CATA Meets IMPOV

A Unified Approach to Measuring Financial Protection in Health

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Abstract

Up to now catastrophic and impoverishing payments have been seen as two alternative approaches to measuring financial protection in health. Building on the previous literature, the authors propose a unified methodology in which impoverishing and catastrophic payments are mutually exclusive outcomes. They achieve this by expressing out-of-pocket payments as a ratio of 'discretionary' consumption, defined as the amount by which total consumption (gross of out-of-pocket payments) exceeds the poverty line. This allows the authors to identify both households who are impoverished by out-of-pocket payments (their ratio exceeds one) and households who are pushed even further into poverty by out-of-pocket payments (their ratio is negative); the authors call such payments 'immiserizing'. Households experiencing 'catastrophic' payments are a

subset of those who incur out-of-pocket payments but who are neither impoverished nor immiserized by them. Two alternative definitions of catastrophic payments are offered: those that absorb more than a pre-specified fraction of discretionary consumption; and those that leave a household's nonmedical consumption (total consumption net of out-of-pocket spending) below a pre-specified multiple of the poverty line. The authors also offer a simple financial protection index that reflects the percentages of households incurring immiserizing, impoverishing, catastrophic, non-catastrophic, and zero out-of-pocket payments. They illustrate their unified approach with data from the World Health Survey, using international poverty lines and a catastrophic payment threshold of 40 percent.

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A Unified Approach to Measuring Financial Protection in Health

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1. Introduction

Since the publication in 2003 of “Catastrophe and impoverishment in paying for health care” (Wagstaff and van Doorslaer 2003), the measures of catastrophic spending and impoverishment proposed there have become the workhorses of empirical work on financial protection in health. Major international comparative studies include van Doorslaer et al. (2006; 2007) and Xu et al. (2003; 2007). In addition, a large number of country- and region-specific studies have been undertaken, some of which explore trends in financial protection or the effects of reforms on financial protection; for a survey of this literature, see Wagstaff (2010b).

Up until now the catastrophic and impoverishing payment measures have been seen as alternatives, capturing different things: the impoverishment measure capturing whether families fall into poverty through out-of-pocket spending; the catastrophic measure capturing whether out-of-pocket payments exceed some threshold of family income or consumption. As a result, studies often report one or the other. Authors presenting studies that include both inevitably struggle with the question of whether one matters more than the other, especially when the two measures move in different directions over time or country rankings differ depending on which measure is used. The impoverishment measure is often perceived to have two strengths: it speaks directly to the hardship caused by out-of-pocket spending; and it has a threshold (the poverty line) that has a special ethical status having being chosen by policymakers. When asked why catastrophic

payments matter, a common response by authors is that these payments capture risk; but the risk of what? And while one can explore the sensitivity of the catastrophic payment results to choice of threshold, the fact remains that no catastrophic payment threshold has the normative status of a poverty line.

In this paper, which builds on previous work by Wagstaff and van Doorslaer (2003) and Xu et al. (2003), we propose a unified financial protection measurement methodology in which impoverishing and catastrophic payments are mutually exclusive outcomes. We achieve this by expressing out-of-pocket payments as a ratio of ‘discretionary’ consumption, defined as the amount by which total consumption (gross of out-of-pocket payments) exceeds the poverty line. This allows us to identify both households who are impoverished by out-of-pocket payments (their ratio exceeds one) but also households who are pushed even further into poverty by out-of-pocket payments (their ratio is negative); we call such payments ‘immiserizing’. Ignoring households who incur such payments, as studies using only the impoverishment headcount measure have done, misses out an important aspect of the financial protection policy agenda; indeed, it is this group that many policy initiatives have largely focused on.¹ In our approach, households experiencing ‘catastrophic’ payments are a subset of those who incur out-of-pocket payments but who are neither impoverished nor immiserized by them. We offer two alternative definitions of catastrophic payments: those that absorb more than a pre-specified

¹ Examples of countries that have introduced schemes to reduce out-of-pocket spending among the poor (and for which evidence on impact is available) include: Cambodia (Flores et al. 2013), Georgia (Bauhoff et al. 2011), Indonesia (Sparrow et al. 2013), and Vietnam (Wagstaff 2010a).

fraction of discretionary consumption; and those that leave a household's nonmedical consumption (total consumption net of out-of-pocket spending) below a pre-specified multiple of the poverty line. This first definition is close to what has been used to date; the second is new and provides perhaps a stronger justification for a policymaker to be concerned about catastrophic payments. We also offer a simple financial protection index that reflects the percentages of households incurring immiserizing, impoverishing, catastrophic, non-catastrophic, and zero out-of-pocket payments. We illustrate our approach using data from the World Health Survey and international poverty lines. We show some broad patterns, and present some more detailed results for the BRICS countries.

2. Recap

We arrive at our unified measure by reworking the classic catastrophic payment measure. Wagstaff and van Doorslaer (hereafter WVD) define out-of-pocket spending as catastrophic when out-of-pocket medical spending, M , exceeds some pre-specified fraction of consumption, C , or C minus some deduction for necessities.² This deduction, they suggest, could be a fixed amount (a minimum threshold for nonmedical consumption, call it NM^*), or the household's actual food spending food, F , or its spending on a broader range of budget items. WVD note that if the fixed deduction approach is used, it is possible that the denominator could be

² WVD relate M to prepayment income in their theory section, but income is notoriously hard to measure in developing countries, and in their empirical illustration – and in the bulk of empirical work in the developing world since – M is related not to income but to consumption. Consumption is, of course, also closer to welfare than income.

zero or even negative (households may record insufficient consumption to reach the fixed threshold for nonmedical spending). WVD remark that this would be “problematic”.

Most studies using the catastrophic payment approach have, in fact, eschewed the idea of a flat-rate deduction, and have instead either expressed M as a fraction of C , or subtracted the household’s actual spending on one or more budget items; typically this is just food spending, F , so the denominator becomes $C-F$, or equivalently $M+NF$ where NF is nonfood spending.³ Using the ratio M/C has some merits. It is the budget share and so easily understandable. Moreover, it has the merit of not depending on how households decide to allocate a given value of NM between food spending and nonfood spending. The ratio $M/(C-F)$ does not have this virtue. There is a discretionary element to food spending, and households who cut back hard on food will, for a given value of NM , have a smaller ratio $M/(C-F)$; using this approach, we will be less likely to classify such households as having incurred catastrophic payments, which is clearly not what we want.

Deducting a fixed amount from C would avoid this problem, and would have the added substantial merit that it takes into account the fact that C overstates the ‘ability to pay’ of households toward the bottom end of the income distribution. To date, however, only one study has used it, namely that of Xu et al. (2003), who subtract a fixed amount intended to capture the amount of money a household

³ Some studies actually appear to define the denominator simply as NF . This is a problem because M is in the numerator but not the denominator. We are trying to see how M relates to the resources the household had at its disposal. It has spent M and therefore had M available. M ought to be counted as part of their resources.

needs to cover subsistence expenditures. Their study illustrates the choices that researchers have to make when opting for the flat-rate deduction approach. Three in particular are worth highlighting. First, what number should the flat-rate deduction be subtracted from? Xu et al. opt for NM rather than from C . This means that M is in the numerator of the catastrophic payment indicator but not the denominator. Since we are trying to see how M relates to the resources the household had at its disposal, and since the household spent M , it might be argued that M should have been included in the measure of the resources available to the household. Second, how should the flat-rate deduction be calculated? Xu et al. opt for a food subsistence allowance, and define it as the average food spending among households whose food spending share (as a percentage of total consumption) was in the 45th to 55th percentile range. In some settings, this could be rationalized in terms of calorie requirements: the food intake of this group may well, in some settings, average 2,000 kilocalories. But this seems unlikely to be true of many developing countries⁴, and is clearly not true of countries like Germany, Norway and the US that were included in the Xu et al. study. An alternative rationalization is that the deduction is supposed to capture a relative standard rather than an absolute one, rather as European Union countries often set their poverty line at a particular percentile of the income distribution. But this might be argued to sit

⁴ Dollar and Glewwe (1998), for example, define their food-based poverty line for Vietnam as the per capita food spending of households in the third quintile of the consumption distribution. This made sense, because at the time (1993) this group consumed, on average, around 2,000 calories per person. This is unlikely to be true today in Vietnam, and does not appear to be true today even in poorer countries. Abebaw and Admassie (2014), for example, report average calorie intake in the third quintile of the consumption distribution in Ethiopia in 2004 to be 3,000, while Pauw and Thurlow (2011) report average calorie intake among the poorest two quintiles of the consumption distribution in Tanzania in 2008 to be 2,358. Admittedly, these are all figures for quintiles of the consumption distribution; however, given Engel's Law, they are also likely to be the same quintile of the food share distribution.

rather awkwardly with the study's focus on food spending which suggests a subsistence – and therefore absolute – focus. Third, as WVD flagged, inevitably with the flat-rate deduction approach there will be some households with a negative denominator, in this case households with nonmedical consumption less than the subsistence food spending threshold. What to do in such cases? Xu et al.'s response is to define the denominator in such cases as NM less *actual* food expenditure. But this leads to the awkward result that a household whose consumption falls just below the food spending threshold ends up being judged to have the same resources or 'ability to pay' as one just above it.

3. A unified financial protection measure

Our value judgment is that $NM \equiv C - M$ should never fall below some threshold NM^* ; we set the latter equal to the poverty line. This is entirely consistent with two features of the prevailing theory and practice of measuring poverty and living standards in the developing world. First, living standards are assessed on a broad household consumption aggregate, and are related to a poverty line that is similarly broad. Second, out-of-pocket medical spending is excluded from the consumption aggregate that is used to assess living standards; as Deaton and Zaidi (2002) put it, the view is that "...such expenditure reflects a regrettable necessity that does nothing to increase welfare. By including health expenditures [in the consumption aggregate] for someone who has fallen sick, we register an increase in welfare when, in fact, the opposite has occurred."

Our main indicator variable whose values define the different outcomes is the ratio $R_1 \equiv M/(C - NM^*)$. The denominator, which we assume is either positive or negative, gives the amount by which household's total consumption exceeds the poverty line, which we can think of as its discretionary consumption. We have four different cases depending on the value of R_1 . These are illustrated in Figure 1 and Figure 2; they are also summarized in Table 1. Note that for simplicity in Figure 1 we have assumed that M is the same for all households incurring out-of-pocket payments, though clearly this need not be the case.

Immiserizing and impoverishing payments

Consider first the case where $R_1 = M/(C - NM^*) < 0$. We call this case (1). Assuming $M \geq 0$, in this case we have $C < NM^*$. Even in the absence of out-of-pocket spending, nonmedical consumption would have been below the poverty line. In this case out-of-pocket spending pushes already-poor households even further into poverty. We call this the case of *immiserizing out-of-pocket spending*. In the impoverishment approach to financial protection, this group of households is not captured by the standard (headcount) measure, which captures only those households whose out-of-pocket spending pushes them into poverty.⁵ And in the analysis of Xu et al. these awkward cases are transformed into regular cases by replacing the deduction by an actual amount to force the denominator to be positive.

⁵ This group's misfortune is picked up in the poverty gap version of the impoverishment approach, but the *number* of households affected is not captured even there.

In our approach, by contrast, the fact the denominator of R_1 is negative in this case conveys important information and identifies one of the outcomes in our approach.

Consider next case (2); here $M/(C-NM^*) > 1$. In this case, assuming $M > 0$ we can conclude firstly that the household would have been above the poverty line if M had been zero (i.e. $C-NM^* > 0$), and secondly that $C-M < NM^*$. This is the case of *impoverishing out-of-pocket spending*.

A third case is where $M/(C-NM^*) = 0$. In this case the household does not incur any out-of-pocket spending. This is the case of *zero out-of-pocket spending*. We call this case (4) for reasons that will become clear.

The last case – which we call case (3) – is where $0 < M/(C-NM^*) < 1$. In this case, assuming $M > 0$ we can conclude again that the household would have been above the poverty line if M had been zero (i.e. $C-NM^* > 0$), and also that $C-M > NM^*$, i.e. the household is not impoverished by out-of-pocket spending.

Catastrophic payments

If we are willing to make further value judgments, we can subdivide case (3) into two: those who experience ‘catastrophic’ payments (3a); and those who do not (3b).

There are two possible ways of thinking about catastrophic payments. One, which is simple and in line with the approach adopted to date, is to subdivide households not incurring impoverishing or immiserizing payments according to the

size of the ratio $M/(C-NM^*)$. This approach is in line with WVD's proposal to express out-of-pocket spending as a ratio of 'capacity to pay' or discretionary consumption, and then define catastrophic payments as payments that exceed some predefined percentage of discretionary consumption. Let X be the catastrophic payment threshold. This case is illustrated in Figure 1a for the case where $X=0.4$; see also Figure 2a and Table 1. The first subcase (3a) under this interpretation of catastrophic payments is where $X < M/(C-NM^*) < 1$. Here out-of-pocket spending is *catastrophic in the sense that it absorbs an excessively large fraction of discretionary consumption*. The second subcase (3b) is where $0 < M/(C-NM^*) < X$. In this case, out-of-pocket payments are *not catastrophic* in the sense that they do *not* absorb an excessively large fraction of discretionary consumption.

There is an alternative way of thinking about catastrophic payments, namely that they are payments that do not quite push a household into poverty but almost do. This introduces some more complexity into the analysis, but gives us a stronger rationale for caring about catastrophic payments. After all, a billionaire could spend 50 percent of his discretionary consumption on out-of-pocket payments and still be a long distance from the poverty line, while a family starting close to the poverty line might need to spend only five percent and end up very close to the poverty line.

If we want to subdivide those with $0 < M/(C-NM^*) < 1$ based on whether they end up "too close" to the poverty line after their out-of-pocket payments, we need a definition of "too close". The obvious way forward is to pick some multiple, Z , of the poverty line. Thus under this second definition, catastrophic payments that push a

family's nonmedical consumption, $C-M$, to below Z times the poverty line. We can classify families with $0 < M/(C-NM^*) < 1$ into groups based on the values of two ratios: $R_1 \equiv M/(C-NM^*)$ and a second ratio $R_2 \equiv M/(C-Z \cdot NM^*)$. This interpretation is illustrated in Figure 1, Figure 2 and Table 1. Figure 3 brings the two approaches to catastrophic payments together, and nests them in the broader unified approach. Each of the dots in Figure 3 is a real household from a country participating in the World Health Survey – the dataset we use in the empirical illustrations in section 4; the poverty line has been set at \$1.25 per capita per day (one of the lines used in the empirical illustrations) and Z has been set at 120 percent.

Consider first the non-catastrophic payment subcase (3b). In this case, we have $0 < M/(C-NM^*) < 1$ and $0 < M/(C-Z \cdot NM^*) < 1$. This is box 5 in Figure 3. Here $C-Z \cdot NM^* > 0$ and therefore the household's total consumption would have been more than Z times the poverty line in the absence of out-of-pocket payments. And because $C-M > Z \cdot NM^*$, even with out-of-pocket payments the household's nonmedical consumption is more than Z times the poverty line. Payments in this case are not catastrophic in that they do not push the family too close to the poverty line. Consider next one of the catastrophic payment subcases (3a) where $0 < M/(C-NM^*) < 1$ and $M/(C-Z \cdot NM^*) > 1$. This is box 2 in Figure 3. In this case too, $C-Z \cdot NM^* > 0$ so that in the absence of out-of-pocket payments, the household's total consumption would have been more than Z times the poverty line; given we also have $C-M < Z \cdot NM^*$ and $M/(C-NM^*) < 1$, we can conclude that after out-of-pocket payments the household's nonmedical consumption is somewhere between the poverty line and Z times the

poverty line. In this subcase, out-of-pocket payments are catastrophic in the sense that they do not push the family into poverty but almost do. Another subcase (3a) is where $0 < M/(C - NM^*) < 1$ and $M/(C - Z \cdot NM^*) < 0$. This is box 8 in Figure 3. In this case, $C < Z \cdot NM^*$; given we also have $M/(C - NM^*) > 0$, we can infer that in the absence of out-of-pocket payments, the household's total consumption would have been somewhere between the poverty line and Z times the poverty line; but given $M/(C - NM^*) < 1$, we also know its nonmedical consumption after out-of-pocket payments is greater than the poverty line. We can think of this case too as one of catastrophic payments in the sense that payments push nonmedical consumption near to the poverty line.

Figure 3 allows us to compare the two approaches to catastrophic payments. The middle panel contains households who are neither immiserized nor impoverished. Households in this middle panel and to the right of the vertical dotted line incur catastrophic payments according to the first definition (X is set at 40 percent of discretionary consumption), while households in the top and bottom panels (boxes 2 and 8) incur catastrophic payments according to the second definition (Z is set at 120 percent). The first definition assigns a lot of households to the catastrophic payment group even though their out-of-pocket payments do not leave them below 120 percent of the poverty line: these are households in box 5 to the right of the vertical dotted line. (Recall each dot represents a household.) Conversely, the first definition assigns to the non-catastrophic payment category an even larger number of households whose out-of-pocket payments *do* leave them

below 120 percent of the poverty line: these are households to the *left* of the vertical dotted line in boxes 2 and 8.

Graphing and measuring financial protection

The immiserizing (1), impoverishing (2), zero (4), and non-impoverishing / non-immiserizing (3) categories are mutually exclusive and mutually exhaustive. Likewise the immiserizing (1), impoverishing (2), zero (4), catastrophic (3a) and non-catastrophic (3b) payment categories are mutually exclusive and mutually exhaustive. This sets this unified approach apart from the approach used to date where, because the denominator in the catastrophic payment approach has not been related to the poverty line, the impoverishing and catastrophic payment categories are not mutually exclusive – a household could quite possibly be in both.

This raises the question of how to interpret changes in or differences in the distribution of the population across the categories. For example, an increase in the fraction of households incurring catastrophic spending is not necessarily a bad thing; it might reflect a fall in the fraction of households incurring impoverishing or immiserizing payments. In fact at least a partial ranking emerges in the case where the policymaker is concerned initially about poverty-reduction and we interpret catastrophic payments as payments that leave the family's nonmedical consumption less than Z times the poverty line. In this case, the zero payment outcome is better than the non-catastrophic payment outcome, which is better than the catastrophic payment outcome, which is better than the impoverishing and immiserizing

outcomes. For similar-sized out-of-pocket payments, we can also say that the former is preferred to the latter. From a headcount perspective, without information on average out-of-pocket payments among those in the impoverished and immiserized groups, a shift in population mass from immiserized payments towards zero payments would indicate an improvement in financial protection. This suggests two possible summary measures of financial protection. One is the fraction of the population in the lowest n categories combined; one could see whether the ranking of countries or time periods varies with the choice of n . The other would be a weighted average of the fractions in each category where the weights reflect the rank of the category: 1, say, for category 1; 2, say, for category 2; 3, say, for category 3a; 4, say, for category 3b; and 5, say, for category 4. As financial protection improves, the index will rise. One could also explore an alternative weighting system that treats households in the immiserizing and impoverishing categories equally on the grounds that it is possible that households in the latter group may conceivably end up, on average, further below the poverty line than households in the former group⁶; below we experiment with such a weighting where households in these two categories are both given a weight of 1.5 rather than 1 and 2 respectively. If the data permit, an adjusted financial protection index could be computed using *only households in receipt of health services*. In this case, category 5 would comprise not all nonspenders but only those who have received care but did not pay for it at the point of use. Including in category 5 nonspenders who did not receive care (i.e.

⁶ This could arise because of the way government programs work, which often focus on reducing the out-of-pocket payments of already-poor households and do little in the short run to help families who are pushed into poverty by their out-of-pocket spending.

nonusers) risks presenting a misleading picture, since it will likely include some who were deterred from using services by the cost of care at the point of use.⁷

4. Some illustrations

We illustrate our unified approach using data from the World Health Survey (WHS) and variations on the international dollar-a-day poverty line. Insofar as we can, we split category (5) (the non-spenders) into two groups: those who received care but did not pay anything; and those who did not receive care at all. The WHS has some attractions for this type of analysis: it was fielded using an identical questionnaire in 70 countries including very poor countries and very affluent countries, although out-of-pocket spending data were collected in only 51 countries⁸; and the data are publicly available and easily accessible. The WHS does, however, have some limitations: it was fielded over 10 years ago; nonmedical consumption information data were collected in a very rough-and-ready fashion; and while there is no accepted best practice on how best to collect data on out-of-pocket spending on medical services, there are some oddities in the WHS approach which probably make it less than ideal (Lu et al. 2009; Heijink et al. 2011; Raban et al. 2013). The

⁷ Such households or individuals could be retained in the analysis and included either among one of the other categories or in a category of their own. However, in neither case is it obvious how to include them since the other categories are all distinguished from one another on the basis of their out-of-pocket spending relative to their total consumption net of the poverty line. Perhaps the best way to capture forgone care due to cost would be in an analysis of use (and nonuse) of services.

⁸ The countries are: Bangladesh, Bosnia and Herzegovina, Brazil, Burkina Faso, Chad, China, Comoros, Rep. of Congo, Croatia, Czech Republic, Côte d'Ivoire, Dominican Republic, Ecuador, Estonia, Ethiopia, Georgia, Ghana, Guatemala, Hungary, India, Kazakhstan, Kenya, Lao PDR, Latvia, Malawi, Malaysia, Mali, Mauritania, Mauritius, Mexico, Morocco, Namibia, Nepal, Pakistan, Paraguay, Philippines, Russia, Senegal, Slovak Republic, Slovenia, South Africa, Spain, Sri Lanka, Swaziland, Tunisia, Ukraine, United Arab Emirates, Uruguay, Vietnam, Zambia, and Zimbabwe.

numbers presented here are therefore best seen as illustrative pending corroboration from alternative data sources.

Preamble

The WHS collects information on out-of-pocket spending both in the individual and the household survey, and we construct alternative measures from both sources. The household is asked how much it spent in total on health services in the previous four weeks, and is then asked how much the household spent *in addition* over the previous 12 months on inpatient care. We divide the latter by 48/4 to get an estimate of four-week additional inpatient spending, and add it to the four-week total to get our household-level out-of-pocket spending figure. In the individual questionnaire, a randomly-selected household member is asked whether they were admitted to hospital in the previous five years, when, and how much they paid out-of-pocket. Those with no admission during the previous five years were asked about their out-of-pocket spending during their most recent outpatient visit in the previous 12 months. We focus on inpatient admissions in the last 12 months, and construct for each randomly-selected household member an estimate of their out-of-pocket spending in the last 12 months; given the routing of the questionnaire, this reflects either inpatient care or outpatient care but not both.

One merit of the household-based measure is that it captures the out-of-pocket spending of all household members. Another is that it captures spending associated with all contacts over the time period in question. A disadvantage of the

household-based measure is that it captures only outpatient costs incurred during the last four weeks. Another is that because utilization data were collected only from one randomly-selected household member, we cannot distinguish between households where someone received care but nothing was spent out-of-pocket, and households where nobody received any care. A merit of the individual-based measure is that we *can* distinguish between these two groups. The other advantage is that we have outpatient expenses incurred over 12 months. A disadvantage is that we have out-of-pocket spending data only for the last contact. The other is that we have spending on inpatient care (if there was an inpatient admission), or on outpatient care (if there was not), but not both.

We need a measure of nonmedical consumption. In the WHS household questionnaire, the household is asked four questions covering its expenditure in the previous four weeks on (i) food, (ii) housing-related costs, (iii) education, and (iv) other goods and services. This is far from ideal, and is a far cry from, say, a typical survey along the lines of the World Bank's Living Standards Measurement Study; such surveys capture consumption rather than just expenditure (they capture, for example, home-grown food and the use value of family-owned housing), and also collect detailed information through a detailed questionnaire the various components of consumption. Even in comparison with household surveys with slimmer consumption modules, the WHS consumption module is very brief. The consensus seems to be (cf. Lu et al. 2009; Heijink et al. 2011; Raban et al. 2013) that nonmedical consumption may be underestimated in the WHS. Because of the

limitations of the WHS consumption data, our results should be viewed as illustrative.

We also need a threshold for catastrophic spending (we set $X = 0.4$) and a poverty line. We use variants of the international “dollar-a-day” poverty line (Chen and Ravallion 2010): the low poverty line (which is actually currently \$1.25-a-day at 2005 prices and purchasing power parities), and the higher poverty line (currently \$2-a-day).^{9,10} We also use a \$5-a-day poverty line which is more relevant for middle-income countries.

Results

Figure 4 illustrates immiserizing and impoverishing payments for one WHS country, Figure 5 illustrates catastrophic payments defined as non-immiserizing and non-impoverishing payments that exceed 40 percent of discretionary consumption, and Figure 6 illustrates catastrophic payments defined as non-immiserizing and non-impoverishing payments that leave a family’s nonmedical consumption below 120 percent of the poverty line. Comparing the left-hand panels of Figure 5 and Figure 6, we see many households incurring payments that are catastrophic according to the former definition but not the latter (the shading gets lighter moving from Figure 5 to Figure 6). Figure 7 and Figure 8 compare the incidence of non-catastrophic payments according to the two definitions: in Figure 7

⁹ If L is the number of dollars per day in 2005 PPP dollars, the corresponding poverty line in local currency for a survey undertaken in year t is equal to $365 \times L \times (CPI_t/CPI_{2005}) \times PPP_{2005}$, where CPI_t is the consumer price index (CPI) for year t for the country in question, and PPP_{2005} is the PPP for that country in 2005.

¹⁰ The World Bank’s data on poverty, and a discussion of the data and methods used to derive them, are available via the interactive tool PovCalNet available at <http://iresearch.worldbank.org/povcalnet/index.htm>.

we see households falling below 120 percent of the poverty line yet not incurring catastrophic payments according to the first definition; by contrast in Figure 8 we see households incurring spending in excess of 40 percent of the discretionary consumption but not classified as having incurred catastrophic spending under the second definition because their nonmedical consumption was not below 120 percent of the poverty line.

Figure 9 shows – for the 51 countries for which the WHS has out-of-pocket spending data – the average¹¹ breakdown across the various groups in Figure 1 and in Table 1 for different poverty lines, along with the simple financial protection index. The first two panels examine the effects of changing the definition of catastrophic spending: the first panel, catastrophic payments are defined as payments that absorb more than 40 percent of discretionary consumption; in the second panel, they are defined as payments that leave nonmedical consumption below 120 percent of the poverty line. The second two panels examine the effects of using the individual spending data rather than the household spending data: when the individual questionnaire is used as the source of the spending data, we are able to separate the no-spenders into (a) those who received care but did not pay and (b) those who did not spend because they did not receive care. In the computation of the financial protection index in the individual data, group (b) is excluded from the calculation.

¹¹ The numbers are mean shares across the 51 countries with no weighting for population size.

Five points are worth making. First, as the poverty line rises, we see the share of households falling into the immiserizing spending category increase, the shares falling into the impoverishing and catastrophic spending categories fall, and the financial protection index value become smaller. Second, whatever the poverty line and consistent with Figure 3, the incidence of catastrophic spending is higher (and the financial protection index value is therefore lower) when catastrophic payments are defined as payments that leave nonmedical consumption below 120 percent of the poverty line. Third, even under the second interpretation of catastrophic payments, we see quite small shares of households falling into the impoverishment and catastrophic spending categories; these are dwarfed by the number falling into the immiserizing spending category. In fact, under the more traditional definition of catastrophic spending, the number of households who experience immiserizing spending is larger than the combined number of households who experience impoverishing or catastrophic spending. Fourth, we see a higher fraction of the sample reporting no spending when the variable is constructed from the individual questionnaire. This reflects the fact that it captures spending from just one randomly-selected household member and misses the spending of other household members.¹² Fifth, based on the data from the individual questionnaire, nonspenders divide roughly equally into those who have received inpatient or outpatient care but have not paid for them at the point of use, and those who did not receive care.

¹² Offsetting this effect (but apparently only partially) is the fact that the recall period for outpatient care is longer for the variable constructed from individual-level.

Figure 10 shows that the effect on the financial protection index of changing from one definition of catastrophic spending to the other varies across countries; in most it makes a relatively small difference (less than 10 percent in a sizable fraction of countries); but in some (Ethiopia and Lao PDR especially) it makes a big difference.

Figure 11 shows the breakdown for the BRICS countries: Brazil, China, India, Russia and South Africa. Also shown are the values of the financial protection index. In the filled-circle markers the categories are weighted 1, 2, 3, 4 and 5, and there is no adjustment for differences across countries in the share of nonspenders who are nonusers. In the unfilled-circle markers we adjust for such differences: nonusers are excluded and a score of 5 is given only to nonspenders who have received care.¹³ The triangle-shaped markers make a different adjustment to the financial protection index: here we weight households in the immiserized and impoverished categories equally at 1.5; the other categories are weighted 3, 4 and 5 as before. In Figure 11 catastrophic spending is defined as spending in excess of 40 percent of discretionary consumption.

Seven points are worth highlighting. First, we see appreciable fractions of the population in some countries – notably Brazil, China and India – falling into the impoverishing and catastrophic spending categories; indeed at the \$1.25-a-day poverty line, these categories dominate the immiserizing spending category in

¹³ The numbers are computed using the out-of-pocket spending data from the household questionnaire, except that we have used the individual-level share of users among nonspenders to estimate the fraction of nonspending households who received care.

Brazil and China. Second, as in Figure 9, the impoverishing and immiserizing spending categories shrink as the poverty line is raised: by the time it has reached \$5-a-day, the impoverishing and catastrophic spending categories are dominated by the immiserizing spending category. Third, the fraction of nonspenders varies across the BRICS countries. In India less than 30 percent of households record no health spending; in South Africa over 70 percent of households record no spending. Fourth, we see differences across the BRICS countries in the shares in the various categories in the spending group, and in countries' financial protection indices. India fares poorly under all three poverty lines: even under the \$1.25-a-day line, over 55 percent of the population experiences immiserizing, impoverishing or catastrophic spending; this rises to over 70 percent under the \$5-a-day poverty line. Brazil, by contrast, fares well under the \$1.25-a-day poverty line: along with South Africa it records the smallest fractions incurring immiserizing and impoverishing payments, and has a much smaller fraction of households incurring catastrophic spending. Fifth, the ranking of countries other than India on the financial protection index depends on the poverty line: Brazil and China slip down the ranking as the poverty line is raised. Sixth, the ranking also depends on whether we put all nonspenders in the top category (the filled circles) or only the nonspenders who receive care (the unfilled circles): the fraction of users among the nonspenders is highest in Brazil (62 percent) and next highest in Russia (57 percent); it is much lower in India (27 percent), South Africa (29 percent) and China (31 percent). Moving from the unadjusted to adjusted index thus makes a smaller difference to

the scores of Brazil and Russia than it does to the scores of China, India and South Africa. Seventh, the ranking in this case is not sensitive to whether we weight the immiserizing and impoverishment categories differently (the filled circles) or equally (the triangles). The adjustment makes a bigger difference in the case of India where a large share of the population falls into the immiserizing payment category, and in cases where the poverty line is higher.

Figure 12 shows how all 51 countries compare on the financial protection index adjusted for differences across countries in the share of nonspenders who are nonusers. The shading switches from red to green at 4 – the score a country would get if all households were in the non-catastrophic spending category (the score would be higher still, of course, if some were in the nonspending category). On the adjusted financial protection index, S Asia and – to a somewhat lesser extent – E Asia and sub-Saharan Africa come out worst among the World Bank regions; Europe and Central Asia and Latin America and the Caribbean come out best. In most regions, there is, however, appreciable heterogeneity.

5. Conclusions

Building on the previous literature, we have proposed a unified approach to the measurement of financial protection in health in which catastrophic and impoverishing payments are two of five mutually exclusive and mutually exhaustive outcomes associated with out-of-pocket spending. Our approach

expresses out-of-pocket payments as a ratio of a household's total consumption in excess of the poverty line, which we might think of 'discretionary' consumption. In our framework, households are classified as having incurred impoverishing payments if this ratio exceeds one. Households incurring positive payments but having a negative ratio (because their discretionary consumption was negative) are classified as having incurred immiserizing payments: these households are pushed even further below the poverty line by their out-of-pocket payments. Households incurring catastrophic payments are a subset of those with positive payments and a ratio between zero and one. We suggest two definitions of catastrophic payments: in the first, they are payments that exceed a certain fraction X of a family's discretionary consumption, i.e. whose ratio exceeds X ; in the second, they are payments that leave a family's nonmedical consumption below Z times the poverty line. We have also proposed a simple financial protection index that reflects the percentages of households incurring immiserizing, impoverishing, catastrophic, non-catastrophic, and zero out-of-pocket payments, where weights of 1, 2, 3, 4 and 5 respectively are attached to these five outcomes. We also suggested an adjusted index where only households receiving care are included in the calculation of the index, so that the zero-payment category includes only households who have received care but have not paid for it at the point of use.

Our approach has, we believe, a number of attractions. First, we bring into the analysis of financial protection the case of immiserizing payments. While such payments have been included in the poverty gap-based measure of financial

protection up until now, the focus in the headcount measure has been on households pushed into poverty by their out-of-pocket payments to the exclusion of already-poor households pushed still further into poverty by their out-of-pocket payments. This is despite the fact that many programs focus on this latter group, and in our data at least more families are immiserized than impoverished. Second, our approach casts impoverishing and catastrophic payments as mutually exclusive categories rather than as alternative ways of thinking about financial protection; under our approach a household cannot simultaneously be in the impoverished and catastrophic categories. Third, we offer a second – and potentially more compelling – definition of catastrophic payments, namely payments that almost push a family into poverty. Fourth, the fact that our approach yields five mutually exclusive and mutually exhaustive categories (immiserizing, impoverishing, catastrophic, non-catastrophic, and zero payments) has implications for measuring financial protection. A policymaker with a commitment to eliminating poverty would be more concerned about the immiserizing and impoverishing categories than the others, which by construction do not involve out-of-pocket payments pushing families into poverty or even further into poverty. One implication of this is that an increase in the fraction of families incurring catastrophic spending might not be a bad thing; it might reflect reductions in the fractions of the population falling in the immiserizing and impoverishing categories. Our simple index of financial protection, which assigns weights of 1 through 5 to the five categories, ignores the size of the out-of-pocket payments involved: impoverished families may on average incur larger out-of-

pocket payments than immiserized families. Nonetheless, as a count-based measure it is not bad, capturing as it does the idea that from a poverty-reduction perspective impoverishing and immiserizing payments are worse than catastrophic payments (at least if defined in terms of whether they leave a family close to the poverty line), which are in turn worse than non-catastrophic payments, which are in turn worse than no payments (especially if this group is restricted to users). Moreover, this index is easy to explain to a non-technical audience.

We have illustrated our ideas using data from 51 countries for which out-of-pocket spending data are available in the World Health Survey. We use \$1.25-a-day, \$2-a-day and \$5-a-day international poverty lines, and a catastrophic payment threshold of 40 percent. While intended to be only illustrative, the results are not without interest. For the 51 countries as a whole, we find very small shares of households falling into the impoverishment and catastrophic spending categories, and a much larger fraction falling into the immiserizing category. We also find a larger fraction of households in the catastrophic payment category when catastrophic payments are defined as payments that leave a family's nonmedical consumption below Z times the poverty line. Unsurprisingly, as we raise the poverty line, the share of households falling into the immiserizing spending category increase, and the shares falling into the impoverishing and catastrophic spending categories decrease. In our more detailed analysis of the BRICS countries (Brazil, China, India, Russia and South Africa), we see appreciable fractions of the population in some countries falling into the impoverishing and catastrophic

spending categories; in fact, at the \$1.25-a-day poverty line, these categories dominate the immiserizing spending category in Brazil and China. The fraction of nonspenders varies across the BRICS countries, with less than 30 percent of households recording no health spending in India, but over 70 percent of households recording no spending in South Africa. The ranking of the BRICS countries other than India on the financial protection index depends on the poverty line (Brazil and China slip down the ranking as the poverty line is raised) and on whether we put all nonspenders in the top category (the basic index) or only the nonspenders who receive care (the adjusted index); moving from the unadjusted to adjusted index makes a smaller difference to the scores of Brazil and Russia than it does to the scores of China, India and South Africa. Across the 51 countries, we see low adjusted financial protection index scores in Asia, and relatively high scores in the World Bank's Europe and Central Asia and Latin America and Caribbean regions. Moving from the unadjusted to adjusted index makes relatively little difference in the European countries, but a sizable difference in countries like India and Ethiopia. This is important because computing the adjusted index will likely be impossible in household expenditure surveys, because of the lack of data on utilization.

Figure 1: Classification of out-of-pocket payments using Pen parade according to two alternative definitions of catastrophic payments

(a) Payments that absorb more than X percent of discretionary consumption

(b) Payments that leave nonmedical consumption below Z times the poverty line

Figure 2: Classification of out-of-pocket payments according to two alternative definitions of catastrophic payments

(a) Payments that absorb more than X percent of discretionary consumption

(b) Payments that leave nonmedical consumption below Z times the poverty line

Figure 3: How the two interpretations of catastrophic payments compare

Figure 4: Immiserizing and impoverishing payments

Figure 5: Catastrophic payments defined as payments exceeding 40 percent of discretionary consumption

Figure 6: Catastrophic payments defined as payments leaving nonmedical consumption less than 120 percent of poverty line

Figure 7: Non-catastrophic payments defined as payments less than 40 percent of discretionary consumption

Figure 8: Non-catastrophic payments defined as payments leaving nonmedical consumption more than 120 percent of poverty line

Figure 9: Shares in different financial protection categories under different assumptions

Figure 10: Effect on financial protection index of changing definition of catastrophic spending

Figure 11: Illustrative results for financial protection for BRICS countries

Figure 12: Adjusted financial protection index

Table 1: Classification of different types of out-of-pocket payment

Case	Type of out-of-pocket payments	Definition of catastrophic payments	
		Payments absorb more than X percent of discretionary consumption	Payments leave nonmedical consumption below Z times the poverty line
1	Immiserizing	$M/(C-NM^*) < 0$	$M/(C-NM^*) < 0$
2	Impoverishing	$M/(C-NM^*) > 1$	$M/(C-NM^*) > 1$
3	Not immiserizing or impoverishing	$0 < M/(C-NM^*) < 1$	$0 < M/(C-NM^*) < 1$
3a	Catastrophic	$X < M/(C-NM^*) < 1$	$M/(C-Z \cdot NM^*) < 0$ or > 1
3b	Non-catastrophic	$0 < M/(C-NM^*) < X$	$0 < M/(C-Z \cdot NM^*) < 1$
4	Zero out-of-pocket payments	$M/(C-NM^*) = 0$	$M/(C-NM^*) = 0$

Notes: M is out-of-pocket medical spending, NM^* is the poverty line (the threshold below which policymakers have agreed nonmedical consumption, NM , should not fall), X is the catastrophic payment threshold, and C is total consumption, equal to $M+NM$.

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