

# WOMEN AND RETIREMENT INCOMES

January 21, 2009

Patricia Apps

---

Professor of Public Economics  
Faculty of Law, University of Sydney  
173-175 Phillip Street, Sydney, NSW 2000 Australia  
Tel: +61 2 9351 0241, Fax: +61 2 9351 0200  
Email: [P.Apps@usyd.edu.au](mailto:P.Apps@usyd.edu.au)  
Research Fellow, IZA: <http://www.iza.org>  
Adjunct Professor, Australian National University and UTS.

## 1 Introduction

The “Retirement income consultation paper” for the “Review on Australia’s future tax system”<sup>1</sup> acknowledges the more limited opportunity women have for saving for retirement, observing that:

*“On average women have lower earnings than men. Many women have greater career interruptions than men, and many are more likely to work part-time due to caring responsibilities. This means the ability of many women to save and contribute to superannuation is more limited than for many men.”* (p.5-6)

The observation raises the question as to whether the ongoing shift from the Age Pension, as a pay-as-you-go (PAYG) non-contributory pension scheme, to a retirement income system centered on compulsory contributions to private sector superannuation funds makes economic sense for women.

This paper outlines the economic case for arguing that the vast majority of women, together with low and average wage workers generally, cannot expect to benefit from a system of this kind. The main points in the argument can be summarized as follows:

- The two main types of retirement income risk, for which a pension scheme should provide protection, are social risk, arising from uncertainty about the aggregate level of national income in the future, and longevity risk, arising from uncertainty about how long an individual will live, and therefore require an income, after retirement. Neither of these risks is adequately covered by private markets in pensions, while public pension schemes greatly improve the possibilities of dealing with them adequately. The negative impact of the current economic crisis on the superannuation savings of many Australians, for example, highlights the

---

<sup>1</sup> See Commonwealth of Australia (2008).

fact that a *defined contribution* pension scheme fails to provide insurance against social risk

- Switching from a PAYG to a fully funded scheme cannot make everyone – current as well as future generations – better off, but can only redistribute the burden of funding pensions across generations. The attempt to deal with the supposed “ageing crisis” by switching from PAYG to funded pensions in fact places an excessively heavy burden on the current generation. Moreover, given the high transactions costs associated with privatised pension schemes, a move to funding is actually more costly than making the required changes to an existing PAYG scheme. The main, and possibly the only, people who gain from the switch are managers of private investment funds and the financial sector.<sup>2</sup>

The portrayal of a looming “ageing crisis” based on a crude projection of demographic trends reflects a misunderstanding of the causes and consequences of these trends. If, for example, the rise in the Aged Dependency Ratio (ADR) were driven by increases in longevity and productivity remained constant, it would follow that either there must be an increase in the retirement age or, alternatively, an increase in the pension contribution rate together with a fall in the pension payment.

If, however, ageing is driven by declines in fertility, as seems to be the case, the policy issues are more complex. There is, in fact, considerable evidence to suggest that the potential for an ageing crisis due to fertility decline is largely policy driven – there is no real need for there to be a crisis. If one appears possible, it is largely because of policies which have prevented the shifts in resources that need to follow a decline in fertility.

While policy settings differ considerably across countries, in the case of Australia important policy drivers of an ageing crisis include the system of family taxation, which heavily discriminates against working married mothers, and a poorly developed child care sector that limits access to quality care which is at an affordable price.

A number of studies show that the combined effect of both is to reduce fertility and female labour supply simultaneously.<sup>3</sup> On the one hand the fall in fertility is the root cause of the problem and, on the other, the disincentive effect on female labour supply contributes to the creation of crisis due to the negative effect on labour productivity<sup>4</sup> and on the tax base required for funding productivity improving investments in education, health and infrastructure, as well as pension payments.

Put differently, the tax and child care systems have prevented the shifts in resources, especially female labour supply, out of the household and into the labour market. This

---

<sup>2</sup> For discussion of who benefits see, for example, Krugman (2004) and Stiglitz (2005).

<sup>3</sup> See Feyrer et al. (2008) and Apps and Rees (2004).

<sup>4</sup> There is a large literature on the negative effects of non-participation on human capital accumulation and, in turn, on the female wage.

shift would provide the resources required to deal with the changing age structure of the population.

The following Sections 2 to 6 expand upon these points and present the in-depth arguments supporting them. Section 7 concludes with a set of specific policy recommendations.

## 2 Retirement income and insurance

The economic justification for government intervention in the provision of retirement incomes centres on the need to respond to the failure of private insurance markets to offer products for the following types of risk:

(i) **Social risk:** private markets generally cannot provide insurance against social (correlated) risk, such as inflation, stock market cycles, unemployment, etc. The solution is for government to spread excessive gains and losses intertemporally and intergenerationally through the tax-transfer system. A defined *benefit* public sector scheme is required. Most superannuation schemes are defined *contribution*, precisely because the private sector cannot deal with *social* risk.

(ii) **Longevity risk:** Length of life is uncertain, and so the individual does not know how much to save. Policies directed towards increasing saving alone cannot offer a solution. The individual must buy an annuity. However, private annuity markets have tended to yield poor rates of return. The literature attributes this to market failure due to asymmetric information and adverse selection.

Individuals have different innate life expectancies (they are different risk types). Efficiency requires that high risk types, that is, those who expect to live a long time, to pay higher premiums. However, insurance buyers are much better informed about factors such as their state of health, previous and current life style, and family health history that determine their risk class in terms of whether they have a high or low probability of a relatively short life. When the insurer cannot identify risk type, full insurance at a fair premium cannot be offered to the low risk types because the high risk group has an incentive to pass itself off as low risk. Thus the private market solution to the adverse selection problem involves restricted coverage to good risks. This is the market failure.

It can be shown that an insurance system that pools risks by giving everyone the same coverage and the same rate of return, in such a way that the scheme breaks even actuarially, involves no market failure, but does represent a redistribution of income from good to bad risks. For this reason it cannot be sustained on a private annuities market: sellers could always find profitable contracts that would bid good risks away from the pooled contract. However, a publicly operated pension system does not allow such

separation of risk types – it enforces pooling.<sup>5</sup> For this reason, a public sector scheme is seen as the solution to the adverse selection problem.

### 3 Pay-as-you-go vs. fully funded approaches

As noted above, the introduction and expansion of compulsory superannuation in Australia has been widely supported on the basis of the proposition that a privatised, fully funded scheme is required to avoid future budget deficits under a publicly funded PAYG system. The Australian Government has produced two major reports on population ageing that highlight the rising burden on future working age generations of the projected rise in the ADR over the next four decades: Intergenerational Report 2002-03 (IGR1) and Intergenerational Report 2007 (IGR2).<sup>6</sup> The reports argue that Australia needs to reduce reliance on the non-contributory, income tested PAYG Age Pension, by expanding private saving in superannuation funds as the ADR rises, to avoid an ageing crisis.

It has been known since Samuelson's (1958) classic paper on overlapping generations' economies that switching from a PAYG to a funded pension system cannot, *per se*, lead to an efficiency gain. There is now a large body of research that draws on the Samuelson model to show that the switch to a fully funded scheme cannot be a solution to the problems raised by declining fertility and increasing ADRs.<sup>7</sup> A key effect of the policy change is to require the present working generation to pay twice – they must save for their own retirement while continuing to pay taxes that finance the pensions of the currently retired. This double burden is especially problematic for working married women who are already contributing disproportionately to government revenues under the present family tax system (see Section 5 below).

To see the fallacy in the argument for switching to a funded scheme, consider an overlapping generation's economy of infinite duration in which individuals live for two periods. In the first period they work, generate income and consume, in the second they just consume. Suppose that output from the working generation will always be 100 in each period. Suppose also that there is an implicit intergenerational contract: the working generation gives 20 units of its output to the retired generation, in exchange for which it receives 20 units in its retirement from the then working generation, who in turn will receive 20 when they retire, and so on *ad infinitum*.

Now suppose that it is decided to switch to a funded system in which each generation has to put aside the output it will consume one period later when it retires. Then at this point in time, either the currently retired generation must receive nothing, or the currently working generation must reduce its consumption by a further 20 units, to 60, in order to

---

<sup>5</sup> Rees and Apps (2006) show that this is a better outcome than the market outcome, and would be preferred by any policy maker who is (at least weakly) averse to inequality in levels of welfare among individuals.

<sup>6</sup> See Australian Government (2002, 2007).

<sup>7</sup> The studies include Breyer (1989), Geanakoplos, Mitchell and Zeldes (1998), Chand and Jaeger (1996) and Orszag and Stiglitz (1999), Miron and Murphy (2001) and Brown et al. (2005), among others. For a discussion in the Australian context, see Apps and Rees (2002).

pay the current pensions and save for its own future pensions. The basis principle holds irrespective of whether the scheme is introduced gradually over time, by successive increases in the compulsory contribution rate and reductions in the real value of the PAYG pension.

International evidence indicates that under most private annuity programs, expected rates of return are below market rates of interest due to high administrative costs (commissions, advertising, excessive executive pay, etc). Administrative costs for public sector schemes are far lower (economies of scale, etc). A clear trade-off is recognised: it is administratively less expensive to provide a uniform retirement program for all individuals than to have a large number of competing programs available, among which individuals can choose.<sup>8</sup>

#### **4 Australia's "ageing crisis" is policy driven**

Though increasing longevity has been a contributing factor, the primary cause of a rising ADR has been the large decline in fertility since the early 1960's. In 1961 the Total Fertility Rate (TFR) in Australia was 3.5. By 1980 this had fallen to 1.9, and since that time it has tended to level out at 1.7 to 1.8. It is projected to remain at around this level for the next 40 years. IGR2 dramatically portrays the effects of this by pointing out that "In 2007 there are 5 people of working age to support every person aged 65 and over. By 2047, there will only be 2.4 people of working age supporting each person aged 65 and over".

This focus on the ADR is misleading when declining fertility is the major cause of population ageing. In the first instance, what is important is the Total Dependency Ratio (TDR), the ratio of the *total* non-working to the working age population. This is influenced by the child-to-working-age ratio, or Child Dependency Ratio (CDR), and of course declining fertility reduces this. The TDR can therefore be falling as the ADR is rising. This has in fact been the general trend since 1961. The projected levelling out of the fertility rate at its current level will cause the TDR to rise, with the result that the TDR will tend to exhibit a U-shaped profile over the period from 1961 to 2047. Since the minimum point in the profile is around the present time, a continuing rise in the TDR is projected for the next 40 years due, as stated in IGR2, to a fall in the traditional working age category (15-64 years of age) from its current 2007 level of 67.5 per cent of the total population to around 60 per cent by 2047, and a rise in the ADR that is greater in absolute value than the fall in the CDR. However, the projected TDR for 2047 is close to the rate for 1961, which did not appear to cause the collapse of civilisation as we know it.<sup>9</sup>

---

<sup>8</sup> See Stiglitz (2000) for a discussion of the evidence. For an analysis of administrative costs, fees and charges based on Australian data, see Bateman (2001).

<sup>9</sup> It should also be pointed out that with productivity growth in the historically experienced range of 1%-2% per annum, over 40 years the average worker's productivity increases by between 50%-120%, and so productivity growth alone can be expected to continue to make a significant contribution to raising output per capita. See Cutler et al. (1990).

Secondly, declining fertility and population ageing need not imply an increase in the *resource costs* associated with an increasing TDR. If the cost to the economy of a child is greater than that of a retiree, the overall costs of dependency can be falling even when the TDR is constant or rising, because of the changes in its composition. In developed economies children are very costly. All need full time care for at least some years and, depending on training and education choices, some may not enter the labour market for at least two decades.<sup>10</sup> It might be argued that the health care costs associated with ageing and greater longevity make retirees more costly than children. However, research in health economics has shown that neither the direct nor indirect effects of ageing can account for much of the sustained rise in medical expenditure in recent decades. A primary cause is rising per capita income,<sup>11</sup> together with improvements in medical technology.<sup>12</sup>

Thus the question arises of what has happened to the resources released by the falling fertility rate. Dramatising the gap (in terms of absolute values) between the ADR and CDR from the present time to 2047 distracts attention from the resource implications of the reverse relationship that held from 1961 to the present time. Given the evidence that, on average, a child is more costly than a retiree,<sup>13</sup> the period from 1961 to 2007 should have seen a significant rise in output per capita due to demographic change alone. The lower TDR over this period should have provided the resources necessary to offset any fall in output per capita up to 2047. In other words, the period should have seen additional saving and higher tax receipts from a larger tax base as sources of finance for productivity improving investments, such as in education, health and infrastructure.

Provided the resources released by a declining fertility rate have been used for these purposes, there can be no reason to anticipate an “ageing crisis” with the leveling out of the fertility rate to 2047.<sup>14</sup> The problem is that they have not. A range of government policies have contributed to an ageing crisis. Here we focus on those that inhibit the efficient reallocation of female labour from the home to the market, in line with the decline in fertility. Arguably, among the most damaging is the family tax system.

## **5 Family tax system and female labour supply**

While the Personal Income Tax (PIT) is based on individual incomes, Family Tax Benefit Part A (FTB-A) and the Medicare Levy exemption are withdrawn on joint income, while

---

<sup>10</sup> This point is highlighted by Barro and Becker (1989). For an analysis using Australian data, see Apps and Rees (2002).

<sup>11</sup> See Hall and Jones (2007), Cutler and McClellan (2001) and Cutler et al. (2006).

<sup>12</sup> Barro (1996) argues that medical advances have made an important contribution to sustaining a long-term positive growth rate. See also Nordhaus (2003) and Becker et al (2005) who conclude that increases in longevity have contributed almost as much to welfare as increases in non-health consumption in the US and worldwide.

<sup>13</sup> For an analysis of child costs in a lifecycle framework, see Apps and Rees (2003).

<sup>14</sup> If fertility rises significantly, then of course the cost of dependency per working-aged individual could rise significantly.

Family Tax Benefit Part B (FTB-B) is withdrawn on the income of the second earner. This has the effect of creating large tax burdens on the income of the second earner, typically the female partner.

To illustrate, the table below lists the marginal tax rate (MTR) and average tax rate (ATR) faced by a second earner as her income rises, in a household in which the primary income is only \$40,000, and where there are two children under 13, with one under 5. The figures show the combined effect of the following elements of the family tax system in 2007-08:

- Personal Income Tax (PIT);
- Low income tax offset (LITO);
- Medicare Levy (ML); and
- FTB-A and FTB-B.

**MTRs and ATRs on the second income 2007-08**

Taxable income	Tax rates on second earnings	
	MTR	ATR
\$0 - \$1,318	0.015	0.015
\$1,319 - \$4,380	0.215	0.155
\$4,381 - \$11,000	0.415	0.311
\$11,001 - \$22,302	0.565	0.440
\$22,303 - \$27,014	0.365	0.427
\$27,015-\$30,000	0.165	0.401
\$30,001 - \$40,000	0.355	0.389

Primary income = \$40,000 pa

From \$1,319 to \$4,380 the MTR on the second earnings is 21.5, due to the withdrawal of FTB-A and the ML of 1.5 per cent. At \$4,380 the MTR goes up an additional 20 cents, to 41.5 cents in the dollar, due to the withdrawal of FTB-B. At \$11,000 the MTR rises to 56.5 cents in the dollar, because the second income hits the 15 per cent rate of PIT scale. Because FTB-A, excluding the base rate, is fully withdrawn at a family income of \$67,014, the second earner's MTR falls to 16.5 cents in the dollar, the rate on personal income plus the ML, at \$27,015. At \$30,000 her MTR is 36.5 cents in the dollar, the sum of the 30 per cent rate on personal income, the 4 cents withdrawal rate of the LITO, and the ML rate.

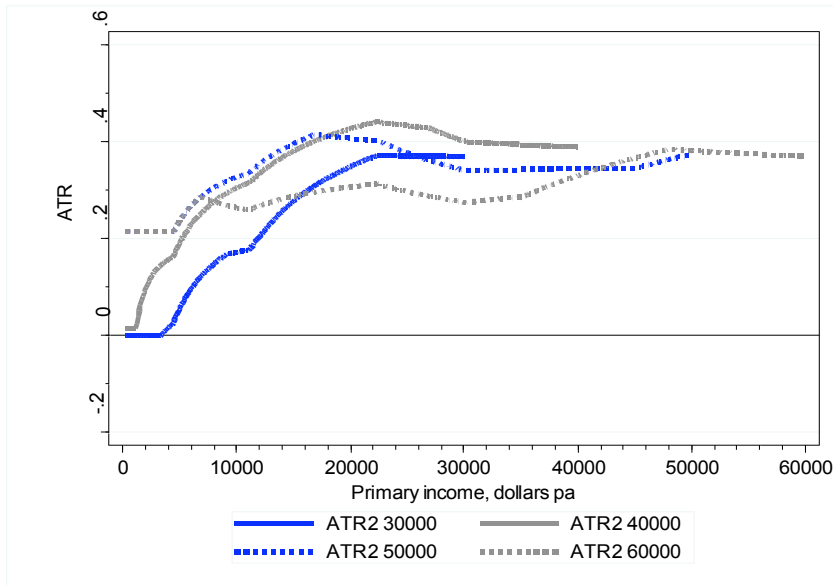
At just over \$22,000, the second earner has an ATR of 44 cents in the dollar – she has lost almost half her income. At \$40,000 she has faced such high MTRs on her earnings up to \$22,302 that her ATR remains at around 40 per cent. Taxes on second earners at these levels in low and average wage families leave little for the cost of child care

When we consider the SGC as an additional 9 per cent tax, it is clear that it makes very little sense for a family with children under school age, and on low to average earnings. Furthermore, married women on low to average earnings who manage to accumulate

saving may find they are no longer eligible for the aged pension – they truly pay twice.

The figure below plots the ATRs faced by a second earner at selected levels of primary income: \$30,000, \$40,000, \$50,000 and \$60,000. In all cases, the second earner faces excessively high ATRs once her income exceeds \$12,000. Her ATR rises to around 40 per cent as her income approaches the level of primary earnings.

**ATRs on second income at selected primary income levels**



These results reflect the transformation of the Australian family tax system from one based largely on individual incomes to one based on joint income, through reforms to the family benefit system during the Howard years. An income tax policy of this kind, in combination with a poorly developed and costly childcare system and lack of paid maternity leave, make it very difficult for married women to work when they have young children. Their withdrawal from the workforce at this time has a negative impact on their labour supply across the entire life cycle. The literature provides evidence of “persistence”.<sup>15</sup> The available data also show that there is a strong positive relationship between female labour supply and household saving.<sup>16</sup> Much of the saving is for the purpose of house purchase. Australia’s high rate of home ownership among retirees makes the country well placed relative to many others to deal with demographic change.<sup>17</sup> The advantage needs to be preserved.<sup>18</sup>

<sup>15</sup> See Shaw (1994).

<sup>16</sup> See Apps and Rees (2003) and Apps (2007)

<sup>17</sup> Data from the Australian Bureau of Statistics 2003-04 Household Expenditure Survey indicate that over 90 per cent of retirees are home owners and that their debt to house price ratio is close to zero. In contrast, a country such as Germany has a low rate of home ownership which, together with a joint income tax system and poor access to child care, creates an almost intractable ageing problem.

<sup>18</sup> The gains could be seriously undermined by policies directed toward encouraging home owners to take out “reverse mortgages” to supplement their retirement incomes, as an alternative to maintaining the real

The family tax benefit system clearly fails in terms of efficiency. Basing taxes on joint income is also unfair. A system of joint taxation discriminates against two-earner couples working long hours, by taxing the second income at higher rates as illustrated. The Australian system is especially unfair because we now have an effective rate scale that is no longer progressive. The highest rates apply at low and average earnings.<sup>19</sup>

## 6 Why productivity and labour supply are central

For a successful approach to demographic change it is essential to focus on improving labour productivity. It therefore makes no sense to impose a tax of 9 per cent on the working population in the form of the SGC unless the revenue/saving goes to investments that improve the productivity of the next generation.

To see more simply why productivity is central, consider a highly stylised life cycle model in which all individuals live for 80 years and the life span can be split into three phases:

Phase 1: 0-20 years, a dependent childhood phase

Phase 2: 20-60 years, the working age phase

Phase 3: 60-80, the retirement phase

In a perfect capital market, the individual borrows (at least implicitly) in phase 1 to fund the cost of child care, consumption and education. In phase 2 the individual repays the debt incurred in childhood (in our society, by having children and supporting them) and saves for retirement.

It is clear that, in this simple model, at any *point* in time the output of the working population must support all three phases. If demographic change causes a rise in the “true” dependency ratio and there is no rise in productivity, living standards must fall. Under a PAYG system the working population pays higher per capita contributions, while those in phase 3 face a cut in their pension. Under a fully funded system, a negative interest rate produces an equivalent outcome. This is the Samuelson result. The interest rate is negative because, with a decline the relative size of phase 2 over successive generations, the demand for capital is continually falling, and this implies a negative real interest rate.<sup>20</sup>

Female labour supply<sup>21</sup> is also central because the tax base cannot include home production.<sup>22</sup> Policies that discourage the labour supply of the second earner therefore

---

value of pension payments for low and average wage workers. Policies of this kind are essentially a strategy for extracting hard earned assets from the elderly, the majority of whom are women.

<sup>19</sup> For a detailed analysis, see Apps (2007).

<sup>20</sup> Note that the capital market is far from perfect, which is one of several factors that justify public funding of child care and education.

<sup>21</sup> Or, more generally, the labour supply of the “second” earner. In around 12 per cent of families with dependent children, the male is the partner on lower earnings.

undermine the tax base. The labour supply of married women of prime working age in Australia is presently around only 50 per cent of that of married males in the same age category. It is of interest to note that the rates for countries such as the US and UK are only marginally higher, which is not surprising because they have similar policies.<sup>23</sup> However, the rates for Scandinavian countries with well developed child care sectors, notably Sweden, are much higher, at around 75 per cent. In contrast, Australia's rate of 50 per cent is significantly higher than that of countries with policies which even more strongly disadvantage women who work, such as Germany, a country which also has a much lower fertility rate.

A more rational set of Australian family tax and child care policies, together with paid maternity leave, can be expected to achieve an increase labour supply, and therefore in the tax base, that will allow Australia to become a more productive economy, as well as a lower taxed country, without an ageing crisis.

## **7 Conclusions**

Rather than summarizing the points made in this paper, the following sets out directions in which policy must move in order to provide a sensible and lasting solution to the resource allocation problems that arise with demographic change, and to begin building a fair and affordable retirement income system.

### **1. Reform the family tax system**

The income tax system should be restored to one based on individual rather than joint incomes, with a progressive rate scale and universal family benefits. This means reversing the direction of family tax reform in the Howard era. This will:

- (i) reduce the tax burden on low and average wage second earners
- (ii) provide working women with higher net incomes, thus enabling them to achieve a higher level of saving and more resources to support themselves in old age.
- (iii) expand the tax base and improve the ability to fund public expenditure.

### **2. Develop a publicly financed and operated, education-oriented child care system.**

This will

- (i) greatly facilitate growth in female labour supply, again expanding the tax base
- (ii) improve the quality of pre-school education, and therefore the productivity of the next generation

---

<sup>22</sup> For a formal analysis of the implications of this constraint on tax policy instruments, see Apps and Rees (1999a,b).

<sup>23</sup> See Apps and Rees (2009) for a comparative analysis of the tax and family benefits policies of these countries.

- 3. Expand the Age Pension and integrate it with a public sector contributory defined benefit scheme.**  
This will
  - (i) improve the risk-sharing capabilities of the existing pension arrangements
  - (ii) reduce the administrative and transactions costs associated with the existing arrangements.
  
- 4. Reduce the SG rate for low and middle income earners**  
This will:
  - (i) reduce the existing double burden of effective taxation on the majority of married women as second earners and on families least able to afford it
  - (ii) provide the option for higher income earners to pay a higher rate
  
- 5. Remove all tax concessions for contributions to superannuation saving that is not finally taken out as an income stream.**  
This will:
  - (i) improve the overall fairness of the tax system, since it is predominantly high income groups who benefit from these concessions
  - (ii) improve incentives for saving by married women, by providing revenue for funding reductions in effective tax rates on second earners working long hours to increase household saving for home purchase and for retirement.

## References

- Apps, PF (2007), "Taxation and Labour Supply", *Australian Tax Forum*, 22, 89-116. Available as CEPR DP 560. Download: <http://econrsss.anu.edu.au/discussionpapers.htm>.
- Apps, PF, and R Rees (2009), *Public Economics and the Household*, Cambridge University Press, Cambridge.
- Apps, PF, and R Rees (2004) "Fertility, Female Labour Supply and Public Policy", *Scandinavian Journal of Economics*, 106, 745-763.
- Apps, PF, and R Rees, (2003), Life Cycle Time Allocation and Saving in an Imperfect Capital Market, NBER Summer Institute Session on: *Aggregate Implications of Microeconomic Consumption Behavior*, Boston, July 21-25. Available as IZA DP 1036. Download: [www.iza.org](http://www.iza.org).
- Apps, PF and R Rees (2002), "Fertility, Dependency and Social Security", *Australian Journal of Labour Economics*, 5, 569-585.
- Apps, PF and R Rees (1999a), "On the Taxation of Trade Within and Between Households", *Journal of Public Economics*, 73, 241-263.

Apps, PF and R Rees (1999b), "Individual vs. Joint Taxation in Models with Household Production", *Journal of Political Economy*, 107, 393-403.

Apps, PF, R Rees and M Wood (2007) "Population Ageing, Taxation, Pensions and Health Costs", *Australian Journal of Labour Economics*, 10, 79-97. Available as CEPR DP 564. Download: <http://econrsss.anu.edu.au/discussionpapers.htm>.

Australian Government (2007), Intergenerational Report 2007, Commonwealth of Australia, Canberra.

Australian Government (2002), Budget Paper No 5, Intergenerational Report 2002-03.

Bateman (2001), "Disclosure of Superannuation Fees and Charges", Centre for Pensions and Superannuation, University of New South Wales, DP 03/04.

Barro, RJ (1996), Health, *Human Capital and Economic Growth*, paper prepared for the Pan American Health Organization, Washington, DC.

Barro, RJ and GS Becker (1989), "Fertility Choice in a Model of Economic Growth", *Econometrica*, 57 (2), 481-501.

Breyer F (1989), "On the Intergenerational Pareto Efficiency of Pay-As-You-Go Pension Systems", *Journal of Institutional and Theoretical Economics*, 145, 643-658.

Brown, J, K Hassett and K Smetters (2005), "Top Ten Myths of Social Security Reform", Center for Retirement Research at Boston College, WP 2005-11.

Commonwealth of Australia (2008), "Australia's future tax system, Retirement income, Consultation paper". Available at: [www.taxreview.treasury.gov.au](http://www.taxreview.treasury.gov.au).

Chand SK and A Jaeger (1996), "Aging Populations and Public Pension Schemes", Occasional Paper 147, IMF, Washington.

Cutler DM, and M McClellan (2001), "Is Technological Change in Medicine Worth It?", *Health Affairs*, XX, 11-29.

Cutler DM, AS Deaton and A Lleras-Muney (2006), "The Determinants of Mortality", *Journal of Economic Perspectives*, XX, 96-120.

Cutler DM, JM Poterba, LM Scheiner, LH Summers (1990), "An Aging Society: Opportunity or Challenge?", *Brookings Papers on Economic Activity*, 1, 1-73.

Feyrer, J, B Sacerdote and A D Stern (2008), "Will the Stork Return to Europe and Japan? Understanding Fertility within Developed Nations", *The Journal of Economic Perspectives*, 22, 3-21.

Hall, EH and EI Jones (2007), “The Value of Life and the Rise in Health Spending”, *The Quarterly Journal of Economics*, Feb. 39-72.

Krugman, P (2004), “Borrow, Speculate and Hope”, *New Your Times*, December 10.

Miron, JA, and KM Murphy (2001), “The False Promise of Social Security Privatization”, NBER.

Nordhaus, WD (2003), “The Health of Nations: The Contribution of Improved Health to Living Standards”, in *Measuring the Gains from Medical Research*, KM Murphy and R Topel, eds., University of Chicago Press, Chicago.

Orszag PR and JE Stiglitz (1999), “Rethinking Pensions Reform: Ten Myths about Social Security Systems”, in *New Ideas about Old Age Security*, Ch 1, 17-56, World Bank, Washington DC.

Rees, R and PF Apps (2006), “Genetic Testing, Income Distribution and Insurance Markets” *Annales d’Economie et des Statistiques*, 83/84, 353-368.

Samuelson PA (1958), “An Exact Consumption-Loan Model of Interest with or without the Social Contrivance of Money”, *Journal of Political Economy*, 66, 467-82.

Shaw, K (1994), The Persistence of Female Labor Supply: Empirical Evidence and Implications, *Journal of Human Resources*, 29(2), 348-378.

Stiglitz, JE (2005), “Securing Social Security for the Future”, *The Economists’ Voice*, Vol 2, Issue 1, Article 5.