

FISCAL INCIDENCE IN MADAGASCAR :

An analysis of the progressivity of taxation and social sector expenditures

**David SAHN
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Cet article propose une analyse de l'incidence distributive de la politique fiscale à Madagascar. De manière générale, dans l'optique de réduire les inégalités résultant de la distribution des revenus, le gouvernement dispose de deux options : appliquer un système fiscal progressif (c a d des impôts qui touchent plus fortement les plus riches), ou bien entreprendre des dépenses progressives (c a d mettre en oeuvre des programmes ou créer des services bénéficiant essentiellement aux pauvres). Dans cet article, nous étudions dans quelle mesure les différents types d'impôts et de dépenses dans les secteurs sociaux permettent effectivement un transfert de ressources vers les pauvres à Madagascar. Pour ce faire, nous avons basé notre analyse sur les données de l'Enquête Permanente auprès des Ménages portant sur les revenus et les dépenses des ménages. Cette enquête, menée par l'Institut National de la Statistique, a touché 4 500 ménages entre avril 1993 et avril 1994, et est représentative de la situation au niveau national.

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This paper examines the distributional incidence of fiscal policy in Madagascar. Conceptually, government can achieve the objective of improving income distribution either with progressive taxation (i.e. taxes that fall disproportionately on the rich) or with progressive expenditures (i.e. programs or services that go disproportionately to the poor). In this paper, we describe the extent to which different kinds of taxes and expenditures succeed in transferring resources to the poor in Madagascar. To do so, we rely on the household income and expenditure data from the *Enquete Permanente aupres des Menages* (Government of Madagascar, 1994), a nationally representative survey of 4500 households conducted from April 1993 to April 1994 by the *Institut National de la Statistique (INSTAT)*.

While we consider a broad range of taxes and expenditures, the list is far from comprehensive. On the tax side, because our data come for household surveys, we cannot say anything about corporation taxation, and our results on some important types of taxes, most notably import duties, depend on strong assumptions. On the expenditure side, we only address the progressivity of social sector expenditures. Limiting our analysis to health and education spending is in part a necessity: by the very nature of public goods such as defense, public order, and the judiciary, it is impossible to identify their beneficiaries, so we cannot comment on large parts of the budget. Further, the transfer payments schemes that account for much of the government's redistributive policies in richer economies are almost nonexistent in Madagascar. Many of the benefits of social services, especially health and education, however, accrue directly to individuals and thus are identifiable. Fortunately, these are also the expenditures that people most commonly expect to have a redistributive impact and they are generally covered in household surveys. Thus, our coverage of expenditure incidence will concentrate on benefits of publicly provided health and education services. This involves exploring whether there is an ordering of various categories of health and education services in the terms of the degree of concentration of benefits.

The remainder of this paper is organized as follows. In the next section we present a discussion of the methods we use, distinguishing between expenditure and tax incidence. This is followed in Section 3 by a presentation of the results. We conclude in Section 4 with summary remarks, and a discussion of the implications for policy.

METHODS

Expenditure Incidence

Measuring the incidence of benefits associated with the provision of public services is complex. First, and most vexing is the need to value the benefit of an individual going to school or receiving health care in a public facility.

Valuing public services involves determining the value of the benefits to individuals making use of a service or participating in a program. The simplest approach, which we rely on heavily in this paper, uses a binary indicator of whether or not one accesses a service. Implicit in this method is the assumption that all individuals using a service or participating in a program receive the same benefits. This is obviously not correct, and most likely introduces a systematic bias in the results. Specifically, it is likely that the poor attend lower quality schools and receive lower quality health care, in part because the services to which they have access are not financed as well. This commends trying to go beyond our simple yes/no characterization of use, and instead place a differential unit value or subsidy on the service received by individual, or sub-group in the population, and thus, the extent it is welfare improving (see for example, Meerman 1979; Selowsky 1979; Castro-Leal, et al 1997, Demery 1997). Beyond the potential for improved accuracy, the use of unit subsidies enables us to aggregate the value across services, so for example, we can arrive at the total benefit of health and education services to an individual. While we compare the unit subsidy results to the more straight forward binary approach, and generally find little difference, we also want to emphasize that we're far from convinced that the former is a better approach, even though it involves extra analytical step of calculating unit subsidies. Quite simply, we are wary of the numerous tenuous assumptions that are required in this valuation exercise. Most obvious is the difficulty of measuring the cost of service delivery accurately. Ideally, we would arrive at unit values based on expenditure data from individual schools and health facilities. There is, however, a paucity of such information. We generally rely on government budget data for a category of spending, divided by the estimated number of individuals going to schools or attending a specific health facility in a region or community. The correspondence between budgets and expenditures, however, is often tenuous. We are also forced to make strong assumptions about the homogeneity of large clusters of clinics or schools, defined by the large geographical areas on which it is possible to derive the government's cost of delivering the service, usually a province or region.

Other problems with traditional benefit incidence analysis are also recognized. These include that budget or even accurate government expenditure data assumes that marginal benefits equal average benefits. Likewise, the

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reliance on costs as a proxy for benefits to the individual also generally fails to account for the fact that economic agents respond to available subsidies in ways that often render incorrect simple accounting of first round benefits and costs. Thus, going beyond such first approximations, and at least taking into account the behavioral response of individuals to changes in the price and availability of publicly provided services, is useful to get a more accurate estimate of the incidence of public expenditures.

The above problems amply illustrate the limitations of benefit incidence studies that use simple indicators of facility use, or disaggregated unit subsidies to value school attendance or health visits. To surmount these limitations, we would need to estimate individual valuations of visits to health facilities and attendance at schools. Despite the value of such models of health and education demand, the comparability of results is quite limited since the prices used are generally imputed from costs of travel, queuing, etc., given that either the services are free or money prices are difficult to accurately measure. Myriad other econometric problems also plague behavioral response models. So while we encourage further research efforts that go beyond simple benefit incidence analysis, the demanding nature of such exercises in terms of data, and analytical methods, commends our use of techniques for measuring direct benefit incidence, especially for policy makers who are primarily interested in ranking the progressivity of benefits associated with various categories of public expenditure, or determining whether a service is progressive.

Tax Incidence

Our objective is to determine whose real purchasing power falls when the government imposes different types of taxes. And more specifically, we want to know the "economic incidence" of a tax, which refers to the reduction in real purchasing power that it imposes, not the more easily measured "statutory incidence," which refers to who is legally required to pay it.

In analyzing the economic incidence of taxes in Madagascar we confront a number of challenges. First, economists have understood that the entities that are legally required to pay a tax are not necessarily those that suffer a reduction in real purchasing power when the tax is imposed. They may successfully "shift" the tax onto other households. A clear example is a firm. Governments in developing countries collect most taxes from firms, but the firms do not suffer reductions in purchasing power. Either the households that own them do, or the firm shifts the tax to its customers or suppliers through changes in its prices. For example, it is standard to assume that if an industry is competitive, then a tax on its product will be passed on to consumers via a price increase equal

to the tax rate. On the other hand, a tax on firms' profits probably falls mostly on firms' owners. The other common example is the ability to avoid a tax by changing one's consumption or income pattern. For example, households that have high elasticities of demand for gasoline, say, can avoid a tax on gasoline consumption by switching to substitutes with little loss in welfare, while those with an inelastic demand cannot do the same so easily.

In trying to measure the economic incidence of taxes, we adopt a number of rather strong assumptions. For direct taxes, we assume that the factors that produce the associated incomes pay the taxes. Thus, wage workers pay the withholding tax on wage income, business owners pay the tax on their firms' profits, etc. This assumption is equivalent to assuming that households supply the associated factors completely inelastically so that they cannot shift the tax. Selden and Wasylenko (1992) defend this elasticity assumption on the grounds that, while restrictive, it often produces results similar to those of more sophisticated models, but at a substantially lower cost in terms of the time and effort required.

For indirect taxes, we assume that households that consume the taxed items pay the associated taxes. Thus, smokers pay taxes on tobacco, households that use kerosene for lamps pay the taxes on kerosene, etc. There are, however, two exceptions to this general rule, largely because of the controversy that surrounds two types of taxes. For gasoline taxes, no one doubts that direct consumption of gasoline is highly concentrated in the upper end of the expenditure distribution, yet critics of gasoline taxes argue that the secondary impact of such a tax is regressive because an increase in gasoline prices causes increases in other prices, especially transport, on which poor people depend more than the rich. To include this effect, we assume that the gasoline tax falls on both direct consumers of gasoline and also consumers of public transport.

Import duties are the other tax that is difficult to manage. The EPM survey, which we use in our analysis, does not ask whether goods consumed are imported or not, so we cannot identify import consumers directly. Rather, we assume that the prices of all goods for which imports are a large share of the market go up by the amount of the tariff when it is imposed. Thus, those who "pay" the tax are consumers of the good, whether it is actually imported or produced domestically. However, not all of this payment goes to the government. A share of the benefits from the import duties goes to protected local producers of the same good who get to charged a higher price for their output. Thus, the costs to consumers that we identify are not equal to the government's revenue.

Ranking of Households

In keeping with generally accepted convention, we use expenditures as our money metric of household welfare. While this welfarist approach to social evaluation has its limitations, expenditures are widely excepted as an appropriate method of making interpersonal comparisons. Beyond the choice of expenditure, we make the standard simplifying assumption that we divide household expenditure by household size to arrive at our welfare indicator. While previous research has shown that results are quite sensitive to judgements made about how household size and composition affect the money metric of their welfare, our work here is qualitatively consistent, even when different equivalence scales are used. Thus, we report and discuss only the results based on similar per capital scaling.

Dominance Testing

We are primarily interested in ranking the progressivity of benefits of categories of social expenditure. Furthermore, we want to evaluate the distribution of expenditures against two benchmarks: whether they are progressive, i.e., inequality reducing relative to our welfare benchmark, and whether they are *per capita* progressive, implying that those at the lower (upper) end of the income distribution receive (pay) at least an equal level of benefit (taxes) as upper (lower) income individuals. To do so, we use two tests for the progressivity of health and education expenditures, and taxes. The first involves the statistical comparison of concentration curves for the types of expenditures. These curves are similar to Lorenz curves in that they plot households from the poorest to the wealthiest on the horizontal axis against the cumulative proportion of benefits received for all households. The second employs cardinal measures in the form of the extended Gini coefficients which provides a middle ground between the normative generality (and consequent indeterminacy) of the welfare dominance approach and the precision (and lack of normative generality) of the Gini coefficient (Yitzhaki 1983).

In the case of the former, we essentially compare the concentration curves for different type of social services and taxes to each other, as well as relative to two benchmarks: the Lorenz curve for per capita expenditures and the 45-degree line. We can say that an expenditure (tax) is progressive if it benefits (taxes) poorer (richer) households more than wealthy (poorer) ones, relative to their income, and regressive if it does not. At the same time, public expenditures, especially in the social sectors, are often held to a higher standard than taxes in their being considered well-targeted to the poor only if the benefits go disproportionately to the poor in absolute terms, not relative to income. We will call such transfers "per capita progressive" and note that they have a

concentration curve that is above the 45-degree line (concave rather than convex). We will call social services whose concentration curve is above the Lorenz curve but below the 45-degree line simply "progressive" and those below the Lorenz curve are "regressive," analogous to the standard tax literature.

Because the concentration curves are constructed from sample data, comparisons between them are, or should be, statistical. The statistical procedures we follow are discussed at some length elsewhere (Younger et al 1998). They are based use the Davidson and Duclos' (1996) estimator to establish a confidence interval around the estimated concentration curves and then test for significant differences between them. Furthermore, we follow the suggestions of Howes (1996a and 1996b) in terms of the procedures for testing the hypothesis of non-dominance. In practice, this involves what Howes refers to as employed tests of "restricted" dominance, excluding the extreme tails so that we reject the null of non-dominance even if the curves cross or are not significantly different in that range, e.g., the 99th percentile. Choosing how restrictive to be is difficult and arbitrary. Most papers use ordinates at the deciles (0.1 to 0.9), which ignores fairly large sections of the income distribution and thus weakens the economic significance of any conclusion that one transfer dominates another. On the other hand, choosing very small quantiles reduces the power of the test as standard errors become based on very few observations per quantile. Based on relatively small sample sizes in the EPM, and the even smaller number of individuals who, for example, are enrolled in post-secondary education, we will extend the range of values over which we test dominance only to the fifth percentile of the income distribution at the bottom and the ninety-fifth percentile at the top. In sum, our decision rule is this: using 20 equally spaced ordinates from 0.05 to 0.95, we reject the null in favor of dominance if all the t-statistics are greater than the critical value and of the same sign; or, we reject the null in favor of crossing if there are at least two significant t-statistics with opposite signs. Rejecting the null of non-dominance using the above procedure implies that one distribution is preferred over the other under any social welfare function that favors progressivity. This is indeed a demanding criteria, especially in light of the low power of the test.

When the dominance tests fail to reject the null we are left with inconclusive results in terms of providing information on the relative progressivity of different types of public expenditures. In these cases, we resort to a second approach to draw conclusions about welfare evaluation and incidence analysis, the use of cardinal measures of welfare. The most common is the Gini coefficient, though any of the several options for inequality indices are also plausible. Yitzhaki (1983) shows that an extended Gini coefficient can adjust the weight given to each point on a Lorenz curve and thus give a clearer notion of how more progressive social welfare functions would rank distributions. The

coefficient is defined as:

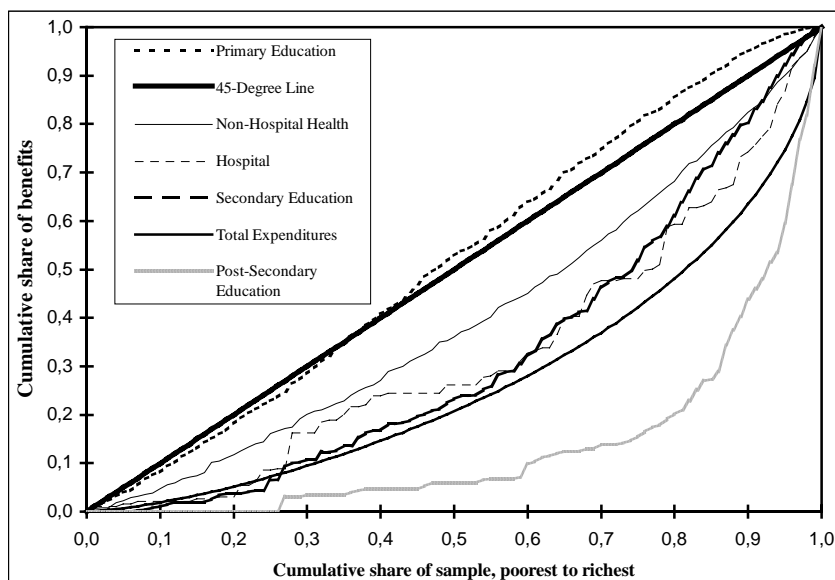
$$G(v) = -v * \text{Cov}\{e, [1-F(y)](v-1)\} / e \quad v > 1$$

where e measures households' receipt of the benefits associated with a particular category of social service or payment of a particular tax; $F(y)$ is the cumulative density function of the welfare ordering; e is mean receipt of the social service; and v is a parameter that affects the weighting of each point on the Lorenz curve. $G(2)$ yields the traditional Gini coefficient, while values of v greater than 2 yield measures that give even greater weight to poorer households. Thus, by calculating the extended Gini coefficient for increasing values of v , we can gain a sense of how a more progressive (yet still cardinal) social welfare function ranks the value of a given public service. To draw conclusions similar to the dominance tests, we calculate Ginis for v values from 1.01 to 10 in steps of 0.5 for income and for all the transfers. If all 20 pairs of extended Ginis (from $v = 1.01$ to 10) are significantly less for one of the social services, we conclude that it "dominates" the other. Our use of this term clearly does not have the same rigorous foundation in welfare analysis as the ordinal measure. We choose it only because the implied policy conclusion is similar, even if it is based on cardinal measures.

RESULTS

The concentration curves for social sector benefits, based on the use of a binary indicator of use, are presented in Figures 1. This visual presentation indicates that the concentration curve for primary education is the most progressive. Nonetheless, it does not appear to dominate the 45-degree line over the entire range of households. Conversely, the concentration curve for post-secondary education is the most convex, and falls below the Lorenz curve for household expenditures. This implies that the benefits associated with post-secondary schools are regressive, being more concentrated among the rich than consumption in general, itself already highly concentrated. The figure also suggests that expenditures on non-hospital based health care are the second most progressive type of the social sector expenditures in Madagascar. The concentration curves for hospital based health services and secondary education fall between the Lorenz curve and the non-hospital based care curves, with the two curves crossing a number of times. Thus while some generalizations can be drawn from portraying the curves, in fact, many of the concentration curves for the social services cross each other, as well as the 45-degree line and the expenditure Lorenz curve, suggesting that at least in these cases, we cannot establish a clear dominance ordering.

Figure 1



We therefore next examine the specific statistical dominance tests results following procedures outlined in the previous section (Table 1A). A "D" indicates that we reject the null hypothesis in favor of dominance, i.e. the item in the column dominates the item in the row. An "X" indicates that we reject the null in favor of crossing. Based on a statistical comparison (t-tests) for the difference between ordinates of two concentration curves at 20 abscissa, we find that, as suggested by the figure, the primary education curve crosses the 45-degree line. And while no type of expenditure dominates the 45-degree line, it is also noteworthy that the 45-degree line statistically dominates the curves for secondary education, hospital care and secondary education. Like primary education, the binary indicator for non-hospital based health care statistically dominates the expenditure distribution. Primary education dominates all other types of services, except hospital care; and although graphically it appears that non-hospital services are more progressive than hospital services and secondary education, statistical tests are unable to reject the null of non-dominance between these curves. Likewise, statistical comparisons of ordinate pairs indicate that post-secondary education is not less progressive than hospital care or secondary education.

Table 1A
Dominance results for public education and health services in Madagascar

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1)	Primary		X	D		D	D	D
(2)	45-Degree Line	X		D			D	D
(3)	Non-Hospital						D	D
(4)	Hospital							
(5)	Secondary						X	
(6)	Household Expenditure					X		D
(7)	Post-Secondary							

Source: EPM (1994) and authors' calculations

Table 1B
**Extended gini comparisons for public education
and health services in Madagascar**

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1)	Primary		X	D	D	D	D	D
(2)	45-Degree Line	X		D	D	D	D	D
(3)	Non-Hospital					D	D	D
(4)	Hospital							
(5)	Secondary						X	D
(6)	Household Expenditure					X		D
(7)	Post-Secondary							

Source: EPM (1994) and authors' calculations

Notes: All measures are scaled by household size (per capita).

In light of the low power of the dominance tests in general and the limited number of conclusion we are able to reach based on these tests, especially when it comes to the ordering of services, we next turn to the results of the cardinal measures. Some notable differences emerge based of the comparison of the extended Gini coefficients. First, the 45-degree line now also dominates hospital care and secondary education. Second, primary education now dominates all types of services. And third, non-hospital care now dominates secondary education.

While the results above are based on national data, it is also possible to disaggregate the data on the basis of gender and region. In Figures 2 and 3, we show the concentration curves for primary education and non-hospital health care. Note that the shape of the curves for males and females are virtually identical. This is in sharp contrast with the urban curve being far more convex than the rural ones, indicating that shifting the provision of services from the former to the latter would result in far more progressive outcomes. On the other hand, the evidence indicates that spending more money to target services to females would not improve distributional outcomes.

Figure 2

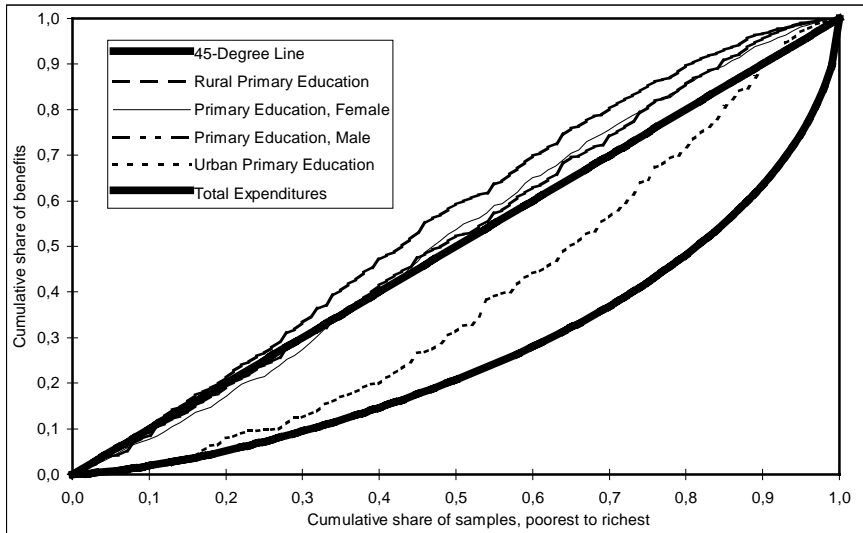
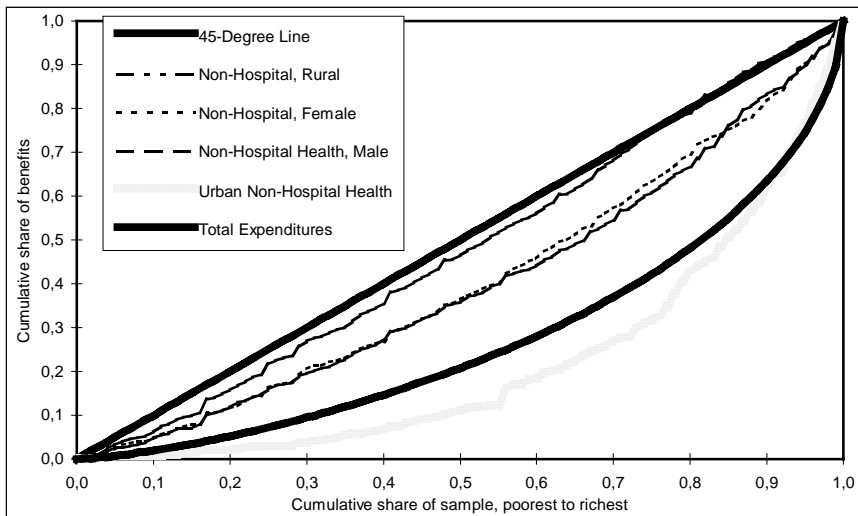


Figure 3



Next we compare the results of analyzing benefit incidence based on a simple dichotomous variable of whether or not an individual uses a service (i.e., goes to a clinic or attends school), with the unit subsidy valuation derived from

dividing government budget data by government estimates of the number of individuals who use a service. Our interest in making this comparison is to explore the extent to which the two methods differ, and thereafter understand why.

Before presenting the dominance results from Madagascar, we refer to the unit subsidy figures, taken from the World Bank and reported in Appendix A, Tables A.1 and A.2. We are particularly skeptical about what we find to be somewhat implausible figures from Madagascar: that the unit subsidy for basic health care facilities in Antananarivo is far less than that in 4 of the other 5 regions. Conversely, the unit value of hospital visits is substantially more in Antananarivo than other regions, as we would expect. The reason for our skepticism is that we can think of no a priori reason non-hospital care is so much less expensive in the capital city, while hospital care is much more so. With this qualification, we first examine the concentration curves for the unit value versus the binary approach (Figures 4 and 5). The only perceptible change is a downward shift in the hospital curve. In terms of more formal dominance tests, there are no differences as compared to the use of the binary approach, either in terms of dominance results relative to the Lorenz curve the 45-degree line, or in the ordering of the progressivity of services. The same holds true for the statistical comparison of the extended Gini coefficients.

Figure 4

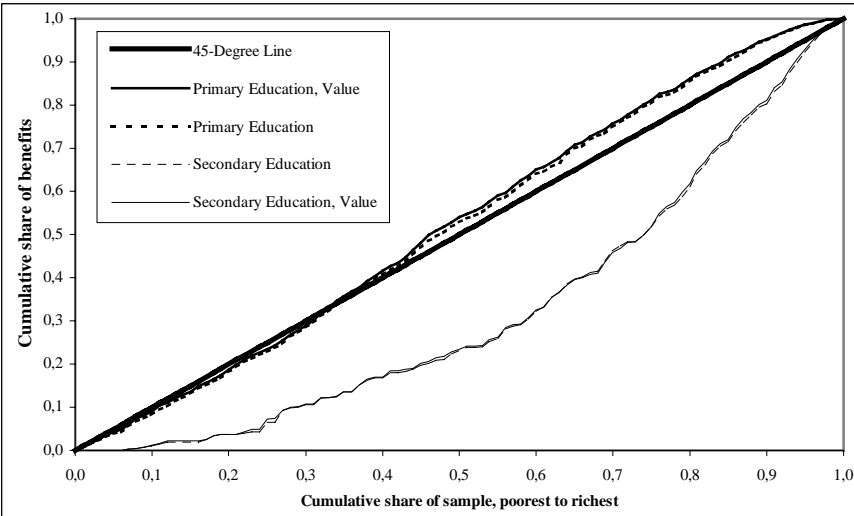
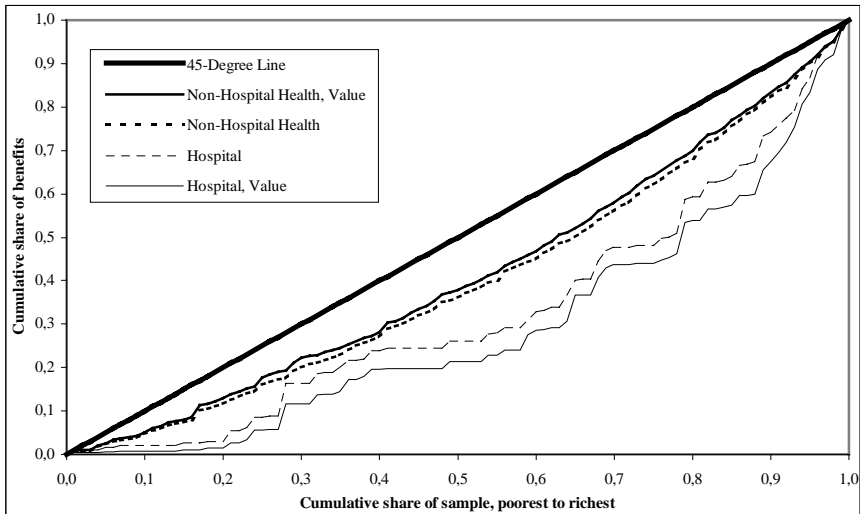


Figure 5



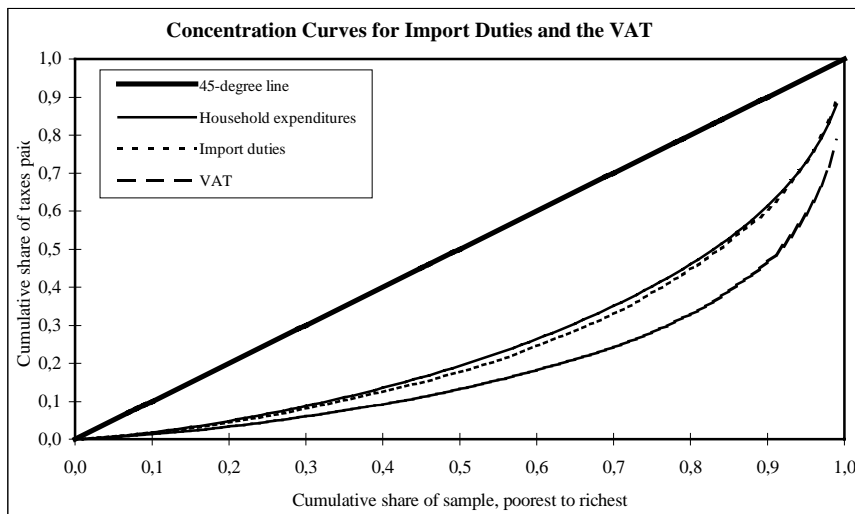
Finally, we can use the unit value data to aggregate the value of all the services, both in terms of whether expenditures with the value of services dominates expenditures without the services. In addition, we can examine the overall impact on the Gini coefficients of the total value of health and education services received. Our dominance results indicate that in Madagascar the expenditure distribution, inclusive of the transfers, is more progressive than without them. This is simply a reflection of the fact that the sum of the values of health and education benefits are more progressive than the expenditure distribution. An examination of the standard Gini coefficient (i.e., $v=2$) also reveals, however, that the overall effect on this parameter of the health and education transfers is quite small: in Madagascar, the numbers are 0.4524 for the Gini without transfer and 4377 with transfers.

Tax incidence

Figures 6 through 10 present the concentration curves for the principal taxes in Madagascar. Table 2 summarizes the results of statistical tests of the null hypothesis that the concentration curves for two taxes are equal and that they are equal to the expenditure Lorenz curve. Recall that in the case of taxes, welfare dominance means that a slight increase in the dominant tax, offset with a slight reduction in the dominated tax, will improve social welfare for any welfare function that favors a more equitable distribution of expenditure. Put another

way, the "dominant" tax is more progressive than the other. Since the results based on the extended Ginis are very similar, we do not present separate tables, although, do make some mention below of the small differences in the results between the dominance tests and the use of the cardinal measures.

Figure 6



The two most important taxes in Madagascar are import taxes (duties and tariffs) and the VAT. The VAT is progressive, while import duties are not, though we cannot reject the null hypothesis that they have the same concentration curves (Figure 6 and Table 2). However, the failure to reject the null is due to one insignificant t-statistic (at 0.05), and tests based on the extended Ginis do reject the null. Thus, at first appearance, the general attempt to reform the tax structure by moving away from import duties toward the VAT may have a positive, albeit small, impact on the after-tax distribution of welfare in Madagascar. However, there is an important difference between these two taxes that our analysis has not captured. We have assumed that import duties increase the price of all goods of the same type, whether imported or not, so buyers of those goods suffer the incidence of the tax. The offsetting increase in real purchasing power does not go entirely to the government, however. Part is distributed to local producers of the good because the import protection allows them to charge higher prices. Under the VAT, however, all of the benefits go to the government. While we cannot be sure of the incidence of all the benefits of import taxes, it is reasonable to assume that firms which benefit are owned by households in the upper end of the expenditure distribution, so that the net effect of the import duties is even less progressive than this analysis indicates, because

it only considers the costs to consumers. Thus, a shift from import taxes to the VAT is likely to be even more progressive than Figure 6 suggests.

Table 2
Table of Welfare Dominance for Taxes in Madagascar, 1996

	Va nil la ne	Ke ro se ne	Exp end itur e	Im- port s	VA T	Al- co- hol	Tob acc o	Pub- lic Tran sport	Wa - ges	Trans port & Gasol ine	A ut o	L N G	Ga sol in e
Vanilla		X	X	X	X	X	X	X	X	X	X	X	X
Kerosene			X	X	X	X	X	X	X	X	X	X	X
Expenditure				X	X	X	X	X	X	X	X	X	X
Imports					X	X		X	X	X	X	X	X
VAT									X	X	X	X	X
Alcohol									X	X	X	X	X
Tobacco								X	X	X	X	X	X
Public Transport									X	X	X	X	X
Wages										X	X	X	X
Transport & Gasoline											X	X	X
Automobile												X	X
LNG													X
Gasoline													

Source: Government of Madagascar (1993) and authors’ calculations
Note: An "x" indicates that the tax in the row dominates the tax in the column.

The other indirect taxes in Madagascar are all excise duties on specific products: alcohol, tobacco, automobiles, and petroleum products (Figures 7 and 8). The concentration curves for tobacco and alcohol excises are statistically indistinguishable from the VAT but dominate import taxes, while taxes on automobiles are more progressive than import duties, the VAT, and other excises (Table 2). Taxes on direct consumption of gasoline are also more progressive than all other taxes except automobile duties. Nevertheless, the majority of gasoline is consumed as an intermediate input to other services, mostly transport. We try to capture at least part of this indirect impact by assuming that gasoline accounts for 20% of the cost of intra- and inter-city transport. (That is the I-O coefficient for petroleum in the transport sector). We then suppose that part of the gasoline tax falls on users of public transport, and we construct a concentration curve for that part of the tax, as well as one for the combined effect of direct purchases of gasoline and indirect purchases via public transport (Figure 8). The results show that even taxes on public transport are progressive (though less so than the direct consumption of gasoline), mostly because it is concentrated among urban households. The combined tax (transport and gasoline) dominates the VAT as well as import taxes. Thus, policy makers can rest assured that taxes on gasoline are not falling disproportionately on the poor and are, instead, quite

progressive. On the other hand, taxes on kerosene, widely used as a fuel for lighting and cooking, are regressive. Thus, to the extent possible both technically and practically, it would be preferable to concentrate duties on gasoline, with reduced duties on kerosene.

Figure 7

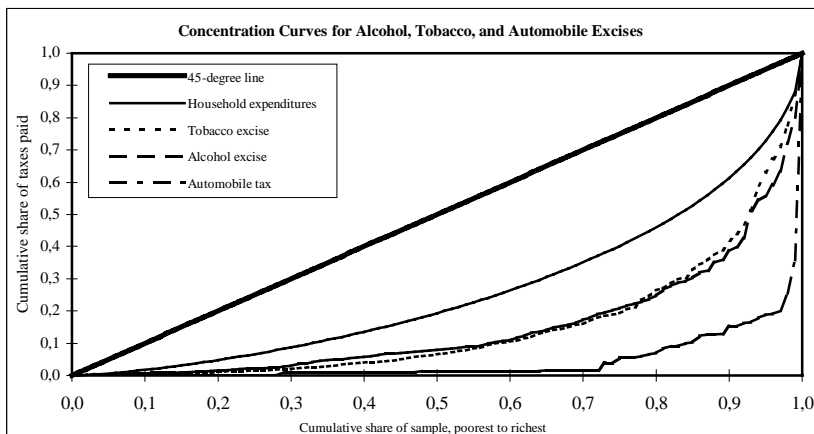
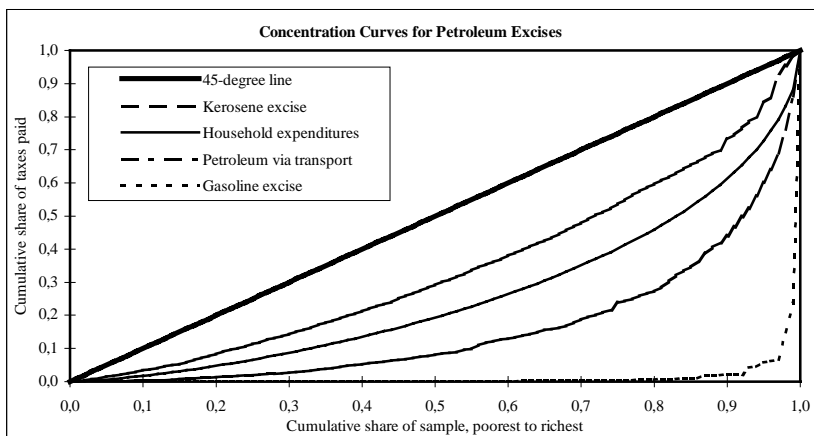


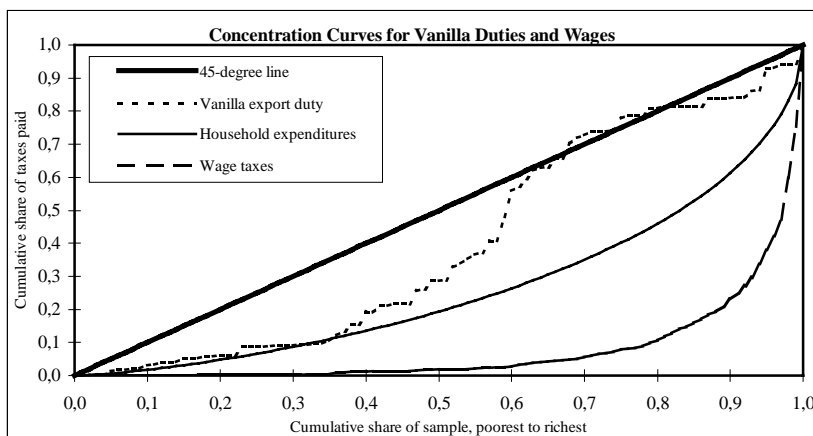
Figure 8



The last two taxes we examine are the direct tax on wage earnings and the vanilla export duty (Figure 9). The former, which comprises a little less than half of direct taxes (the rest coming from corporations), is highly progressive, as one would expect since it falls entirely on workers in the formal sector. For vanilla duties, even though the concentration curve is well above all others, we

find no statistical difference between it and the concentration curves for other taxes and the Lorenz curve.

Figure 9



This finding is due to the small number of vanilla producers in the sample, 103, which makes rejection of the null based on significant difference in all ordinate pairs difficult. Statistical comparisons of the extended Gini support this view (Table 3). By this criterion, vanilla taxes are more regressive than many other categories of taxes, particularly excises, and taxes on wages and salaries. However, the statistical comparisons still fail to show that vanilla taxes are regressive, or that they are more regressive than the VAT or import duties. Despite that, we would expect a larger sample to show that vanilla producers, who are rural farmers, are not as wealthy as the population in general. Thus, the government's movement away from export duties probably has a positive distributional impact.

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Table 3
Extended Gini Coefficients for Taxes Paid in Madagascar, 1996

	Vanilla Duties	Kero- sene	House- hold Expendi- tures	Import Duties & Tariffs	VAT	Alcohol	Tobacco	Gasolin e via Public Transpo- rt	Wages	Transpo- rt & Gasolin e	Auto	LNG	Gasolin e
2	0.256	0.290	0.484	0.615	0.645	0.699	0.705	0.719	0.851	0.892	0.952	0.985	1.062
4	0.725	0.604	1.056	1.399	1.500	1.709	1.804	1.817	2.342	2.339	2.606	2.868	2.938
6	1.128	0.804	1.428	1.920	2.084	2.466	2.683	2.682	3.668	3.576	4.109	4.711	4.795
8	1.447	0.954	1.710	2.310	2.529	3.080	3.433	3.410	4.884	4.662	5.504	6.529	6.620
10	1.704	1.077	1.939	2.623	2.888	3.600	4.094	4.047	6.019	5.634	6.817	8.327	8.417
Number of Households Paying the Tax (N=4500)													
	103	3936	-	4463	4491	1635	1061	2175	723	2194	102	97	85

Source: Government of Madagascar (1993) and authors' calculations

SUMMARY AND CONCLUSIONS

Inequality is a problem that merits policy makers' attention. Among the expenditures that we review, many are progressive and thus will mitigate the existing inequality somewhat, but the effect is often small and inadequate. Madagascar, like most governments, would do well to consider how to better target their expenditures.

For the benefits of public services in the social sector, most are progressive relative to the skewed income distribution, but in no cases do transfers meet our definition of per capita progressivity where the benefits disproportionately fall on the poor in absolute terms. This implies that even the most progressive social services go disproportionately to wealthy people, rather than to the poor, a cause for serious concern. While we recognize that active means testing is administratively and politically difficult, probably impossible, in the Madagascar context, our results suggest that general provision of social services as carried out today is a poor substitute for well-targeted transfer payments to the poor. Of course, there are other arguments in favor of social spending, based on externalities associated with them, but hopes that such spending will have a substantial impact on Madagascar's expenditure distribution are misplaced.

Individually, primary education services tend to be the most progressive, and university education is the least progressive, to the point of being regressive. Non-hospital health care is more progressive than secondary education and hospital care, although, there is no ordering in terms of the relative progressivity of the latter two.

Our comparison of simple use/no use indicators of social services vs. valuations based on unit costs at a regional level show few significant differences. This is not so much due to a lack of correlation between welfare and the disaggregation variable (region). We know that residents of rural regions are poorer than those in urban areas. Rather, the estimated cost of service does not vary systematically with region. It is as common to find higher expenditures per student or patient in poorer regions as lower ones. Our prior intuition is that this reflects data and/or valuation problems, not the true value of services to the recipients, which we would expect to be lower in rural (and thus, poorer) areas.

On the tax side, overall, the progressivity we observe is striking. In Ghana, the only other African country for which we have a comparable analysis, the broad-based consumption taxes are neutral, and the income tax, while progressive, is less so than in Madagascar (Younger 1996). This contrast is all the more impressive given the high degree of concentration in per capita

consumption in Madagascar. (Madagascar's Gini for per capita expenditures is 0.48, compared to 0.36 for Ghana.) At the same time, it is interesting to note that the only regressive taxes in Madagascar, on kerosene and (probably) agricultural exports, are also the regressive taxes in Ghana.

Our analysis informs the debate on tax reform in Madagascar in several ways. First, economists usually argue that tax reform should shift the tax structure toward broad-based taxes such as a VAT or income tax on economic efficiency grounds. In industrial countries, such taxes tend to be less progressive than some more specific taxes that concentrate on "luxury" goods because the very thing that makes them less distortionary, their breadth of coverage, also brings their distribution close to the overall income or expenditure distribution. In Madagascar, however, that appears to be less the case. Both the VAT and the tax on wage and salary income are progressive. At first sight, that is comforting for those who favor a move to the so-called broad-based taxes. But it also reflects the fact that these taxes are not nearly as "broad-based" as the same taxes in an industrial economy because the formal sector to which they apply is relatively small in Madagascar. Thus, while the taxes are progressive, they may be more distortionary than is typically supposed.

Interestingly, import duties are less progressive than the VAT, although not dramatically so. This is probably because the formal sector does not produce many goods that are not also imported, so the tax bases for the two are not so different as one might expect. That does not mean that the two are substitutable, however. The incentive distortions of import duties remain, tending to close the economy. At the same time, some of the benefits of import duties go to local firms, or more precisely, their owners, who are almost surely from the top end of the income distribution, while all of the benefits of a VAT go to the government, whose expenditures are probably more progressive.

The vanilla export duty has the highest concentration curve, yet we fail to reject the null of equality between it and all other taxes or the expenditure distribution. This indeterminate result is likely due to the small number of producers in our sample, yet the striking shape of the concentration curve offers tentative support on equity grounds for reductions in export duties. Of course, to the extent that Madagascar enjoys substantial market power in the world vanilla market, there may be an optimum export duty on vanilla that helps keep world prices high by restricting Madagascar's supply to the market. However, the loss of market share to other exporters, especially Indonesia, casts doubt on the degree of market power that Madagascar really has.

We also observed that taxes with narrow bases are concentrated in three areas in Madagascar: petroleum duties, export duties, and "sin" taxes on alcohol

and tobacco. The major rationale for these taxes is that they provide good tax handles, even if they are distortionary. There is also an argument in favor of using taxes to discourage consumption of alcohol and tobacco for health reasons, and petroleum products for environmental reasons, because of the externalities associated with the use of these products. Because the "sin" taxes are progressive, it is difficult to criticize them, and there is not much policy interest in reducing them. The petroleum taxes are much more controversial, with the controversy focusing on their purported adverse distributional impact. Our results suggest, however, that taxes on gasoline are highly progressive, even after including the indirect impact on public transport in the case of gasoline. For these products, then, the critics are mistaken, and the government should consider gasoline taxes as an attractive possibility for further revenue increases. The same cannot be said of kerosene, however. Used primarily as a lighting source in households that do not have electricity, and also for cooking, a duty on kerosene is the one clearly regressive tax in Madagascar.

It is important to remember that progressivity is not the only measure of a good tax or good expenditure. Policy makers must also consider the returns on expenditures as well as a tax's impact on economic efficiency (distortions to the allocation of resources). Other considerations such as administrative efficacy and of course, the utility of the corresponding government expenditures that a tax pays for need to be taken into account. Nevertheless, progressivity does matter, not least at a political level.

Finally, we want to make clear that this paper is not the last word on tax and expenditure progressivity in Madagascar. All of the results that we report in this paper implicitly assume that demand and supply elasticities are zero, i.e. that quantities consumed do not change when taxes or subsidies change. This assumption greatly simplifies the analysis, and it does provide accurate first-order approximations to the true incidence (Younger, 1997), but it is an obvious area for improvement. In particular, we think that there is room for useful research in four main areas: sensitivity of the results to the methods chosen; valuations of public services on the basis of demand function estimates; estimation of marginal rather than average benefits; and more careful consideration of the general equilibrium consequences of tax policy.

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Incidence Fiscale à
Madagascar

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APPENDIX A

Table A.1
Per student expenditures in education, by region in Madagascar, 1994

Region	Primary	Secondary
	(FMG)	
Antananarivo	50,090	226,508
Antsiranana	34,288	115,247
Fianarantsoa	70,940	205,609
Mahajanga	45,710	130,245
Toamasina	39,076	171,399
Toliara	67,457	324,628
All Madagascar :	50,504	192,491

Sources : World Bank, Madagascar Poverty Assessment : Volume II Main Report, Annexes.

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Table A.2
Per patient expenditures on health, by region in Madagascar, 1993

Region	Hospitals	Health Center/Clinic
	(FMG)	
Antananarivo	4,406	844
Antsiranana	2,481	2,062
Fianarantsoa	2,132	2,120
Mahajanga	1,072	1,737
Toamasina	1,893	1,158
Toliara	930	1,978
All Madagascar :	2,136	1,413

Sources : World Bank, Madagascar Poverty Assessment : Volume II Main Report, Annexes.