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Saving?**  
**An empirical analysis**

by

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## Does Gender have any Effect on Aggregate Saving? An empirical analysis

STEPHANIE SEGUINO & MARIA SAGRARIO FLORO

**ABSTRACT** *This study investigates the effects of gender on aggregate saving. We test the hypothesis that shifts in women's relative income, which can affect their bargaining power within the household, have a discernible impact on household saving and, by extension, gross domestic saving, due to differing saving propensities by gender. The empirical analysis is based on panel data for a set of semi-industrialised economies, covering the period 1975–95. The results indicate that, as some measures of women's relative income and bargaining power increase, gross domestic saving rates rise. The implied gender disparity in saving propensities may be linked to differences in saving motives based on gender roles, and well as divergent experiences of economic vulnerability. These findings suggest the importance of understanding gender differences in planning for savings mobilisation and in the formulation of financial and investment policies.*

### 1. Introduction

Aggregate saving provides 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.<sup>1</sup> 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 as a source of investment funds.

In recent years, the debate on the determinants of aggregate saving shifted from a focus on Keynesian capacity-to-save factors, including the role of per capita income and the influence of age structure of the population, to the effects of interest rates, public sector deficits, and government tax and social welfare policies. Of note is the recent interest in the macro-level impact of shifts in the distribution of income on saving, a research agenda fuelled by a renewed concern about the relationship between growth and equity.<sup>2</sup>

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One area that requires further examination is the role that gender plays in influencing aggregate saving. A small but growing body of literature strongly suggests there are gender differences in saving decisions as well as in risk attitude, at least in some developed economies (Bajtelsmit & Bernasek, 1996; Bajtelsmit & Van Derhei, 1997; Sunden & Surette, 1998; Hinz, *et al.*, 1996; Hungerford, 1999). Given their divergent social and economic circumstances within and outside the household, women and men may have differing propensities to save. If so, shifts in women's relative bargaining power are likely to affect household saving. Since this constitutes the most significant component of gross domestic saving in many developing countries, changes in household saving rates critically influence aggregate saving rates.

This paper explores the evidence to determine whether there are gender differences in saving behaviour that affect household savings. Theoretically, gender has contradictory and thus ambiguous effects on this large component of domestic saving, as evidenced by the discussion in Section 2. Thus, the role of gender in influencing aggregate saving largely becomes an empirical one. The models tested here use the gross domestic savings rate as the dependent variable, controlling for standard saving determinants, including those that affect business and public saving. The use of a panel data set of semi-industrialised countries allows us to explore the effects of shifts in women's bargaining power, including relative income, on saving over time within as well as across countries. The empirical results show evidence of gender effects on aggregate saving. In particular, we find that, for this set of countries, an increase in women's share of wage income leads to a higher aggregate saving rate. The specific reasons for this need to be sought at a more micro level in individual countries, although we advance a variety of explanations for why women's saving behaviour will differ from men's and, in particular, why women may wish to save at a higher rate. Further research can usefully explore whether economic structure (e.g. agricultural versus industrial) interacts with differences in women's and men's employment and income possibilities to produce a discernible effect on aggregate saving rates.

## **2. Gender and Aggregate Saving**

Studies on the determinants of saving have not taken into account the possible effect of gender. Yet, if gender influences saving behaviour at the household level, by implication, there may be important macroeconomic effects of changes in gender relations. Unfortunately, household saving data for most developing countries are unavailable. Therefore, household saving behaviour in our study, as is the case for the other studies, is examined indirectly through gross domestic saving, which consists of both private (household and business) as well as public saving.

In considering the role that gender plays in determining aggregate saving, we take the developing country context, which differs in important ways from that of industrialised economies. Developing country households, 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 may also 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.

### *2.1. Gender Differences in Saving Behaviour*

The literature on gender differences in saving behaviour is sparse and has focused primarily on developed countries. That research has found significant differences in retirement savings and investment decisions by gender. Bajtelsmit & Van Derhei (1997) and Hinz *et al.* (1996) found that women in the United States invest their pensions more conservatively than men. Looking at 1995 individual contributions to the 401(K) pension plan in the United States, Hungerford (1999) shows that women participants have significantly higher contribution rates to their plan than men. Bajtelsmit & Bernasek (1996) find evidence to suggest that, with private pensions, women are more conservative in their investment allocation, holding much higher proportions of their portfolios in fixed assets than men. These studies do not, however, explore *why* risk attitudes and saving behaviour differ by gender. This question is explored in Section 2.3, but before turning to that issue, we consider an important institutional context of saving—the household.

### *2.2. Household Decision-making*

Research on saving at the household level generally makes the assumption of 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 a unitary household may be a convenient one, it overlooks the possibility that, in non-pooled income households, there are gender differences in the relative strength of saving motives among household members. Moreover, in households that pool savings, the differences in saving motives of male and female household members are likely to lead to negotiation and bargaining, with the effect that saving rates are influenced by differences in male and female bargaining power.

Recent scholarship on intra-household bargaining provides a useful framework for analysing the relationship between gender, power, and saving at the household level. This literature emphasises that power among household members affects 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 utility functions for goods and services differ. Women are more likely to spend income on health, education and food for children while men spend a larger portion of income on luxury goods such as cigarettes, alcohol and gambling (Guyer, 1980; Neuhauser, 1989; Thomas, 1992; Hoddinott & Haddad, 1995; Quisumbing & Maluccio, 1999).

Research suggests that the decision-making process that determines resource allocation is influenced by the relative bargaining power of adults.<sup>3</sup> 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 fallback position is determined by a variety of factors, with the most commonly identified as those that affect control over economic resources, such as wealth, access to outside income, assets at marriage, and kinship networks that provide material support (Blumberg, 1988; McElroy, 1990; Agarwal, 1995; Folbre, 1997). External or environmental factors can also affect women's and

men's fallback positions in household bargaining. These might include property rights, gendered access to employment, divorce laws, and child support rules and enforcement.

It follows that a relative improvement in any of the factors that affect an individual's outside options should exert an influence on the allocation of household income among alternative uses. We can anticipate that, as women's earnings rise, for example, the allocation of household income is likely to shift towards expenditures on children's nutrition, health and education, and away from luxury goods, as empirical studies demonstrate.

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 men in their allocation of income between saving and current expenditures? Secondly, if so, will improvements in women's relative income and other measures of 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.

### *2.3. Gendered Determinants of Saving Preferences*

Because the options and constraints that women face in developing economies differ from those of men, their saving behaviour 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 labour market, are more likely to be beneficiaries of social insurance policies, may have less need to fall back on savings for consumption smoothing purposes.<sup>4</sup> Conversely, insofar as women are less able to rely on state-level programmes when income flows are interrupted, they may have a greater incentive to save out of their current income than men.<sup>5</sup> Women may also achieve their consumption-smoothing goal by maintaining ties to kinship networks that involve 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 saving behaviour. Women are likely to outlive men, a factor that propels them to save at higher rates. In addition, the need to raise funds for a dowry may lead women to save more than men of the same age cohort in those countries where the dowry system still prevails.<sup>6</sup> In South Korea, for example, where young women are the primary source of labour 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. This suggests the strong impact of these social norms on consumption behaviour and, by extension, saving behaviour.

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 upon to support parents in old age (Greenhalgh, 1985). This family system, which socialises 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 the factory women she interviewed saved, on average, 30% 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 saving behaviour, and cross-country variations are likely to be important.

Financial market conditions may also interact with gender norms to influence an individual's saving behaviour. 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's and women's saving rates. For example, Bangladeshi women are constrained from saving in large sums since this can attract the unwanted 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 & Gupta, 1996).

Access to an informal savings programme may 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 saving frequently takes place through *susu*, an informal savings programme. 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. Similarly, studies of informal savings associations in Asia, Latin America and Africa, such as chit clubs and rotating saving and credit associations (ROSCAs), show that a substantial number of them are formed by women, especially those with independent sources of income. Many of these groups are all-female to prevent men from monopolising the funds (Adams & Fitchett, 1992).<sup>7</sup>

Differences in responsibility for children's well-being may also affect saving behaviour, although the direction of this effect is unclear. 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 relative income and bargaining power increase. This implies a lower level of savings (with an ambiguous effect on the rate of saving). 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.<sup>8</sup>

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 & Paxson (1997) find for Taiwan, however, 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.

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 labour 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 labour market practices in which occupational segregation and discrimination lead to pay inequities with women frequently sequestered in low-wage occupations. The implication is that women's lower levels of income also result in fewer resources available for savings and investment and may suggest a greater aversion for absolute risk.<sup>9</sup>

Women's access to income can affect saving behaviour in other ways. Papanek & Schwede (1988) in a Jakarta study show that women are more likely to participate in *arisan*, informal saving groups, if they are employed. Furthermore, increases in women's earnings raise the household's income and can lead to an increase in saving once subsistence needs 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, improve.

Social and gender norms may also determine 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 labour force participation (Fleck 1998). Further, *purdah* and other forms of female seclusion that constrain women's mobility and choice of activities similarly may affect their ability to save.

In sum, from this discussion, it can be seen that the factors influencing women's saving propensities differ from those that shape male behaviour. Moreover, contradictory forces work on women's saving behaviour, with women's care responsibilities, which argue for higher current expenditures, pitted against other factors that make them more economically vulnerable than men (the latter encouraging higher saving rates). These opposing pressures are likely to exist, whether or not households pool savings. Further, household-pooled savings are influenced by decision-making patterns that depend on the relative bargaining power between household members that interacts with gendered differences in saving propensities.<sup>10</sup> Gender differences in control over economic resources, including access to outside income, may thus be an influential factor insofar as shifts in control may have an effect on the balance of power within the household to affect saving decisions.

### **3. Empirical Analysis of Aggregate Saving Determinants**

#### *3.1. Measures of Women's Influence on Household Saving Decisions*

Empirical tests of the role of gender in influencing aggregate saving require measures that reflect women's ability to save in non-pooled saving households and their bargaining power to influence saving decisions in pooled-saving households. These measures can then be used to test for gender differences in household allocations of income to expenditures and saving, and also they serve to account for indirect linkages between gender and saving.

Factors that influence gendered saving patterns in pooled and non-pooled saving households largely overlap. Determinants of female bargaining power are linked to women's control over resources, such as income and assets. One measure of income earning abilities is women's share<sup>11</sup> of the wage bill:

$$SHARE = WAGE \times EMP \quad (1)$$

where *SHARE* is women's share of the wage bill, *WAGE* is the ratio of female to male wages or  $W_F/W_M$ , and *EMP* is women's share of manufacturing jobs.<sup>12</sup> The decomposition of the female share of the wage bill takes into account not only relative wages but also women's access to formal sector jobs. An increase in the size of each of these variables is expected to produce a positive effect on female income and bargaining power. With regard to assets at marriage, which can have a positive effect on female bargaining power at the household level, a commonly used measure is the gap between male and female educational attainment since this reflects not only gender differences in access to potential income but also differences in their sense of personal efficacy and capability. A reduced form equation for the determinants of female bargaining power can be written as:

$$BP = BP \left[ \begin{matrix} (+) & (+) & (+) & (-) \\ SHARE & (WAGE) & EMP, & DHK \end{matrix} \right] \quad (2)$$

where *BP* is relative female bargaining power, *DKH* 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.

### 3.2. Specification of the Aggregate Saving Model

The empirical model we test uses cross-country time-series data for a set of semi-industrialised countries for the period 1975–95. Given the paucity of household saving data in most developing countries, we examine the effect of the gender distribution of wage income on aggregate saving, using gross domestic saving as a percentage of GDP as the dependent variable. In so doing, we make efforts to adequately control for public and firm saving. This section presents the specification for two saving models, which include as regressors measures of female income and bargaining power, and control for a variety of saving determinants well-established in the literature.<sup>13</sup> The first is a simple model that focuses on measures that capture the ability to save. The second expanded model includes a larger set of regressors found in more broadly focused studies of aggregate saving determinants.

In the simple model, per capita income captures the ability to save, with the saving rate rising with income levels. The growth rate of GDP is also expected to have a positive effect on the aggregate saving ratio. The theoretical foundation for this link comes from the life-cycle hypothesis (LCH), based on the notion that individuals attempt to spread consumption evenly over the life cycle. A typical pattern would be dissaving in youth, positive saving in middle age, and dissaving in retirement. This hypothesis suggests that the rate of growth has a positive effect on aggregate saving because it raises the income of the working age population relative to the elderly (Modigliani, 1970). Consistent with the LCH, the demographic composition of the population can explain cross-country differences in aggregate



savings rates (Leff, 1969; Deaton & Paxson, 1997; Higgins & Williamson, 1997). A higher dependency ratio (ratio of children and elderly to working adults) is likely to lead to lower aggregate saving rates, since working adult income must be spread among a larger number of non-working household members. Finally, because public saving is a component of aggregate saving, this variable is controlled for in our regressions with a measure of the central government budget surplus (deficit).

This simple model (Model I) can be written:<sup>14</sup>

$$DSR_{it} = \alpha_0 + \alpha_1 SHARE_{it} + \alpha_2 DHK_{it} + \alpha_3 ADR_{it} + \alpha_4 PCY_{it} + \alpha_5 RGDP1_{it} + \alpha_6 FISCAL_{it} + \theta_{it}, \quad (3)$$

where *DSR* is the domestic saving rate, *SHARE* is female share of the wage bill, *DHK* is the gap between the share of men and women over 25 that have completed a secondary education, *ADR* is the age dependency ratio, *PCY* is per capita income, *RGDP1* is the growth rate of *GDP*, *FISCAL* is the central government budget surplus (or deficit), *i* is country, *t* is time, and  $\theta$  is the error term. (For a complete listing of all variables, codes, and data sources, see Appendix A.) We test a second version of this and subsequent models, decomposing *SHARE* into its component parts, relative female wages (*WAGE*) and female share of employment (*EMP*).

The simplicity of Model I, although similar to that used in a number of studies of saving determinants, might arguably result in an omitted variable bias if any of the regressors capture the effects of omitted variables that are also correlated with aggregate saving. To address that problem, we estimate a second expanded model (Model II) incorporating a variety of variables that have received attention in the more broadly focused saving literature.

Financial conditions and, in particular, the prevalence of financial institutions and range of available financial assets to meet savers' needs, have been found to influence saving rates. A typical measure of this variable is M2 as a percentage of GDP (Edwards, 1995; Fry, 1995). The rate of inflation may affect the willingness to save but the effect here is likely to be ambiguous. While inflation may signal macroeconomic uncertainty, encouraging saving as a precautionary measure, individuals may wish to restore the real value of money balances by saving more. An improvement in the terms of trade may also play a role, by raising income since the cost of imports is relatively cheaper, and this may lead to an increase in savings (Ostry & Reinhart, 1992; Masson *et al.*, 1998).

Finally, the real interest rate is likely to have ambiguous effects on the aggregate saving rate, depending on the relative strength of the income and substitution effects on individuals (Gupta, 1987). Another explanation for the effect of interest rates on saving is advanced by neo-Kaleckians. Akyüz (1993) shows that an increase in real interest rates can shift the distribution of income to households (creditors) away from business and government (debtors). The aggregate saving rate will fall if the household sector has a lower propensity to save than the corporate sector or public sector. Further, interest rates may influence profits and thereby business saving. This link is related to the heavy reliance in some countries (such as several East Asian economies) of firms on debt financing to fund investment projects. In those cases, a higher interest rate can reduce firm profits and thus saving, having a negative effect on aggregate saving rates.<sup>15</sup> The net effect of interest rates on aggregate saving in semi-industrialised economies is thus theoretically ambiguous.

The second expanded model (Model II) incorporates these additional saving determinants:

$$\begin{aligned}
 DSR_{it} = & \beta_0 + \beta_1 SHARE_{it} + \beta_2 DHK_{it} + \beta_3 ADR_{it} + \beta_4 PCY_{it} \\
 & + \beta_5 RGDP_{it} + \beta_6 FISCAL_{it} + \beta_7 M2_{it} + \beta_8 RIR_{it} \\
 & + \beta_9 INF_{it} + \beta_{10} TOT_{it} + \varepsilon_{it}
 \end{aligned} \tag{4}$$

where  $M2$  is money and quasi-money as a share of GDP,  $RIR$  is the real interest rate,  $INF$  is the rate of inflation,  $TOT$  is the terms of trade, and  $\varepsilon$  is the error term.

## 4. Econometric Tests and Results

### 4.1. The Sample

The sample used in the empirical analysis comprises a set of semi-industrialised countries for which gender-disaggregated wage data are available (Appendix B). The sample was selected from middle-income countries as defined by the World Bank (1998). Future research might usefully expand this data set to include industrialised countries, but at this point our goal is to examine behaviour in countries that are broadly similar in stage of development.

Furthermore, the semi-industrialised country context differs in important ways from that of industrialised economies and agricultural economies. Semi-industrialised economies have been noted for the rapid rate at which women have been incorporated into the paid labour force, with a significant share finding employment in the manufacturing sector (Standing, 1989). The available data on gender income differences is for the manufacturing sector only. Although economy-wide data would be preferable, there is a paucity of gender-disaggregated earnings data for other sectors. The available earnings data may, however, more accurately reflect the gender distribution of income for the countries in our sample than a sample that includes agricultural-based or industrial economies, where larger shares of women are employed in the agricultural and service sectors.

### 4.2. The Data

The gross domestic saving rate, as noted above, is measured as a ratio to GDP. Real GDP is measured in 1995 prices and, from this, growth rates are calculated for the sample countries. Per capita income data are measured in 1995 dollars. The education variables are from Barro & Lee (2000), and  $DHK$  is measured as the difference in average years of secondary education attained by males and females 25 and older.<sup>16</sup> The remaining macro-level variables, described above, are measured in a straightforward manner. Table 1 presents a summary of the country variable means, averaged for the period 1975–95.

Wage and employment data are for the manufacturing sector only and are from the International Labour Organisation (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

**Table 1.** Descriptive statistics of selected variables, 1975–95 averages

	<i>DSR</i>	<i>WAGE</i>	<i>EMP</i>	<i>SHARE</i>	<i>DHK</i>	<i>RGDP1</i>	<i>ADR</i>	<i>PCY</i>	<i>RIR</i>	<i>M2</i>	<i>INF</i>	<i>TOT</i>
Brazil	22.3	53.3	9.7	14.8	0.6	3.0	68.6	\$4033		16.2	580.3	112.8
Chile	20.7	77.3	11.2	19.8	-6.0	5.3	61.5	\$2925	15.5	28.8	37.6	114.3
Colombia	20.5	80.0	16.6	30.0	-5.9	4.1	72.5	\$1960	13.2	17.9	24.5	121.0
Costa Rica	21.5	71.5	13.2	22.7	-2.0	3.6	71.7	\$2976	5.0	35.5	21.4	110.7
Cyprus	18.6	58.4	16.8	26.7	4.8	7.0	55.3	\$8006	1.9	72.1	6.8	98.9
El Salvador	8.7	86.8	19.2	35.9	-1.5	1.3	89.0	\$1525	2.4	30.5	14.1	117.6
Greece	16.2	74.8	14.3	25.4	11.9	2.3	52.7	\$9971	4.3	45.0	16.3	104.4
Hong Kong	33.2	73.2	20.2	35.0	1.7	7.3	45.9	\$15 022	0.7	160.7	8.5	99.3
Indonesia	30.5	64.9	17.7	29.2	2.2	6.3	72.4	\$646	11.9	24.1	11.6	108.6
Korea, Rep. of	31.4	48.5	12.9	19.1	6.6	8.0	53.4	\$6008	2.8	32.9	10.5	105.2
Malaysia	34.0	50.5	16.4	24.8	6.1	7.0	74.7	\$2747	4.3	59.1	4.4	108.4
Mexico	22.6	79.5	14.5	26.0	-0.2	2.6	84.7	\$3127	12.6	20.9	45.3	119.2
Paraguay	19.1	86.9	16.7	31.5	-0.5	4.7	86.6	\$1728	8.5	19.8	20.7	120.9
Philippines	21.1	87.0	21.5	40.2	1.9	3.2	78.3	\$1073	4.9	27.7	12.6	104.1
Portugal	18.5	71.8	18.2	31.2	1.7	3.0	54.8	\$8334	3.3	85.3	16.1	96.3
Singapore	41.3	54.4	15.9	24.6	3.7	7.5	44.0	\$14 455	4.1	71.0	3.5	96.8
Sri Lanka	13.6	79.6	19.9	35.9	5.0	4.5	64.3	\$519	2.2	27.0	12.3	104.3
Taiwan	23.1	64.1	18.0	29.6	8.5	8.0	53.8	\$5182	0.2	36.6	4.5	96.9
Thailand	28.0	66.6	19.4	32.0	0.5	7.7	67.5	\$1572	7.6	51.0	5.6	108.3
Turkey	16.8	86.5	9.4	17.6	2.9	4.0	70.0	\$2304		20.4	55.1	100.9

Note: For variable definitions, see Appendix A. All variables measured in percentages except for PCY and TOT.

**Table 2.** Correlation matrix of gender variables

	<i>SHARE</i>	<i>WAGE</i>	<i>EMP</i>	<i>DHK</i>
<i>SHARE</i>	1.000	0.630	0.603	-0.228
<i>WAGE</i>		1.000	-0.222	-0.394
<i>EMP</i>			1.000	0.121
<i>DHK</i>				1.000

Note: *SHARE* is the female share of the wage bill; *WAGE* is the ratio of female to male earnings; *EMP* is the female share of manufacturing employment; and *DHK* is the difference in the percentage of males and females over 25 that have completed a secondary education.

and thus unbalanced panels.<sup>17</sup> Second, in most cases, the earnings data are corrected for hours worked, but some are not. Further, these data take into account women's and men's formal sector employment and wage earnings in the formal manufacturing sector, serving as proxies rather than precise measures of economy-wide earnings. There are two reasons this may not be a cause for significant worry. First, the panel data estimations capture variation over time, and sectoral gender wage gaps may have a similar trend. 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 saving data, which usually have problems of consistency and reliability. Since gross domestic data are derived from national income accounts, one may expect measurement errors due to inaccuracies in both investment and balance-of-payments data. Measurement errors are also likely to have a downward bias on the aggregate saving estimates. 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 that the errors are random. In addition, the use of pooled time series data that yield a large number of observations permits behavioural 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, since these variables are likely to be collinear. Table 2 provides a correlation matrix of the relevant variables. While there is some evidence of multicollinearity, education and relative income variables are not perfect substitutes, in particular when gender is taken into account. 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 labour markets (Birdsall & Behrman, 1991; Behrman & Zhang, 1995; Horton, 1996; Psacharopoulos & Tzannatos, 1992). We therefore chose to include both variables.

#### 4.3. Econometric Results

The regressions are conducted with panel data to capture the effect of changes in variables within countries over time in order to account for time-varying country-

specific effects. A two-way error components model is used, and can be summarised as:

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

where the error term  $\vartheta_{it}$  has three components:

$$v_{it} = \mu_i + \lambda_t + \varepsilon_{it}$$

Here,  $\mu_i$  captures the country specific-effects while  $\lambda_t$  represents time-varying effects, and  $\varepsilon$  is the random disturbance term. Country (fixed) effects control for unobserved time-invariant differences that might affect saving.

Several issues need to be considered in estimation: heteroscedasticity, autocorrelation, stationarity and endogeneity. Heteroscedasticity 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 heteroscedasticity 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 modelled as an AR(1) with a common country coefficient.

Many of the variables used in the regressions are measured as percentages, and should be stationary in the long run. Nevertheless, formal unit root tests did not allow us to reject the hypothesis of non-stationarity for some of the variables. To address that problem, those variables are measured in first differences in a second set of regressions whose results are discussed below. Many previous studies do not appear to have tested for unit roots, and rely on data measured in levels, using an AR(1) correction. For comparability, we present results using levels, but caution that the more reliable  $t$ -statistics are in regressions that correct for unit roots using first differences.

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 with the results indicating no evidence of endogeneity for the gender variables.<sup>18</sup>

Table 3 summarises the results obtained from the generalised least squares (GLS) estimates of Model 1. Estimates of the basic model with variables measured in levels and an AR(1) correction for serial correlation are given in columns (1) and (2), while columns (3) and (4) report results with variables measured as first differences (See the note to that table for exceptions.)

In column (1), the wage share, decomposed into WAGE and EMP, is used as a proxy for the gender distribution of income. The regression results show that WAGE has a positive and significant effect on aggregate savings, indicating that as women's wages rise relative to those of men, the domestic saving rate increases. EMP is also positive but not significant, while DHK, the education gap variable, has the predicted negative sign, and is significant. That is, the narrower the gap between female and male educational attainment, which enhances women's bargaining power, the higher the aggregate saving rate. The remainder of the variables have the expected signs and are also significant. Thus, per capita income, the growth rate of GDP, and the government budget surplus all exert a positive and significant effect

**Table 3.** Determinants of gross domestic savings: Model I. Fixed effects GLS reduced form model. Dependent variable: gross domestic saving as percentage of GDP

<i>Estimation</i>	<i>Model with AR(1) Adjustment</i>		<i>Model in First Differences</i>	
	(1)	(2)	(3)	(4)
WAGE	0.068 (1.86)*		0.093 (3.47)***	
EMP	0.039 (0.71)		0.137 (1.76)*	
SHARE		0.093 (1.14)		0.213 (2.86)***
DHK	-0.173 (-5.00)***	-0.182 (-5.78)***	0.074 (1.46)	0.072 (1.46)
ADR	-0.190 (-2.47)***	-0.205 (-2.69)***	-0.481 (-2.37)***	-0.462 (-2.44)**
PCY	0.001 (3.69)***	0.001 (5.53)***	0.001 (0.61)	0.001 (0.67)
FISCAL	0.133 (3.73)***	0.128 (3.70)***	0.223 (5.05)***	0.223 (5.04)***
RGDP1	0.071 (1.76)*	0.054 (1.46)	0.252 (2.81)***	0.234 (2.66)***
Adj. $R^2$	0.952	0.951	0.153	0.153
DW	1.804	1.802	2.130	2.139
$N$	144	144	145	145

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. Variables were tested for unit roots when measured in levels, using the Augmented Dickey-Fuller test. The variables with evidence of unit roots in levels are first differenced, and the results are shown in columns (3) and (4). The exceptions to first differencing are DHK, RGDP1, and for expanded model TOT, INF and RIR, which are measured in levels for these regressions.

on aggregate saving, while an increase in the age dependency ratio causes aggregate saving to fall. Results are less conclusive in column (2) when the female wage share (SHARE) is used as the gender relative income variable. Nevertheless, its sign is positive as expected.

In columns (3) and (4), where variables exhibiting unit roots are measured in first differences, gender-relative income variables all have a positive and significant effect on aggregate saving, whether measured as SHARE or disaggregated into WAGE and EMP. These results suggest that female saving propensities exceed those of men, so that when women's income rises relative to that of men and/or their bargaining power in the household increases, aggregate saving is positively affected. The education gap variable, however, changes sign and becomes insignificant. With the exception of PCY, the remaining variables retain their sign and statistical significance. Note that the adjusted  $R^2$  falls substantially in these regressions as compared with (1) and (2).

Table 4 reports results of testing the expanded model (Model II). The inclusion of additional variables alters the sample size because some country observations are not available. This nevertheless serves as a useful test of robustness of results reported in Table 3. Noteworthy in all of these regressions is that, although the coefficients on the gender income variables are slightly reduced with the inclusion of the additional variables, each retains its statistical significance. The education gap variable, however, is no longer significant in (1) and (2), and changes sign in (3) and (4). (Alternative educational measures produced similar results.) PCY, FISCAL, and RGDP1 continue to retain their significance in these equations. Interestingly, the real interest rate has a negative and significant effect. This result is consistent with the argument that high interest rates cut into firm profits and thus firm saving, an outcome that was so painfully highlighted during the Asian financial crisis.

**Table 4.** Expanded model of saving determinants: Model II. Dependent variable: gross domestic saving as a percentage of GDP

<i>Estimation</i>	<i>Model with AR(1) Adjustment</i>		<i>Model in First Differences</i>	
	(1)	(2)	(3)	(4)
WAGE	0.058 (2.14)**		0.112 (5.35)***	
EMP	0.097 (1.80)**		0.254 (3.19)***	
SHARE		0.101 (2.25)**		0.267 (3.31)***
DHK	-0.164 (-1.29)	-0.177 (-1.54)	0.103 (1.23)	0.098 (1.22)
ADR	-0.239 (-3.13)***	-0.241 (-3.15)***	-0.223 (-1.08)	-0.268 (-1.28)
PCY	0.001 (5.08)***	0.001 (5.29)***	0.002 (1.79)*	0.002 (1.78)*
FISCAL	0.133 (2.65)***	0.136 (3.20)***	0.205 (4.39)***	0.206 (4.30)***
RGDP1	0.075 (1.80)*	0.080 (1.79)*	0.221 (2.42)***	0.212 (4.30)***
M2	-0.243 (-9.61)***	-0.234 (-12.27)***	0.103 (2.10)**	0.095 (2.05)**
TOT	0.100 (12.54)***	0.097 (5.92)***	0.019 (0.61)	0.022 (0.69)
INF	0.010 (1.11)	0.012 (1.70)*	0.090 (6.50)***	0.089 (6.62)***
RIR	-0.169 (-6.64)***	-0.140 (-4.00)***	-0.058 (-1.95)*	-0.053 (-1.76)*
Adj. $R^2$	0.976	0.977	0.358	0.352
DW	1.799	1.772	2.166	2.177
$N$	107	107	111	111

Notes: See Table 3.

Conversely, inflation has a positive effect, as do improvements in the terms of trade. In contrast to predictions, M2 has a significant negative effect in the levels model but is positive and significant (as would be predicted) in the model in first differences.

#### 4.4. Summary of Econometric Results

The gender income variables perform well in these regressions, and the WAGE variable is particularly robust to alternative specifications. The education gap variable performed less consistently and little can be deduced about the effect of a gender education gap on bargaining power and therefore aggregate saving. This may, in part, be 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.)

The regression estimates of the gender income variables, whether the female share of income, or the decomposed components of that variable, lead us to surmise that the gender distribution of income matters for aggregate saving. The insight offered by the results obtained from decomposing the wage share is that even if, for example, the female share of employment remains constant, a higher relative female wage increases the amount of income under women's control sufficiently to raise aggregate saving rates. Table 5 summarises the econometric results obtained for the gender variables. The remaining variables, although not the focus of this paper, performed largely as expected with the exception of M2 and inflation, which either changed signs, were insignificant, or both.

The preliminary evidence on the role of gender in determining aggregate saving suggests that measures of women's access to income are positively correlated with

**Table 5.** Summary of econometric results for gender variables

<i>Version</i>	Gender Variable	Model I with AR (1) correction	Model I in first differences	Model II with AR (1) correction	Model II in first differences
Model I	WAGE	(+)*	(+)*	(+)*	(+)*
	EMP	(+)	(+)*	(+)*	(+)*
	DHK	(-)*	(+)	(-)	(+)
Model II	SHARE	(+)	(+)*	(+)*	(+)*
	DHK	(-)*	(+)	(-)	(+)

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

the aggregate saving rate. These results are suggestive of differential saving behaviour at the household level, and imply that women's propensity to save is higher than men's for this set of countries. The size of the gender effect is not insignificant, although it varies in our estimates. Consider, for example, the results of the expanded model (Model II) given in Table 4. In column 3, we see that a one percentage point increase in women's share of employment raises aggregate saving by roughly a quarter percentage point—an effect on saving comparable to a one percentage point increase in the growth rate of GDP. In fact, a percentage point increase in women's share of the wage bill (column 4) raises aggregate saving by about one quarter of a percentage point, which is larger than the effect of a percentage point increase in the growth rate of GDP.

## 5. Conclusions

This paper explores the role that gender plays in influencing aggregate saving rates for a set of semi-industrialised countries. These countries have increasingly relied on female labour in their export manufacturing sectors. A question of interest is whether increases in women's relative wages as well as increases in their share of income affect aggregate saving, particularly through its impact on a significant component of gross domestic saving, namely household saving. Presupposed in this question is that women and men have differing propensities to save due to variations in external factors that affect savings behaviour.

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—or 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 access to wage income leads to higher rates of aggregate saving. The data do not tell us whether the effect on saving is due to increased saving in non-pooled saving households, or women's bargaining power, and thus saving, in pooled saving households. Nevertheless, these results are of interest in that they imply an aggregate role for micro-level gender relations. Further, these results are also consistent with a growing body of research that suggests that gender is an important macroeconomic variable. They demonstrate the importance of understanding critical gender issues in planning for savings mobilisation and in the formulation of financial policies.



## Notes

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1. Of course, 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 (Paxson, 1995; Feldstein & Bacchetta, 1991; Carroll & Weil, 1993).
2. On the topic of income distribution and aggregate saving, see Schmidt-Hebbel & Servén (1999) and Smith (2001).
3. See, for example, Guyer (1980), Haddad & Hoddinott (1991) and Thomas (1992).
4. This is because of men's differential benefits from social protection programmes, 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.
5. In line with this argument, Callen & Thimann (1997) find evidence that the generosity of social security systems explains a portion of cross-country variations in OECD countries, although they do not consider gender differences in assessing generosity.
6. In some developing countries, such as Taiwan, India, Pakistan and Bangladesh, dowry payments can amount to several years' worth of household income. Deolalikar & Rose (1998) find that the size and incidence of dowry payments in those countries have been increasing in recent decades.
7. Furthermore, 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.
8. An important caveat 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, jewellery and livestock, over which they have greater control. These assets, however, can be misinterpreted as current consumption expenses.
9. Bajtelsmit & Bernasek (1996) found that gender differences in investing and risk-taking could 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.
10. Floro & Seguino (2002) develop formal household saving models that reflect the conflicting factors influencing women's saving behaviour. The paper presents a non-pooled income household saving model and a pooled saving model based on Nash cooperative household bargaining. 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 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 interest effect. The second model shows how factors that affect women's relative bargaining power may influence saving rates in pooled-savings households.
11. This relationship is derived from an equation for the total wage bill, which is the sum of female and male average wages, each multiplied by the respective share of total employment.
12. We would be much better off if we had information on women's share of income, which includes additional sources of income, such as wealth income. The data constrain us, however, to rely on labour income to measure the gender distribution of income.
13. The extensive literature on determinants of aggregate saving is not surveyed here. For excellent summaries, see Kotlikoff (1989) and Schmidt-Hebbel & Servén (1999).
14. 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.
15. On debt financing in Asian economies, see Wade & Veneroso (1998).
16. 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. The motivation for using secondary education rather than total educational attainment is that the former is arguably a better measure of an asset that can improve household bargaining power in semi-industrialised economies where jobs require higher levels of education.
17. Hussein & Thirwall (1999) note, however, that variation in the sample size becomes a useful test of robustness, depending on whether the significance of key variables changes as sample size changes.

18. This was done by regressing DSR on all independent variables (the ‘constrained’ model). The ‘suspect’ 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.

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## Appendix A. Variable Description and Source

	Variable	Source
ADR	Age dependency ratio, defined as ratio of percentage of population under 15 or over 65 to working age population.	World Bank World Development Indicators (WDI), except for Taiwan. Except where otherwise noted, all data for Taiwan are from DGBAS (various years).
DHK	The gap between male and female secondary education completion rates (25 and older).	Barro & Lee (2000).
DSR	Domestic saving rate as a percentage of GDP.	WDI. For Taiwan, DGBAS (1997).
EMP	Female share of manufacturing employment	ILO, various years.
FISCAL	Ratio of general government surplus to GDP.	WDI.
INF	Rate of inflation.	WDI.
M2	Money and quasi money as percent of GDP.	WDI.
PCY	Per capita income expressed in constant 1995 \$US.	WDI.
RGDP1	Growth rate of real GDP.	WDI. For Taiwan, DGBAS (1997).
RIR	Real interest rate.	International Monetary Fund (various years).
SHARE	Female share of manufacturing earnings	ILO (various years).
TOT	Terms of trade index (1985 = 100).	WDI.
WAGE	Ratio of female to male earnings	ILO (various years), with some exceptions. Data for Mexico are from Alarcón & McKinley (1997) and Indonesian wage data are from SAKERNAS (various years). Taiwan wage data are from DGBAS (personal communication).

**Appendix B. Sample Countries in the Panel Data**

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

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