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HEALTH POLICY AND EQUITY OF HEALTH CARE FINANCING IN AUSTRALIA: 1973–2010

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Using data from Australian Taxation Statistics and Household Expenditure Surveys we analyze the distribution of health care financing in Australia over almost four decades. We compute Kakwani Progressivity indices for four sources of health care financing: general taxation, Medicare Levy payments, Medicare Levy Surcharge payments, and direct consumer payments, and estimate the effects of major policy changes on them. The results demonstrate that the first three of these sources of health care financing are progressive in Australia, while the distribution of direct payments is regressive. Surprisingly, we find that neither the introduction of Medicare in Australia in 1984 nor the Extended Medicare Safety Net in 2004 had significant effects on the progressivity of health care financing in Australia. By contrast, the Lifetime Cover scheme—introduced in 2000 to encourage people to buy and hold private health insurance—had a progressive effect on health care financing.

JEL Codes: D31, I14, I18

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1. Introduction

Equity is widely regarded as an important policy objective in the health care sector (McLachlan and Maynard, 1982; Mooney, 1986; Wagstaff *et al.*, 1989; O'Donnell *et al.*, 2007). Although the substantial literature on inequality of health and health care has revealed a number of sources of disagreement about what is meant by equity in this sector (Culyer and Wagstaff, 1993), there is nevertheless broad agreement among policy makers and the general public that health care financing contributions should be determined mainly according to ability to pay, with health care services distributed according to need (Wagstaff *et al.*, 1992).

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The principle of financing according to ability to pay suggests that individuals'/households' contributions to the cost of health care (whether through the tax system, a health insurance system, or out-of-pocket (OOP) expenses), should be distributed among households according to ability to pay rather than according to the risk of illness. One obvious reason is that health care payments are considered to be an economic barrier for some people. Another reason is that payments for health services impinge upon the ability of households to pay for other essential goods and services such as food. The distribution of these goods as well as health services is considered an important social justice issue (Culyer, 1993). Also, as the World Health Organization (2000) noted, a health system in which individuals sometimes end up in poverty through their purchase of needed care, or forced to not use it because of the associated cost, is considered unfair. Positive studies of the distribution of extant health expenditures, health care, and health per se hence can provide useful information to inform normative decisions about the fairness or otherwise of outcomes under current and historical health care financing and provision arrangements. The purpose of this study is to undertake a detailed examination of the distribution of health care financing over more than three-and-a-half decades: a period over which Australia's health care financing arrangements have changed considerably on several occasions.

Since the Second World War, Australia's health care financing and delivery systems have been the subject of several quite substantial transformations and re-transformations. The most radical reforms since that time arguably were motivated primarily, if not exclusively, by concerns about equity in the health sector. An example of earlier government interventions that targeted distributional concerns was the introduction of regulations over private health insurance (PHI) markets via the National Health Act 1953. These regulations mandated that insurers charge the same premium to all purchasers of the same policy (the "community rating" provision), and that no applicant for a PHI policy be denied coverage ("open enrolment"). These provisions, which were strengthened in 1958 to limit the use of exclusionary clauses (e.g., on existing illnesses and chronic conditions) in PHI policies were also clearly motivated by equity concerns.

Moreover, the institution of the universal and compulsory Medibank scheme, in 1975, for example, was motivated by equity considerations, underpinned by empirical evidence (Scotton and Deeble, 1968) that recent migrants and low-income groups were over-represented in the uninsured Australian population. The reintroduction of the provisions via the introduction of the Medicare scheme (1984), was also motivated by the objective of financing health care according to ability to pay, and distributing health care according to need.

Furthermore, the institution of reinsurance/risk equalization schemes for PHI in Australia (Connelly *et al*., 2010), may also be viewed as attempts to arrest an adverse selection "death spiral" in Australian PHI markets (Butler, 2002), while preserving community-rating and open enrolment. More recently, the Government's decision to extend the Medicare safety net to provide additional financial protection for those who would otherwise incur high out-of-pocket expenses can also be seen as policy that is motivated by considerations of equity.

Empirical analysis of equity in health care has been the subject of considerable attention over the last two decades. The literature has focused on the distribution

of health care utilization (e.g., Propper and Upward, 1992; van Doorslaer *et al*., 1992, 2000, 2004; Gerdtham and Sundberg, 1998a; van Ourti, 2004; Allin, 2008) and the distribution of health care financing. Research on the U.S. and Europe (Wagstaff *et al*., 1992, 1999a; Smith, 2010) indicates that tax-financed health care systems tend to be proportional or mildly progressive, whereas social insurance and private health care systems tend to be regressive. In most of the countries, out-of-pocket payments are regressive sources of funding.

Other studies investigating health care funding in the U.S. (Holahan and Zedlewski, 1992; Rasell and Tang, 1994; Rasell *et al*., 1994) verified the regressivity of health care financing and suggested a reform that mostly relied on taxes in order to make the health care system less regressive. Moreover, Yu *et al*. (2006, 2008), O'Donnell *et al*. (2008), and Hajizadeh and Connelly (2010) have provided the first empirical estimates for a number of Asian territories. In general, these studies showed that the contribution of rich households to health care funding as a percentage of their ability to pay is higher in most low- and lower-middle-income countries while the opposite is more likely to be observed in high-income economies. In addition to these works, some studies (Castano-Yepes *et al*., 2002; Yi *et al*., 2005; Hajizadeh and Connelly, 2010) have investigated the effect of different health care reforms on the progressivity of health care financing.

Notwithstanding the importance of equity-related concerns in Australian health policy, relatively few empirical measures of the distribution of health care services or of health care financing are available. While many authors have considered the role of income, only five studies of the income distribution of health care financing and/or services in Australia have been undertaken using contemporary measures of distribution (e.g., concentration indices, Kakwani progressivity indices (KPIs), etc.).

The first of these studies (Lairson *et al*., 1995) considered the distribution of health care, health status, and health care financing, for the year 1988–89. Data on health care utilization were taken from the 1988–89 National Health Survey (NHS), and the distribution of expenditures was estimated using cross-section data from the 1988–89 Household Expenditure Survey (HES) (Australian Bureau of Statistics, 1975–2010), the 1989 Income Tax Statistics (Australian Taxation Office, 1973–2008), and other health expenditure data supplied by the Australian Institute of Health and Welfare (1992). The authors found that the distribution of direct payments (OOP expenses plus PHI premiums) was regressive in Australia in 1988–89. Nevertheless, due to the predominantly progressive effect of the tax-funded health care system, health care financing overall was slightly progressive. They showed that serious illnesses and serious chronic diseases were distributed equally across different income groups whereas the distribution of health (as measured by self-reported health status) exhibited pro-rich inequality. The study also provided some evidence on the presence of income-related inequalities in the distribution of utilization by health care sub-type after standardizing for differences in the need for health care—hospital outpatient departments were utilized more heavily by lower-income groups, whereas the distributions of private fee-for-service for general practitioner (GP) and specialist services were slightly pro-rich.

Schoen and Doty (2004) report results from a cross-sectional random survey of 1,400 individuals in five countries: Australia, Canada, New Zealand, the United Kingdom, and the United States. The survey included questions on access difficulties and waiting times, cost-related problems of access, and consumer ratings of physicians and the quality of care. Their results for Australia suggested relatively few income-related inequalities. For example, Australia was the only country in which no income-related disparities were found with difficulties in seeing a specialist when one was needed and there were no statistically significant differences in ratings of the quality of care, by income. On the other hand, lower-income individuals were more likely to report cost-related problems of access on two of the five measures that were employed. By contrast, all five measures were significantly different between low- and high-income individuals for the U.S. sample, for example.

van Doorslaer *et al.* (2008) also conducted a detailed study of health care utilization in Australia using the 2001 NHS. These authors standardized for differences in health care need and conducted separate analyses of GP and specialist services. They also disaggregated hospital admissions by public and private hospital status. Their work confirmed that the distribution of health care in Australia was generally progressive, although the results suggest that, among higher income individuals, there is some substitution of private hospital for public hospital treatment, and specialist for GP treatment services.

Goodall and Scott (2008) also recently considered inequity in the use of hospital services in Australia using data from the Household Income and Labour Dynamics in Australia (HILDA) panel survey. They found that the probability of one or more hospital inpatient admissions was equal across income groups but, in contrast with the earlier findings of Lairson *et al.* (1995), they found that the distribution of day hospital visits was pro-rich. Goodall and Scott (2008) also found that the distribution of the number of inpatient admissions was pro-rich. Overall, these results on inpatient services suggest that while there are no income-related differences in the need-adjusted probabilities of any inpatient use, higher-income individuals have a larger number of inpatient admissions.

In a recent study, Hajizadeh *et al.* (2012) used five National Health Surveys (NHSs) to measure inequality in health care utilization for Australian adults (i.e., age ≥15) over the period 1983 to 2005. The NHSs enabled them to study the quantities of six categories of health care services: hospital admissions, GP visits, specialist visits, dentist visits, any physician visits, and ambulatory care visits. The NHSs report income, but do not contain adequate expenditure data to enable a complete consideration of inequalities in health care financing, hence Hajizadeh *et al.* (2012) examined only inequalities in utilization. Nevertheless, the long timeframe enabled them to study the distributions of health care services before and after a wide range of policy changes, including the introduction of Medicare (in 1983) and a series of changes to taxes, subsidies, and regulatory rules for PHI in the late 1990s. The authors reported concentration indices (*C*s) and horizontal inequity indices (*HI*s) for each category of medical services and applied the direct standardization approach to compute the *HI*s. In the interests of parsimony, our discussion of their results focuses on the *HI* results. After standardizing for health care need indicators and other control variables, they found that the distributions

of GP services and hospital services were pro-poor in both the pre-Medicare and Medicare periods. The distributions of specialist, dentist, and ambulatory visits were, however, generally pro-rich according to their *HI* measures. Their *HI* analyses of pre-Medicare (in 1983) and Medicare era data also suggest, though, that the distribution of each category of service was more pro-poor (or less pro-rich) after the introduction of Medicare than it was prior to Medicare. Their empirical results for the period 1989–2005 also provide some evidence that the implementation of a range of PHI policies from the late 1990s to 2001 have had a pro-rich effect on the use of health services.

Thus, to date several studies have considered the equity of health care distribution in Australia, but only one study—by Lairson *et al*. (1995)—has considered the distribution of health care financing in Australia. The current paper builds on that cross-sectional study for 1988–89 in several respects. Chiefly, this paper reports the computation of distributional measures for health care financing for a time series that starts in 1973–74 and ends in 2010. This annual time-series thus enables the equity of health care financing in Australia to be analyzed for a period of three-and-a-half decades of Australia's modern history. In doing so, the current study completes the equity picture for health care in Australia which has been drawn in a recent paper by Hajizadeh *et al*. (2012) that analyzed the utilization aspect of equity in health care. The results of the current study are used to test the impacts of government policies that targeted various aspects of health care financing over this period, including:

1. The introduction of Medicare (February 1, 1984).
2. The Private Health Insurance Incentives Scheme (PHIIS) (including the Medicare Levy Surcharge (MLS) and subsidies for PHI) (1997–99).
3. The Lifetime Cover scheme for PHI (July 1, 2000).
4. The Extended Medicare Safety Net (EMSN) (March 1, 2004).

Several of these initiatives (e.g., 1 and 4 above) were concerned largely, or primarily, with distributional objectives in health sector financing and delivery, however the impacts of these reforms on equity of health care financing have not previously been analyzed. Similarly, the distributional effects of policy changes that were designed to bolster PHI coverage (i.e., measures 2 and 3 above) and to extend the Medicare safety net have not been analyzed to date. This paper constructs a suitable time-series for the analysis of changes in incidence of health care financing in Australia, by income, over time, and presents such analyses. The empirical results provide some insight into the distributional effects of a number of substantial policy changes on health care financing. Together with results recently produced by Hajizadeh *et al*. (2012) on health care utilization over the period 1983–2005, they also complete the picture of the overall distributional effects of major policy changes. Importantly, the empirical work presented here shows that common perceptions about the influence of these policy changes on the equity of health care financing and utilization are incorrect.

The paper is organized as follows: Section 2 first describes the general methodological approach, before setting out some explicit hypotheses about the effects of health policies on the distribution of health care financing; Section 3 explains the data; Section 4 presents the results; and Section 5 concludes.

2. Methods

2.1. *The Concentration Index, the Gini Coefficient, and the Kakwani Index*

The notion that individuals should contribute to health care according to their ability to pay is the commencing point of inequality analysis in health care financing. The assessment of inequality in health care financing requires measurement of the extent to which health care payments are related to individuals' ability to pay. The established methods of measuring progressivity of taxes in the public finance literature can be employed to assess the deviation from proportionality in the relationship between payments for health care and ability to pay.

We employed the KPI in order to assess the inequality of health care financing in Australia. The KPI is part of an approach that summarizes the overall pattern of the progressivity of the tax system. This index can be adapted to assess equity of health care financing. The index can also be defined as

$$KPI = C_{tax} - G_X, \tag{1}$$

where C_{tax} is the concentration index for tax and G_X is the Gini coefficient for pre-tax income (Gerdtham and Sundberg, 1998b). The C_{tax} index can be easily computed using the following "convenient regression" equation (Kakwani *et al*., 1997):

$$2\sigma_r^2\left(\frac{h_i}{\eta}\right) = \alpha + \beta r_i + \varepsilon_i, \tag{2}$$

where i indexes the individual, σ_r^2 is the variance of fractional rank, h_i is the health payment variable and η is its mean, and $r_i = i/N$ is the fractional rank of individual i in the living standard distribution, with $i = 1$ for the poorest and $i = N$ for the richest. The OLS estimate of β is an estimate of the concentration index (O'Donnell *et al*., 2007). The standard error of β provides an estimate of the standard error of C, but is not accurate because the nature of the fractional rank variable induces a certain pattern of autocorrelation in the data. A solution for this problem is to use the Newey–West (Newey and West, 1994) regression estimator which corrects for autocorrelation as well as heteroscedasticity (World Bank, 2012a).[1]

The value of the KPI can be measured directly in a single step from the following regression:

$$2\sigma_r^2\left[\frac{h_i}{\mu} - \frac{y_i}{\eta}\right] = \alpha + \delta r_i + u_i, \tag{3}$$

where y_i is the ability to pay variable and η is its mean, and the OLS estimate of δ is the KPI. The values of KPI range between $-2(= -1 - G_X)$ and $+1(= 1 - G_X)$. If health care payments are proportional to income the KPI is equal to zero; whereas the index is positive (negative) if the health care payments are progressive

[1]For more explanation of the concentration index, see Wagstaff *et al*. (1991), Kakwani *et al*. (1997), and Lambert (2001).

(regressive). The value of +1 denotes the highest possible degree of progressivity while the value of –2 reflects the highest possible degree of regressivity (World Bank, 2012b).

The KPI has the useful property of not only being able to identify progressivity but to measure the degree of progressivity of taxation (or health care financing). This property is especially useful in tracking progressivity over time or comparing progressivity across countries. Another important characteristic of this index is that the overall KPI of a tax system can be determined by a weighted average of the indices for individual taxes where the weights are the proportions of each tax in total tax revenue (Wagstaff *et al*., 1992). These properties make the KPI a desirable measure in the empirical analysis of equity in health care financing.

We used the computed KPIs and their standard errors to estimate 95 percent confidence intervals for each year the index was calculated. Then, the calculated upper and lower limits of these intervals were employed to test the statistical significance of the changes in the values of the KPIs over time.

2.2. *Reforms and Hypothesized Effects*

Australia's health care system has undergone several reforms since the 1970s. It can be assumed that these reforms affected the progressivity of health care financing over time, given that they have changed the financing of the health care system. The first universal public scheme in Australia was introduced on July 1, 1975, through the Health Insurance Act 1973, as Medibank. The Medibank scheme, which was introduced by the Whitlam (Labor) Government, was a tax-financed health care financing scheme. There is evidence that Medibank increased government direct expenditures on health substantially, and that total government expenditures—i.e., direct plus indirect (e.g., tax concession-based) expenditures—also increased, albeit less dramatically (Butler and Smith, 1992). The two noteworthy distributional aspects of the scheme are that it was tax financed (via a progressive taxation system) and that it introduced subsidies for medical services for all consumers, thereby reducing out-of-pocket prices for at least the previously-uninsured. Thus, one may hypothesize that the distribution of health care financing became more progressive with the introduction of Medibank.

When the Fraser (Liberal–National Coalition) Government took power in November 1975, it set about making major changes to the Medibank scheme. On October 1, 1976 it introduced a 2.5 percent levy (the Medicare Levy (ML)) on taxable income, but exempted individuals who opted out of the public scheme by purchasing PHI. It also reduced the subsidies payable to private fee-for-service medical practitioners and hospitals, which may be expected to have increased out-of-pocket payments by consumers, *ceteris paribus*. The Fraser Government also passed the Medibank Private bill which allowed the Health Insurance Commission to enter the PHI market. Hence, it can be hypothesized that the distribution of health care financing became less progressive with the introduction of Medibank Mark 2.

Following its 1983 election the Hawke (Labor) Government restored the major features of the original Medibank scheme, branding the renewed scheme "Medicare." It is hypothesized that health care financing became more progressive when Medicare was introduced in 1984.

The Howard (Liberal–National Coalition) Government introduced a range of amendments to the Medicare scheme per se (e.g., changes in safety net provisions, changes to the subsidies for GP services, etc.), but its more substantive interventions were those policies that were designed to encourage PHI membership. Whereas the three hypotheses above are attached to "big bang" health sector policies, the Howard Government's substantive policies in this sector were implemented in stages. On July 1, 1997 it introduced the first part of the Private Health Insurance Incentives Scheme (PHIIS), which consisted of a tax penalty—called the Medicare Levy Surcharge (MLS)—computed as 1 percent of income for individuals who earned more than $50,000 and couples/families who earned more than $100,000 but did not purchase PHI.[2] On December 31, 1998, subsidies for PHI were introduced: low-income singles and families (defined by taxable incomes less than $35,000 and $70,000, respectively) were entitled to fixed-sum subsidies for hospital and ancillary cover, which varied by the type of cover (i.e., hospital and/or ancillary) purchased, and by family composition (e.g., a $200 subsidy was available for a hospital policy for couples without children). Note, in particular, that under this policy individuals with incomes between $35,000 and $50,000 (and families with incomes between $70,000 and $100,000) were both ineligible for subsidies and exempt from the MLS. These policy provisions will be labeled PHIIS Mark 1 in this study. It is hypothesized that the progressivity of health care financing increased with the introduction of PHIIS Mark 1.

On January 1, 1999, the subsidy provisions of the PHIIS were revised in three respects: (i) the PHI rebate was specified as a 30 percent *ad valorem* subsidy; (ii) the income-based eligibility criteria were removed (i.e., all income-earners became eligible for the subsidy); and (iii) some specifications of maximum deductible (or "excess") provisions were introduced so that individuals who purchased PHI policies with front-end deductibles in excess of $500 ($1000 for families) were no longer exempt from the MLS. The latter will be labeled PHIIS Mark 2.[3] Thus, one may hypothesize that the distribution of health care financing became less progressive with the introduction of PHIIS Mark 2.

In 2000 the Lifetime Cover policy was introduced. This policy instituted penalties—in the form of health insurance premium loadings—for individuals who joined a PHI fund for the first time after their 31st birthday. The penalties were (and still are) computed as percentage loadings by subtracting 30 from the joining age and multiplying by 2, with a maximum loading of 70 percent (e.g., a 40 year-old would pay a loading of 20 percent on the base premium, in perpetuity).[4] Whether the subsequent uptake of PHI may be expected to have a positive or negative impact on regressivity depends upon the effect of the policy on demand, by age group, and on the income distribution of joiners. Specifically, if income

[2]The MLS was an additional 1 percent surcharge of taxable income imposed on high income earners who did not hold a private health insurance policy for private hospital treatment with a specified maximum deductible (currently, $500). The MLS is in addition to the normal 1.5 percent Medicare Levy.

[3]Elements of the PHIIS were later amended: on April 1, 2005, the PHI rebates were increased to 35 percent for 65–69 year-olds and 40 percent for older age groups, while in 2012 both the PHI rebates and the MLS became income tested.

[4]From 2010, individuals who first took out PHI after their 31st birthday had their age-based penalties removed if they have maintained PHI coverage continuously for ten years.

increases with job tenure and joiners are predominantly young(er), the impact of the policy change could be regressive. If, on the other hand, joiners are older and have higher incomes the policy change could have a progressive effect on health care financing. Given that this policy is largely responsible for the recent increase in the proportion of individuals with PHI (Butler, 2002) and that the uptake of PHI has increased mostly among high income earners (Palangkaraya *et al*., 2009), it is hypothesized that the distribution of health care financing became more progressive with the introduction of the Lifetime Cover scheme.[5]

The final policy initiative considered in this paper was implemented by the Australian Government in March 2004. The Extended Medicare Safety Net (EMSN) was introduced because Australians were facing considerable increases in OOP expenses for their health services. The EMSN aims to increase affordability of health care services for all Australians, especially for those with high OOP costs and with high levels of health care need (Department of Health and Ageing, 2004). The reason the recent initiative is referred to as the "extended" Medicare Safety Net is that there already exists the original Medicare Safety Net (OMSN), which was introduced at the same time as Medicare in 1984. The OMSN and the EMSN currently work simultaneously and provide families and singles with an additional rebate for out-of-hospital Medicare services when defined annual thresholds have been met (Savage *et al*., 2009).

The calculation of these thresholds differs for the OMSN and EMSN. For any particular out-of-hospital service, Medicare pays an insurance rebate equal to at least 85 percent of a specified Medicare Benefits Schedule fee (the Schedule fee) for that service. Under the OMSN, the annual threshold is defined in terms of the sum of the differences between the rebate and the Schedule fee (or the differences between the rebate and the actual price charged if the latter is less than the Schedule fee). When this annual threshold ($430.90 in 2014) is exceeded, Medicare pays a rebate equal to 100 percent of the Schedule fee for the remainder of the calendar year.[6] However, there are no price controls on medical services in Australia, so the price actually charged for any particular service may exceed the Schedule fee. Under the EMSN, the annual threshold is defined in terms of the sum of the differences between the rebate and the actual price charged. When this annual threshold (in 2014 either $624.10 or $1,248.70, depending upon family circumstances) is exceeded, Medicare pays 80 percent of the difference between the rebate and the actual price charged for the remainder of the calendar year.[7]

[5]In 2000 Australia also introduced a 10 percent goods and services tax (GST). We do not treat the GST extensively in this paper for several reasons. First, virtually all health care is excluded from the GST. Second, when the GST was introduced, other tax reforms were also introduced that were designed to prevent the GST from having a regressive impact. Third, Warren *et al*. (2005) have shown that over the period 1994–95 to 2001–02 the distribution of post-tax income in Australia remained "remarkably stable." Indeed, their comparisons of all taxes by decile for 1994–95 and 2001–02 show that the tax shares of three of the five bottom deciles fell over this period, but by no more than 0.02 percent while the tax shares of the other two were constant. We thank an anonymous referee for suggesting we address this issue.

[6]The thresholds for both the OMSN and the EMSN are adjusted in line with the Consumer Price Index on January 1 each year.

[7]An exception to this arises if an EMSN benefit cap has been specified for the service. For services subject to an EMSN benefit cap, Medicare will pay only the capped amount if 80 percent of the out-of-pocket expense exceeds the capped amount. Most services are not subject to an EMSN benefit cap.

The EMSN, then, extends the financial protection provided by the OMSN. The main purpose of the EMSN is to protect all Australians from high OOP expenses for health care services provided out-of-hospital, mainly for those with complex health needs (Department of Health and Ageing, 2004). Hence, it is hypothesized that the distribution of health care financing became more progressive with the introduction of the EMSN program.

3. Data

An evaluation of progressivity in health care financing requires an assessment of several sources of funding, some of which are indirectly allocated to the health care system as well as those payments that are made exclusively for health care. There are five different sources of funding in Australia's health care system: general tax payments, ML payments, MLS payments, direct payments, and workers' compensation and motor vehicle third party insurance payments. Accordingly, measuring progressivity of health care financing requires measuring progressivity indices for these five sources. However, this study measures progressivity of only the first four sources of health care financing due to the unavailability of suitable data on the fifth source.

The Taxation Statistics data (Australian Taxation Office, 1973–2008) are used to measure the KPIs for general tax, and ML and MLS payments. Estimating the KPI requires one to ascertain the Lorenz curve and estimate its statistical measure, the Gini coefficient. Both of these are obtained from data on the cumulative percentages of two variables: income and population. The population is ranked in ascending order of income and, ideally, data at the individual level would be used to obtain the Lorenz curve and the Gini coefficient. In the other part of the index, the health payments concentration curve, data at the individual level would also be ideal. Nevertheless, this study uses grouped data in order to measure KPI for general tax payments, ML payments, and MLS payments because in Australia, due to the Health Insurance Act and the Privacy Act, there is a restriction on the release of data on individuals and data can only be released in a grouped form at a level of aggregation such that no individual consumer or producer can be identified.

Unit record data are generally preferable to grouped data for this kind of work because a point estimate of the concentration index from grouped data ignores information on within-group association between income (rank) and the health variable (Kakwani *et al.*, 1997). As was mentioned by Connelly and Doessel (2002), an important characteristic of grouped data is that they generate a smaller range for the variable in comparison to data at the individual level, because accumulated data in grouped form suppresses some variation at the mean. Some studies (e.g., Gastwirth, 1972; Rasche *et al.*, 1980; Lerman and Yitzhaki, 1989; Sarabia *et al.*, 1999; van Ourti and Clarke, 2010) have explored the bias that results from using grouped data in the estimation of the Gini coefficient and introduced some methods to overcome this problem. Also, Clarke and van Ourti (2010) have recently investigated the bias in the calculation of the concentration index using grouped data and found an overall tendency for the concentration index to be

underestimated; this occurs at an increasing rate as the number of income groups is successively lowered.

Clarke and van Ourti (2010) suggested two methods to correct the bias that results from measurement error, viz. the use of an instrumental variable (IV) and the use of a simple formula for correction. The *IV approach* involves finding instrumental variables (e.g., age and education) to reduce the error in the ordering of individuals within each category of income. The *overall correction approach*, which can also be employed to reduce the bias in the Gini coefficient, uses only information on the number of groups (n) to correct C. Clarke and van Ourti (2010) suggest correcting the bias resulting from measurement error by multiplying the concentration index by $n^2/n^2 - 1$ and showed that the simple correction formula outperforms the IV approach. The use of this correction can thus substantially improve the accuracy of comparisons of C over time and across countries.

We used Taxation Statistics data over the period 1973–74 to 2007–08 (Australian Taxation Office, 1973–2008) to measure the KPIs. As the taxation data used for each year are grouped into income bands, these income bands have been fixed in real terms over time. The *overall correction approach* was used to correct the bias resulting from measurement error.

Data for the calculation of the KPIs for direct payments (OOP expenses plus PHI premiums) were obtained from seven recent HESs (Australian Bureau of Statistics, 1975–2010). The HESs collected detailed information about the expenditure and income of households in Australia in the form of successive "series." The first survey, which was conducted during July 1974 to June 1975, was limited to capital cities only.[8] Subsequent HESs covered the whole of Australia. These surveys were designed to measure changes in households' expenditure patterns at different income levels and characteristics of households (Haque, 2005). Appendix A shows the number of households in each HES.

Household income and health expenditure have been equivalized to take into account household size. There is no universally accepted method for determining equivalence scales (OECD, 2013). In this study, similar to some other studies (e.g., Aronson *et al*., 1994; Wagstaff *et al*., 1999a; Zhong, 2009; Cavagnero and Bilger, 2010), we employed a scale suggested by Aronson *et al*. (1994). The equivalized income/health care payments, x, are calculated as follows:

$$x = y/z^h, \tag{4}$$

where y is disposable income/health care payments and z^h is defined as:

$$z^h = (n_a + \Phi n_c)^\theta \quad 0 \le \theta \le 1, \quad 0 \le \Phi \le 1 \tag{5}$$

where n_a is the number of adults and n_c the number of children in the household, and θ and Φ are the equivalence scale parameters. We set both the parameters to 0.5 as in Wagstaff *et al*. (1999b).

[8]We did not use this survey in our analysis as it is not based upon a nationally representative sample.

4. Results

This section presents the empirical results. First, we report the results of publicly financed health care expenditure: (i) general tax, (ii) ML payments, and (iii) MLS payments. Then, the results for private health care financing (direct payments) and total health care financing are presented. Finally, the effects of the reforms on the progressivity of health care financing are investigated.

4.1. *Public Health Care Financing*

Public health care financing in Australia includes three main sources: general tax, ML payments, and MLS payments. Thus, estimating the progressivity of public health care financing requires the computation of KPIs for these three sources. Measuring KPIs for ML payments and MLS payments is straightforward as they are earmarked for health care. However, allocation of general tax to health care is difficult because that is not specifically earmarked for health care services. Therefore, we can estimate progressivity of general tax contributions by weighting them in accordance with the share of total health expenses in government expenditure. This enables the estimation of the Kakwani index for health care financing.

4.1.1. General Taxation

Table 1 reports the empirical estimates for general tax[9] in Australia, for the period from 1975–76 to 2007–08. According to the results reported in Table 1, there is a predominant trend toward increasing income and general tax payment inequality in Australia after decreasing to their all-time lowest value in 1978–79. The Gini coefficients and *C*s for general tax follow the same trend over the period studied and the values of *C* are greater than the computed Gini coefficients for all years. As can be seen in the table, the KPI is positive for all years, therefore it is a progressive payment. This is due to fact that Australia imposes a progressive income tax on individuals. The results indicate that the KPI increased to an all-time high value in the year 1975–76, 0.2302, before decreasing to 0.1624 in 1981–82. Then, the KPI showed an increasing trend before falling again to its smallest value of 0.1589 in 1988–89. The index started to decline gradually from 1991–92 to 1999–2000 before increasing slowly in more recent years.

Figure 1 depicts the adjusted value of the Gini coefficients, *C*s, and KPIs for general tax payments. The values of the indices for each year were adjusted with the starting year as the base (the base year index is set to 1). The adjusted values of the Gini coefficients and *C*s illustrate a smoothly increasing trend from 1978–79 onwards. The adjusted values for these indices at the end of the study period were 20 and 16 percentage points above their base values, respectively. The adjusted values for KPI demonstrate a decreasing trend in the beginning of the period before leveling out at 10–15 percent below the base year value from 1989–90 to

[9]We took net tax to be representative of general tax because it is not possible to calculate general tax for all years of the study due to unavailability of data. There is no significant difference between the KPIs for net tax and the KPIs for general tax for the years for which data on general tax are available.

TABLE 1

Gini Coefficients, Concentration Indices, and KPIs for General Tax Payments in Australia, 1973–74 to 2007–08

Financial Year	Mean Total Income (A$)	Mean General Tax (A$)	Gini Coefficients (robust SEs)	Concentration Indices (robust SEs)	Kakwani Progressivity Indices (robust SEs)
1973–74	4,794	725	0.3127 (0.0332)	0.5087 (0.0900)	0.1959 (0.0578)
1974–75	5,612	975	0.3201 (0.0326)	0.5069 (0.0846)	0.1868 (0.0530)
1975–76	6,741	1,184	0.3104 (0.0281)	0.5407 (0.0917)	0.2302 (0.0641)
1976–77	8,992	1,942	0.2751 (0.0259)	0.4599 (0.0659)	0.1847 (0.0401)
1977–78	9,760	1,996	0.2714 (0.0233)	0.4563 (0.0583)	0.1849 (0.0352)
1978–79	10,824	2,216	0.2617 (0.0228)	0.4323 (0.0527)	0.1705 (0.0302)
1979–80	11,749	2,503	0.2702 (0.0218)	0.4364 (0.0492)	0.1662 (0.0276)
1980–81	12,988	2,767	0.2778 (0.0223)	0.4411 (0.0512)	0.1633 (0.0290)
1981–82	14,499	3,172	0.2842 (0.0220)	0.4466 (0.0509)	0.1624 (0.0289)
1982–83	16,039	3,410	0.2854 (0.0230)	0.4537 (0.0566)	0.1683 (0.0336)
1983–84	16,823	3,756	0.2909 (0.0246)	0.4563 (0.0584)	0.1654 (0.0339)
1984–85	17,829	4,036	0.2968 (0.0259)	0.4729 (0.0635)	0.1761 (0.0376)
1985–86	19,007	4,455	0.3057 (0.0295)	0.4925 (0.0732)	0.1867 (0.0437)
1986–87	20,332	4,899	0.3133 (0.0338)	0.5014 (0.0798)	0.1880 (0.0461)
1987–88	22,115	5,105	0.3295 (0.0463)	0.4963 (0.0811)	0.1668 (0.0358)
1988–89	24,375	5,674	0.3367 (0.0664)	0.4956 (0.0824)	0.1589 (0.0293)
1989–90	25,399	5,658	0.3293 (0.0393)	0.5098 (0.0748)	0.1805 (0.0363)
1990–91	26,317	5,668	0.3236 (0.0377)	0.5065 (0.0709)	0.1829 (0.0344)
1991–92	27,114	5,701	0.3231 (0.0559)	0.5095 (0.1045)	0.1864 (0.0496)
1992–93	27,838	5,978	0.3271 (0.0646)	0.5076 (0.1148)	0.1805 (0.0510)
1993–94	29,465	6,263	0.3250 (0.0700)	0.5055 (0.1243)	0.1805 (0.0549)
1994–95	30,466	6,480	0.3315 (0.0747)	0.5053 (0.1275)	0.1738 (0.0534)
1995–96	31,496	6,897	0.3378 (0.0763)	0.5086 (0.1276)	0.1709 (0.0518)
1996–97	32,514	7,310	0.3433 (0.0777)	0.5138 (0.1294)	0.1705 (0.0523)
1997–98	34,076	7,749	0.3485 (0.0821)	0.5183 (0.1349)	0.1699 (0.0535)
1998–99	35,651	8,266	0.3504 (0.0845)	0.5206 (0.1379)	0.1703 (0.0540)
1999–00	37,175	8,931	0.3653 (0.0961)	0.5313 (0.1505)	0.1660 (0.0552)
2000–01	39,740	9,194	0.3662 (0.1006)	0.5517 (0.1944)	0.1855 (0.0937)
2001–02	41,000	9,000	0.3618 (0.0942)	0.5437 (0.1814)	0.1819 (0.0871)
2002–03	42,229	10,013	0.3658 (0.0969)	0.5464 (0.1838)	0.1806 (0.0868)
2003–04	45,151	10,452	0.3643 (0.1016)	0.5486 (0.1916)	0.1843 (0.0900)
2004–05	47,538	11,387	0.3717 (0.1068)	0.5524 (0.1989)	0.1807 (0.0920)
2005–06	49,735	11,555	0.3796 (0.1097)	0.5644 (0.2043)	0.1848 (0.0945)
2006–07	55,100	12,243	0.3800 (0.1208)	0.5757 (0.2187)	0.1957 (0.0978)
2007–08	56,794	12,329	0.3773 (0.1171)	0.5897 (0.2238)	0.2124 (0.1067)

Note: All indices are statistically significantly different from zero at the 1 percent level.

1990–2000. Then, the index increased slowly up to just above the base year value at the end of the study period.

4.1.2. Medicare Levy Payments

The estimated values of *C*s and KPIs for ML payments from 1983–84 to 2007–08 show a steady increase in the value of *C* for ML payments from 0.3428 in 1983–84 to 0.4288 in 2007–08 (see Table 2). However, the estimated KPIs for ML payments suggest a trend toward more progressivity from 1983–84 to 1990–91 as the computed KPI increased from 0.0519 to 0.0859, respectively, before decreasing to 0.0763 in 1992–93. There has been a trend toward less progressivity in the ML payment since 1995–96 onwards. Although the values of both the Gini coefficient and the *C* index for ML payments increased throughout the study period, the KPI

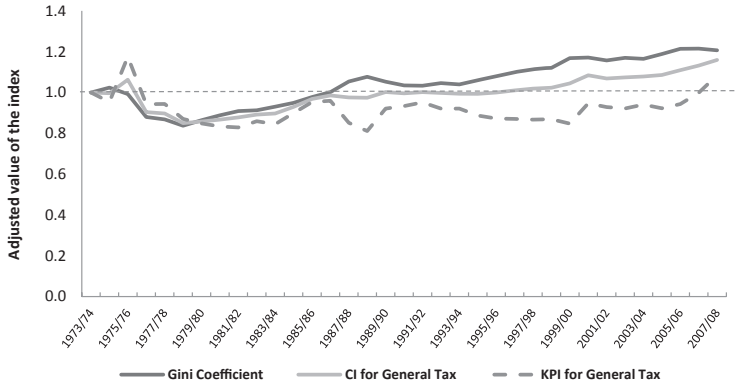

Figure 1. Adjusted Value of the Gini Coefficients, Concentration Indices, and KPIs for General Tax Payments in Australia from 1973–74 to 2007–08

TABLE 2

Gini Coefficients, Concentration Indices, and KPIs for Medicare Levy Payments in Australia, 1983–84 to 2007–08

Financial Year	Mean Total Income (A$)	Mean ML (A$)	Gini Coefficients (robust SEs)	Concentration Indices (robust SEs)	Kakwani Progressivity Indices (robust SEs)
1983–84	16,823	63	0.2909 (0.0246)	0.3428 (0.0264)	0.0519 (0.0170)
1984–85	17,829	158	0.2968 (0.0259)	0.3544 (0.0263)	0.0575 (0.0146)
1985–86	19,007	171	0.3057 (0.0295)	0.3677 (0.0306)	0.0620 (0.0156)
1986–87	20,332	209	0.3133 (0.0338)	0.3757 (0.0342)	0.0623 (0.0137)
1987–88	22,115	244	0.3295 (0.0463)	0.4019 (0.0472)	0.0724 (0.0131)
1988–89	24,375	269	0.3367 (0.0664)	0.4115 (0.0663)	0.0748 (0.0130)
1989–90	25,399	279	0.3293 (0.0393)	0.4028 (0.0419)	0.0735 (0.0176)
1990–91	26,317	282	0.3236 (0.0377)	0.4095 (0.0405)	0.0859 (0.0155)
1991–92	27,114	291	0.3231 (0.0559)	0.4048 (0.0406)	0.0817 (0.0152)
1992–93	27,838	300	0.3271 (0.0646)	0.4034 (0.0433)	0.0763 (0.0148)
1993–94	29,465	355	0.3250 (0.0700)	0.4050 (0.0690)	0.0800 (0.0145)
1994–95	30,466	370	0.3315 (0.0747)	0.4089 (0.0752)	0.0774 (0.0142)
1995–96	31,496	410	0.3378 (0.0763)	0.4164 (0.0767)	0.0787 (0.0143)
1996–97	32,514	481	0.3433 (0.0777)	0.4174 (0.0779)	0.0741 (0.0134)
1997–98	34,076	452	0.3485 (0.0821)	0.4185 (0.0824)	0.0700 (0.0130)
1998–99	35,651	479	0.3504 (0.0845)	0.4131 (0.0849)	0.0628 (0.0133)
1999–00	37,175	497	0.3653 (0.0961)	0.4264 (0.0973)	0.0611 (0.0127)
2000–01	39,740	533	0.3662 (0.1006)	0.4214 (0.1018)	0.0552 (0.0138)
2001–02	41,000	540	0.3618 (0.0942)	0.4238 (0.0955)	0.0620 (0.0125)
2002–03	42,229	561	0.3658 (0.0969)	0.4247 (0.0983)	0.0589 (0.0127)
2003–04	45,151	594	0.3643 (0.1016)	0.4179 (0.1027)	0.0535 (0.0130)
2004–05	47,538	625	0.3717 (0.1068)	0.4247 (0.1081)	0.0530 (0.0128)
2005–06	49,735	651	0.3796 (0.1097)	0.4315 (0.1105)	0.0519 (0.0125)
2006–07	55,100	719	0.3800 (0.1208)	0.4325 (0.1212)	0.0525 (0.0123)
2007–08	56,794	747	0.3773 (0.1171)	0.4288 (0.1178)	0.0516 (0.0122)

Note: All indices are statistically significantly different from zero at the 1 percent level.

index for ML payment declined starting from 1990–91. This indicates that inequality in the income distribution has increased proportionally more than that for ML payments during this period. This results in a reduction of the progressivity of ML payments.

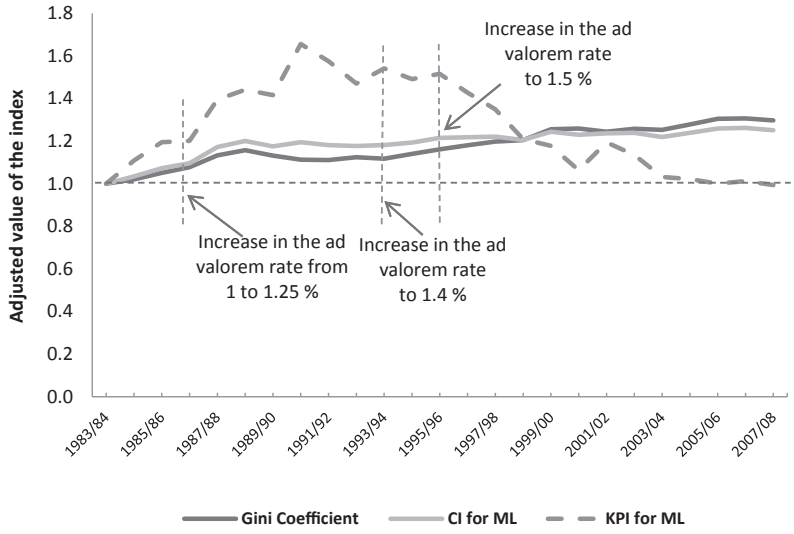

Figure 2. Adjusted Value of the Gini Coefficients, Concentration Indices, and KPIs for Medicare Levy Payments in Australia from 1983–84 to 2007–08

The adjusted index with the starting year as the base indicates that the value of KPI is not much associated with the changes in the *ad valorem* rate for the ML from 1 percent to 1.25 percent in November 1986 and to 1.4 percent and 1.5 percent in July 1993 and 1995, respectively (see Figure 2). The KPI began to decrease from 1990–91 to the end of the study period and fell below its base period value by the end of the period studied.

The declining trend in the value of the KPI for ML payments in recent years is due to the fact that the ML low taxable-income exemption threshold in Australia has not increased very much over the study period despite considerable economic improvement (see Appendix B). In other words, although ML low taxable-income exemption thresholds increased in line with movements in the Consumer Price Index (CPI), the difference between nominal income (both mean and median) and the threshold rose over time. This means that, due to income growth in Australia, a larger proportion of individuals falls in the income bracket that requires payments of the ML for the health sector with the passage of time.

4.1.3. Medicare Levy Surcharge Payments

The MLS payment was introduced on July 1, 1997 as a way of encouraging high income earners to take out private hospital cover. The results for MLS payments from 1997–98 to 2007–08 are reported in Table 3. The calculated CI for the MLS payments is decreasing over the period studied whereas the value of the Gini coefficient is increasing. Thus, we should have a decreasing trend in the value of KPIs over time for this source of funding. There is a downward trend in the KPI for MLS payments, and the adjusted value of KPI dropped off to 35 percent of its value in the starting year by the end of the period (see Appendix C).

TABLE 3

Gini Coefficients, Concentration Indices, and KPIs for Medicare Levy Surcharge Payments in Australia, 1983–84 to 2007–08

Financial Year	Mean Total Income (A$)	Mean MLS (A$)	Gini Coefficients (robust SEs)	Concentration Indices (robust SEs)	Kakwani Progressivity Indices (robust SEs)
1997–98	34,076	9	0.3485 (0.0821)	0.8737 (0.0867)	0.5253 (0.1194)
1998–99	35,651	18	0.3504 (0.0845)	0.8196 (0.0805)	0.4692 (0.1167)
1999–00	37,175	17	0.3653 (0.0961)	0.8128 (0.0798)	0.4475 (0.1249)
2000–01	39,740	10	0.3662 (0.1006)	0.7829 (0.0855)	0.4167 (0.1320)
2001–02	41,000	12	0.3618 (0.0942)	0.7639 (0.0885)	0.4021 (0.1292)
2002–03	42,229	15	0.3658 (0.0969)	0.7340 (0.0912)	0.3681 (0.1330)
2003–04	45,151	20	0.3643 (0.1016)	0.6971 (0.0921)	0.3327 (0.1371)
2004–05	47,538	25	0.3717 (0.1068)	0.6576 (0.0941)	0.2858 (0.1423)
2005–06	49,735	31	0.3796 (0.1097)	0.6386 (0.0641)	0.2590 (0.1270)
2006–07	55,100	39	0.3800 (0.1208)	0.5964 (0.0633)	0.2164 (0.1363)
2007–08	56,794	46	0.3773 (0.1171)	0.5344 (0.0623)	0.1572 (0.1326)

Note: All Gini coefficients and concentration indices are statistically significantly different from zero at the 1 percent level.

A significant downward trend in the value of the *C*s and KPIs over time is mainly due to the increasing proportion of individuals falling above the high taxable income threshold that triggers the MLS liability. One reason for this is that the high taxable income threshold did not increase with inflation: it remained constant at $50,000 for individuals and $100,000 for couples/families during the period reported in Table 3.[10]

Another possible explanation for this trend is that more high-income earners avoided paying the MLS by purchasing PHI in recent years. Indeed, the proportion of people with PHI for hospital and general treatment in Australia has increased since July 1997 (see Appendix D). As can be seen, the proportion of the population covered for hospital treatment and general treatment has increased 15 and 20 percentage points, respectively, over the period 1997–2009.

4.2. *Direct Health Care Payments*

Table 4 reports the estimates of the *C*s and the KPIs for direct health care payments (OOP payments plus PHI premiums). Data for this part of analysis are obtained from HESs. We again equivalized household income[11] and health expenditure using the scale suggested by Aronson *et al*. (1994). The computed KPIs indicate that direct payments are a regressive source of health care financing in Australia. The value of the KPI declined to –0.1920 in 1988–89 after an increase in the value of the KPI from –0.1644 in 1975–76 to –0.1548 in 1984. The decline in the KPI in 1988–89 can be due to a decrease in the proportion of the population covered by PHI after the introduction of Medicare (see Appendix D). In other words, the

[10]In 2009 the threshold increased to $70,000 and $140,000 for individuals and couples/families, respectively. In 2012, the threshold increased to $84,000/$168,000 and a three-point scale of MLS rates was introduced (1.0, 1.25, 1.5 percent) for three income bands above the thresholds.

[11]Household expenditure from the HESs was used as a proxy for income (or ability to pay) in the calculation of the KPIs. We obtained almost the same results when we used disposal income in the measurement of the KPIs.

TABLE 4

Gini Coefficients, Concentration Indices, and KPIs for Direct Payments in Australia, 1975–76 to 2009–10

Financial Year	Average Weekly Household Expenditure (A$)	Average Direct Health Payments (A$)	Gini Coefficients (robust SEs)	Concentration Indices (robust SEs)	Kakwani Progressivity Indices (robust SEs)
1975–76	172	5	0.3230 (0.0069)	0.1586 (0.0118)	–0.1644 (0.0138)
1984	362	14	0.3494 (0.0065)	0.1945 (0.0186)	–0.1548 (0.0196)
1988–89	503	22	0.3490 (0.0043)	0.1569 (0.0137)	–0.1920 (0.0139)
1993–94	602	27	0.3294 (0.0043)	0.1662 (0.0098)	–0.1632 (0.0102)
1998–99	699	32	0.3372 (0.0039)	0.1899 (0.0140)	–0.1473 (0.0138)
2003–04	893	46	0.3515 (0.0046)	0.2540 (0.0154)	–0.0975 (0.0139)
2009–10	1236	66	0.3759 (0.0052)	0.3225 (0.0480)	–0.0535 (0.0460)

Note: All indices except the KPI for 2009–10 are statistically significantly different from zero at the 1 percent level.

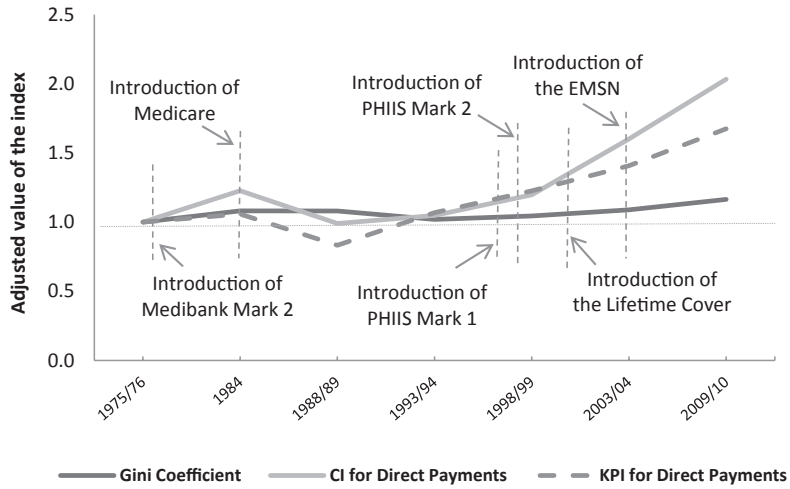

Figure 3. Adjusted Value of the Gini Coefficients, Concentration Indices, and KPIs for Direct Payments in Australia from 1975–76 to 2009–10

implementation of Medicare led relatively richer individuals to begin dropping PHI coverage. This resulted in a smaller contribution of rich individuals to health care financing as PHI premiums—and therefore direct payments.

The KPI increased quite dramatically to –0.0975 in 2003–04. The increase in the progressivity of direct payments is apparent in Figure 3, which illustrates the adjusted value of the KPIs for direct payments. The rise in the value of the KPI in 2003–04 appears to be explained by an increased uptake of PHI among higher income groups (Palangkaraya *et al*., 2009), reflecting a series of changes in the prices and regulation of PHI in the late 1990s to increase PHI membership and usage of private health care. Appendix D demonstrates a pronounced increase in the proportion of the Australian population with PHI in the late 1990s. Thus, the set of PHI policy reforms implemented in Australia during 1997–2000 increased

TABLE 5

KAKWANI PROGRESSIVITY INDICES FOR TOTAL HEALTH CARE FINANCING IN AUSTRALIA, 1975–76 TO 2003–04

Financial Year	KPI for General Tax	Weight	KPI for ML	Weight	KPI for MLS	Weight	KPI for Direct Payments	Weight	Total KPI
1975–76	0.2302	0.679	0.000	0.000	0.000	0.000	–0.1644	0.321	0.1036
1984	0.1708	0.619	0.0547	0.066	0.000	0.000	–0.1548	0.315	0.0606
1988–89	0.1589	0.561	0.0748	0.090	0.000	0.000	–0.192	0.349	0.0289
1993–94	0.1805	0.543	0.0800	0.083	0.000	0.000	–0.1632	0.374	0.0436
1998–99	0.1703	0.571	0.0628	0.083	0.4692	0.003	–0.1473	0.347	0.0527
2003–04	0.1843	0.583	0.0535	0.072	0.3327	0.002	–0.0975	0.345	0.0783

Note: The weight for each source of funding was computed with the information derived from Australian Taxation Statistics, World Health Organisation, and the OECD statistics database.

the health care financing contributions of higher income groups as a result of more purchases of PHI. The use of private health care policies may also give rise to patient co-payments and this is another possible source of the improvement in health care financing progressivity since the PHI reforms.

According to Table 4 and Figure 3, the KPI for direct payments increased to –0.0535 in 2009–10. The increase in the KPI indicates that high income earners in 2009–10 contributed a proportionately greater share of their income as direct payments to health care financing in Australia compared to 2003–04. This result is likely explained by both the operation of the EMSN and the higher prevalence of PHI in the Australian population. The former is likely to have reduced OOP spending by lower-income groups, while the latter is likely to have increased out-of-pocket expenditures by wealthier, privately insured people exercising their private health insurance policies.[12]

4.3. *Total Health Care Financing*

The Kakwani index has an important characteristic that allows one to measure the overall progressivity of a tax system. The overall index can be determined by a weighted average of the indices for individual taxes, the weights being the proportionate contribution of each tax to total tax revenue (Wagstaff *et al*., 1992). Similarly, the progressivity of total health care financing can be computed by a weighted average of the KPIs for the sources of health care funding. Table 5 reports total KPIs for health care financing in Australia over the period from 1975–76 to 2003–04 for years in which data for all four financing sources are available.

The results of our study confirm that health care financing in Australia was progressive over the study period. This is because publicly funded health expenditure contributes a high proportion of total health care financing and is progressive. The KPIs for total health care financing show that the KPIs increased gradually

[12]In relation to the EMSN, a recent report (Savage *et al*., 2009) shows that the EMSN reduced OOP expenses for patients with cancer and diabetes. These two diseases tend to be more prevalent in the population of low socioeconomic status groups (Wagener and Schatzkin, 1994; Kumari *et al*., 2004; Robbins *et al*., 2005; Clegg *et al*., 2009).

from 1988–89[13] to 1998–99 after declining drastically from 1975–76 to 1988–89. The results of the study also revealed that there is a 50 percent jump in the adjusted value of the KPI from 1988–89 to 2003–04 (see Appendix E). This improvement in the progressivity of total health care financing is due to a considerable increase in the KPI for direct payments, reflecting a range of the PHI policy reforms.

4.4. *The Effects of Health Reforms*

This section investigates the effects of the reforms, articulated in Section 2.2, on the progressivity of health care financing in Australia. For this purpose, the estimated KPIs and their 95 percent confidence intervals were employed to measure upper and lower limits for each of the indices (i.e., $KPI \mp 1.96 \cdot SE$). These were then used to test the statistical significance of differences between the KPIs before and after the introduction of each policy.[14]

Recall that the time-series on general tax commences the year prior to the introduction of the Medibank scheme on July 1, 1975. However, unfortunately, it is not possible to investigate the effects of the Medibank scheme and Medibank Mark 2 on the progressivity of health care financing as suitable (e.g., HES) data do not exist. Hence the first policy we are able to examine is the introduction of Medicare in 1984. The increase in the value of the KPI for direct payments between 1975–76 (–0.1644, SE = 0.0138) and 1983–84 (–0.1548, SE = 0.0196) is evident. While this can be interpreted as a decrease in the regressivity of this source of health care financing after the introduction of Medicare, it is not statistically significant. Turning our attention to total health care financing, the results suggested that total health care financing in Australia was more progressive in 1975–76 (0.1036) than in 1984 (0.0606). This is due mainly to the fact that general tax payments were more progressive and contributed a higher percentage of total health care funding in 1975–76 than in 1983–84.

The long term effect of Medicare on the progressivity of health care financing in Australia can be assessed using the estimated KPIs for direct payments and total health care financing in 1975–76 and 1993–94. According to the results provided in Table 4, the estimated value of the KPI for direct payments decreased in 1993–94. However, the difference between the KPIs in 1975–76 (–0.1644, SE = 0.0138) and 1993–94 (–0.1632, SE = 0.0102) is not statistically significant. In addition, the results for total health care financing indicate that the distribution of health care financing in 1975–76 is even more progressive than in the years after the introduction of Medicare. Thus, based on this evidence it does not appear that Medicare increased the progressivity of health care financing in Australia as hypothesized.

In relation to the PHIIS, we hypothesized that the introduction of PHIIS Mark 1 on July 1, 1997 would have a positive impact on the value of the KPI whereas the introduction of PHIIS Mark 2 on January 1, 1999 would have a regressive effect on the financing of health care in Australia. We were unable to test

[13]The results of KPIs for this year accord with the results of the study conducted by Lairson *et al.* (1995) which showed that the health care payment system in Australia is progressive.

[14]We could not apply formal tests for structural breaks in time series because we were unable to measure the progressivity of total health care financing for all years studied. We also could not test for the statistical significance of KPI changes in total health care financing because we were unable to compute 95% confidence intervals for this index over time.

the effects of these two health policies separately because there is no information on the direct health care payments before and after the implementation of each policy. However, we could examine the overall effect of these two policies by comparing the KPI estimated for direct payments and total health care financing before and after the implementation of the policies. According to the results presented in Table 4, the value of the KPI for direct payments in 1993–94 (–0.1632, SE = 0.0102) is smaller than that in 1998–99 (–0.1473, SE = 0.0138), but the difference is not statistically significant. The KPI for total health care financing also confirmed that the value of the KPI for total health care financing in 1998–99 (0.0527) is greater than that in 1993–94 (0.0436).

We also hypothesized that the Lifetime Cover scheme would increase the progressivity of health care financing in Australia. We used the estimated KPIs of direct payments and total health care financing for 1998–99 and 2003–04 to test this hypothesis. The results demonstrate that the value of KPI for direct payments in 2003–04 (–0.0975, SE = 0.0139) is bigger and statistically significantly different (at the 0.05 level) from the reported value for 1998–99 (–0.1473, SE = 0.0138). Similarly, the progressivity of total health care financing improved between 1998–99 (0.0527) and 2003–04 (0.0783). Therefore, our results do provide some evidence to support the hypothesis that the Lifetime Cover scheme increased the progressivity of health care financing. This finding is in contrast to what is commonly believed—that the introduction of the PHI policies in 1997–2000 decreased the progressivity of health care financing in Australia because of the 30 percent rebate on PHI premiums. In other words, overall the contribution of wealthy individuals on the financing of health care in Australia increased after the PHI policies, even though the rebate was mostly received by high-income individuals. This is due to the fact that wealthy individuals contributed more as direct payments to health care financing in Australia upon the increase in PHI coverage among those who are better-off.

Our final hypothesis is that the EMSN would improve the progressivity of health care financing after its introduction in 2004. We used the KPI for direct payments in 2003–04 and 2009–10 to examine this hypothesis. Our findings show that the KPI for direct payments has increased from –0.0975 (SE = 0.0139) in 2003–04 to –0.0535 (SE = 0.0460) in 2009–10. The increase, however, is not statistically significant. This result indicates that even though Australian government has implemented the EMSN to decrease OOP payments among the poor, the impact of this policy on the progressivity of health care financing is not statistically significant. Moreover, a study conducted by Savage *et al*. (2009), revealed that the majority of EMSN benefits (55 percent) in 2007 went to the top socioeconomic quintile while the least socioeconomically advantaged population (10 percent) only received 3.3 percent of the benefits. This demonstrates that EMSN benefits are mainly distributed among wealthy individuals with high Medicare-related OOP expenses. As noted by Savage *et al*. (2009), this can be explained in two ways: (i) people in low income areas are protected from high OOP costs (e.g., more of them have a Commonwealth concession card), and/or (ii) people in low income areas use fewer Medicare services that are associated with high OOP costs (e.g., specialist services). The former study also showed that more than 40 percent of the EMSN expenditures were appropriated by medical practitioners, which is another

reason that the EMSN did not have its intended and hypothesized effect. Previous studies provide some evidence for these explanations. Jones *et al.* (2008) demonstrated that concession cards in Australia provided considerable protection against OOP expenses associated with GP services but no protective effect was found for specialist services. Also, van Doorslaer *et al.* (2008) and Hajizadeh *et al.* (2012) found that poorer individuals use more GP services whereas richer people were more intensive users of specialist services.

5. Discussion and Conclusions

This study was conducted to assess the equity of health care financing in Australia over several decades. The KPIs were computed to estimate the progressivity of: (i) publicly financed health care expenditures (general tax, and ML and MLS payments), (ii) direct payments, and (iii) total health care financing (i.e., the sum of (i) and (ii)). The progressivity of public financing was measured by computing the KPIs using Taxation Statistics. The progressivity of direct payments was calculated using data from seven HESs.

Our results indicate that direct payments over the period 1973–74 to 2009–10 were regressive. This result corresponds with the previous findings from Australia (Lairson *et al.*, 1995) and a number of other OECD countries (Wagstaff *et al.*, 1992, 1999a) as well as China, Kyrgyz Republic, and Taiwan, where the distributions of direct payments have been shown to be regressive. It stands in contrast to the findings for a range of other countries in Asian nations including Bangladesh, Indonesia, Republic of Korea, Philippines, Sri Lanka, and Thailand (O'Donnell *et al.*, 2008) as well as Iran (Hajizadeh and Connelly, 2010), in which the distribution of direct payments was shown to be progressive. As far as public health care financing is concerned, our results show that all three sources of health care financing, viz. general taxation, and ML and MLS payments were progressive over the study period. This finding is similar to the results of an earlier study in Australia (Lairson *et al.*, 1995) and to those for countries such as Denmark, Ireland, Portugal, the U.K., Finland, and Sweden (Wagstaff *et al.*, 1992, 1999a) in which health care is funded largely or predominantly with taxation revenue.

This study also reveals that total health care financing in Australia is progressive even though direct payments are a regressive source of health care financing and still account for a sizeable proportion of the total. The results indicate that there was a tendency toward more regressivity from the mid-to-late 1970s and through to the late 1980s. Remarkably, the introduction of Medicare in 1984 does not appear to have had any short-term influence on this trend. Progressivity did improve, though, after 1988–89. These results are noteworthy because the results produced by Hajizadeh *et al.* (2012) show that the progressivity of health care utilization per se improved across each of the six categories of medical services that were measured. Thus, it appears Medicare improved the progressivity of health care use but had little short-term impact on arresting the decline in health care financing progressivity that was witnessed in the mid-to-late 1970s and continued until at least 1988–89.

Interestingly, total health care financing in the year 2003–04 did become more progressive due to the introduction of the Lifetime Cover scheme in 2000, which

encouraged more middle- and high-income earners to purchase PHI policies and thereby reduced the regressivity of our measure of direct payments (which includes expenditures on PHI premiums and OOP payments for health care). Thus, it would appear that this policy was successful in raising the contributions of higher-income individuals, relative to lower-income individuals in Australia, although as Connelly and Brown (2010) argue, the MLS penalty is also likely to have played a role. This significant increase in the progressivity of health care financing after the implementation of the PHI policies (especially the Lifetime Cover scheme), however, occurred alongside a deterioration of equity in health care utilization with the better-off using more services for the same need (Hajizadeh *et al*., 2012).

Although our findings show a decrease in the regressivity of direct payments after the implementation of the EMSN in 2004, the changes in the value of the KPIs are not statistically significant. Further, as demonstrated in Savage *et al*. (2009), the EMSN reform, which was introduced by the Australian government to increase accessibility of health services by decreasing OOP expenses for the poor, was associated with an increase in health care utilization mainly among the rich. Together with the health care utilization results previously reported by Hajizadeh *et al*. (2012), this work on health care financing completes an overall picture of trends in inequality in the Australian health sector. Although the public sector plays a dominant role in Australia's health care financing arrangements and in the provision of hospital services, the private sector still has a substantial role in both health care financing and delivery. This private–public blend gives rise to a mixed picture of progressivity in both the financing and delivery of hospital services and GP services, but regressivity in the financing and delivery of dental services and specialist services. While recent reforms to PHI coverage have improved the progressivity of health care financing, they also appear to have contributed to increased regressivity in the utilization of specialist and dental services. These findings shed new light on the effects of policy changes in the Australian health sector on the distribution and redistribution of health care services and shifts in the burden of health expenditures.

Moreover, with regard to the special characteristics of health care financing in Australia including the public–private mix and fundamental reforms over the past four decades, this study provides some useful insights into the impact of different health reforms on health sector equity. This may be useful for other countries in which reforms motivated by a concern for health sector equity are under development. For instance, although Hajizadeh *et al*. (2012) have shown that the introduction of Medicare was associated with improvements in the progressivity of health care utilization, here it has been shown that no significant improvement in the progressivity of health care financing occurred. This is somewhat remarkable because Medicare is a compulsory and universal health care financing scheme. Thus, while Medicare did achieve the then-government's objective of improving access to health care for lower-income households, it apparently did little or nothing to address extant inequalities in health care financing. Conversely, changes effected by a conservative government to encourage PHI membership—including the provision of non-means-tested subsidies for all PHI buyers—were associated with a considerable improvement in the progressivity of health care financing and, as Hajizadeh *et al*. (2012) have shown, a small but statistically

significant reduction in the regressivity of the distribution of specialist services. Thus, contrary to claims that the PHI reforms are regressive (see, e.g., Yong, 2006; Mitchell, 2012), the evidence presented here shows these claims to be false. These findings underscore the importance, in any country, of considering the progressivity of both health care financing and utilization in appraising the redistributive impact of the health care system and of empirically analyzing the results of policies that are expected to affect the inequality of distribution.

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Supporting information

Additional supporting information may be found in the online version of this article at the publisher's web-site.

Appendix A: Number of households sampled in various HESs in Australia: 1975/76 to 2009/10

Appendix B: Median taxable income, mean taxable income and ML low taxable-income exemption threshold for individuals and couples in Australia from 1983/84 to 2007/08

Appendix C: Adjusted value of the Gini coefficients, concentration indices and KPI for Medicare Levy Surcharge payments in Australia from 1983/84 to 2007/08

Appendix D: Private health insurance coverage (insured persons as % of population) in Australia

Appendix E: KPIs for total health care financing in Australia from 1975/76 to 2003/04