, active members of households can save more, and will do so to smooth consumption over the life cycle. This has been confirmed in several studies (Edwards 1995; Hussein and Thirlwall 1999).

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[38]A capacity-to-save variable we do not consider here due to lack of data is financial wealth, which is assumed to negatively affects savings in the life cycle model as it increases the resources available for consumption. On this, see Masson, Bayoumi, and Samiei (1995).

[39] From a Kaleckian perspective, the direction of the effect of the rate of growth on saving depends on the distribution of income, given that workers are likely to have a lower marginal propensity to save than the rich or capitalists. While a measure of income inequality would therefore be a useful explanatory variable in empirical studies, it is not included here due to absence of reliable time series data for a number of the countries in our sample.

The effect of income growth due to population growth on the saving ratio, however, depends on how population growth affects the ratio of active to non-active households (Deaton and Paxson 1997, 1998). Population growth may be balanced (that is, the age structure of the population is constant over time) or not. In the former case, the population growth rate might be expected to have an analogous effect on savings as per capita income growth. When population growth is unbalanced, however, the age structure of the household may be changing. This will have a negative effect on the saving rate due to the extra consumption demands made on society if it is the result of a growing child-dependency ratio in the early stages of rapid population growth. Several studies provide empirical support for a strong negative correlation between the saving rate and the population growth rate [or the dependency ratio] (Leff 1969; Higgins and Williamson 1997; Modigliani 1970). Conversely, an increase in saving comes about as a result of a rise in the ratio of the active to retired households as population growth persists.

Recent empirical evidence has raised questions about these findings. Deaton and Paxson (1997, 1998), using data from the United States and Taiwan, show that neither the population growth rate nor the per capita income variable conform very well to the standard expectations of life-cycle theory. In particular, they found that saving rates tend to be positively correlated with age.[40] The authors note that bequests to children among Taiwanese households seem to be a more important motive for saving than is the case in other countries. The demographic effect on saving is therefore likely to be ambiguous, in general, and country-specific.

B. Willingness to Save

Factors affecting the willingness to save include financial market conditions, policy variables, and those reflecting macroeconomic conditions.

4. *Interest Rate*

One of the most discussed and debated hypotheses is the effect of the rate of interest on saving. The direction of response depends on the relative strength of the substitution versus the income effect. The classical view emphasizes the interest rate as a reward for waiting and assumes that interest rates affect saving positively. But a higher rate of interest may allow households to reach their target income with less saving, and saving rates may therefore fall, if this effect dominates.

There are other *a priori* reasons to doubt the responsiveness of savings to the observed (bank) rates of interest, particularly in developing countries. Informal financial intermediaries, such as savings clubs, ROSCAs, and other indigenous savings groups, tend to be quite prevalent in both rural and urban areas of the developing countries. These informal markets do not necessarily respond to the bank rate of interest in ways that the formal financial institutions do.[41] Further, van Wijnbergen (1983) and Taylor (1983) argue that higher interest rates only cause shifts in portfolio composition from the informal sector into bank deposits.

The negative effect of interest rate on domestic savings has also been argued by neo-Kaleckians such as Akyűz (1993) who shows that increases in the real interest rates can shift the distribution of income to households

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[40] Households in Taiwan with the oldest heads save around thirty percentage points more of their incomes than households with the youngest heads (Deaton and Paxson 1997).

[41] The question of the contribution of the informal sector to the aggregate volume of savings is often discussed in the context of deposit mobilization (Ghate1992; Hulme and Mosley 1996). It is also not always clear whether informal savings are substitutes or complements to formal bank deposits. Further, In the case of institutional arrangements such as *ROSCAs*, *nidhis, bishis* (found in India), and chit funds, motives other than interest return influence participation. For example, in chit funds or *ROSCAs*, reciprocity, the built-in provision for borrowing at short notice through bidding, compulsory saving by deferring consumption, and convenience or absence of formalities are critical to attracting savers. These factors explain the weaker effect of the interest rate.

(creditors) away from business firms and the government (debtors). The aggregate saving rate will fall if the household sector has a lower propensity to save than the corporate sector.

Given the potentially contradictory effects of interest rates on savings, it is not surprising that in recent years, studies examining this relationship have yielded mixed and largely inconclusive results.[42]

5. *Financial Conditions*

Another determinant of the willingness to save is the prevalence of financial institutions and the range of availability of financial assets to meet savers' particular needs. Financial system development is assumed to increase the opportunity for and returns to financial saving, thereby affecting the saving rate positively. On the other hand, it may also enhance access to credit and ease liquidity constraints faced by households. This could, at least initially, lead to lower household saving rates.

Financial market development is hard to quantify but several useful proxies have been developed. The most commonly used indicator is the degree of monetization of the economy defined as money and quasi-money as a percentage of GDP (Edwards 1995; Fry 1995). Another proxy is the domestic credit provided by the banking sector as a percentage of GDP (Hussein and Thirlwall 1999). This is based on the idea that bank credit finances investment and growth, which in turn generates saving.

6. *The Inflation Rate*

The rate of inflation is expected to affect the willingness to save, but the effect is likely to be ambiguous. On the one hand, inflation may send signals of macroeconomic uncertainty, encouraging saving as a response to perceived risk. Also, inflation acts like a tax on money balance holdings. If individuals wish to restore the real value of their money balance holdings (the so-called real balance effect), saving will rise with the rate of inflation. On the other hand, individuals may seek to avoid the tax by saving less if it becomes burdensome in relation to the convenience of holding money. Moreover, even if private saving does increase, total saving may not rise if the government fully consumes the proceeds of the inflation tax. Inflation may also discourage other forms of voluntary saving because its real value is falling.

7. *Government Taxation and Saving*

Aggregate saving may also be influenced by the rate of government taxation and saving. High tax ratios of revenue to GDP indicate a greater ability of governments to run surpluses, producing a positive effect on aggregate saving. The relationship is not unambiguous, however, since this may simply offset saving at the household level, "crowding out" private saving.

8. *Terms of Trade*

An improvement in the terms of trade raises income since the cost of imports is relatively cheaper and this leads to an increase in savings (Masson, Bayoumi, and Samiei 1995).[43] This effect is thus integrated into time-series models with a distinction made between transitory and permanent changes in the terms of trade. The former, which causes a temporary change in income, is expected to increase savings while the latter tends to have an ambiguous effect (Ostry and Reinhart 1992).

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[42] Evidence supporting the "high interest elasticity of saving" hypothesis such as the work of Fry (1978) and Fry and Mason (1982) has been challenged by Giovannini (1983), and Schmidt-Hebbel, Webb and Corsetti (1992). Recent studies have shown that the effect on savings in developing countries, if it exists at all, is relatively small and appears to have diminished over the past two decades (Fry 1996).

[43] This is referred to in the literature as the Harberger-Laursen-Metzler or HLM effect.

Appendix B

Mathematical Proof

This appendix provides the mathematical proof of equation (15). The differential of the perceived risk function is:

$$d\left(\frac{-B_{22}}{B_2}\right) = \frac{\partial}{\partial X_1}\left(\frac{-B_{22}}{B_2}\right)dX_1 + \frac{\partial}{\partial X_2}\left(\frac{-B_{22}}{B_2}\right)dX_2.$$

This is negative if X_2 increases as X_1 decreases, e.g., so that from equation (5) in the text

$$dX_2 = 1(1+r)dX_1, \quad (1+r) \geq 0.$$

Substituting for dX_1, and dividing by dX_2, we then have:

$$\frac{d}{dX_2}\left(\frac{-B_{22}}{B_2}\right) = \frac{-\partial}{\partial X_1}\left(\frac{-B_{22}}{B_2}\right) + (1+r)\frac{\partial}{\partial X_2}\left(\frac{-B_{22}}{B_2}\right) \leq 0 .$$

We now observe that under the continuity assumption, the following holds as an identity:

$$\frac{\partial}{dX_1}\left(\frac{-B_{22}}{B_2}\right) = \frac{\partial}{\partial X_2}\left(\frac{-B_{12}}{B_2}\right).$$

The above inequality can now be written as:

$$\frac{\partial}{\partial X_2}\left(\frac{B_{12} - (1+r)B_{22}}{B_2}\right) < 0.$$

We now wish to prove that the increased perceived risk hypothesis implies that the derivative of equation (14) in the text is negative. We first define

$$\overline{X_2} = \left[(Y_1 - X_1)(1+r)\right] + \xi$$

From equation (5), we know that:

$$X_2 = \overline{X_2} + Y_2 - \xi.$$

Because $[B_{12} - (1 + r) B_{22}] / B_2$ is decreasing in X_2, we must have that

$$\left[\frac{B_{12}-(1+r)B_{22}}{B_2}\right]\leq\left[\frac{B_{12}-(1+r)B_{22}}{B_2}\right] \quad \text{if } Y_2 \geq \xi. \tag{E.1}$$

Note that the right side of this inequality is evaluated at $X_2 = \overline{X}_2$ and is not a random variable. This implies that:

$$B_2(Y_2 - \xi) \geq 0 \quad \text{if } Y_2 \geq \xi.$$

Multiplying both sides of equation (E.1) by $B_2(Y_2 - \xi)$, we obtain the following:

$$\{[B_{12}-(1+r)B_{22}](Y_2-\xi)\} \leq \left[\frac{B_{12}-(1+r)B_{22}}{B_2}\right]\cdot[B(Y_2-\xi)] \tag{E.2}$$

if $Y_2 \geq \xi$. Given this, the inequalities in (E.1) and (E.2) will be both reversed so that the expected values holds for all Y_2.

$$E[B_{12}-(1+r)B_{22}]((Y_2-\xi)\leq\left[\frac{B_{12}-(1+r)B_{22}}{B_2}\right]_\xi\cdot E[B_2(Y_2-\xi)]. \tag{E.3}$$

To prove that the left side of (E.3) is negative, it is sufficient to show that the right side is negative. From equation (10) in the text, the expression in braces is positive so that we have to show that $E[B(Y_2-\xi)]\leq 0$. Since $B_{22} < 0$, we must have

$$B_2 \leq (B_2)_\xi \quad \text{if } Y_2 \geq \xi \tag{E.4}$$

Multiplying (E.4) by $(Y_2 - \xi)$, we can write

$$[B_2 \leq (B_2)_\xi](Y_2 - \xi) \quad \text{if} \quad Y_2 \geq \xi.$$

This holds for all Y_2, since inequalities in (E.4) are reversed if $Y_2 \leq \xi$.

Taking the expected values, we then obtain

$$E[B_2(Y_2-\xi)]\leq(B_2)E(Y_2-\xi)=0$$

which implies

$$E[B_{12}-(1+r)B_{22}](Y_2-\xi)\leq 0.$$

Therefore, since $D < 0$, it follows that equation (14):

$$\left(\frac{\partial X_1}{\partial\gamma}\right)=-\left(\frac{1}{D_2}\right)E\{[B_{12}-(1+r)B_{22}](Y_2-\xi)\}$$

is negative. Hence,

$$\frac{\partial S_1}{\partial \gamma} > 0. \qquad\qquad \text{Q.E.D.}$$

Appendix C

List of Variables

ADR	Age dependency ratio, defined as ratio of percentage of population under 15 or over 65 to working age population.
DHK	The difference between the average years of secondary education attained by men and women, 15 and older.
DSR	Domestic savings rate as % of GDP.
FSHW	Female share of total (female and male) wages.
FY	Gender relative income variables (FSHW or WSH).
INF	Rate of inflation.
PCY	Per capita income expressed in constant 1987 international prices.
M2	Money and quasi money as percent of GDP.
PCY1	Growth rate of PCY.
POP1	Population growth rate.
ρ	Female share of manufacturing employment.
RGDP1	Growth rate of real GDP.
RIR	Real interest rate.
RW	Ratio of female to male earnings.
TAXREV	Tax revenue as share of GDP.
TOT	Terms of trade index (1985 = 100).
WSH	Female share of manufacturing earnings or the ratio of female to male earnings multiplied by ρ.

Appendix D
Sample Countries in the Panel Data

Brazil
Chile
Colombia
Costa Rica
Cyprus
El Salvador
Greece
Hong Kong
Indonesia
Korea, Rep.
Malaysia
Mexico
Paraguay
Philippines
Portugal
Singapore
Sri Lanka
Taiwan
Thailand
Turkey