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**Australian Centre for Economic Research on Health**

## **Equity of health care financing in Iran**

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## Abstract

This study presents the first analyses of the equity of health care financing in Iran. Kakwani Progressivity Indices (KPIs) and concentration indices (CIs) are estimated using ten national household expenditure surveys, which were conducted in Iran from 1995/96 to 2004/05. The indices are used to analyze the progressivity of two sources of health care financing—health insurance premium payments and consumer co-payments (and the sum of these)—for Iran as a whole, and for rural and urban areas of Iran, separately. The results suggest that health insurance premium payments became more progressive over the study period; however the KPIs for consumer co-payments suggest that these are still mildly regressive or slightly progressive, depending upon whether household income or expenditure data are used to generate the indices. Interestingly, the Urban Inpatient Insurance Scheme (UIIS), which was introduced by the Iranian government in 2000 to extend insurance to uninsured urban dwellers, appears to have had a regressive impact on health care financing, which is contrary to expectations. This result sounds a cautionary note about the potential for public programs to crowd out private sector, charitable activity, which was prevalent in Iran prior to the introduction of the UIIS.

Keywords: Equity, Health care financing, Kakwani progressivity index, Iran.

JEL codes: D31, D63, I18, P43.

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# 1 Introduction

Health sector equity is widely regarded as an important policy objective (O'Donnell *et al.* 2007) and one against which the performance of health care systems is often evaluated (Lairson *et al.* 1995). Some authors have gone so far as to suggest that equity concerns ought to predominate other health sector goals, including that of efficiency (Mooney 1986). Irrespective of one's normative position, the positive economic analysis of distributional concerns in the health sector has been of considerable interest to economists, policy-makers and others in recent years (Wagstaff *et al.* 2000; Wilkinson 1995). The distributions of health care financing contributions in European countries and the United States (Wagstaff and van Doorslaer 1992; Wagstaff *et al.* 1999) and Australia (Lairson *et al.* 1995) have now been analysed; and recently, O'Donnell *et al.* (2008) provided the first empirical estimates for a number of Asian territories. To date, though, there has been no analysis of the health care financing distribution in middle-eastern countries. This paper provides the first such evidence, for Iran.

In Iran, Article 29 of the Constitution guarantees all citizens the right of access to health care. Thus, the letter of the law suggests that the provision of health care to the entire Iranian population must be one of the Iranian government's focal points. Although such decrees are subject to the usual vagaries (of interpretation, etc.), it may also be argued that the government of Iran has taken a number of steps in recent years to improve access to health care. Indeed, greater equity in health care financing is a stated goal of the Iranian government, as articulated in the Law of the Fourth Economic, Social



and Cultural Development Plan (Management and Planning Organization of Iran 2004). The modern reforms to health care financing in Iran began in the mid-1990s, and largely have involved the extension of health insurance coverage to large proportions of the rural and the urban Iranian population that were previously uninsured. Indeed, it can now be said that, since 2005, most Iranians have had insurance for both hospital and out-of-hospital care.

During the preceding decade, the Iranian government embarked on a range of initiatives that were designed to improve insurance coverage, which included the introduction of insurance for hospital services for the urban uninsured (approximately 10 per cent of Iran's population), and the introduction of insurance covering in- and out-of-hospital services for the rural population (about 30 per cent of the Iranian population). Indeed, the main gap in insurance coverage in Iran is now out-of-hospital services for the (formerly) "urban uninsured" who do not have insurance for out-of-hospital services (such as GP services). On the other hand, a publicly funded and supplied primary health care (PHC) program exists in Iran, and is available at zero price to Iranians. Thus, although health insurance coverage in Iran is not universal, it is fairly close to being so when purchases of insurance policies and public health care financing programs are taken together. The concomitant growth of the health sector in Iran is apparent in the World Health Organization (WHO) National Health Accounts (NHAs), which record an increase in health expenditure from 4.9% of GDP in 1996 to 7.8 % of GDP in 2005 (WHO 2008).

In this article, we provide the first measures of equity in health care financing for Iran. Reliable data on the health sector are difficult to ob-

tain directly from the Iranian government. So, instead we use household income and expenditure survey data for 1995-1996 to 2004-2005 to examine the progressivity of health care financing, and to decompose our estimates to examine the progressivity of health insurance premium payments and consumer co-payments for medical care over this period. Hence we are able not only to produce the first estimates of equity of health care financing in Iran, but also to track changes in the progressivity of health care financing, by source. This time-series dimension to the work is particularly interesting given the government's stated focus on equity in health care financing policy over this period and the rapid health expenditure growth that occurred in Iran over the study period. Moreover, we are able to examine progressivity in both rural and urban populations separately. This is important because the Iranian government's policies have specifically addressed the problem of uninsured rural and urban dwellers, separately, with qualitatively- and temporally-distinct policy initiatives.

The paper is organised as follows: Section 2 provides an overview of health care financing and delivery in Iran, along with a discussion of recent government initiatives to improve health insurance coverage and our hypotheses regarding their effects; Sections 3 and 4 describe the data and methods; Section 5 presents the results; and Section 6 concludes.

## 2 Health Care Financing and Delivery in Iran: A Brief Overview

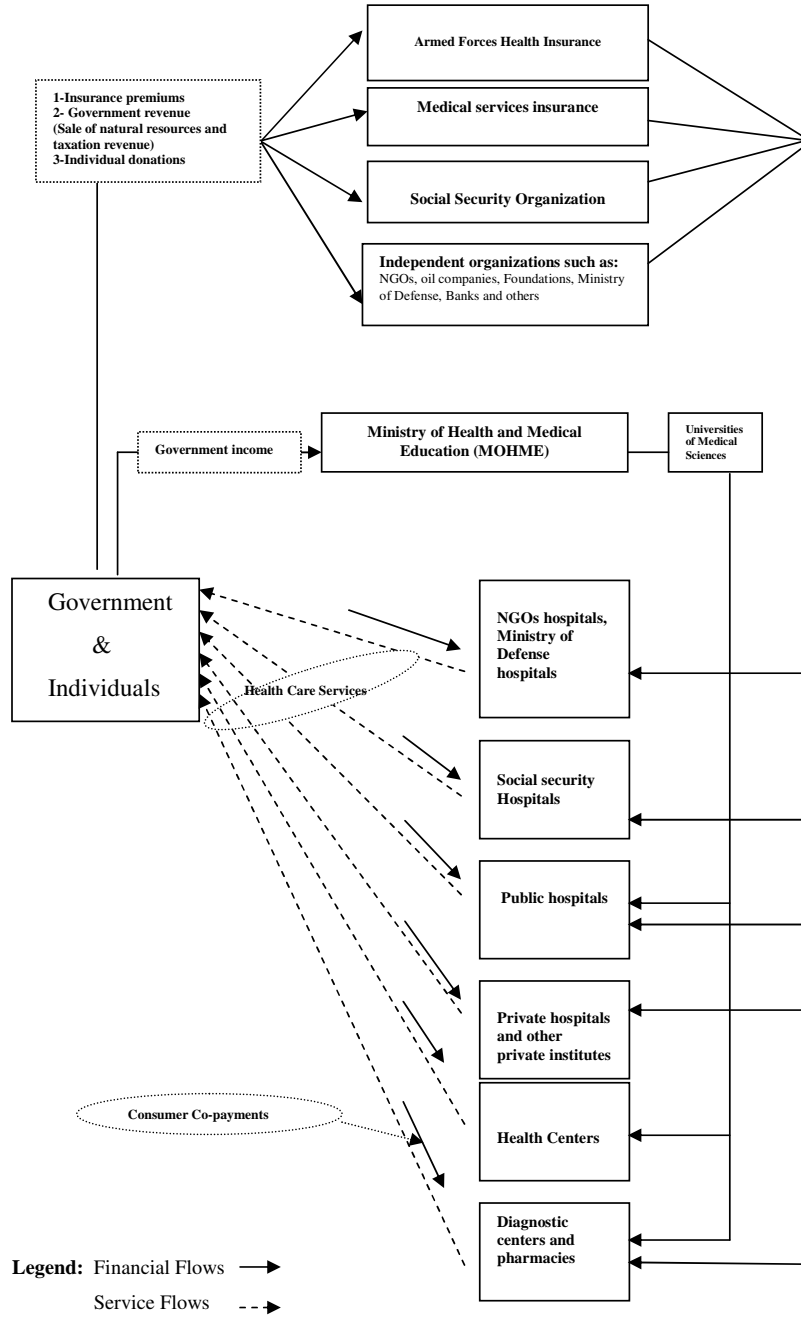
Figure 1 presents a schematic representation of Iran's health care financing and delivery arrangements.

The top half of Figure 1 indicates the institutional arrangements in Iran's health care financing system. Although all Iranians are now formally insured for inpatient hospital treatment, there are numerous health insurance carriers and these include both government and independent organizations. The government organizations include the Medical Service Insurance Organization (MSIO), the Social Security Organization (SSO) and the Armed Forces Medical Service Organization (AFMSO). The independent organizations include oil companies, radio and television broadcasters, banks, and so on that provide health insurance for their employees.<sup>1</sup> Generally speaking, health insurance is employer-based, in the sense that government employees are covered by government organisations and that employees of larger independent organisations tend to be covered by their employer. Small business operators, sole traders and so on, may also purchase an insurance policy from the MSIO or the SSO. Purchased insurance policies typically cover both in- and out-of-hospital services, however the MSIO coverage that is extended to urban dwellers who have not purchased a policy does not cover out-of-hospital services. Since 2005, the insurance that has been extended to Iran's rural population has covered both in- and out-of-hospital services and is identi-

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<sup>1</sup>According to the Iranian Constitution, the latter "independent" organisations are, nevertheless, public property.

Figure 1: The Iranian Health Care Financing and Delivery Systems



cal to the coverage obtained by employees and others who purchase cover directly.

Insurers in Iran receive insurance premium revenue from their members, but they also receive government support, which is derived from general taxation revenue as well as the sale of natural resources (e.g., oil). They may also receive individual donations and bequests. According to the World Health Organization (2008) NHAs government expenditures account for approximately 50 per cent of health care financing in Iran, while private sources (i.e., private insurance premiums and consumer co-payments) account for the remaining 50 per cent of health expenditure. A very important point to make, in this regard is that, according to The Central Bank of the Islamic Republic of Iran (2009) in the last decade, on average, only about 30% of government derived from taxation. The remaining 70% was derived from the sale of natural resources, principally, oil. Thus, the equity picture that we are able to draw by focusing only on private health care financing in Iran is not as skewed as it would be if greater general tax revenue were raised by taxes levied on the population.

The boxes in the lower half of Figure 1 indicate the main components of the Iranian health care delivery system and the arrows to their right indicate flows of funds from two sources: insurers and the MOHME. The insurer payments represent expenditures for services rendered to their insureds and payments from the MOHME (via the Universities of Medical Sciences) to public hospitals, health centres, diagnostic centres and pharmacies. With the exception of the (primary) health centres, the revenue streams of each of the services just listed include both direct government grants via the MOHME

and insurance company payments from the entities at the top of Figure 1. Note that all of the health care delivery entities in the lower half of Figure 1 receive consumer co-payments, which are denoted by the solid arrows to the left of the boxes.

The only health care delivery entity type in Figure 1 that receives zero payments from health insurers is health centres, which are financed and run by the MOHME. This has been a central feature of the Iranian health care system since the Islamic Revolution in 1979: traditionally, the government had relied heavily on its Primary Health Care (PHC) system—which all Iranians are entitled to use—to pursue its equity goals in the health sector. This system involves the widespread use of low-cost, effective primary care services. These services include community health education, prenatal care, family planning, nutritional care and education, immunization, school hygiene, dental health, environmental health and so on, as well as the treatment of some conditions. The services are delivered by units that are called “health posts” in urban areas and “health houses” in rural areas. Importantly, these entities, which are the first contact point in the health system, also control referrals to the second level of the health system (which we refer to as secondary health care), which is made up of Rural and Urban Health Centres, where a GP provides medical services to referred patients. These centres, in turn, refer patients to District-level hospitals and to (the more prestigious) University of Medical Sciences hospitals, which constitute the tertiary components of the Iranian health care system.

As Figure 1 shows, the institutional expenditure on secondary and tertiary health care services in Iran derives from health insurance. Thus, the

gaps in health insurance coverage that existed prior to reforms that were introduced between 1995 and 2005 primarily affected services produced by the secondary and tertiary components of the Iranian health care system.

## **2.1 Reforms in Iranian Health Care Financing and Hypothesised Effects**

### **2.1.1 Reforms**

One important step by the government, in its effort to extend insurance coverage, was the introduction of the Public Medical Service Insurance Coverage Act (PMSICA). This Act, which was implemented in September 1995, established the MSIO. The MSIO's remit was to provide formal health insurance coverage to people from a range of occupations, social strata and circumstances, including civil servants, village dwellers, decamping tribes, the self-employed, people with disabilities, university students, released captives and the families of individuals who the Iranian authorities recognised as "martyrs".

In 2000, the government then introduced an initiative called the Urban Inpatient Insurance Scheme (UIIS). The purpose of the UIIS was to subsidize inpatient health care for Iranians who live in urban areas but do not hold health insurance. This initiative extended health insurance to approximately 10 per cent of the Iranian population.

Finally, in 2005, the Iranian government announced the extension of insurance to the 30 percent of Iran's population that lives in rural areas. As was mentioned previously, rural Iranians now have insurance for primary-

through-tertiary health care services, and their policy inclusions and conditions are essentially identical to those who have an insurance policy purchased from their insurer or the MSIO. Unfortunately, the available household survey data do not enable us to observe the effects of this policy on the progressivity of health care financing. Thus, we restrict our attention to measuring the progressivity of health care financing and the impact, if any, of the UIIS over the time series.

### 2.1.2 Hypothesised Effects

Initiatives such as the UIIS may be expected to increase the progressivity of health care financing in urban areas of Iran. Thus, one may hypothesise that the KPIs for urban areas will increase in magnitude (i.e., become less strongly negative or more positive), *ceteris paribus*, following the introduction of the UIIS. Relaxing the *ceteris paribus* assumption complicates matters, particularly when one considers the possibility that the UIIS may have also resulted in some crowding out of charitable behaviour. In particular, charitable organisations which provide support to the poor and uninsured predate the UIIS reforms: the role for these organisations in assisting the urban “uninsured” presumably changed with the introduction of the UIIS and could be expected to lead to crowding out.<sup>2</sup> Furthermore, if the UIIS affected the behaviour of urban medical providers, either in respect of the prices charged to the poor and uninsured for their services, or their propensity to refer the uninsured for hospital treatment, this may attenuate the progressivity of the impact of

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<sup>2</sup>Of course, if such charities were crowded out of urban areas, but *into* rural areas, the progressivity of health care financing in rural areas could improve.



the reforms where total health care expenditure and out-of-pocket payments, in particular, are concerned. Finally, if the urban uninsured were not, on average, *relatively* poor the impact of the policy could be neutral or regressive. Unfortunately, we cannot control for such variables in our analysis: data on these potential confounders are not available.

In summary, we hypothesise that health care financing in Iran will have become more progressive over the study period, at least in urban areas. A converse (more regressive) or neutral result on the estimated KPIs and CIs over time could arise if crowding out, behavioural, or other confounders prevail.

### 3 Data

As was described in Section 2, public and private expenditures on health care in Iran account for approximately equal (i.e., 50/50) shares of the total. Public expenditures are financed mostly via the sales of natural resources and from other sources of government revenue, including income taxation. Unfortunately, reliable data on public health expenditure do not exist. Private expenditures on health care take the form of consumer co-payments and health insurance premium payments. Fortunately, high-quality data are available on private expenditures on health care by household, via the Household Income and Expenditure Surveys (HIES). These surveys are collected and published annually by the Iranian Statistics Centre from 1995/96 to 2004/05, for both rural and urban areas.

The data include measures of household income and detailed disaggre-

gations of household expenditure data on a variety of goods and services, including health care. Importantly, the health care expenditure measures capture consumer co-payments and payments of health insurance premiums separately, enabling us to disaggregate our inequality measures for these two sources.

The HIES are based on a two-step sampling approach in which households, which constitute the sampling unit, are randomly selected from all parts of the country. In the first step, the number of “blocks” and “villages” required for representative sampling in every province is estimated using the following formula:

$$n_{ch} = \frac{1}{m} \left[ \frac{Z_{0.05} S_{ch}}{B_{ch} X_{ch}} \right]^2 D_{eff} \quad (1)$$

where  $c$  indicates the variable of interest,  $h$  indexes the province,  $m$  is the number of households in the sampling block (which, in turn, is set equal to five in rural areas and 100 in urban areas),  $s_{ch}$  indicates the estimated standard deviation of the variable,  $B_{ch}$  is the  $p$ -value,  $X_{ch}$  is the estimated mean of  $c$  and  $D_{eff}$  is the (cluster sample) design effect. The latter is an estimate of the factor by which the number of sampling units (households in this case) required must increase due to the cluster sampling design, compared with a simple random sample.<sup>3</sup> In the second step, the sampling units—the households—are chosen using the systematic circle method (Statistical Center of Iran 2005).

Data at the level of the individual are not available to us, so we take the

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<sup>3</sup>For the Iranian HIES the  $D_{eff} = 1.2$ .

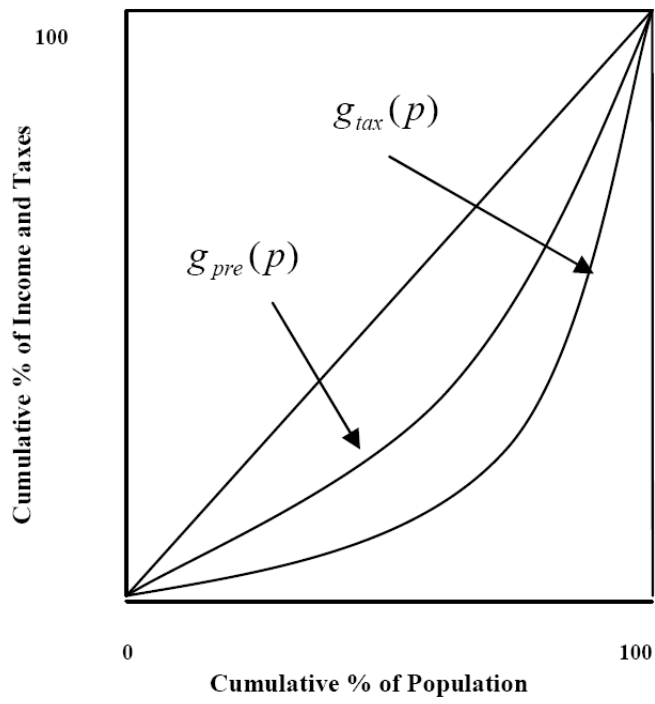
household as the unit of observation in this study.

## 4 Methods

The concept of an equitable distribution of health expenditure is, of course, a normative one. The actual distribution of health expenditure is, on the other hand, a positive matter. Our purpose is to conduct a positive analysis of health expenditures in Iran. We do this by estimating Kakwani progressivity indices (KPIs), which can be used to quantify the progressivity/regressivity of health care financing using the available data. This approach, which has been used commonly in health economics (Wagstaff and van Doorslaer 2000) is superior to the use of alternatives such as the Fairness of Financial Contributions (FFC) index (Murray *et al.* 1989; World Health Organization 2000) which, as Wagstaff (2002) has established, cannot distinguish between the progressivity or regressivity of health care financing. Furthermore, the Kakwani index, a global index of progressivity, has the useful properties of not only being able to identify progressivity but to measure the degree of progressivity of taxation or health care financing (Wagstaff and van Doorslaer 1992). This property is especially useful in tracking progressivity over time or comparing progressivity across countries.

The KPI is (along with measures such as the Suits Index) part of an approach that compares the actual tax distribution with a revenue-equivalent proportional tax distribution. According to these measures, a tax system is considered to be progressive if better-off individuals pay proportionally more of their income as taxes than do poorer individuals. Thus, these measures

Figure 2: The Kakwani Progressivity Index



reflect the extent by which a tax system digresses from proportional financing (Achdut 2000).

The Kakwani index depends on two curves: the Lorenz curve for pre-tax income ( $g_{pre}(p)$ ) and the tax concentration curve ( $g_{tax}(p)$ ). The former plots the cumulative percentage of income earned by the population of individuals or households, ranked in ascending order of pre-tax income; the latter plots the cumulative percentage of tax payments made by individuals or households ranked in ascending order of pre-tax income. The tax concentration curve and Lorenz curve for pre-tax income coincide when taxes are imposed strictly in proportion to income. The tax concentration curve lies inside the concentration curve for pre-tax income if the average tax rate decreases with income (so that the tax system is regressive). Conversely, if taxes are progressive, the tax concentration curves lies outside the Lorenz curve for pre-tax income (Wagstaff and van Doorslaer 1992). The Kakwani index values range between -2 and +1 and is equal to the difference between the tax concentration index and the Gini coefficient for pre-tax income. If taxes are proportional to pre-tax income the Kakwani measure is equal to zero; whereas the index is positive (negative) if the tax system is progressive (regressive). The value of +1 denotes the highest possible degree of progressivity while the value of -2 reflects the highest possible degree of regressivity.

The KPI can also be formulized for different sources of taxes as  $K_T = C_{tax} - G_X$  where:  $K_T$  is the Kakwani index,  $G_X$  is the Gini coefficient for pre-tax income and  $C_{tax}$  is the concentration index for tax, which can be estimated with the following equation:  $C_{tax}$  equals pre-tax income,  $t_n$  through  $t_n$  are tax rates,  $Tx = t_1x_1 + t_2x_2 + .. + t_nx_n$  and  $TX = Tx/n$  (Gerdtham

and Sundberg 1998). Thus, the Kakwani index requires one to ascertain the Lorenz curve and estimate its statistical summary measure, the Gini coefficient. Both of these are obtained from data on the cumulative percentage of two variables: income and population, ranked in ascending order of income.

Similarly, the KPI can be adapted to examine the progressivity of a given source of health care finance, such as:  $K_h = CC_{pay} - G_x$ , where  $K_h$  is the KPI for a given source of health care financing (e.g., consumer co-payments),  $CC_{pay}$  is the health payments concentration curve for that source of finance and  $G_x$  is the Gini coefficient for income.

In this study, we generate Gini coefficients for income, and concentration indices and KPIs for three health expenditure measures: health insurance premium payments, consumer co-payments and total health expenditures (i.e., the sum of the preceding two categories). In each case, we also use household expenditure from the HIIES as a proxy for ability to pay and recompute the CIs and KPIs. We do this because the variance of a household's income is generally higher than the variance of transitory expenditure; and transitory income often tends to be underestimated/under-reported in household surveys, whereas household expenditure tends to be reported more accurately (Xu *et al.* 2003; Deaton and Grosh 2000). Thus, there are some reasons to prefer the expenditure-based measures over the income-based measures. Furthermore, this turns out to be important in our study, because in numerous cases regressivity is suggested by one measure, but progressivity is suggested by the other. Furthermore, our income-based measures display considerably more volatility than the expenditure-based measures.

In addition to presenting these indices for Iran as a whole, we disag-

gregate the analysis to produce the same indices for rural and urban areas, separately. The latter is a worthwhile exercise, especially because the Iranian government has pursued health care financing policies that have specifically targeted urban, and then rural areas, sequentially.

Finally, to measure the size of any changes to these indices over time and their statistical significance, we also estimate simple time-trend regressions of the following (general) form:

$$I_t = \alpha_0 + \alpha_1 t + \alpha_2 DVUIIS_t + \epsilon_t \quad (2)$$

where  $I$  is the index of interest (e.g., the KPI for consumer co-payments),  $t$  indexes time,  $DVUIIS$  is an intercept dummy for the UIIS policy, and  $\epsilon$  is a stochastic error term. The sign and statistical significance of  $\alpha_1$  serve as a test of the null hypothesis of no change in progressivity: a statistically significant coefficient rejects the null hypothesis and, if negative (positive) a trend decline (increase) in progressivity. Similarly, we test the null hypothesis that the UIIS was associated with of no change in progressivity by estimating  $\alpha_2$ : the null hypothesis is rejected if the coefficient is statistically significant; if the coefficient is positive (negative), we treat this as evidence that the UIIS policy was progressive (regressive). Our modelling approach is to include both the time trend ( $t$ ) and the policy dummy variable ( $DVUIIS$ ) in the regressions, and also to estimate the regressions without the dummy variable and without the time trends. The results presented in this paper are those for the final, parsimonious, models that were chosen by considering the goodness-

of-fit and other econometric (model selection) criteria.<sup>4</sup>

## 5 Results

In this section we present the estimated Gini coefficients for income, health expenditure concentration indices and KPIs for (i) health insurance premium payments, (ii) consumer co-payments, and (iii) total private health expenditure ((iii)=(i)+(ii)). The results are presented for (a) Iran, (b) urban areas of Iran, and (c) rural areas of Iran, for the years 1995/1996 to 2004/2005.

Tables 1 and 2 present the expenditure- and income-based results, respectively, for Iran. Tables 3 and 4 present the results for urban areas, and Tables 5 and 6 present the results for rural areas of Iran. We commence with some general observations about the results in Tables 1-6, and then consider the results for (a) through (c), in sequence. Finally we compare the results for each source of health care financing (i.e., (i) through (iii)) across the national, urban, and rural regions.

The first observation is that the household income-based Gini coefficients, concentration indices and KPIs are all generally smaller—and in some cases are considerably smaller—than the household expenditure-based measures of inequality: generally, the expenditure measures suggest greater progressivity (less regressivity) than the income-based measures. The exceptions to this rule are the national, urban and rural KPIs estimated for health insurance premium payments, for which the income-based estimates are larger; and the concentration indices for these payments, which are not sensitive to whether

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<sup>4</sup>The results of the other specifications are available from the authors upon request.



the income- or expenditure-based measures are used. On this point, note that the income- and expenditure-based Gini coefficients in all regions are fairly stable, suggesting that there has been little change in the distribution of income, per se, over the time period studied. Indeed, the regression coefficients on the time trends in all Gini regressions were statistically insignificant (as is indicated by the “-” in the second-last column of each of these tables). Second, it is noteworthy that whether the expenditure- or income-based approach is chosen has an effect on the sign of some or all of the estimated KPIs in the national, urban and rural estimates. Thus, where the KPI measures are concerned, the judgement as to whether or not private health care expenditures are regressive or progressive is sensitive to whether the income measure or the expenditure-based income proxy measure of household income is used. The concentration indices, on the other hand, universally suggest progressivity for all of the health expenditure measures: they are invariant to whether an income or expenditure-based proxy of income is used. Third, although the time-series trends from the expenditure-based measures in Tables 1, 3 and 5 are mixed, the income-based indices generally exhibit a trend of increasing progressivity, although many of these are statistically insignificant.

## **5.1 Iran (all regions)**

First, consider the results for Iran. The concentration indices for each source of health care financing are positive in both Tables 1 and 2, suggesting that private health expenditures and their two constituents—insurance premium payments and consumer co-payments—are progressive.

While this result is unaffected by the choice of an income- or expenditure-based computation of the indices, the trend estimate is sensitive to that choice. Specifically, the expenditure-based measures in Table 1 suggest that consumer co-payments and total private health care expenditure have become slightly less progressive over the decade, but that health insurance premium payments have become more progressive. By contrast, the income-based computations in Table 2 suggest that all three private health expenditure measures have become more progressive.

Turning our attention to the KPI measures of progressivity, the expenditure- and income-based measures produce different pictures of health care financing over the decade. According to the expenditure-based measures, consumer co-payments and total health expenditure in Iran are progressive, but became slightly less so over the study period, while health insurance premium payments were regressive in 1995/1996, but became less so over the following seven years and, from 2003/2004, became progressive. The income-based KPIs, though, suggest that the distribution of consumer co-payments in Iran are regressive, but became slightly less regressive over the study period. The distribution of total health expenditure, on the other hand, was regressive in 1994/1995 (KPI=-0.06820) but, by 2004/2005 this source of health expenditure had become progressive (KPI=0.00599).

Perhaps the most striking results are those generated from the regressions on the expenditure-based measures in Table 1. According to these results, the only statistically-significant trend increases in progressivity were in health insurance premium payments (see the positive, statistically significant time trend ( $t$ ) coefficients in the second last row); and that all of the remaining

Table 1: Gini Coefficients, Concentration Indices and Kakwani Progressivity Indices for Health Care Financing in Iran: 1995/1996 to 2004/2005 (Household Expenditure Measures)

Year	Gini Coefficient	Concentration			KPI for Consumer Co-payments	KPI for Health Insurance Premium Payments	KPI for Total Private Health Expenditure
		Concentration Index for Consumer co-payments	Index for Health Insurance Premium Payments	Concentration Index for Private Health Care Expenditure			
1995/1996	0.37038	0.50510	0.28855	0.47875	0.13472	-0.08183	0.10837
1996/1997	0.36407	0.51170	0.29472	0.48198	0.14763	-0.06935	0.11791
1997/1998	0.36776	0.49860	0.31624	0.47387	0.13083	-0.05152	0.10610
1998/1999	0.36046	0.50844	0.33771	0.47749	0.14798	-0.02275	0.11703
1999/2000	0.36729	0.51035	0.33213	0.47971	0.14306	-0.03516	0.11242
2000/2001	0.37688	0.49817	0.35166	0.47342	0.12129	-0.02522	0.09654
2001/2002	0.35891	0.48132	0.32922	0.45627	0.12241	-0.02969	0.09736
2002/2003	0.32795	0.44185	0.31231	0.41862	0.11389	-0.01564	0.09066
2003/2004	0.35163	0.47061	0.36822	0.44786	0.11899	0.01660	0.09624
2004/2005	0.35455	0.48106	0.37111	0.45916	0.12651	0.01657	0.10461
Regression results:							
<i>t</i>	-	-	0.00746 (0.005)	-	-	0.010035	-
<i>DVUIIS</i>	na	-0.032236 (0.010)	-	-0.02729 (0.018)	-0.02023 (0.001)	-	-0.01528 (0.001)

Table 2: Gini Coefficients, Concentration Indices and Kakwani Progressivity Indices for Health Care Financing in Iran: 1995/1996 to 2004/2005 (Household Income Measures)

Year	Gini Coefficient	Concentration Index for Consumer co-payments	Concentration Index for Health Insurance Premium Payments	Concentration Index for Private Health Care Expenditure	KPI for Consumer Co-payments	KPI for Health Insurance Premium Payments	KPI for Total Private Health Expenditure
1995/1996	0.24030	0.15741	0.27830	0.17210	-0.08289	0.03800	-0.06820
1996/1997	0.24694	0.20528	0.28359	0.21601	-0.04166	0.03665	-0.03094
1997/1998	0.28313	0.08495	0.27158	0.11036	-0.19818	-0.01155	-0.17277
1998/1999	0.25211	0.20888	0.34373	0.23290	-0.04323	0.09162	-0.01921
1999/2000	0.25036	0.20967	0.35942	0.23475	-0.04069	0.10906	-0.01561
2000/2001	0.30353	0.21420	0.38239	0.24192	-0.08933	0.07886	-0.06161
2001/2002	0.24528	0.21048	0.35994	0.23452	-0.03480	0.11466	-0.01076
2002/2003	0.23983	0.17704	0.32384	0.20312	-0.06279	0.08402	-0.03671
2003/2004	0.23480	0.17546	0.37244	0.21842	-0.05934	0.13765	-0.01638
2004/2005	0.23396	0.20387	0.38951	0.23995	-0.03009	0.15555	0.00599
Regression results:							
<i>t</i>	-	-	0.01185 (0.005)	-	-	0.01383 (0.000)	-
<i>DVUIIS</i>	na	-	-	-	-	-	-

sources of health care financing became *less* progressive when the UIIS was introduced (see the negative, statistically significant coefficients on *DVUIIS* in the final row of Table 1). This result is contrary to expectations, but is consistent with the hypothesis that the UIIS scheme crowded out charitable activities in health care financing. Finally, note that the time trend estimate on the Gini coefficient was not statistically significant, indicating no trend change in the progressivity of the income distribution itself in Iran over the period of interest.

## 5.2 Urban Iran

Tables 3 and 4 contain the results for urban Iran. Note that the numerical values of all concentration indices and KPIs have increased over time. The results thus suggest that the progressivity of health care financing in urban areas of Iran has generally increased although in reality, for several series (e.g., concentration indices for consumer co-payments), the recorded change is very small in magnitude. The regressions reported in the last two rows of Tables 3 and 4 suggest that the only statistically significant time trends were in those regressions for the concentration index and KPI for health insurance premium payments. Note, though, that *all* of the KPI regression coefficients on the *DVUIIS* policy dummy variable in Table 3 are negative and statistically significant. In Table 4, the coefficient on *DVUIIS* is also negative and statistically significant. These results provide further evidence that the impact of the UIIS policy—which targeted the urban uninsured—was regressive.

Table 3: Gini Coefficients, Concentration Indices and Kakwani Progressivity Indices for Health Care Financing in Urban Areas of Iran: 1995/1996 to 2004/2005 (Household Expenditure Measures)

Year	Gini Coefficient	Concentration Index for Consumer co-payments	Concentration Index for Health Insurance Premium Payments	Concentration Index for Private Health Care Expenditure	KPI for Consumer Co-payments	KPI for Health Insurance Premium Payments	KPI for Total Private Health Expenditure
1995/1996	0.37947	0.51996	0.22614	0.47717	0.14048	-0.15333	0.09770
1996/1997	0.37384	0.52429	0.24260	0.47806	0.15045	-0.13124	0.10422
1997/1998	0.37386	0.52520	0.25360	0.48044	0.15134	-0.12025	0.10659
1998/1999	0.37533	0.53710	0.28845	0.48427	0.16176	-0.08688	0.10893
1999/2000	0.38507	0.55229	0.29472	0.50231	0.16722	-0.09035	0.11723
2000/2001	0.41174	0.54746	0.31821	0.50409	0.13572	-0.09353	0.09234
2001/2002	0.38915	0.52808	0.29713	0.48428	0.13893	-0.09202	0.09512
2002/2003	0.35582	0.46257	0.29291	0.42654	0.10674	-0.06291	0.07072
2003/2004	0.38319	0.50429	0.34383	0.46078	0.12110	-0.03936	0.07759
2004/2005	0.38856	0.53552	0.35857	0.49505	0.14695	-0.02999	0.10649
Regression results:							
<i>t</i>	-	-	0.01301 (0.000)	-	-	0.017503 (0.021)	-
<i>DVUIIS</i>	na	-	-	-	-0.02436 (0.012)	-0.03467 (0.000)	-0.03212 (0.060)

Table 4: Gini Coefficients, Concentration Indices and Kakwani Progressivity Indices for Health Care Financing in Urban Areas of Iran: 1995/1996 to 2004/2005 (Household Income Measures)

Year	Gini Coefficient	Concentration					
		Concentration Index for Consumer co-payments	Index for Health Insurance Premium Payments	Concentration Index for Private Health Care Expenditure	KPI for Consumer Co-payments	KPI for Health Insurance Premium Payments	KPI for Total Private Health Expenditure
1995/1996	0.28394	0.22851	0.21156	0.22604	-0.05543	-0.07237	-0.05790
1996/1997	0.28389	0.25787	0.22222	0.25202	-0.02601	-0.06167	-0.03186
1997/1998	0.28218	0.20283	0.22786	0.20695	-0.07936	-0.05432	-0.07523
1998/1999	0.28676	0.27164	0.28386	0.27418	-0.01512	-0.00290	-0.01257
1999/2000	0.29916	0.27153	0.32571	0.28165	-0.02763	0.02655	-0.01750
2000/2001	0.36708	0.27241	0.35022	0.28667	-0.09467	-0.01686	-0.08041
2001/2002	0.30172	0.29011	0.32984	0.29738	-0.01161	0.02811	-0.00434
2002/2003	0.29680	0.23893	0.30222	0.25218	-0.05787	0.00542	-0.04463
2003/2004	0.29498	0.23945	0.35279	0.26943	-0.05553	0.05781	-0.02555
2004/2005	0.29523	0.26592	0.37861	0.29079	-0.02931	0.08338	-0.00444
Regression results:							
<i>t</i>	-	-	0.01789 (0.000)	-	-	0.02434 (0.000)	-
<i>DVUIIS</i>	na	-	-	-	-	-0.057184 (0.029)	-

Perhaps ironically, the only positive and significant *time-trend* coefficients in Tables 3 and 4, are those on the CIs and KPIs health insurance premium payments. Thus, health insurance premium payments trend progressivity apparently would have improved more substantially in the absence of the UIIS policy.

Finally, note that the income-based KPIs suggest that consumer co-payments and total private health expenditure in urban Iran remain mildly regressive, but that insurance premium payments in urban areas—which were regressive at the start of the time series—were progressive by 2004/2005.

### **5.3 Rural Iran**

Tables 5 and 6 contain the results for rural areas of Iran. The Gini coefficients are, once again, stable for rural areas of Iran and are numerically close to the estimates for urban areas. Interestingly, the concentration indices and KPIs display quite different time-trends depending upon whether one chooses the household income- or expenditure-based computations. The regression results also differ considerably between the income- and expenditure-based measures.

Numerically, the income-based measures (Table 6) uniformly suggest increasing progressivity (decreasing regressivity) over the study period, although the regression results on the time-trend are mostly statistically insignificant. By contrast, the expenditure-based concentration indices for (Table 5) consumer co-payments and total private health expenditure suggest decreasing progressivity, as do the KPIs for both these series. The concen-



tration index for health insurance premium payments, on the other hand, suggests increasing progressivity between 1994/1995 and 2004/2005, as does the KPI. However, only the regressions on the CIs for Consumer co-payments and Private Health Expenditure, and the KPIs for Health Insurance Premium Payments have statistically significant regression coefficients: the coefficient on the *DVUIIS* suggests a regressive effect of that policy for the CI regressions and the positive time-trend coefficient on the KPI for Health Insurance Premium Payments suggests an increase in trend progressivity for that source of health care financing. The expenditure-based measure of the latter KPI suggests that health insurance premium payments were regressive in rural Iran at the start of the series, but became mildly progressive in 1998/1999 and remained progressive by 2004/2005, although, they did become regressive for one year in the interim (2002/2003).

The foregoing results on the *DVUIIS* are somewhat curious: the UIIS is an urban scheme which we expected to have zero effect on progressivity in rural areas unless, for example, charitable organisations were crowded out of urban areas *into* rural areas, in which case the policy should have had a progressive spill-over effect on rural areas. Thus, we find the regressive impact suggested by the negative coefficients on *DVUIIS* in Table 5, difficult to explain.

## 5.4 Regional Comparisons

Finally, we present a brief comparison of the KPI measures (only) on each source of health care financing ((i)-(iii)) across the three geographical/regional

Table 5: Gini Coefficients, Concentration Indices and Kakwani Progressivity Indices for Health Care Financing in Rural Areas of Iran: 1995/1996 to 2004/2005 (Household Expenditure Measures)

Year	Gini Coefficient	Concentration Index for Consumer co-payments	Concentration Index for Health Insurance Premium Payments	Concentration Index for Private Health Care Expenditure	KPI for Consumer Co-payments	KPI for Health Insurance Premium Payments	KPI for Total Private Health Expenditure
1995/1996	0.40970	0.54143	0.37024	0.52702	0.13173	-0.03946	0.11733
1996/1997	0.40941	0.55544	0.37331	0.53793	0.14603	-0.03610	0.12852
1997/1998	0.42530	0.53098	0.41387	0.52066	0.10568	-0.01143	0.09536
1998/1999	0.41180	0.54269	0.43783	0.52851	0.13089	0.02604	0.11672
1999/2000	0.41457	0.51860	0.42091	0.50522	0.10403	0.00634	0.09065
2000/2001	0.40451	0.49653	0.43778	0.48865	0.09202	0.03327	0.08414
2001/2002	0.40166	0.50069	0.41639	0.49011	0.09903	0.01473	0.08845
2002/2003	0.38241	0.49818	0.36551	0.48108	0.11577	-0.01690	0.09868
2003/2004	0.39996	0.52399	0.44089	0.51145	0.12403	0.04093	0.11149
2004/2005	0.40346	0.50235	0.43381	0.49197	0.09889	0.03035	0.08851
Regression results:							
<i>t</i>	-	-	-	-	-	0.006868 (0.021)	-
<i>DVUIIS</i>	na	-0.03348 (0.003)	-	-0.031216 (0.003)	-	-	-

Table 6: Gini Coefficients, Concentration Indices and Kakwani Progressivity Indices for Health Care Financing in Rural Areas of Iran: 1995/1996 to 2004/2005 (Household Income Measures)

Year	Gini Coefficient	Concentration Index for Consumer co-payments	Concentration Index for Health Insurance Premium Payments	Concentration Index for Private Health Care Expenditure	KPI for Consumer Co-payments	KPI for Health Insurance Premium Payments	KPI for Total Private Health Expenditure
1995/1996	0.27068	0.16952	0.37907	0.18709	-0.10116	0.10839	-0.08359
1996/1997	0.28497	0.24646	0.39823	0.26106	-0.03851	0.11326	-0.02391
1997/1998	0.30795	0.17333	0.40052	0.19373	-0.13463	0.09257	-0.11422
1998/1999	0.29196	0.23099	0.48142	0.26421	-0.06097	0.18946	-0.02775
1999/2000	0.29916	0.27153	0.325706	0.281654	-0.02763	0.02655	-0.01750
2000/2001	0.29283	0.18383	0.48941	0.22426	-0.10900	0.19658	-0.06857
2001/2002	0.28991	0.22340	0.46820	0.25392	-0.06650	0.17829	-0.03599
2002/2003	0.27888	0.22691	0.40072	0.24931	-0.05197	0.12184	-0.02957
2003/2004	0.27747	0.23986	0.45679	0.27231	-0.03761	0.17932	-0.00516
2004/2005	0.29384	0.24524	0.48776	0.28169	-0.04860	0.19392	-0.01214
Regression results:							
<i>t</i>	-	0.01639 (0.030)	-	0.01628 (0.022)	-	-	-
<i>DVUIIS</i>	na	-	-	-	-	-	-

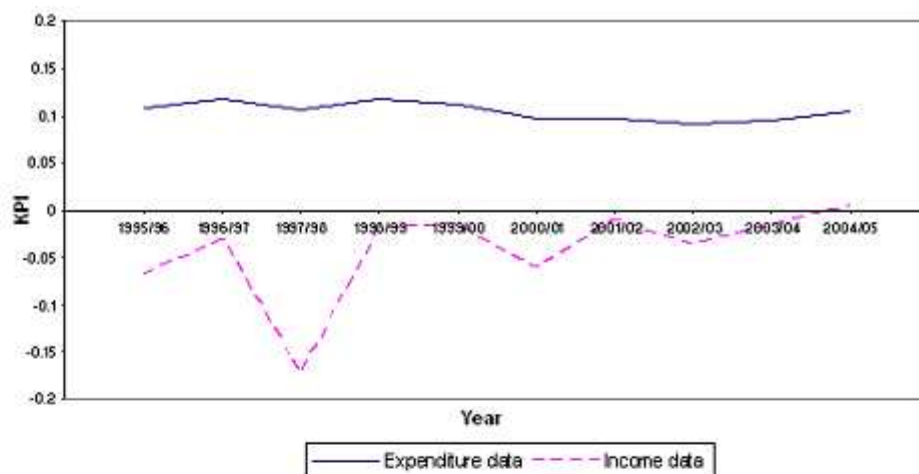
areas ((a)-(c)) of interest.

Figure 3 presents the KPIs for total private health expenditure in Iran (all regions), urban areas of Iran, and rural areas of Iran, in panels (a) through (c) respectively. The expenditure-based measures are depicted by solid lines and the income-based measures are depicted by broken lines. The relative volatility of the income-based KPIs are particularly evident in the three panels of Figure 3 (and this volatility characterises the income measures in the remaining figures too). The expenditure-based KPIs are fairly stable across the regions, with the only appreciable overall change being a decrease in progressivity in rural areas (See Figure 3c).

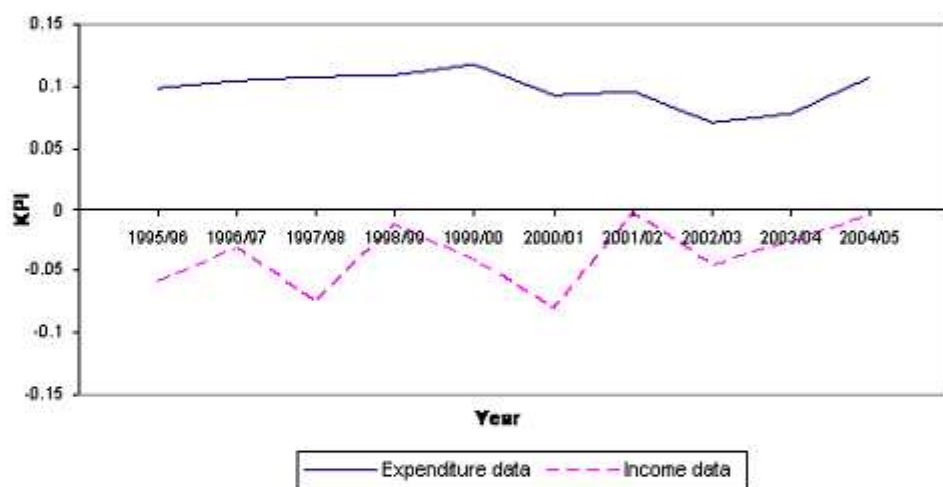
In relation to the expenditure-based measures, the statistically significant decline in the progressivity of Total Private Health Expenditure in urban areas between 1999/2000 and 2003/2004 (and subsequent improvement in 2004/2005) is apparent in Figure 3b. This result corresponds with the negative statistically significant coefficients the policy dummy variable *DVUIIS* in Tables 1 and 3. A slightly different trend is evident in rural areas (Figure 3c), where the commencement of a fall in progressivity actually predates the introduction of the policy by one year. In both rural and urban areas there are subsequent general improvements in progressivity which, between these regions, appear to be negatively correlated: at the national level, the result is a fairly stable trend line with near-zero growth/decay.

Figure 4 presents the KPIs for private health insurance premium expenditures. Recall that the time-trend results on all of the expenditure-based KPIs for Health Insurance Premium Payments suggested trend progressivity; however the *DVUIIS* coefficients were negative for the regressions on

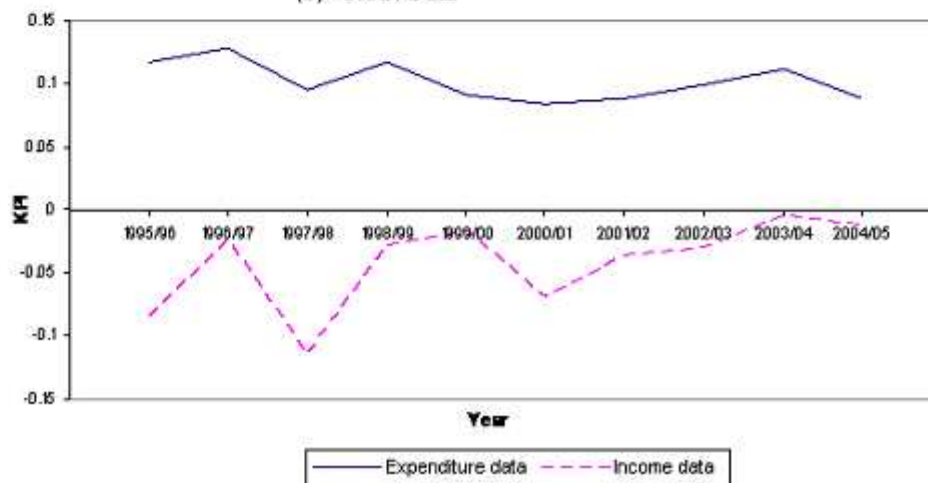
Figure 3: Kakwani Progressivity Indices for Total Private Health Expenditure in Iran, 1995/1996 to 2004/2005



(a) All regions



(b) Urban areas

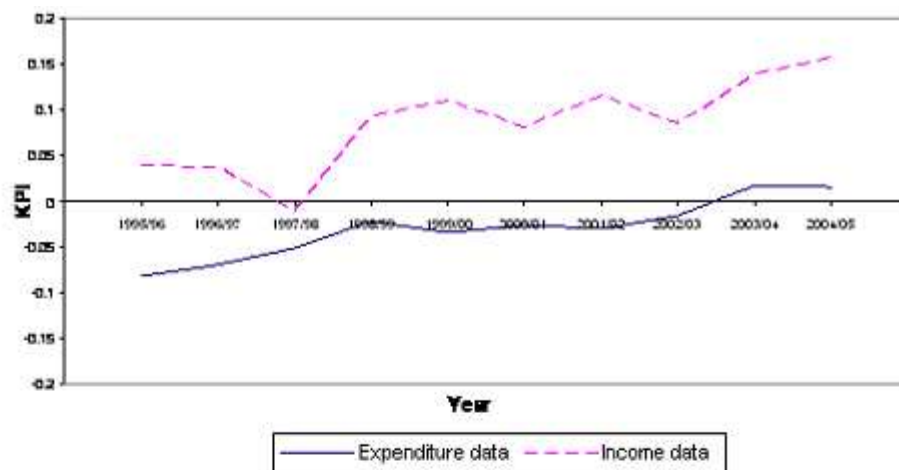


(c) Rural areas

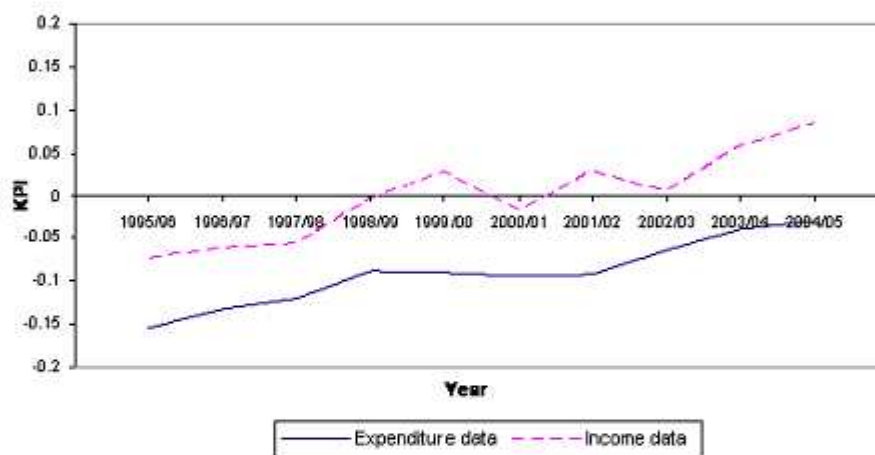
urban KPIs. As far as the income-based estimates are concerned, the largest changes arose in urban areas of Iran: the KPI increased from -0.07237 in 1995/1996, to 0.08338 in 2004/2005. In rural areas, the (income-based) KPI for health insurance premium payments also increased, but by a smaller magnitude. The index 0.10839 at the start of the series, and rose to 0.19392 in 2004/2005. For Iran (Figure 4a), the (income-based) KPI grew from 0.03800 in 1995/1996 to 0.15555 by the end of the series. Thus, according to the income-based KPIs, the distribution of insurance premium payments in Iran in the mid-1990s was close to proportional, but by the mid-2000s had become progressive. On the other hand, the expenditure-based measures suggest that there was a move from regressivity to progressivity in rural areas (Figure 4c) and in Iran as a whole (Figure 4a), and also reduction in regressivity in urban areas (Figure 4b) that, by 2004/2005, had rendered the distribution of private health insurance premium expenditures close to proportional.

Figure 5 contains the final set of KPIs for private co-payments by Iranians for the period 1995/1996 to 2004/2005. The income-based measures suggest that consumer co-payments are regressive in each region, but became less so over the 10 years shown. In urban areas the expenditure-based KPIs suggest a decline in progressivity from 1999/2000 through 2002/2003, followed by an increase in progressivity to approximately 1995/1996 levels by 2004/2005. In rural areas, the expenditure-based KPIs also suggest a decline in progressivity between 1998/1999 and 2000/2001. Although progressivity increased again thereafter, it declined again in the final year of the series, to less than 1995/1996 levels. As was reflected in the estimated time-trend and policy dummy (*DVUIIS*) results of regressions on the expenditure-based KPIs (cf

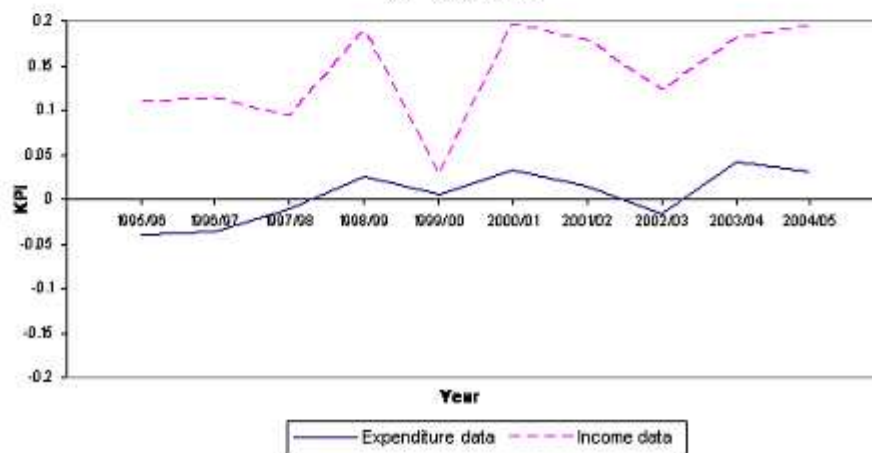
Figure 4: Kakwani Progressivity Indices for Private Health Insurance Premium Expenditures in Iran, 1995/1996 to 2004/2005



(a) All regions

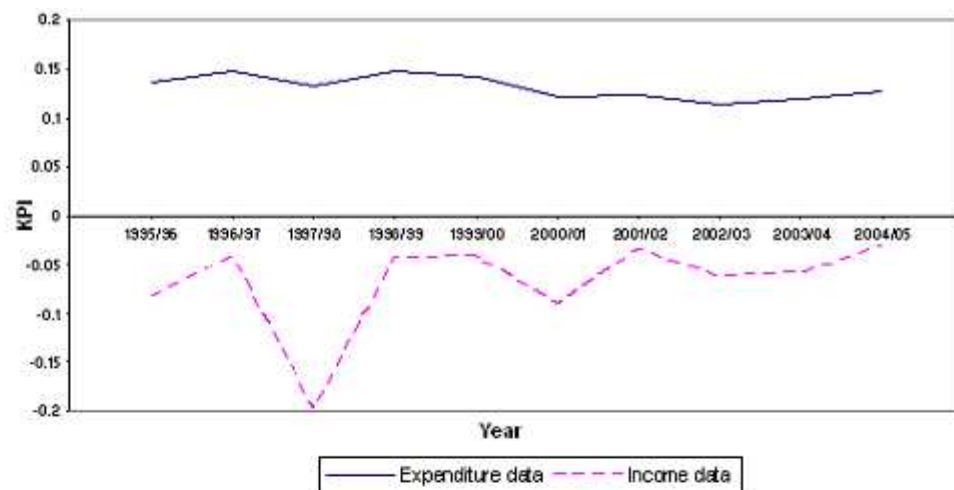


(b) Urban areas

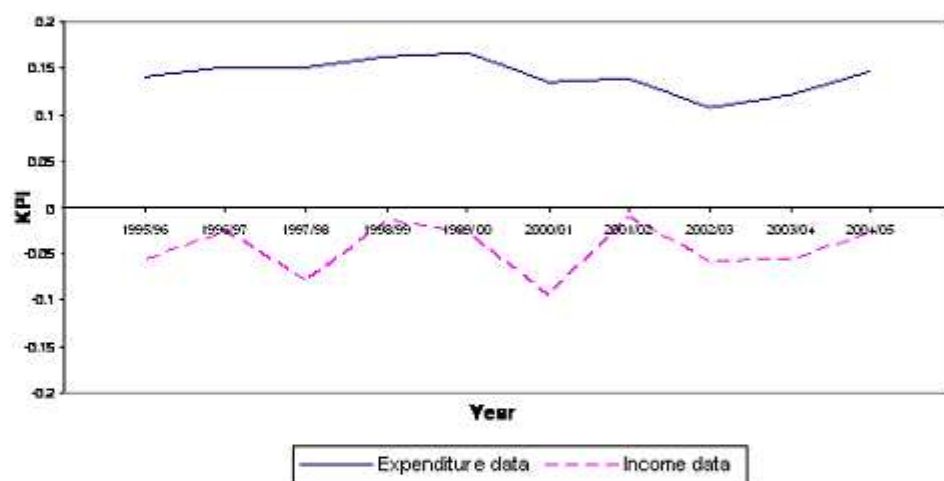


(c) Rural areas

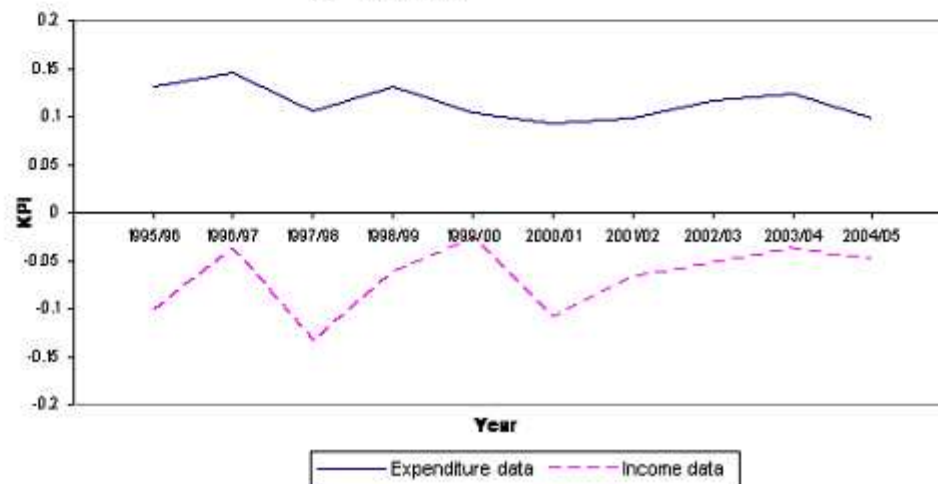
Figure 5: Kakwani Progressivity Indices for Private Copayment Expenditures in Iran, 1995/1996 to 2004/2005



(a) All regions



(b) Urban areas



(c) Rural areas



Tables 1, 3 and 5), there is little trend change in progressivity for Consumer co-payments, but the UIIS policy itself appears to have been associated with a decline in progressivity.

## 6 Discussion and Conclusions

This paper contains the first empirical evidence on the equity of health care financing in Iran. Kakwani Progressivity Indices were computed to measure inequality of consumer co-payments, health insurance payments and total private health care expenditure, using data from annual household expenditure and income surveys from 1995/1996 to 2004/2005 . The progressivity of these sources of health care financing was measured by computing KPIs with both household income and household expenditure data. The results show two different pictures for progressivity of health care financing in Iran based on whether an expenditure- or income-based approach is used to estimate the indices. The income-based KPIs suggested less progressivity than the expenditure-based measures for both consumer co-payments and total payments, although the reverse was true for health insurance premium expenditures. Generally, we favour the expenditure-based measures because expenditure data are known to be more reliable, and subject to lower variance than income data in household surveys. We therefore will refer to the results produced by our expenditure-based measures to summarise our findings.

The results suggest that consumer co-payments are progressive in both urban and rural areas of Iran. This result is similar to the results produced for

consumer co-payments in Asian nations such as Bangladesh, Indonesia, Korea Republic, the Philippines, Sri Lanka, and Thailand (O'Donnell *et al.* 2008). By contrast, there is evidence that consumer co-payments are regressively distributed in Japan, China, the Kyrgyz republic, Taiwan (O'Donnell *et al.* 2008) and also in a number of OECD countries (Wagstaff and van Doorslaer 1992, Wagstaff *et al.* 1999).

The expenditure-based KPIs for health insurance payments suggest that this source of health care financing was progressive, in some years, in rural areas but regressive in all years in urban areas. For Iran, as a whole, these payments were mostly regressive, but became mildly progressive by the end of the time-series. The finding that health insurance premium payments are generally regressive corresponds with results for countries such as the Korean Republic, Japan, Taiwan, Germany and the Netherlands which also have regressive health insurance premium expenditures (Wagstaff *et al.* 1999, O'Donnell *et al.* 2008).

Finally, the expenditure-based KPIs for consumer co-payments suggest that this source of health care financing is progressive. However, paradoxically, the UIIS—a policy that was designed to extend health insurance coverage to urban dwellers without insurance—was associated with a slight deterioration in progressivity following its implementation in 2000/2001. This result may be due either to a crowding out effect, since private charities that provided health insurance or health care pre-dated the reforms; or it may have simply been that the uninsured urban population was not, in fact, *relatively* poor. Although the regressive impact of this reform was relatively mild, our results nevertheless sound a cautionary note about the potential

for well-intentioned reforms to crowd out charitable activity.

This paper constitutes the first insight into the equity of the health sector in Iran. In order to get a complete picture of equity in the Iranian health sector, it will be necessary to examine evidence on the distribution of health care services *per se* in Iran. This is important because the distribution of health care itself may not be progressive even if its financing is. We intend to explore this issue in future work on Iran.

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