

**The Impact of the Financial Crisis on Poverty and Income
Distribution in Mongolia***

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I. Introduction

The financial crisis of 2008-09 has considerably slowed the pace of economic growth in Mongolia. When combined with the Dzud (severe winter storm) of 2009-10, which occurred just as the economy was beginning to recover and killed over 1 million heads of livestock, the slowdown is likely to have significant impacts on poverty as well as the distribution of income and consumption among the poor and non-poor.

In this paper we examine the poverty and distributional impacts of the crisis in Mongolia, relying on predictions from a simulation model based on pre-crisis data, given that household data to measure impacts during and after the crisis is unavailable. It is difficult to predict the distributional impacts of the financial crisis with a high degree of confidence. Evidence from previous crises suggests that relative inequality falls about as often as it rises during aggregate contractions (Paci et al, 2008). Furthermore, as the crisis spreads *within* a country (through adjustments in domestic credit and labor markets and fiscal policies), its impacts across different groups, sectors or areas became all the more difficult to track.

The primary impact of the crisis in Mongolia has occurred through its effects on the export sector, remittances, and a fall in global demand for commodities. The Dzud created more problems, with an estimated 8,500 households losing their entire stocks of animals, and hence their largest source of income (FAO, 2010). High meat prices induced by the Dzud, along with rising commodity prices and exports in 2010, have led to recent spikes in the inflation rate, which is leading to declines in real wages despite increases in nominal real wages. Such high inflation has the largest impact on the poor (the number of workers who claim that their earnings do not meet their basic needs increased by 15 percent during the first half of 2010) and creates concerns about a possible relapse into an economic crisis (World Bank, 2010a).

As the discussion so far suggests, the impact of the crisis and the subsequent shock of Dzud on income distribution and poverty in Mongolia is likely to have been complex and dynamic. Given these complexities, an analysis of the impacts must address the following issues: (i) which sectors and/or regions are most likely to be impacted and in what way; (ii) how sectoral and regional impacts translate into impacts across the income or consumption distribution; and (iii) the characteristics of those who will likely become poor as a result of the crisis. In order to provide information useful to policymakers, the above questions would have to be analyzed *ex ante*, without the benefit of micro data that capture actual impacts. Also, the method for assessing impacts must be able to account for multiple channels through which the impacts can be transmitted to households and individuals, and identify the relative importance of these channels in a given country context.

A number of different approaches have been used in the economic literature and by development institutions to estimate *ex ante* the impact of a crisis on household incomes and poverty. A commonly used approach involves estimating an output elasticity of poverty, in which historical trends of output and poverty are used to determine the responsiveness of poverty rates to growth in output, which is then combined with macroeconomic projections to estimate the impacts of reduction in future growth on poverty. Although this method is easy to apply, it only provides aggregate poverty (or at most, sectoral or regional) impacts and very little information on how the impacts are likely to be distributed among different groups or sub-populations. Other approaches, used in a few middle-income countries, involve using micro-simulation methods that combine computable general equilibrium (CGE) models with the predictions from behavioral regressions built on pre-crisis household data to simulate household-level impacts across the entire income/consumption distribution.

The approach adopted here is best seen as a compromise between “aggregate” approaches that rely on growth-poverty elasticities and complex macro-micro simulation approaches that harness the power of general equilibrium models and household data. The compromise involves combining the behavioral estimations from pre-crisis household data with aggregated macroeconomic projections. This leads to a model that is leaner than the typical macro-micro simulation models, takes less time to compute, and useable in countries where CGE models are either unavailable, outdated or of poor quality. In contrast to CGE models, aggregate macroeconomic projections—such as those for national, sectoral or regional GDP and remittance flows—are available for most countries with which the Bank or the International Monetary Fund (IMF) has an ongoing dialogue, including Mongolia. Compared to the simple elasticity-based approach, this approach has the main advantage of being able to generate estimates for individuals and households all along the distribution with and without the crisis, taking into account different channels of impact on household income.

The paper is structured as follows. Section II outlines the basic methodological approach used to create the simulation results used here. Section III discusses the macroeconomic projections that are used as inputs into the model. Sections IV and V examine the model’s projections for poverty and distributional impacts respectively, Section VI discusses the impact of Dzud (severe winter) and Section VII concludes.

II. Methodological Approach

Estimating the likely impact of the macroeconomic shock on the welfare of Mongolian households, in the absence of crisis or post-crisis household data, must rely on methods that extrapolate impacts based on pre-crisis data. We employ a microsimulation approach that superimposes macroeconomic projections on behavioral models built on pre-crisis micro data, namely the last available household survey of 2007/8. The model is loosely based on previous approaches to microsimulation described in Bourguignon, Bussolo, and Pereira da Silva (2008) and Ferreira et al. (2008) – with an important simplification of omitting the computable general equilibrium (CGE) component, which is difficult to employ in most developing countries. Instead the approach described here links the behavioral model to aggregate and sector level macroeconomic projections for a specific country and year, and extrapolates the microeconomic snapshot of future impacts from these projections.¹

Using macroeconomic data and projections for the period 2009-2011, the model is able to predict income distributions at the individual and household levels. The poverty and distributional impacts of the crisis can be estimated by comparing the crisis scenarios with the pre-crisis or “benchmark” data from the 2007/8 household survey. The model explicitly allows for shocks to labor income – modeled as employment shocks, earnings shocks or a combination of both – and international remittances, and is able to capture most of the changes in total income since labor income and international remittances account for a significant proportion of household income in Mongolia.² Other sources of income, such as domestic remittances, and capital and financial income are expected to grow at the same rate as aggregate GDP. The macroeconomic variables

¹ A similar approach has been used to estimate the poverty and distributional impact of the financial crisis on a number of developing countries, including Bangladesh, the Philippines, Poland and Mexico. See Habib et al (2010a, 2010b) for application to Bangladesh and the Philippines, and World Bank (2010) for application to Mexico.

² Labor income constitutes 74% of total household income, and international remittances constitute 3.4%.

that are “inputs” into the microsimulation model are intended to capture the sources of income losses discussed above. These variables are changes in aggregate and sectoral GDP, changes in international remittances and population growth.

The income projections from the model are used to produce a variety of outputs, including aggregate poverty and inequality comparisons across scenarios, individual income and labor market outcomes, profiles of groups entering (and exiting) poverty as a result of the crisis (and recovery from the crisis), and various measures of how the impacts are distributed across the population. The results presented below capture the likely impact of the crisis (2009) on household welfare and recovery from the crisis (2010 and 2011) in Mongolia.

A number of caveats apply to this methodology. Firstly, the micro-simulations presented here are based on past data that reflect the pre-existing structure of labor markets and household incomes. Consequently, any prediction about these variables assumes that these structural relationships remain constant over the period for which projections are made. It is reasonable to expect that the structural make-up of the labor market could change between a crisis and a non-crisis scenario, which cannot be captured by our model. Moreover, since the data reflect only the labor market outcomes in the formal economy, we are unable to make predictions about the informal economy, which is likely to be an important part of the coping strategy for many crisis-affected households³.

Secondly, the quality and accuracy of the projections from the model is a function of the nature and quality of data underpinning the exercise. The results would depend not only on the validity of the micro-models during a crisis (see above), but also on the macro projections of the crisis and recovery scenarios. In addition, the use of a pre-crisis year (2008) as a comparator is tricky because the comparison could potentially attribute certain outcomes to the crisis when they are a result of other factors that occurred over the same period.

The third caveat relates to our decision to work with income, rather than consumption data. The advantage of using income is that it allows us to link welfare impact on households directly with potential channels of impact, which are employment, labor earnings and remittances. There are two primary caveats to working with income data: (i) income data often tends to be of lower quality than consumption data, which introduces an element of noise into the analysis due to the unobserved presence of measurement error; (ii) converting predicted income into consumption and consumption-based measures assumes that the ratio of consumption to income is unchanged for every household between the baseline and prediction years.

Finally, the model does not allow for mobility of factors (labor or capital) across regions, urban and rural areas and national boundaries. Consequently all individuals are assumed to remain in their 2008 place of origin, even as they experience a change in labor force status or sector of employment. While this assumption is an abstraction from truth, it is likely to matter only when the impacts are disaggregated spatially or across rural and urban areas. Moreover, changes in domestic remittances from urban to rural areas are incorporated, so that lack of factor mobility does not necessarily imply that income flows across space are assumed to remain constant.

³ For a detailed qualitative account on the coping strategies used by households, please refer to Reva et al. (2011).

III. Macroeconomic projections of crisis impact

Since Mongolia is a landlocked country with large swathes of inarable land, livestock is by far the most important factor of production. Nearly all of those engaged in agriculture (35 percent of the labor force in 2009) are livestock herders, and around 90 percent of all rural households own animals. However, the agricultural sector has seen sporadic growth in the past few years due to adverse weather conditions, and the Dzud of 2010-11 has played a significant role in further exacerbating this trend (Mongolia National Statistical Office, 2004).

Although growth in industry and services has largely offset the instability in agriculture over the past decade, the financial crisis is expected to have again slowed down the growth in these two sectors. The primary impact of the crisis is likely to have occurred through its effects on the country's mining and agricultural exports. Within industry (which accounted for nearly 14% of the labor force in 2009), mining is the dominant activity, accounting for about half of all industrial output and a large share of export earnings (World Bank, 2004). Reduced demand for exports from Canada, the United States, and especially China is likely to have had a significant impact on economic output in Mongolia.

This would have resulted in reduced labor demand in the formal industry sector and reduced household income in the informal and agricultural sectors. The impacts would likely have originated in urban areas and formal sectors and then propagated to the rest of the country through linkages between these sectors and more informal sectors of the economy. Finally, falling commodity prices, particularly those of gold and copper, could reduce the value of Mongolia's exports and have a significant impact on household income. Moreover, qualitative data suggest that fluctuations in the prices of cashmere, sheep's wool, camel's wool, skin, and meat caused problems for herders throughout 2009, which was exacerbated by rising prices of imported food (sugar, flour, rice) and high transport costs (Reva et al, 2011). Unfortunately, our model is unable to directly capture the effect of commodity price changes, although some of the indirect effects on employment and income are captured via the sector growth projections.

Table 1 shows the macroeconomic projections available at the time of writing (November 2010). Mongolia is expected to experience a sharp macroeconomic shock in 2008-09 followed by a recovery in 2010 and 2011. During the crisis period, aggregate GDP growth would have stagnated, mainly due to a 4.1% contraction of output in the industrial sector. In fact, GDP in *per capita* terms is expected to fall by 0.5% between 2008 and 2009. Starting in 2010, however, the economy would begin to recover rapidly. Driven by resurgence in the industrial and services sectors, the economy is projected to grow at 7% in 2010 and nearly 9% in 2011. Surprisingly, remittances are expected to grow at a healthy 48.3 percent in response to the crisis, but will grow much more slowly in 2010 than in other years, reflecting a slight lag in the response of remittances to the downturn.

Table 1: Output projections in Mongolia in real terms

	Actual (Tg billions)	Crisis (% annual growth in real terms)		Recovery (% annual growth in real terms)	
		2008	2009	2010	2011
Total GDP	3,151	0.4	7.0	8.9	
Agriculture	796	2.3	3.7	3.5	
Industry	979	-4.1	8.5	11.9	
Services	1,377	2.5	7.9	9.8	
Remittances	110	48.3	21.9	43.1	
CPI	100.0	6.4	3.6	-0.8	

Note: These numbers represent the macroeconomic projections available at the time of writing in November 2010. Actual data, as it becomes available, may differ from these projections.

Sources: MNGLDB, IMF

Translating changes in output into changes in employment

In order to determine the impacts at the household level, output-employment elasticities are employed to translate the macroeconomic output projections into sectoral employment changes. The elasticities are calculated from historical data on sectoral employment and output.⁴⁵ The employment projections also need to take into account population growth, to fully account for demographic changes that would affect the size and composition of the labor force and ultimately impact the estimates of per capita household income. Official population projections suggest that the total population of Mongolia is expected to grow by 6.2% between 2008 and 2011, with the size of the working age population (age 15-64 years) growing by 7.3%. These population projections, disaggregated by gender and age groups, are used to adjust the simulation results for population growth.⁶

Table 2 shows the results of this exercise, namely the employment projections (sectoral and aggregate) for all years. The effect of the initial shock on employment is significant and lingers even during the recovery period of 2009-11. Even before the crisis (in 2008), Mongolia had a low employment rate of 55%, with the largest share of employment in agriculture and, especially, services sectors. The lack of demand for exports during the crisis period would result in a contraction of the labor market. Declines in both the employment level and rate are expected for the crisis period (Table 2). The share of both agriculture and industry sectors in the number of workers employed would have fallen, while the share of services in total employment would have increased.

⁴ The output-employment elasticities are estimated to be -0.58, 0.86 and 0.02 for agriculture, industry and service sectors, respectively.

⁵ We can use the output-employment elasticities from our other case study countries (Bangladesh, the Philippines, and Mexico) as comparators for Mongolia. Although the countries are not perfect comparators, the results reveal useful insights about the Mongolian economy. We find that agricultural employment in Mongolia is much more (negatively) elastic to changes in output, and manufacturing employment is more (positively) elastic. This implies that growth in Mongolia is driven largely by the manufacturing sector, and that newly created jobs are likely to be in manufacturing, more so than in the other countries studied. Most likely, this reflects that manufacturing sectors in the other countries are more developed than in Mongolia.

⁶ This is done essentially by re-weighting the households in the 2008 micro data to replicate the demographic changes predicted by population projections.

Even during the recovery period (2009-11), employment growth is expected to be slow despite significant growth in output. Thus the labor market is likely to be slow in returning to pre-crisis levels of opportunities for workers. Although the number of employed people is expected to increase, the employment *rate* would drop due to a rapid increase in the working-age population. The biggest gains in terms of sectoral shares are in industry, while the sectoral share of agriculture in employment is expected to fall as the economy grows during the recovery period.

	Actual	Crisis	Recovery	
	2008	2009	2010	2011
Employment Status (millions)				
Employed	76.0	75.3	76.0	76.1
Non-Employed	62.3	66.4	69.1	72.3
Employment Rate	54.9	53.1	52.4	51.3
Sectoral shares (% of employed in each sector)				
Agriculture	35.4	35.3	34.2	33.4
Industry	13.7	13.3	14.9	15.6
Services	50.9	51.4	50.9	51.0

Source: HHS 2007/08, MINGLDB, and projections.

IV. Aggregate impact on poverty and inequality

Below the method for simulating the labor and non-labor incomes of individuals and households are summarized (a more detailed description is available in the Annex). In order to simulate changes in *labor income* from the pre-crisis year to the crisis (or recovery) year, the labor force and employment status of individuals in the baseline or pre-crisis survey are “modified” so that the net movements in and out of employment and sectors *equals* the predicted aggregate changes in sectoral and total employment over this period. This modification requires identifying movers (i.e. individuals whose labor market status is predicted to change between the baseline and end years) and stayers (i.e. individuals whose labor markets status is predicted to remain the same between the baseline and end years), on the basis of information from behavioral models estimated on the pre-crisis (2008) micro data.⁷

Once aggregate employment changes have been replicated at the individual level, labor *earnings* are predicted for movers who change their sector or status of employment between pre-crisis and crisis years, using an earnings model estimated on pre-crisis data. Finally the sectoral wage bill is adjusted (scaled upward or downward) so that the product of projected employment and earnings changes is equal to projected GDP changes for each sector. This yields labor income for every employed individual in the crisis year.

To simulate changes in *non-labor income*, the projections of aggregate changes in remittances are linked to the pre-crisis remittance information from household data using a simple assignment rule that ensures that the total change in remittances received by households is equal to the projected change in aggregate remittances from the macro data. Other components of non-labor income (profits, rents and domestic remittances) are assumed to grow at the rate of aggregate GDP for the relevant period.

The simulation exercise described above is conducted separately for every “prediction” year, namely 2009, 2010 and 2011, with 2008 as the baseline year. In other words, the exercise for 2010 and 2011 do *not* take the 2009 projections as the “baseline”, but instead repeats the exercise

⁷ Specifically, these (multinomial logit) models generate individual-level probabilities for each potential labor market state (i.e. out of the labor force, unemployed, employed in agriculture/industry/services) for all working-age individuals, from the pre-crisis data. Movers (stayers) are individuals with a relatively low (high) probability of being assigned to their pre-crisis state, as predicted by the behavioral logit models based on pre-crisis data.

– using the macro projections of changes between 2008 and the prediction year – on 2008 household data.

Table 3 shows the trend in household income, as projected by the simulations based on 2008 data. Household income closely tracks the projected macro changes in GDP and remittances. A 0.4% drop in average income is projected for 2009, driven mainly by a decline in labor income, which

Table 3: Projected household income and its sources				
	Actual	Projected		
	(Tg/year) 2008	(% change from previous year)		
		2009	2010	2011
Total HH income	3,276,394	-0.4	6.4	4.1
HH Labor income	2,426,546	-2.2	6.7	2.9
HH Non-labor income	831,152	4.7	5.6	7.4
Intl. Remittances	1,191,182*	4.9	1.2	2.2
<i>Note: Total HH income also includes implicit rent</i>				
<i>*Remittances are reported only for households that receive them, and thus higher than non-labor income, which is reported for all households</i>				
<i>Source: Own estimations based on HHS 2007/8, and projections</i>				

constituted 74% of pre-crisis income. Non-labor income grows at about 5% between 2008 and 2009. Total income recovers in 2010 and 2011, with the primary source of that growth being labor income in 2010 and non-labor income in 2011. This is because the slowdown in remittance growth does not manifest themselves until 2010, after the labor market has largely recovered, followed by a recovery in remittances in 2011.

The impact on poverty and inequality

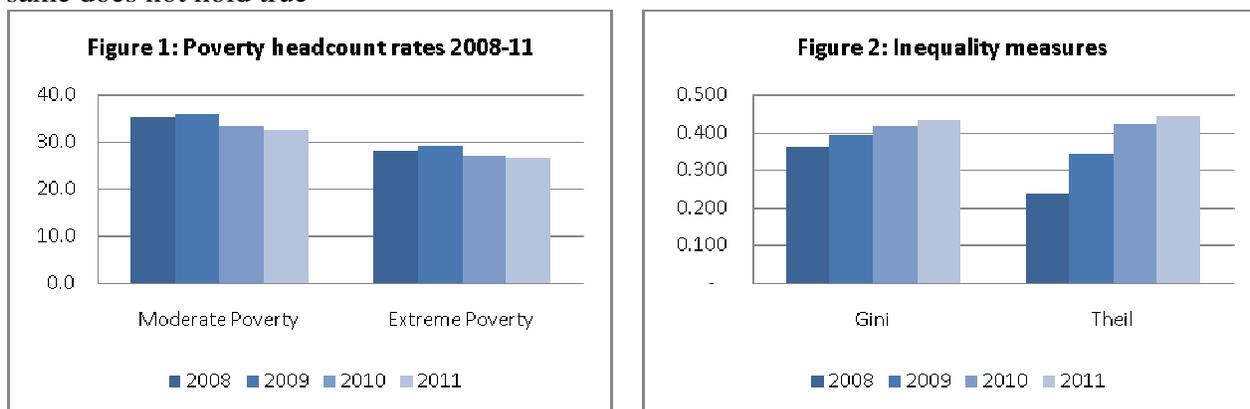
To obtain projections of poverty estimates, which are defined in terms of per capita consumption in case of Mongolia, the household incomes referred to above have to be first translated to consumption and then compared against consumption poverty lines. This exercise implies two key issues that merit discussion: how income projections are translated into consumption and how poverty lines are adjusted (or not) to take into account changes in relative prices over time.

To translate income projections to consumption, the ratio of consumption to income for the baseline year (2008) for every household is used to convert projected per capita incomes for 2009, 2010 and 2011 into per capita consumption. The implicit assumption underlying this simple rule is that the average propensity to consume for every household is unchanged between the baseline and prediction years. The constant savings rate that this assumption implies is probably more realistic for poor households than for better-off households. This also implies that our approach may overestimate the consumption impact of the crisis on better-off households, since such households may compensate for an income loss by reducing savings (or through more dis-saving), resulting in a smaller impact on consumption.

Poverty lines are kept unchanged at their 2008 nominal level for the entire exercise, for the following reason. For the purpose of the simulation all components of household income (from labor and non labor sources) are computed in real terms (constant 2008 prices), since all income estimates are derived from 2008 data and the macroeconomic changes or shocks replicated on the micro data are in real terms. This also implies that in order to obtain projected poverty

measures for 2009, 2010 and 2011, the simulated household incomes for the relevant year will need to be compared against the poverty line(s) for 2008.⁸

Figure 1 shows the projected trend for poverty measures. The moderate poverty headcount is expected to increase by 1 percentage point during the crisis, but once the economy recovers in 2010, poverty falls to below pre-crisis levels. A similar pattern emerges for extreme poverty. The same does not hold true



Source: Own estimations based on MNGDLB

for inequality, however, which is expected to continue rising slowly even after the economy has recovered (Figure 2). The poverty gap, which measures the distance from the poverty line, also falls during the recovery, but stays above crisis levels. This result implies that many of those that exit poverty during the recovery were very close to the poverty line. In the next section we will discuss the characteristics of those who enter and exit poverty during this period.

V. Impacts on Income Distribution

By generating predicted levels of income and consumption for all households, the microsimulation model allows us to examine the type of households that are likely to be affected by the crisis and benefit from the recovery, the primary channels of impact and their relative importance, and the distribution of the impact across different income groups.

Below these results are organized in terms of two non-overlapping time periods: the “crisis” period of 2008-09 when economic growth was stagnant, and the “recovery” period of 2009-11 when GDP is expected to grow at 7% and 9% in two successive years. This organization allows us to compare the dynamic distributional changes and the profiles of those affected by the changes across two periods that are quite different in terms of the direction of economic change. It allows us, for example, to examine how the gains from the recovery were distributed across space and groups in comparison to the losses from the crisis; and how the characteristics of those

⁸ The use of the 2008 poverty lines in real terms to estimate projected poverty for subsequent years necessarily assumes that the poverty line (which is usually anchored to a food basket) and nominal value of incomes are “inflating” at the same rate, which is given by the Consumer Price Index or CPI. In the case of Mongolia, this is a valid assumption, since the data show that there is hardly any difference between food and non-food inflation during the period under study (the two price indices show a difference of 0.6% in 2011). It should be noted that in some other countries for which simulations have been run (e.g. Bangladesh, the Philippines), a larger divergence between food and non-food inflation necessitates an adjustment of the poverty line, to ensure that the same food bundle is affordable in prediction years.

who fell into poverty during the crisis differ from the characteristics of those who exited during the recovery.

The crisis period, 2008-2009

The results from three types of analysis are presented below. First, we examine the characteristics of the group we will call “crisis-vulnerable” or “new poor”, which refers to households that have become poor between 2008 and 2009, and compare them against the chronic poor (those who are poor in both years) and the non-poor (those who are not poor in either year). Second, we use growth incidence curves to see how changes in income are distributed across income groups and employment sectors.

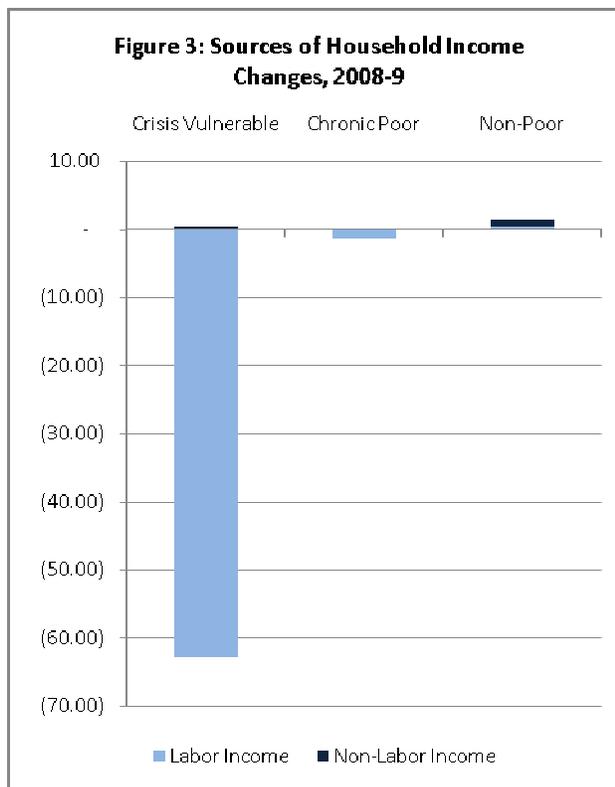
A profile of the “crisis-vulnerable”

Crisis vulnerable households are projected to suffer large income losses over the period (2008-09) with a 62% drop in average

household income, due almost entirely to a 75% loss in household labor income (Figure 3)⁹. This is a significantly larger percentage loss than what is experienced by the *chronic poor* (households who are poor in *both* 2008 and 2009) and the non-poor (households who are not poor in either period). Note that non-labor income slightly offsets the losses in labor income, because remittance growth remains strong through the crisis period.

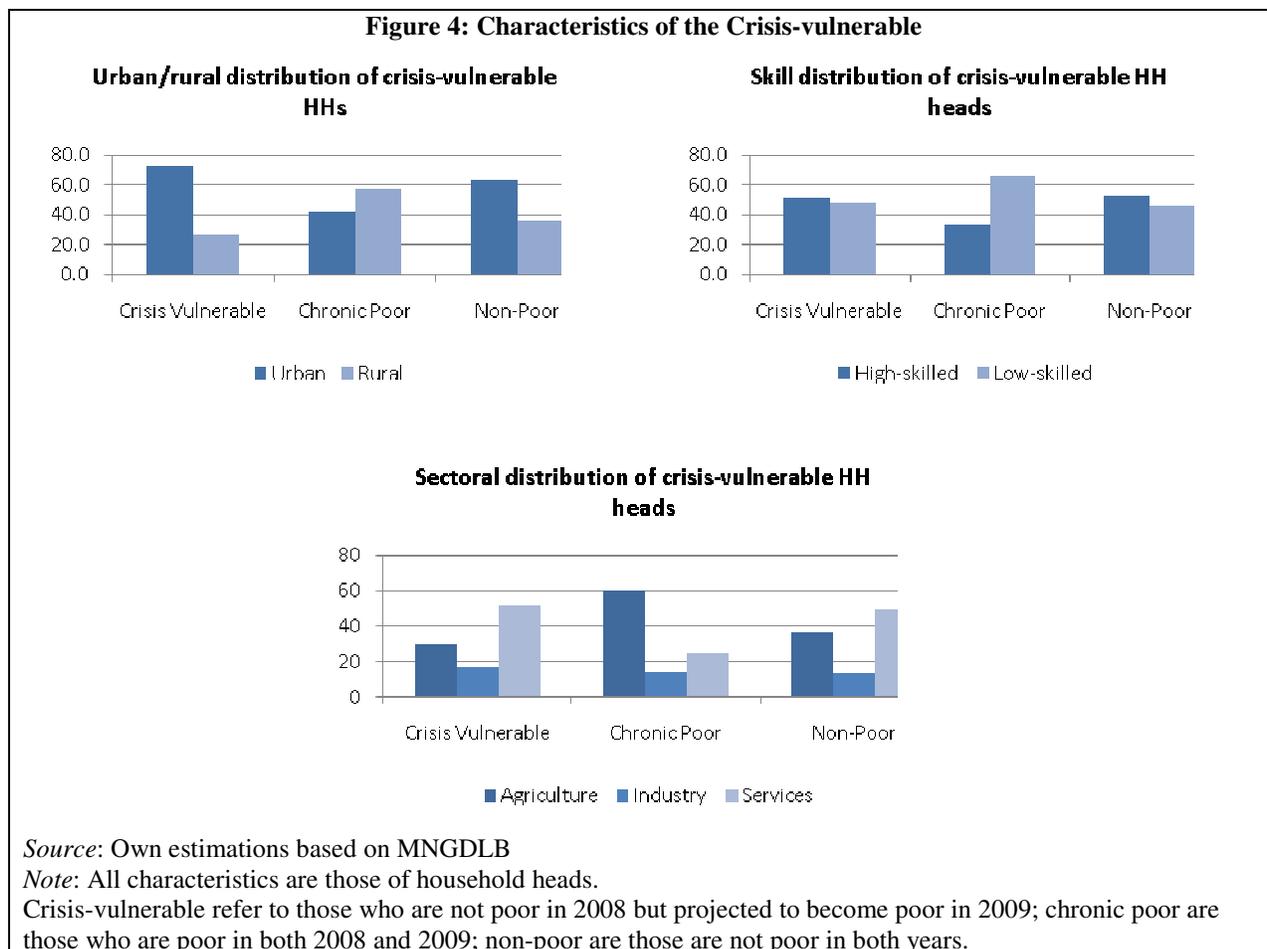
Figure 4 compares the characteristics of crisis-vulnerable households with those of the other two groups. A few characteristics of crisis-vulnerable households appear to distinguish them from *both* groups. The crisis-vulnerable are much more likely to be urban and employed in industry or services than either the chronic poor or the non-poor, and more likely to be high-skilled (defined as having 10+ years of education) than the chronic poor. In fact, on average, vulnerable household heads are almost as “skilled” as non-poor household heads.

The profile of crisis-vulnerable households is consistent with reduction in labor income being the primary channel of impact for households that are predicted to become poor as a direct result of the crisis. Further, output and income losses are expected to be concentrated in industry and (to some extent) the services sector – output growth in 2009 is negative in industry and just around 2% (well below the historical norm) in services (see Table 1). This explains why crisis-vulnerable household heads are disproportionately more likely to have been employed in industry and services and less likely to have been employed in agriculture before the crisis than are heads of other households.



⁹ Note that since we do not measure asset losses, we are unable to capture wealth effects. As a result, labor income as shown here is the main channel of impact *among* the channels considered in this analysis, including remittances, employment income, and various forms of non-labor income.

Figure 4: Characteristics of the Crisis-vulnerable

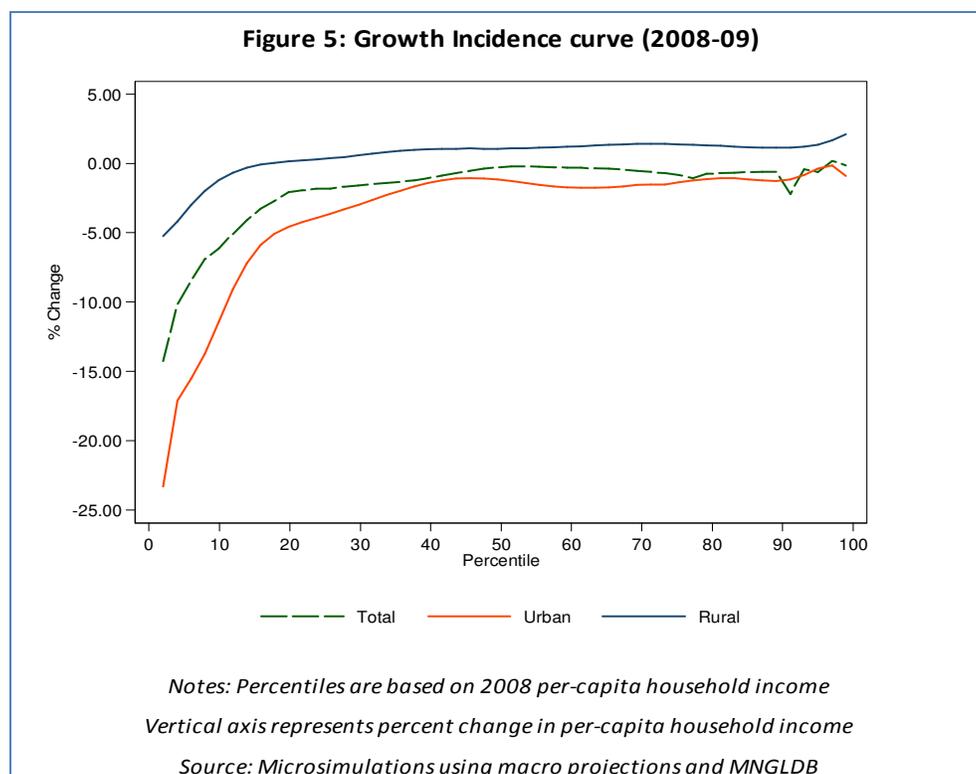


How the income losses are distributed

Next we examine how per capita household income losses between 2008 and 2009 are distributed across households with different pre-crisis income levels. For this purpose we first order households according to their pre-crisis per capita household income level (from lowest to highest), group them into income percentiles (as defined in 2008) and plot the *average* percentage loss in per-capita household income by percentile in the form of a Growth Incidence Curve (GIC). We perform this exercise for all households, as well as for specific groups. Each GIC allows us to compare percentage income losses across households within the group. Comparison across groups (e.g. households in rural and urban areas) are not straight forward,

however, because income percentiles (measured on the x-axis of the graphs) are group rather than population specific. For instance, given that on average income levels are higher in urban than in rural areas, a household in the 30th percentile of the urban income distribution would be significantly better off than a rural household in the 30th percentile.

Per capita household income losses are largest among those at the bottom of the 2008 income distribution (0 to 20th percentiles), whereas households above the 20th percentile appear to suffer a uniform 2-3% income loss. Income losses, therefore, appear to be highly skewed towards lower income households, a pattern that is seen for urban and rural areas alike (Figure 5).



Comparing rural and urban households, the average urban household is likely to have suffered a much larger shock than the average rural household. Although the poorest 10 percent of rural households suffer an income loss of 5% or less, better-off rural households experience barely any income loss on average. In comparison, per capita income loss among urban households ranges between 5% and 23% for the bottom 20% of the urban distribution, and 2-5% for the rest. This difference is likely due to the fact that the crisis hit hardest in the industry sector, which is traditionally located in urban areas.

Within urban and rural areas, the distributional pattern for the population as a whole is replicated with the losses being concentrated mostly among the poor. However, the reasons why the poorest households are most affected are somewhat different for urban and rural areas. Income losses in rural areas are associated with losses in agricultural employment and earnings. In contrast, losses in urban areas are a direct consequence of relative large declines in employment and earnings in the (formal) industry and service sectors, as mentioned above, and the likely contagion effect to the informal sector where most of the poor and extreme poor are employed.

The recovery period, 2009-2011

Similar analysis to that described for 2008-2009 is conducted for the recovery period, with a focus now on those who exit poverty as positive economic growth is expected to resume, as well as on how the positive income growth is distributed across the population. The time period for this analysis is 2009-11, with the projected outcomes for 2009 now being considered the income distribution against which outcomes in subsequent years will be compared.¹⁰

A profile of the poverty “exiters”

Households that escape poverty between 2009 and 2011 are projected to experience significant income gains over the period – with a 32% increase in average household income and a 34% increase in per capita income. About two-thirds of the growth in income comes from a 28% gain in household labor income, with the remainder coming from a 45% gain in non-labor income (Figure 6). Both labor and non-labor income gains (in percentage terms) are higher for “exiters” than for the rest of the population.

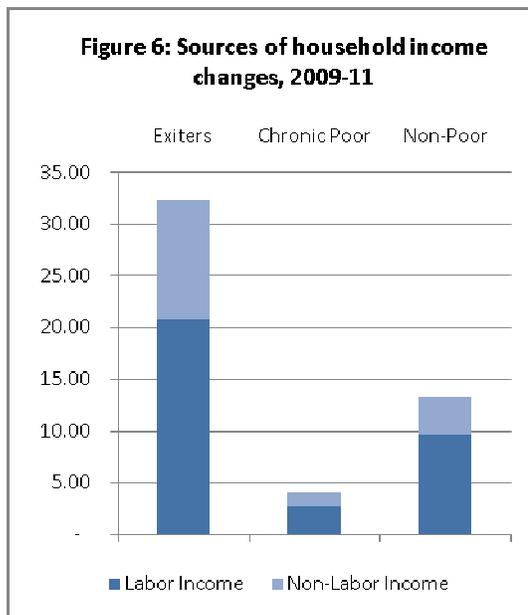
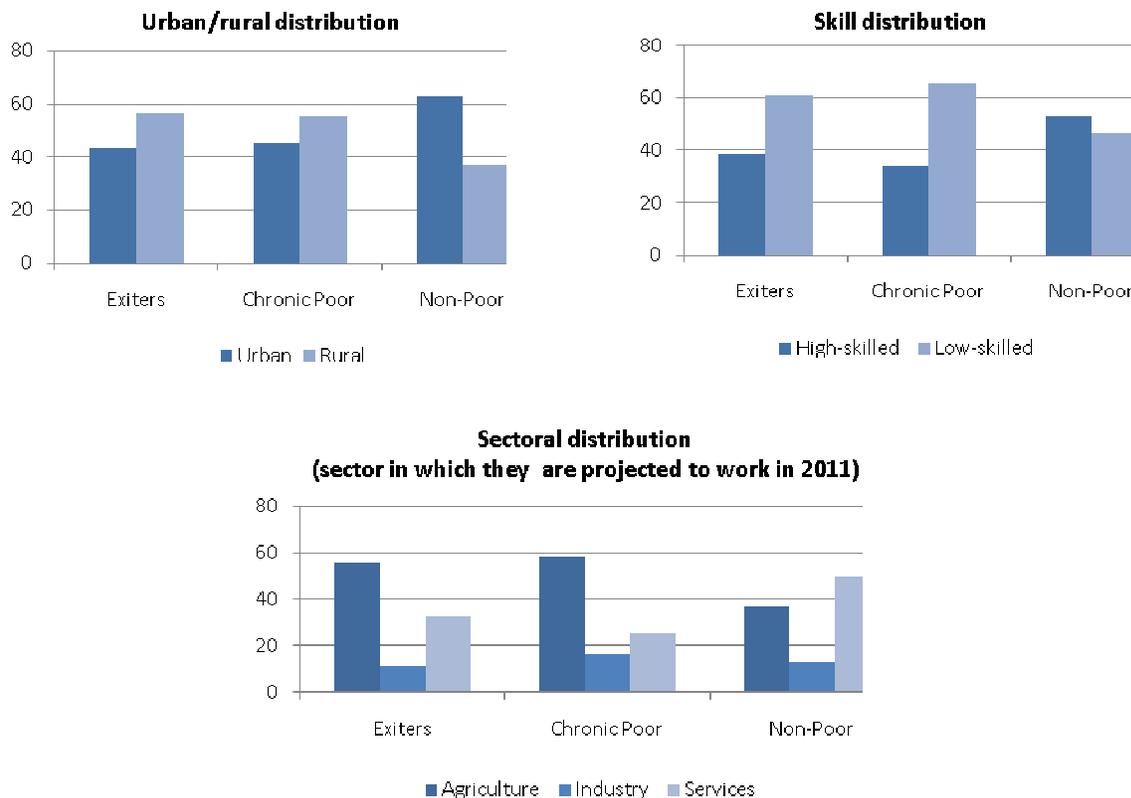


Figure 7 below shows the characteristics of poverty exiters between 2009 and 2011. Household heads among poverty exiters are more likely to be employed (in 2011) in services and less likely to be employed in industry than those in other groups – those who are poor in both 2009 and 2011 (referred to as the chronically poor) and those who are not poor in both years (the “non-poor”). Household heads among exiters are also less likely to be employed in agriculture than the chronically poor but more likely to be so than among non-poor. The share of rural households is slightly higher among exiters than among the chronic poor and much higher than that among the non-poor. Poverty exiters are also more skilled than the chronic poor, but less skilled than the non-poor.

To understand the sectoral pattern better, it is useful to focus on the chronic poor and poverty exiters (as defined in Figure 7), noting that these two groups add up to *all households who are projected to be poor in 2009*. Figure 7 then shows that the services sector accounts for a high share of households exiting out of poverty between 2009 and 2011, relative to the share of this sector among all poor in 2009. The opposite is true for industry and agricultural sectors, both of which account for a lower share among poverty exiters than among all the poor in 2009. The key role of service sector in poverty reduction during the recovery period is due to a combination of two factors – the strong output growth (averaging 9% annually) expected in the service sector in 2010 and 2011 (see Table 1) and the large share of this sector in employment (around 51%) that is projected to hold steady over the period (Table 2).

Figure 7: Characteristics of “poverty-exiters” (households moving out of poverty in 2009-11)

¹⁰ To be clear (and as noted earlier), the comparison in this case is between two scenarios (2009 and 2011), *both* of which are simulated using the 2008 baseline data and macro changes between the baseline and prediction year. Such simulations identify, for example, households that are poor in 2009 but not so in 2011, and so on.



Source: Own estimations based on MNGDLB

Note: All characteristics are those of household heads.

Exiters refer to those who are projected to be poor in 2009 but not poor in 2011; chronic poor are those who are poor in both 2009 and 2011; non-poor are those who are not poor in both years. Note that these definitions are different from those employed for chronic poor and non-poor in Figure 4.

Important insights also emerge from comparing the characteristics of poverty-exiters (between 2009 and 2011) in Figure 7 with those of the crisis-vulnerable (between 2008 and 2009) in Figure 4. One key difference between the two groups is that the heads of crisis-vulnerable households are much more likely to be employed in services and industry, and less likely to be employed in agriculture, than heads of poverty-exiting households. For example, 69% of household heads who become poor between 2008 and 2009 were employed in industry or services in 2008; whereas 44% of those who exit poverty between in 2009 and 2011 are projected to be employed in industry or services in 2011. This also implies that a sizeable 56% of household heads who exit poverty between 2009 and 2011 will be employed in agriculture. Consistent with this pattern, the crisis-vulnerable are much more likely to be urban than poverty-exiters – urban households make up nearly 70% of the crisis-vulnerable, compared to around 40% of those who exit poverty between 2009 and 2011. The crisis-vulnerable also have more education on the average – more than 50% of them have education of 10 years or more, compared to less than 40% of the poverty-exiters.

Why is agriculture expected to contribute more to exit from poverty during 2009-11 than to entry into poverty during 2008-09, even as share of agriculture in GDP and employment is expected to fall during 2009-11? The explanation for this apparent paradox is that although many workers are expected to move out of the agricultural sector during 2009-11 as employment in other

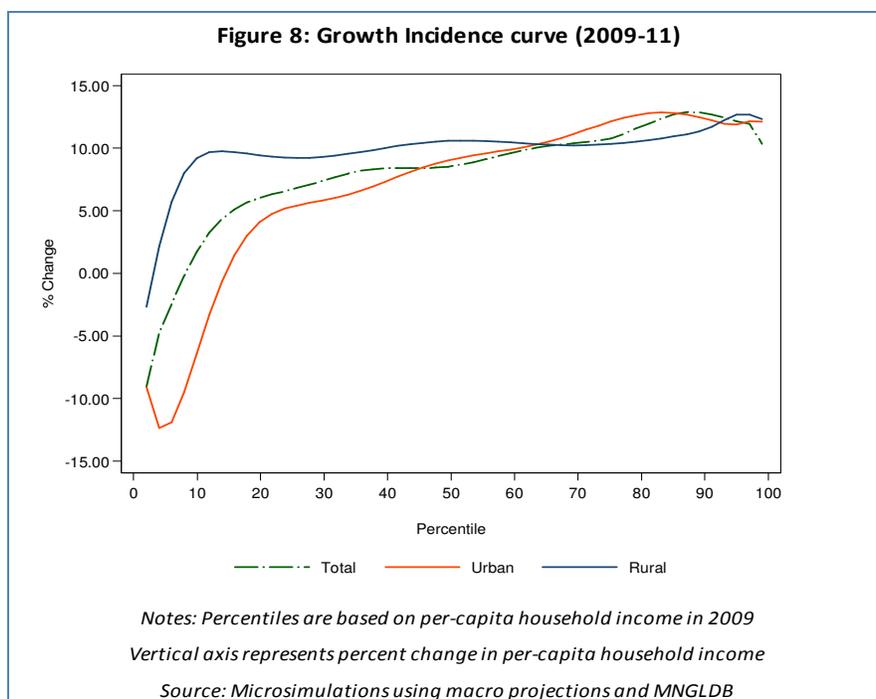
sectors expand, those who *remain* in agriculture experience a large productivity boost as the sector recovers with a 3-4 % annual growth during 2009-11. In contrast, as employment in industry and services expands, income growth among those who are employed in these sectors does not rise as rapidly. Therefore, although jobs move from agriculture to industry and services, a sizeable share of those who exit poverty are likely to belong to the agricultural sector. In other words, growth and job-creation in the non-agricultural sectors, by attracting workers away from agriculture, would contribute to raising labor productivity and reducing poverty in the agricultural sector.

These results, while subject to significant caveats due to the assumptions underlying the simulations, seem to provide an important insight: that the characteristics of the exiters, on the average, would not be necessarily similar to those of the crisis-vulnerable. In other words, although *some* of those who became poor during the crisis are likely to exit poverty during the recovery, others who exit poverty between 2009 and 2011 were “chronically poor” to start with (i.e., poor in both 2008 and 2009), rather than becoming poor as a consequence of the crisis. This also suggests that while some of poverty created by the crisis is likely to be transitory or temporary in nature, a sizeable number of those who became poor during the crisis are in the risk of staying in poverty even after the first two years of the recovery period. Moreover, the crisis-vulnerable who have a higher risk of staying in poverty for a longer period are more likely to be urban and employed in the industry sector – the very characteristics that would have made them vulnerable to the crisis in the first place.

How income gains during 2009-11 will be distributed

Projected economic growth in 2010-2011 is expected to translate into higher income in both rural and urban areas (Figure 8). But most of this growth is concentrated at the top and middle of the distribution. Growth in per capita income for the bottom 20 percent of the distribution is small or non-existent. In fact, the bottom 10 percent of the population suffer a loss in income even during the recovery period, likely as a result of not being able to regain employment lost during the crisis.

A similar pattern of small or negative growth in income for the lower end of the distribution is seen for the bottom 20 percent of urban households and the bottom 10 percent of rural households, likely due to the destruction of livelihoods and subsequent underemployment, as well as persistent employment. Moving up the distribution, income gains are higher among households in the middle of the rural income distribution than those in the middle of the urban income distribution. However, households in the 60-90th percentile of the urban distribution have higher income gain than the corresponding households in the rural distribution. The pattern of low income growth among the urban poor and middle class is consistent with the profiles of the poverty exiters described earlier (who are less likely to belong to industry sector and urban areas), and suggest that the impact of growth in the industry sector is muted.



VI. Projecting the impact of Dzud – an extension of the simulations

The microsimulation methodology can also be used to examine the possible impacts of the 2009-10 dzud on the Mongolian economy. Dzud is a particularly snowy winter in which a heavy snow cover permeates large sections of the country. Dzuds can have serious macroeconomic implications in a country like Mongolia because of the loss of livestock it can cause. In a usual winter, animals are able to feed on frozen grass through the snow cover, but during a dzud they are unable to access this fodder. Thus many animals are lost to starvation or cold. In the dzud of 2009-10, over 60% of the country was covered by a thick blanket of snow of up to 61 cm as late as the end of April. Approximately 7 million livestock animals (approximately 16% of the entire livestock population) are estimated to have been lost (World Bank, 2010b). Around 217,000 households were affected by this catastrophe, with over 8,500 households losing their entire stock of animals (FAO, 2010). This massive loss of productive assets is likely to have an impact on poverty. Moreover, there is likely to be a difference in the capacity for resilience between poor herders with only a few animals and richer farmers with larger stocks (as well as herds to manage for larger companies) who could continue to sell at low prices and still meet basic needs.

Note that the results described in this section are based on a constructed counterfactual

Table 4: Output projections with and without the dzud (in real terms)			
	Actual 2008 (tg billions)	Without Dzud 2008-10 (% growth)	With Dzud 2008-10 (% growth)
Total GDP	3,151	7.4	7.2
Agriculture	796	6.0	-3.6
Industry	979	4.1	6.9
Services	1,377	10.6	13.6

Sources: MNGLDB, IMF

scenario and *not* on the macroeconomic projections used in the rest of this report. This also implies that all the results so far in this paper do not take into account the impact of dzud. The purpose of this section is just to indicate how the macroeconomic impacts projected for the dzud may (roughly) translate into poverty and distributional impacts in 2010. These results should *not* be compared or combined with those in earlier sections of this paper, since the macroeconomic scenario with Dzud constructed here is not fully comparable with the scenarios used in the rest of the paper (see footnote 9 below).

Table 4 shows the macroeconomic projections of output losses due to the dzud (from IMF), comparing a “with dzud” scenario to a “without dzud” counterfactual.¹¹ Note that since the disaster mainly affects livestock, the economic impacts will manifest themselves almost exclusively in the agricultural sector. In fact, agricultural output is expected to fall by 3.6 percent between 2009 and 2010 as opposed to the original projection of 6 percent growth. At the same time, IMF projections suggest output growth in industry and services to be slightly higher with Dzud. The higher growth in these sectors is however not enough to compensate for the loss in agricultural output. Growth in aggregate GDP during 2008-10 is expected be lower by 0.2 percentage points lower as a result of the dzud as compared to the “without dzud” scenario.

The poverty impact of the Dzud in 2010 is shown in Table 5. Both poverty and extreme poverty headcount rates are expected to be 0.6 percentage points higher than in the “without dzud” scenario. In both cases, however, the poverty gap decreases. This is because of the higher growth in industry and services, which results in some influx of previous labor force non-participants into these sectors, who start earning an income and move further out of poverty.

Table 5: Poverty and inequality impacts of the dzud			
	Actual 2008	Without Dzud 2010	With Dzud 2010
Moderate Poverty			
-Headcount rate	35.2	33.2	33.8
-Poverty gap	10.0	10.6	9.9
Extreme Poverty			
-Headcount rate	28.1	27.0	27.6
-Poverty gap	7.4	8.2	7.4

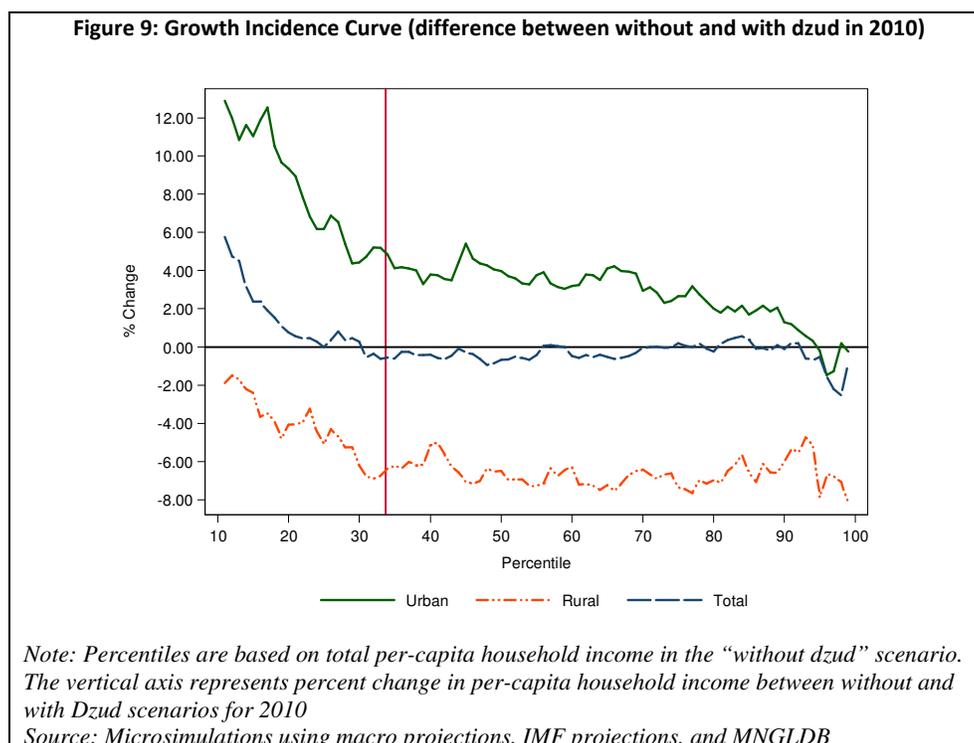
Source: Microsimulations using macro projections and INEGI

This point is illustrated in Figure 9 below, which shows the Growth Incidence Curve of the income impact of dzud– showing the % difference in per capita household income between *without* and *with*-dzud scenarios for the year 2010 for each percentile of the population. The vertical line represents the poverty line. The line labeled as “total” shows that those below the poverty line experience an upsurge

¹¹ We estimate the micro impact of the dzud using macroeconomic projections from the IMF. Unfortunately, the sectoral classification of these projections do not match the economic classifications used in the macro projections used throughout the rest of this report, and also do not provide a “without dzud” alternative. As a result, in order to estimate the impact of the dzud, we create a new “with dzud” macro scenario by combining the growth rate from the IMF projections with the sectoral shares from the original macro projections used throughout this paper.

in income after the dzud as more people enter the labor force in the industry and manufacturing sectors, thus bringing down the poverty gap.

As expected, there is also a large difference between the impacts of dzud in urban versus rural areas (Figure 9). Due to loss in agricultural output, *rural* households suffer significant income losses throughout the income distribution, with the loss in per capita income being around 6% for all those above the 30th percentile of per capita income, and smaller for those below the 30th percentile. Urban households, however, are able to take advantage of the slightly higher growth in industry and services sectors to bolster their income, with the increases projected to be larger for urban households who are in the lower end of the distribution.



Thus the analysis suggests that the severe winter (Dzud) of 2009-10, which led to a sharp fall in agricultural output resulting in loss of income for rural households in particular, may have led to an adverse impact on poverty in 2010 compared to what would have happened without the shock. This has two implications. Firstly, the reduction in poverty during the recovery period of 2009-11 may turn out to be slower (by around 0.5 percentage points or so) than what has been predicted in Section V of this paper. Secondly, if the impact of Dzud on agriculture in 2010 is as severe as projected by the IMF, agriculture would be playing a smaller role in poverty reduction during the recovery period than what has been projected in section V of this paper.

VII. Conclusion

The analysis presented here shows that the macroeconomic shock propagated by the financial crisis is associated with significant changes in aggregate poverty and inequality. The crisis is projected to have some impact on poverty in 2009, followed by recovery in subsequent years as output and employment are expected to grow. Moreover, there are distributional implications of these changes because of the asymmetric nature of crisis impacts. The distributional analysis shows that there are important differences in the characteristics of those that fall into poverty in 2009 and those that exit poverty in 2010-11. Those who become poor between 2008 and 2009 are more likely to live in urban areas and work in industry and service sectors than those who rise out of poverty between 2009 and 2011. The urban and rural poor are the most affected by the shock, and are also the ones who benefit least from the recovery, with the urban poor benefiting the least by far. Perhaps because of the asymmetry between how losses and gains during the crisis and recovery periods are distributed, although overall poverty rate is projected to drop below the 2008 level by 2011, inequality is expected to increase throughout the 2008-11 period.

The potential impact of Dzug in 2010 adds another level of complexity to the projected recovery process: rural households bear nearly all the adverse impacts of the weather shock, which implies that poverty reduction in rural areas may in fact be slower than what has been projected during the recovery period of 2009-11, with agricultural sector playing a smaller role than what would have occurred without the Dzug.

Despite these impacts, the economy recovered strongly in the first quarter of 2010, with a 7.6 percent growth in GDP from the first quarter of 2009, largely driven by increased exports to China and increased prices of metals, particularly copper. However, this recovery, along with high meat prices due to the Dzug, is likely to have long-lasting impacts on inflation and, consequently, on real wages. Moreover, despite the recovery in commodity prices, there are concerns that prices may be overinflated relative to fundamentals, particularly if the global economy continues to falter.

In the wake of the recovery, there have been growing pressures on the government to make good on promises to spend increased mineral sector revenue on cash transfers. However, such transfers should ideally be targeted carefully so as to have the greatest impact in mitigating the household effects of the crisis.

Focus group studies suggest that social welfare payments (including pension, child benefits, allowance for poor households, and disability allowance) were useful but suffered from poor targeting. Although the child benefit program was mentioned as an exception to this rule, its cancellation during the crisis had a negative impact on households (Reva et al., 2011)

Any policy response to target those who are impacted by the crisis or Dzug should take into account the characteristics of households that are likely to be the crisis-vulnerable and the poverty-exiters, to identify those who are likely to be trapped in poverty even as the economy recovers. Nearly all the increase in poverty is due to losses in labor income, and exiting out of poverty is also associated with increases in labor income. Special attention must be paid to employment creation potential, particularly

given the high growth in the working-age population in recent years that may outpace the expected rate of job-creation, as estimated from historical data. The results from this simulation exercise can be useful in informing such discussions, at least until actual survey data become available on who are being impacted by the macroeconomic shock and to what extent.

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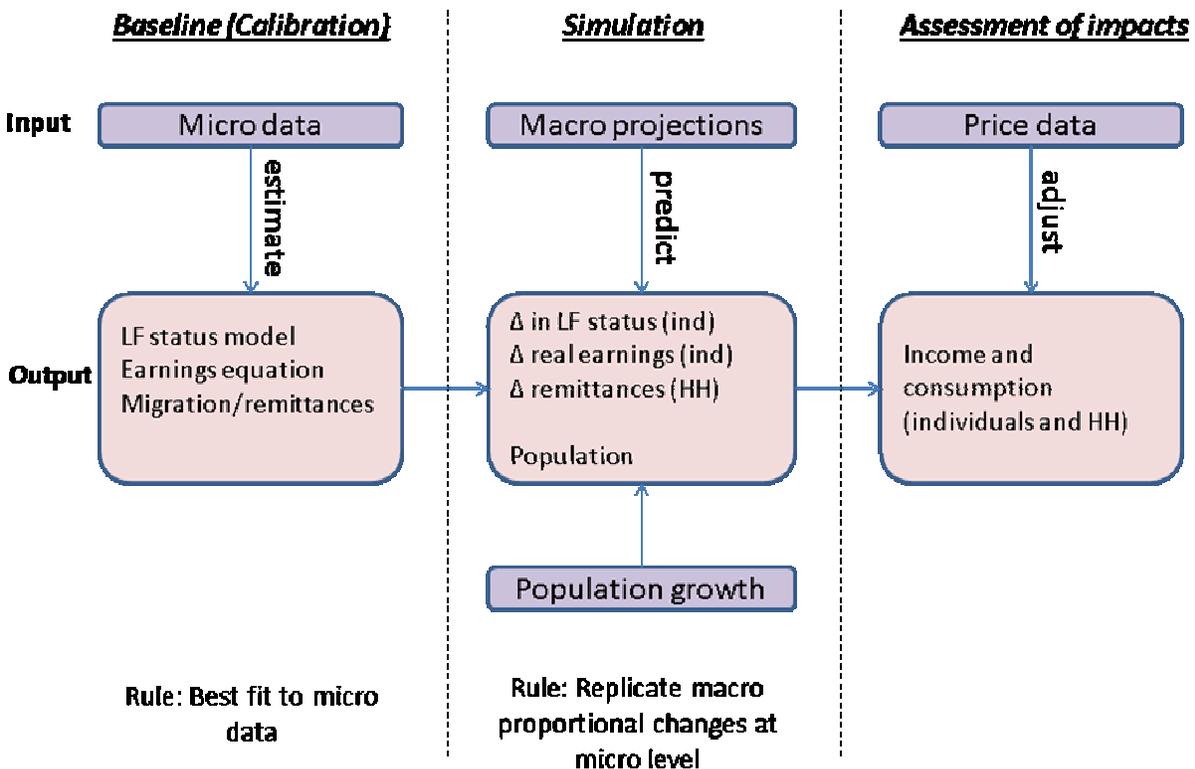
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Annex

Methodology and model overview

In this section we provide a brief overview of the mechanics underpinning the simulation exercise. The exercise can be broken down into three distinct steps: calibration, simulation and assessment of impacts. A description of each step follows and a schematic of the complete model is presented below.



Calibration. Calibration is the process by which household and individual-level information is used to model labor market behavior and outcomes and to predict the likelihood of receiving remittances.¹² This is done in three steps. First, we model labor force status for all working age individuals (15-64) as a function of household and individual characteristics, where labor force status can be non-employed¹³, and employed in agriculture, industry or services. Although ideally we would like to work with a more detailed menu of options, the number of labor force states that can be considered is dictated by the level of disaggregation available for the macro projections. We then use a multinomial logit to estimate the parameters of the model, as well as the individual-level probability of remaining in a particular state and/or changing to a different one, as given by (1). The approach is similar to that used in Ferreira et al (2009). We estimate the model separately for high and low-skill individuals to allow for structural differences in the labor market behavior of the two groups.¹⁴

$$I_{i,j=s}^G = \text{Ind}[a^s + z_i b^s + u_i^s > a^j + z_i b^j + u_i^j \mid \forall j \neq s] \quad (1)$$

where $s = \text{Labor force status}$; $G = \text{labor skill level (high/low)}$; $z = \text{gender, age, education, region, remittances, and urban/rural area}$.

Second, we model labor earnings for all employed individuals ages 15 to 64 as a function of individual and job characteristics and use a standard Mincerian OLS regression to estimate the parameters of the model, as given by (2) (similar to Ferreira et al. 2008). We use a fairly broad definition of labor earnings for the purpose of the exercise that includes wages and salaries, but also income from self-employment. This is particularly important in the case of agriculture and for economies with large informal sectors, such as Mongolia, since wage and salaried workers constitute a limited fraction of those employed in these sectors. It may lead however to a loss in precision and/or predictive power given that the structural relationship between individual and job characteristics and earnings could be different for salaried and non-salaried workers. To allow for maximum flexibility and (indirectly) account for some of these differences we estimate the model separately for agriculture, industry and services and for low and high-skill workers.¹⁵

(2)

where $x = \text{gender, age, education, region, and indicators for salaried and/or public employment}$.

Finally, we model non-labor income with a focus on international remittances and make some minimal assumptions about other sources of non-labor income. Ideally, we would estimate a probit model to predict how likely a household would be to receive international remittances, given its characteristics. However, if the migration-related information in the survey is poor or insufficient and/or the predictive power of probability model is low (as is the case for Mongolia), we are better-off relying on a simple non-parametric assignment rule that is consistent with the existing evidence (the specific rule used for Mongolia is discussed in more detail when we describe the simulation process).

Simulation. Simulation is the process by which information on aggregate projected **changes** in output, employment and remittances is used to generate **changes** in labor and non-labor income

¹² We estimate a reduced form of the household income-generation model which is based on Bourguignon and Ferreira (2005) and Alatas and Bourguignon (2005)

¹³ This includes “out of the labor force” and “unemployed”.

¹⁴ For Mongolia, low-skilled refers to individuals with 9 or fewer years of education. All those with 10 or more years of education are considered high-skilled.

¹⁵ Notice that, although we could estimate separate models for salaried and non-salaried workers based on the information from the household survey, we would not be able to use these models for the purpose of predicting future earnings since we do not have earnings and employment information disaggregated by salaried/non-salaried workers from macro data.

at the micro level using the structural models developed as part of the calibration.¹⁶ This is done in four steps.¹⁷ First, we use population growth projections to adjust for demographic changes between 2008 (base year) and 2009-2011. This adjustment is particularly important in the case of Mongolia because fertility rates are still high, which implies that the number of labor market entrants rises faster than overall population. In practical terms, doing this allows us to explicitly take into account changes in the size of the working age population, and hence to distinguish between employment growth driven (or rather absorbed) by demographic trends and net (or additional) employment growth.

Secondly, we use the projections from the labor force status and labor earnings models to replicate projected changes in aggregate total and sectoral output and employment. We start with employment and calculate the total number of individuals that need to be reassigned between employment and non-employment and across employment sectors in order to match projected aggregate changes in total and sectoral employment. We then use the estimated probabilities from the multinomial model to select candidates for reassignment.¹⁸ The direction and magnitude of flows between employment and non-employment and across sectors of employment is given by changes in the relative shares of different status with respect to the reference population. For instance, whether individuals must be reassigned from non-employment to employment or vice-versa depends on whether the employment rate of individuals ages 15 to 64 is increasing or decreasing. Similarly, workers are expelled from sectors whose relative share in total employment is declining and absorbed into sectors whose relative share in total employment is increasing will absorb workers (note that this is independent of whether employment in a sector is growing or contracting in absolute terms).

The sequence in which individuals are reassigned across states and sectors matters for the final simulation results so we briefly describe here the procedure we follow:

- Step 1 – Flows between employment and non-employment: If the employment rate is increasing, non-employed individuals with the lowest predicted probability of being non-employed will be reassigned. If the employment rate is declining, employed individuals with the highest probability of being non-employed will be reassigned. Reassignments will continue up to the point where the changes in the employment rate at the micro level matches the changes at the macro level.
- Step 2 - Flows out of contracting sectors: For sectors whose share of total employment is declining, those individuals with the lowest predicted probability of being employed in the sector will be selected out and added to the pool of “eligible” workers to be unemployed or employed in growing sectors (notice this pool also contains those who have been reassigned from outside the labor force if the total participation rate is growing). Reassignments out of

¹⁶ We do not assure consistency (i.e that absolute aggregate magnitudes are equal) between the data set used at the two modeling stages (see Bourguignon et. al 2008). Additionally, we assume equal changes at macro and micro levels. We cannot run a test if macro changes are similar or not to micro changes because of lack of a panel data at micro level (see Deaton 2001 and Bourguignon et al 2008).

¹⁷ This sequence for introducing changes in the model is based on Vos et al (2002)

¹⁸ We add error terms which represent the unobserved heterogeneity of agents’ labor supply behavior. These lead to some disparateness in responses to a change in the labor demand, capturing the fact that in the real world individuals who are identical in observables might still respond differently the same change in labor demand.

each sector will continue up to the point where the change in the sector employment share at the micro level matches the change at the macro level.

- Step 3 – Flows into growing sectors: Individuals in the pool of “eligible” workers will be assigned to growing sectors on the basis of their predicted probability of being employed in each sector. Assignments are made sequentially with the sector whose employment share is growing fastest absorbing workers first and the sector whose employment share is growing the slowest absorbing workers last. Reassignments to each sector will continue up to the point where the change in the sector employment share at the micro level matches the change at the macro level.

There are a few important features of this process that are worth mentioning. The reassignments described in steps 1 to 3 are calibrated so as to replicate **net** aggregate flows between employment and non-employment and across sectors. In reality, movements across these different states are quite significant so that gross flows are usually larger than net flows. The order of proposed steps is such that it allows for non-employed individuals to become employed and employed individuals to become non-employed, but also for individuals to change sectors. In doing this we try to capture the fact that highly “employable” individuals are more likely to remain employed in one sector or another, at times at the expense of less “employable” workers (i.e. highly “employable” workers will crowd others out when employment opportunities become relatively more scarce).

We next use the earnings model estimated as part of the calibration to predict earnings for two groups of workers: those with no previous earning history (i.e. non-employed in 2008) and those who change sector of employment. Because earnings are a function of both observable and unobservable individual and job characteristics, we add a random element to the predicted earnings produced by the model to account for unobserved heterogeneity.¹⁹ For all other individuals, we use the earnings information available in the household survey.

Once all workers have been assigned positive labor earnings, total earnings in a sector are adjusted to match aggregate projected changes in output. This step relies on the fact that that projected changes in sectoral output can be explained by projected changes in sectoral employment and projected changes in sectoral earnings and profits, and *assumes* that earnings and profits grow at the same rate.

The treatment of public sector workers and those with more than one job differs slightly from what we just described. Total public sector employment is assumed to remain constant (i.e. no individuals are assigned to or out of the public sector) and labor earnings of public sector workers are adjusted in line with their sectoral mapping (agriculture, industry or services). Similarly, for those holding more than one job, we assume the sector of employment of their secondary activity remains constant while earnings are adjusted in line with sectoral changes.

The third step in the simulation process pertains to changes in international remittances. As mentioned above, in the case of Mongolia we simulate these changes following a very simple allocation rule. We calculate the total change in international remittances between 2008 and 2009-2011, using actual and projected data and allocate the dividend as follows: (i) across regions, remittances are allocated proportionally to the 2008 regional distribution; (ii) among households within regions: recipient households are selected at random and given a remittance

¹⁹ Specifically, we draw an individual error from the error distribution generated during the estimation.

transfer equivalent in real terms to the average remittance transfer in that region in 2008, with the *number* of total transfers to be made within each region being equal to the total amount of additional remittances to be distributed divided by the 2008 average value. As a result of this process the overall distribution of remittances across regions remains unchanged; while there is an increase in number of recipient households (both types of households, those who did or did not receive remittances in 2008, *can* receive new remittances in 2009-11). Once we have obtained this distribution, translating changes in remittance flows into household level impacts requires measuring the changes in real local currency terms, taking into account both inflation as well as changes in the nominal exchange rate between the peso and the US dollar.

Finally we simulate changes in other sources of non-labor income. For this we assume that capital and financial income grow at the same rate as real GDP. For the case of social transfers, we consider a number of different scenarios for the expansion of safety net programs as a policy response to the crisis. For details, please see section 5 of the text.

Assessment of Impacts. Impact assessment is the process by which we use the information on individual employment status and labor income, as well as on non-labor income at the household level, to generate income distributions and construct various poverty and distributional measures that can then be used to compare the crisis and the benchmark scenarios. This is done in three steps.

First, we explore the possibility that if food prices were to rise at a rate different from non-food prices, the food basket to which the poverty line is anchored would become unattainable at an income equal to the poverty line. Between 2008 and 2011, food CPI in Mongolia is expected to increase at nearly the same rate as non-food and general CPI. Thus, we can proceed without adjusting the poverty line, although this may not be the case in other country scenarios.

Second, we calculate total household income by aggregating labor income across all employed individuals and adding non-labor income, and then use information on household size to construct a measure of per-capita household income, as in (3).

Third, because poverty in Mongolia is measured on the basis of per-capita consumption, we need to map income to consumption. We do this by assuming that the household-level consumption-to-income ratio remains unchanged between 2008 and each simulated year 2009-2011. This is a strong assumption, but the best we can do given the available information.

$$PCExp_m^* = PCI_m^* * \frac{PCExp_m^{2008}}{PCI_m^{2008}} \quad (4)$$

Finally, we use information on household and individual income and consumption levels to evaluate the poverty and distributional impacts of the crisis by comparing poverty and other outcomes between the benchmark (without crisis) and “with crisis” scenarios.

Limitations and caveats of the simulation exercise

The proposed approach has some appealing features, the primary one being its capacity to generate income counterfactuals at the individual and household levels that can then be used to assess impacts across the entire distribution. However, it also has some important limitations that must be taken into account when interpreting the results presented below. Some of these have been addressed in the chapter, but there are others worth noting. We discuss these below.

First, the micro-simulations presented here are based on past data that reflect the pre-existing structure of labor markets and household incomes. Consequently, any prediction about these variables assumes that these structural relationships remain constant over the period for which

projections are made. It is reasonable to expect that the structural make-up of the labor market could change between a crisis and a non-crisis scenario, which cannot be captured by our model.²⁰

Second, the quality and accuracy of the projections from the model is a function of the nature and quality of data underpinning the exercise. The results would depend not only on the validity of the micro-models during a crisis (see above), but also on the macro projections of the crisis scenarios. In addition, the use of a pre-crisis year (2008) as a comparator is tricky because the comparison could potentially attribute certain outcomes to the crisis when they are a result of other factors that occurred over the same period. This is particularly important with regard to the output and employment projections since they are key drivers of the results in the absence of a CGE or similar model. In addition:

- The ability to account for heterogeneity across sectors, groups, and others depends on the level of disaggregation of the available macro projection. For instance, the behavior of the tradable and non-tradable sectors within industry can only be modeled separately if output growth projections are available for each sector.
- The ability to accurately predict employment and earning changes depends on the available information and on the assumptions needed to correct for information gaps. For instance, in the absence of projections on total and sectoral earnings growth, we need to assume that earnings and profits grow at same rate within a sector. How realistic this assumption is would depend on the country and sectoral context.
- The ability to directly model and predict changes in the relative shares of formal and informal employment within sectors is limited by the lack of projections on the growth of each type of employment. Instead, formal and informal status are assigned in proportion to what is observed in 2008 for each sector and consequently all compositional changes in sectoral employment are driven by population growth and individual employment transition, rather than more general labor market cyclical dynamics.
- The ability to model remittances depends on the quality of the available data on migrants and remittances, particularly for countries with rapid and/or volatile growth of remittances.

Third, the model does not allow for mobility of factors (labor or capital) across regions, urban and rural areas and national boundaries. Consequently all individuals are assumed to remain in their 2008 place of origin, even as they experience a change in labor force status or sector of employment. Although this assumption is an abstraction from truth, it is likely to matter only when the impacts are disaggregated spatially or across rural and urban areas.

Fourth, our model is limited in its ability to account for shifts in relative prices between different sectors of the economy as a result of the shock. Although we do explore the possibility of food prices increasing at a different rate than non-food prices or general CPI, there are other potential sources of price impacts – for example, the effect of a change in the terms of trade between agriculture and other sectors on real household incomes in all sectors – our approach does not

²⁰ Validation of the predictions of this model can be tested once actual household data for one or more of the relevant years (2009, 2010 and 2011) become available.

take into account. Unfortunately, in the absence of a CGE model to link up to, it is nearly impossible to explicitly model for changes in terms of trade between sectors.

The *final* limitation, related to validation of hypothesis, applies to *all* ex-ante approaches including ours. The only validation or test for our simulation model is to combine ex-ante and ex-post analysis (see Bourguignon and Ferreira, 2003). Since ex post data will not be available for some time, some uncertainty about the simulations generated by the ex-ante evaluations is bound to remain.