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## An Analysis of the Rural Minimum Living Standard Guarantee Program

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## Abstract

This paper examines China's rural minimum living standard guarantee (dibao) program, one of the largest minimum income cash transfer schemes in the world. Using household survey data matched with published administrative data, the paper describes the dibao program, estimates the program's impact on poverty, and carries out targeting analysis. The analysis finds that the program provides sufficient income to poor beneficiaries but does not substantially reduce the overall level of poverty, in part because the number of beneficiaries is small relative to the number of poor. Conventional targeting analysis reveals rather large inclusionary and exclusionary targeting errors; propensity score targeting analysis yields smaller but still large targeting errors. Simulations of possible reforms to the dibao program indicate that expanding coverage can potentially yield greater poverty reduction than increasing transfer amounts. In addition, replacing locally diverse dibao lines with a nationally uniform dibao threshold could in theory reduce poverty. The potential gains in poverty reduction, however, depend on the effectiveness of targeting.


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# Unconditional Cash Transfers in China: An Analysis of the Rural Minimum Living Standard Guarantee Program

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## I. Introduction

Recent decades have seen a substantial expansion in the use of targeted cash transfer programs in developing countries. Some of these programs have been conditional, for example, the Progresa program in Mexico, and others have been unconditional, such as the Bantuan Langsung Tunai (BLT) program in Indonesia. A common characteristic of the programs is means testing, with eligibility determined in reference to a maximum income threshold. Such programs have received considerable attention from policy makers and researchers, and the body of literature examining their design, implementation and impact continues to grow.

The focus of this study is a large unconditional cash transfer program in China, the rural minimum living standard guarantee or "dibao" program. China's rural dibao program is part of a multipronged effort since the late 1990s to rebuild rural social programs, as well as to address the changing structure of rural poverty (Lin and Wong 2012, World Bank 2009). Following substantial poverty reduction in the 1980s and 1990s, poverty in rural China became more dispersed geographically, and transitory poverty became increasingly important (Lin and Wong 2012, World Bank 2009, 2010). In contrast to China's earlier "poor area" poverty alleviation programs, the dibao program targets households wherever they reside and, in principle, provides transfers based on income shortfalls. Thus it is suited to China's evolving poverty landscape.

Local experiments with the rural dibao program began in the 1990s and were gradually expanded until 2007, when the program was adopted nationwide. Coverage of the program has since grown to reach more than 50 million individuals, comparable in size to large-scale cash transfer programs like India's National Rural Employment Guarantee and Brazil's Bolsa Familia program. Thus its potential impact on poverty within China, if not worldwide, is sizable. Although a national program, implementation remains decentralized: eligibility thresholds, beneficiary selection, and transfer payments are determined locally. The program's decentralized nature and considerable variation in thresholds and transfer amounts raises questions regarding the advantages and disadvantages of decentralization of public transfer programs, an issue raised in Ravallion's (2009) analysis of China's urban dibao program and more generally in the literature on public finance in developing countries (e.g., Gadenne and Singhal 2013).

Despite its importance, little is known about the rural dibao program's performance and poverty impact. Several reports provide descriptive analyses and preliminary evaluations of the program's successes and challenges, but they are based on older data (World Bank 2011; Luo and Sicular 2013). Studies have been done on China's urban dibao program (e.g., Chen, Ravallion and Wang 2006; Gao, Garfinkel and Zhai 2009; Wang 2007; Ravallion 2008, 2009); however, the urban and rural programs are distinct, address different levels and types of poverty, and face somewhat different challenges.

For our analysis we use nationwide household- and village-level survey data matched with county-level administrative data on the dibao program from the Ministry of Civil Affairs (MOCA). The data are for 2007-2009, the years during which the rural dibao program was expanded to reach full nationwide coverage. Using these data, we outline major features of the program, estimate its poverty impact, and carry out targeting analysis. We find that although the program provided substantial income benefits to beneficiaries, its overall poverty impact was limited. Moreover, targeting analysis reveals that the exclusionary and inclusionary targeting errors were quite large.

In settings such as rural China where measurement of household income is difficult, administrators of conditional transfer programs often rely on observable correlates of income to determine eligibility (Chen, Ravallion and Wang 2006). We therefore estimate the relationship between household characteristics and dibao participation, which provides insights into the correlates of dibao selection, and carry out propensity score targeting analysis. Propensity score targeting analysis, which evaluates the program's targeting performance based on observed selection in relation to correlates of income, should yield better targeting performance than conventional targeting analysis. We find that although propensity score analysis reduces the magnitude of exclusion and inclusion errors, the targeting errors remain large.

How can the rural dibao program's poverty impact be improved? In recent years spending on the program has grown substantially, which raises the question of whether and how expansion of the program can increase its impact. We therefore carry out simulations of increases in the dibao budget to analyze the consequences of increased program spending on the poverty headcount, gap and squared gap. Specifically, we simulate the impact of (a)

expanding the number of beneficiaries without changing the transfer amounts, and (b) increasing the transfer amounts without changing the number of beneficiaries. In these simulations we assume that, aside from changes in the transfer amounts and numbers of beneficiaries, other aspects of the program are unchanged. The results suggest that expanding coverage has the potential to yield greater reductions in poverty than increasing transfer amounts.

Our data reveal substantial local variation in the dibao eligibility thresholds and transfer amounts. This variation is correlated with local fiscal capacity, and poor counties tend to have lower dibao thresholds and transfers than do rich counties, with obvious implications for targeting and the poverty impact. We construct simulations to investigate the impact of adopting a uniform nationwide dibao threshold and a uniform nationwide transfer amount. The results indicate that such standardization measures, whether adopted separately or jointly, have the potential to reduce poverty substantially. The gains from standardization, however, are likely to be minimal without improvements in the program's targeting performance.

We begin in the next section with some background on the rural dibao program and discussion of relevant literature. Section III describes the data. Section IV shows patterns of dibao participation, thresholds, and transfers in the data, and also documents the extent of local variation. Section V examines whether dibao transfers bring recipient households above the dibao thresholds and out of poverty. Section VI analyzes the targeting effectiveness of the program using conventional targeting analysis. Section VII examines the characteristics of dibao and non-dibao households, reports the results of probit analyses that identify the characteristics associated with program participation, and presents the results of the propensity-score targeting analysis. Sections VIII and IX contain the policy simulations. We conclude with a discussion of main lessons and implications.

## II. Background on China's rural dibao program

Experiments with the rural dibao program began in the 1990s, mainly in more developed rural areas. By the early 2000s rural dibao programs were fairly widespread, but they relied on local funding and, due to differences in local fiscal capacity, varied across counties in terms of the level of support and criteria for eligibility. In 2004 the central government called for the rural dibao

program to expand and began to provide funding for the program in poor areas; by the end of 2006 roughly 80 percent of the provinces and counties in China had adopted some form of rural dibao program (Ministry of Civil Affairs 2007, World Bank Social Protection Group 2010, Xu and Zhang 2010).

In early 2007 the central government announced that the rural dibao program was to be implemented nationwide in all counties and with central subsidies (Xinhua 2007a, 2007b; World Bank Social Protection Group 2010; Xu and Zhang 2010). Under this new national initiative, the program would become more standardized and would absorb or complement several pre-existing programs that had provided subsidies for poor households, such as the five-guarantee (*wubao*) program and the subsidy program for destitute households (*tekun jiuzhu*). Although central funding of the program increased, the program was to be co-funded by local governments based on their fiscal capacity, and the minimum income thresholds and subsidy amounts continued to be set locally at the county level in light of local fiscal capacity (World Bank 2010).

Official statistics indicate that the rural dibao program grew quickly after 2006 (Table 1). In 2007, the first year of nationwide implementation, the rural dibao program provided transfers to 36 million rural individuals (4.9% of the rural population) and accounted for three-quarters of the rural recipients of social relief, followed in a far second place by the five-guarantee program, which covered 5 million recipients (Department of Social, Science and Technology Statistics of the National Bureau of Statistics 2008, p. 330; National Bureau of Statistics 2009, pp. 89, 939). By 2010-11 program participation had leveled off at about 53 million individuals, equivalent to 8% of the rural population. This is more than double the size of the urban dibao program (23 million) and far outnumbers the sum total of participants in all other rural poverty relief programs (17.9 million in 2010; does not include disaster relief) (Ministry of Civil Affairs 2011; National Bureau of Statistics 2011).

Spending on the program also grew. According to official statistics shown in Table 1, in 2007 government spending on the rural dibao program was 11 billion yuan, with an average transfer amount of 466 yuan per recipient. In 2009 spending on the program was 36 billion yuan or, with an average transfer of 816 yuan per recipient. Although the number of recipients leveled off after 2010-11, program spending continued to expand, implying further increases in transfers

per recipient. As of 2013, total spending reached 87 billion yuan, with an average transfer of 1,609 yuan per recipient.

Due to the diversity of China's rural economy and the difficulty of measuring income for rural households, the dibao program's implementation has varied among localities and evolved over time. Local variation and flexibility was explicitly built into the central dibao policy regulations (Poverty Alleviation Office of the State Council 2010). According to reports based on fieldwork (World Bank Social Protection Group 2010, World Bank 2011), variation exists in the extent to which applications are open versus by invitation of local officials. In practice village leaders often identify potential beneficiaries and invite them to apply. Village committees, which include village leaders and other community members, play a central role in identifying and screening potential beneficiaries. Members of village committees live in close proximity to and have local knowledge of potential beneficiary households. Applications or nominations for dibao benefits are submitted to the township government and forwarded to the county Department of Civil Affairs. Decisions are made by township and county officials, who review the documentary evidence submitted by households and villages, and who sometimes visit the households to check on, or to collect additional, information. The names of applicants are, in principle, made public in the villages and are subject to community review and feedback.

National policy permits, and local officials in practice make use of, a range of information to evaluate eligibility. This might include information about household income, assets, and housing conditions, as well as the presence of household members who are able or unable to work, or of illness or disability (Poverty Alleviation Office of the State Council 2010; World Bank Social Protection Group 2010; World Bank 2011).

In principle the dibao program tops up the income of recipients to the level of the local dibao threshold. The amount of the dibao benefit, then, should depend on the level of the dibao threshold and the level of household per capita income. Table 1 shows the national average dibao threshold, which has increased over time. Dibao thresholds vary substantially among provinces and counties. Practices regarding how to determine the amount of the transfer also vary. In some areas local officials estimate the gap between the household's income and the local dibao threshold and decide on the transfer accordingly. Due to difficulties accurately

measuring income, most localities use other approaches. The 2007 national policy allowed local officials to classify households in tiers according to their apparent level of poverty and to set fixed benefit amounts associated with each tier. This tier-classification approach appears to have been widely used (World Bank Social Protection Group 2010).

Several reports have noted that although such flexibility has advantages, it gives local officials and village leaders considerable discretionary power. The program does not appear to have well-functioning checks and balances, in part because of limited resources at the local level for administration of the program. These features of the program create the potential for irregularities (World Bank 2011). In the Chinese-language media reports of rural dibao irregularities are numerous, so much so that they have been classified into standard categories: giving dibao on the basis of connections or personal relationships (*guanxi bao, renqing bao*), cheating (*pian bao*), and mistakes (*cuo bao*). An internet search using Baidu yielded many reports of irregularities in multiple localities, including a widely discussed case of dibao corruption in Fang County, Hubei, as well as cases in Shaanxi, Shandong and Guangxi.

Problems with the dibao program are of concern to China's central leadership and policy circles. In 2012 Guoqiang He, a member of the Politburo Standing Committee and Secretary of the Central Commission for Discipline Inspection, gave a speech about the problem of corruption in China that explicitly mentioned corruption in the dibao program, which he referred to using the phrase "a tide of unhealthy practices in urban and rural dibao (*chengxiang dibao zhongde buzheng zhi feng*)" (Zhu 2012). He outlined major reasons for these problems: "first, local village and township cadres don't do their jobs, they don't go out to the villages and meet with the people, don't really understand and grasp which are the households in difficulty; second, dibao work is not sufficiently transparent and open; and third, a few village and township cadres are selfish and looking out for their own benefit, and they give dibao benefits to relatives, friends, or even themselves."

The Ministry of Civil Affairs has openly acknowledged the existence of such irregularities and called for improvements in dibao work. A recent news report published comments by the Minister of Civil Affairs regarding the findings of an internal review of the dibao program. The Minister reported that the review found cases of cheating, mistakes, and awards based on

connections, but concluded that the overall incidence of such problems is relatively small. The internal review estimated that the rate of incorrect/mistaken dibao benefits was 4% (Xinhuanet 2013). The basis of this estimate is not explained.

To address problems in dibao implementation, in early 2013 the Ministry of Civil Affairs announced some new policies that were to be adopted nationwide. The new policies include (1) allowing households to apply for dibao benefits directly to the county Department of Civil Affairs rather than having to go through the village and township levels, (2) requiring that county-level officials visit and check at least 30% of applications, (3) instituting a filing and auditing system for close relatives of local officials and village leaders involved in dibao implementation, (4) establishing and improving systems for community feedback, and (5) establishing a systematic mechanism for checking information on dibao applications against information in other departments, e.g., vehicle registration data and savings account information (Xinhuanet 2013).

These sorts of reports reveal divergence between policies and implementation. Although it is difficult to know exactly the extent of such divergence, the reports raise questions about the rural dibao program's performance, targeting, and impact on poverty.

## III. Data

For our analysis we use two types of data. First, we use rural household survey data for the years 2007, 2008 and 2009 collected by the China Household Income Project (CHIP) in conjunction with the Rural Urban Migration in China (RUMiC) project. Hereafter we will refer to these as the CHIP data. During the years covered by the CHIP data, the rural dibao program expanded rapidly nationwide. As of 2009, coverage was about 90% of the program's level at full implementation, which was attained after 2010 (Table 1). Second, we use administrative data published by the MOCA on rural dibao thresholds, transfers and expenditures. The MOCA data are available at the county level. We use the MOCA data for counties covered in the CHIP survey to create a matched dataset for the same years. The CHIP rural survey covers 82 counties, and for 77 we are able to match county-level information from MOCA.

The CHIP rural survey sample is covers about 8000 rural households containing more than 30,000 individuals in nine provinces (Hebei, Jiangsu, Zhejiang, Anhui, Henan, Hubei, Guangdong,

Chongqing and Sichuan). These nine provinces cover nearly half of China's total population and span China's eastern, central and western regions. Table 2 shows the sample size for each year.

A detailed description of the CHIP dataset can be found in Li, Sato and Sicular (2013). Here we highlight key features relevant to our analysis. The CHIP rural sample is a subset of the National Bureau of Statistics (NBS) annual rural household survey sample, which covers 68,000 households in all 31 provinces. Like the larger NBS rural sample from which it is drawn, the CHIP sample is representative at the provincial level. CHIP's provincial sample sizes are not proportional to the provincial populations. For this reason, and also because of the deliberate selection of provinces covered by CHIP so as to represent China's three major regions (eastern, central, western), for most analyses we use two-level weights reflecting the provincial and regional populations. Weights are constructed using population statistics from China's annual 1% population sample surveys (NBS, various years).

The nine provinces in the 2007-09 CHIP sample exclude the Northeast and China's autonomous regions in the Northwest and Southwest. These autonomous regions contain relatively high concentrations of the poor, which may explain in part why the CHIP dataset has lower poverty rates than the full NBS sample. Based on the 2009 official poverty line and the full NBS national rural household survey data for 2009, China's poverty rate was 4.7%; using the same poverty threshold and (weighted) CHIP rural data, the poverty rate is 3.2%.

The nine provinces covered in the CHIP sample also have lower concentrations of dibao participants than is the case nationwide according to the official data. In 2009 the nine provinces covered by the CHIP rural sample contained 47% of China's rural population but only 38% of China's rural dibao recipients.[2] Nevertheless, the mean values of key variables such as income are not dissimilar to those in the full NBS sample (Table 2; Li, Sato and Sicular 2013). Thus, with

[2] Population data from NBS (various years). Provincial and national rural dibao data are for the month of December, 2009, and are published on the Ministry of Civil Affairs website. Note that in December 2008 the nine provinces contained 36% of rural dibao recipients in China. See http://files.mca.gov.cn/cws/201001/20100128094132409.htm and http://cws.mca.gov.cn/accessory/200905/1243323064255.htm, accessed December 31, 2012.

careful interpretation in light of sample coverage, the CHIP data provide a reasonable approximation of the situation in much of China.

The CHIP dataset contains detailed information on household incomes, consumption, composition and demographics, and many other (but not all) variables collected by the NBS as part of its annual rural household survey. Additional variables were collected using an independent questionnaire designed by the CHIP and RUMiC project participants. The CHIP dataset also contains matching community-level data gathered through a village survey. The availability of rich information at the individual, household and village levels provides a unique resource for our analysis.

The CHIP datasets also contain information on household participation in the dibao and wubao programs. Participation is self-reported. In our analyses we treat households that indicated participation in either the dibao or wubao programs as dibao households and their members as dibao participants because the distinction between the two programs is not always clear at the local level and because during the time frame of our analysis the wubao program was to some extent being absorbed by the dibao program (World Bank Social Protection Group 2010).

Table 2 shows the number of dibao (including wubao) households and individuals in the CHIP datasets. The numbers of dibao households and individuals increase markedly over the three years, reflecting the expansion of the program during this time frame. The numbers of dibao households and individuals are adequate for analysis at the national level, but with disaggregation the numbers quickly become too small. Consequently, our analysis is carried out primarily at the national level.

In order to evaluate the dibao program's targeting performance and poverty impacts, we need to estimate the "ex ante" or counterfactual level of income that households would have had in the absence of the dibao transfers. Here we estimate ex ante income as equal to reported or "ex post" income minus the amount of dibao transfers received by the household. This approach assumes that receiving a dibao transfer does not change household behavior. It is widely recognized in the literature on cash transfers that households that receive transfers are likely to alter their behavior, for example, by reducing effort to earn income. If this is the case for rural dibao recipient households, our estimates of ex ante income will understate the true

counterfactual income that households would have had in the absence of the transfer. Consequently, our estimates of ex ante income are likely to be too low, thus exaggerating the difference between ex post and ex ante incomes and leading to overstatement of the impact of the dibao program on incomes and on poverty. Despite this possible overstatement, we find that the impact of the dibao program on poverty rates is relatively small. In view of the small measured impact of the program even with possible overstatement, use of more complicated methodology that incorporates household responses is not warranted.

The CHIP household survey data contain ex post incomes, but not information on the amounts of dibao transfers received by the households.[3] Information about dibao transfers is, however, available at the village and county levels. The CHIP village-level data contain information for 2008 and 2009 on the number of dibao and wubao households within the village and on the average dibao transfer per recipient within the village. Also, MOCA publishes county-level data on rural dibao participation and expenditures, which can be used to calculate county average dibao expenditures per recipient.[4] It is possible that county expenditures include some categories of government spending on the dibao program other than the dibao transfers to households; as discussed later, however, the county average dibao expenditures are quite similar to the village average transfers.

We use the village average dibao transfers and county average dibao expenditure amounts as proxies for household level dibao transfers. In this way we obtain two estimates of ex ante income for dibao households: one is equal to ex post household income per capita minus the village average dibao transfer, and the other is equal to ex post income per capita minus the

[3] The data contain information on the total transfer income received by the households, including both private and public transfers, but without any breakdown by source or type of transfer. We found no correlation between total transfers received by households and their dibao participation.

[4] MOCA publishes county-level dibao data on a monthly basis. In our analyses for 2008 and 2009, we use year-end (December) values of the MOCA county-level dibao participation and expenditure levels to calculate monthly dibao expenditures per recipient. To obtain annual dibao expenditures, we multiply the December amounts by twelve. These estimates therefore capture the level of transfers per capita attained by the end of the calendar year. Since the MOCA county-level data are not available for 2007, for 2007 we use the January 2008 county-level data, multiplied by twelve. We compared the January versus December values of the MOCA dibao variables for later years (December 2008 versus January 2009, and December 2009 versus January 2010) and did not find systematic differences.

county average dibao expenditure.[5] This approach effectively assumes an egalitarian distribution within villages or within counties of dibao benefits among dibao recipients.

The dibao participation rates in the CHIP rural survey are lower than the aggregate rates implied by official data.[6] To some extent this reflects the selection of provinces in the CHIP sample, but the discrepancy remains even for the nine CHIP provinces (to be discussed in more detail below). The reason why the CHIP sample has lower dibao participation rates than the official data is not clear. It is possible that dibao households are under-sampled in the CHIP survey. Under-sampling of poor households—which are presumably more likely to be dibao recipients—is a known feature of the NBS household survey samples from which the CHIP samples are drawn. It is also possible that some dibao households do not report their dibao participation. Households may not be aware that the transfers they received were from the dibao program, or they may not want to disclose their participation in the program. A third possibility is that the official numbers overstate true participation rates. It is widely accepted that local-level governments in China massage their statistics so as to appear to comply with central government policy targets and in order to obscure local irregularities in program implementation (Hvistendahl 2013).

## IV. Patterns of dibao participation, thresholds and transfers

Consistent with the official data in Table 1, our data show substantial expansion of the dibao program since 2007 (Table 3). The mean dibao threshold, calculated using MOCA county-level data for all provinces, increased from 1,064 yuan per capita in 2007 to 1,428 yuan per capita in 2009; changes were similar for the nine sample provinces. The mean dibao transfer per capita also increased. Dibao thresholds were, on average, higher than, and dibao transfers lower than, China's official poverty lines at the time (785 yuan in 2007, 1,067 yuan in 2008, and 1,196 yuan in 2009).

[5] In the few cases of missing village-level (county-level) data we use county-level (village-level) information to impute missing values.

[6] Gao, Garfinkel and Zhai (2009) find that in the CHIP urban data (for 2002) the rate of dibao participation is also lower than the officially reported rate.

The MOCA county-level data show substantial variation in dibao eligibility thresholds. Figure 1 is a graph of the distribution of county dibao thresholds for the CHIP sample counties in each of the three sample years. In 2007 and 2008 the county dibao thresholds ranged from less than 500 yuan per capita per year to more than 3,000 yuan. In 2009 the lowest thresholds had risen above 500 yuan, and the highest to more than 4,000 yuan.

Figures 2a and 2b show the distributions of dibao transfers in the CHIP sample counties for 2008 and 2009. The distributions based on the county-level averages from MOCA data and on the village-level averages from CHIP are similar, although variation is wider at the village level (because averaging at the county level eliminates variation within counties). As is the case for the thresholds, variation in the dibao transfers is substantial. In 2009, for example, county average dibao transfers ranged from less than 500 to more than 3,000 yuan per capita.

Dibao participation increased along with dibao thresholds and transfer amounts. Calculated using the CHIP data, the rate of participation in the rural dibao program increased from 1.9% in 2007 to 3.0% in 2009 (Table 4). Dibao participation rates in the CHIP data are lower than national participation rates implied by the MOCA statistics, which increased from 5.0% of the rural population in 2007 to 6.9% in 2009. Possible reasons for discrepancies between the CHIP and official dibao statistics include those discussed earlier.

Table 4 reports dibao participation rates by province calculated using the CHIP data and also the official data. Based on the CHIP data, dibao participation rates in 2009 ranged from less than 1% in Hebei and Zhejiang provinces to 5-6% in Guangdong and Chongqing. Similar variation is evident in the official data. Such variation reflects differences across locations in dibao thresholds, financing and implementation, as well as in household incomes and thus eligibility.

Is dibao participation higher for lower income households? Using the CHIP data, we calculate dibao participation rates by deciles of ex ante income (Figure 3). In general, dibao participation rates are higher for poorer income groups. In all three years the participation rates are highest for individuals in the poorest decile of the income distribution. Dibao participation drops sharply for the second poorest decile, and thereafter tends to decline further as one moves to higher income groups. In all years, however, less than 10% of individuals in the poorest decile

are dibao participants. Moreover, in all years dibao participation is evident in all income deciles, including the very richest.

With expansion of the dibao program over time, the pattern of participation has shifted more towards poorer income groups. As shown in Figure 3, between 2007 and 2009 participation rates increased for most income groups, with relatively large increases for the bottom deciles. Participation rates, however, also rose for middle deciles. For the richest four deciles, participation rates remained below 2% in all three years. Figure 3 reveals that even though poorer groups are more likely to participate in the dibao program, participation by middle-income and richer deciles is nontrivial.

## V. Impact of dibao transfers on incomes and poverty

Do dibao transfers provide a minimum income guarantee, that is, do they bring household incomes up to the level of local dibao thresholds? In order to answer this question, we compare ex ante and ex post incomes for individuals whose incomes were below the local (county) dibao threshold. Table 5 gives the percentages of individuals in the CHIP sample with ex ante and ex post incomes below the local dibao thresholds in each of the three years. The first three rows classify individuals using ex post incomes; the second three rows using ex ante incomes calculated using village average transfers; and the bottom three rows using ex ante incomes calculated using county average transfers.

The first column shows the percentages of all individuals in the CHIP sample, including both beneficiaries and non-beneficiaries, whose incomes were below the dibao thresholds. The percentage of individuals whose ex post income was below the dibao thresholds increased over time from 2.4% in 2007 to 2.6% in 2008 and further to 3.8% in 2009. This increase is somewhat surprising given the dramatic expansion of dibao participation and transfers during these years; however, dibao thresholds were also raised. Examination of ex ante incomes reveals that eligibility rates also increased: from 2007 to 2009 the share of individuals in the CHIP sample with ex ante incomes (calculated using county average transfers) below the local dibao thresholds rose from 2.5% to 4.1%.

Did the dibao program provide a minimum income guarantee? In all three years the percentage of dibao recipients with ex ante incomes below the dibao thresholds exceeded the percentage with ex post incomes below the thresholds (last column of Table 5). For example, in 2009 12 to 15% of dibao recipients had ex ante income below the dibao thresholds, and only 5.7% had ex post income below the dibao thresholds. In other words, the dibao transfers raised more than half of dibao recipients who started out below the local dibao threshold above the local threshold. We conclude that the rural dibao program was reasonably successful in providing an income guarantee for dibao recipients who started out below the local dibao threshold.

Of course, these numbers ignore non-recipients whose incomes were below the dibao thresholds. About 90% of individuals with income below the local threshold did not receive dibao transfers. For these individuals, the dibao program did not provide a minimum income guarantee. The lack of guarantee to this group reflects a substantial exclusionary error in targeting, which we discuss in the next section.

Did the dibao program reduce rural poverty, and if so, to what extent? We answer this question by comparing poverty incidence and the poverty gap calculated using ex ante versus ex post incomes. Table 6 reports estimates of poverty incidence calculated using three absolute poverty lines.[7] In all cases poverty incidence was higher for ex ante incomes than for ex post incomes. This is consistent with a poverty-reducing impact of the dibao program. In all cases, however, the difference in ex ante versus ex post poverty incidence is smaller than half a percentage point. In other words, the dibao program's impact on poverty incidence was small.

Table 7 shows estimates of the poverty gap calculated using ex ante incomes and ex post incomes. As expected, the poverty gap calculated using ex ante incomes is larger than that calculated using ex post incomes. In 2007 and 2008 the ex ante poverty gap was 2-3% larger than the ex post poverty gap, and in 2009 it was 6.5% larger. Again, the difference is fairly modest, especially when compared to total dibao expenditures.

[7] For estimates of absolute poverty, we use China's official poverty line as of 2011 (adjusted back to 2007, 2008 and 2009 using the national rural consumer price index). We also use the $1.25 and $2 per person per day international poverty thresholds based on purchasing power parity (PPP) income. See notes to Table 6 and Golan, Sicular and Umapathi (2014) for further details.

According to the official data, in 2007 total dibao expenditures were equivalent to 18% of the ex ante poverty gap; by 2009 total dibao expenditures had risen to 64% of the ex ante poverty gap (Table 7). The reduction in the poverty gap per yuan dibao expenditure was therefore fairly small. In 2007 each yuan of dibao expenditures was associated with a reduction in the poverty gap of 0.13 yuan. In 2009 each yuan of dibao expenditures was associated with a reduction in the poverty gap of 0.10 yuan.

Dibao participation in the CHIP sample is lower than that reported in official statistics, and it may be appropriate to evaluate the program's poverty impact using the level of dibao expenditures implied by the CHIP data. We calculate total dibao expenditures implied by the CHIP data as equal to the weighted sum of county level transfers times the number of dibao recipients within each county (see note to Table 7).[8] By this calculation, total dibao expenditures are substantially lower than the official numbers. In 2009, for example, they are only 36% of the official total.

Even using these lower estimates of total dibao expenditures, the poverty impact of the dibao program remains modest. In 2009, for example, dibao expenditures implied by the CHIP data were equivalent to 26% of the ex ante poverty gap, but the poverty gap calculated using ex post incomes was only 6.5% lower than that calculated using ex ante incomes. Each yuan of dibao expenditures was associated with a reduction in the poverty gap of only 0.24 yuan. These discrepancies between dibao expenditures and poverty reduction suggest leakages in targeting.

## VI. Conventional analysis of dibao targeting

The dibao program's stated goal is to assist households with incomes below the dibao thresholds, so inclusionary targeting error—the proportion of program beneficiaries with higher incomes—is a relevant criterion for evaluation of the program. The dibao program does not claim to cover all individuals with incomes below the dibao threshold, so exclusionary error may not be a measure of the success of the program in meeting its own objectives. Nevertheless, analysis of the program's exclusionary targeting error is informative.

[8] For dibao recipients who live in counties for which MOCA county-level transfer data are missing, we use the village average transfers from CHIP.

Table 8 contains estimates of inclusionary and exclusionary targeting error of the dibao program calculated using local dibao thresholds as the targeting criterion. Targeting errors have declined over the three years. For example, based on estimates using the county average dibao expenditures, from 2007 to 2009 inclusionary error declined from 94% to 86%, and exclusionary error from 94% to 89%. Despite these improvements, the overwhelming majority of dibao beneficiaries had ex ante incomes higher than the local dibao thresholds. Moreover, the dibao program reached only a small proportion (11% or less) of individuals with ex ante incomes below the dibao thresholds. In all years, then, it appears that the vast majority of eligible individuals did not benefit from the program.

By comparison, for China's urban dibao program Chen, Ravallion and Wang (2006) report an inclusionary error of 43% and an exclusionary error of 71%. Although based on data for earlier years, their estimates suggest that the targeting performance of China's urban dibao program is markedly better than that of the rural dibao program. Weaker performance of the rural dibao program is not surprising given the uneven capacity and resources of local governments in rural China, as well as the difficulty of measuring rural incomes.

The targeting performance of the rural dibao program can also be evaluated relative to the poverty line so as to ascertain the extent to which the program benefited the poor versus nonpoor. Table 9 shows the shares of the poor and nonpoor who received dibao benefits. These shares are calculated using the three poverty lines and ex ante incomes. In all cases, less than 10% of the poor received dibao transfers. A higher proportion of the poor than nonpoor, however, were dibao recipients. For example, based on the 2011 official poverty line, the percentage of the poor receiving dibao benefits in 2009 was 8%, versus less than 3% of the nonpoor. Also, the proportion of the poor who received dibao benefits increased over time. For example, based on the official poverty line, the share of the poor receiving dibao benefits increased from 4.7% in 2007 to 8.0% in 2009.

How well does the dibao program target poor households? Table 10 shows the inclusion and exclusion errors calculated using ex ante incomes in relation to the official poverty line. The inclusion error is between 64 and 75%, depending on the estimate and year. That is, between 64

and 75% of dibao recipients were not poor. The exclusion error is between 92 and 95%, indicating that the overwhelming majority of the poor did not benefit from the dibao program.

## VII. Correlates of dibao participation and propensity score analysis of dibao targeting

The conventional analysis of dibao targeting implicitly assumes that selection of program beneficiaries is based on current year household incomes as collected by the NBS and reported in the CHIP data. As discussed by Chen, Ravallion and Wang (2006), such assumptions may not be correct. Local officials who implement the dibao program do not have access to the NBS income data, and even if they did, the NBS data contain some unknown degree of measurement error.[9] In practice, local officials are likely to select beneficiaries based on some observable correlates of income. China's national rural dibao policies in fact endorse such practices, and local regulations explicitly mention alternative criteria for identifying recipients.

In view of these considerations, Chen, Ravallion and Wang (2006) propose an alternative approach, propensity score targeting analysis, based on the idea that local officials select beneficiaries with reference to a latent income variable that is correlated with ex ante income as measured in the survey data as well as with other observed characteristics plus an error term. Targeting analysis can then be carried out based on latent household incomes (Ravallion 2008).

The first step of propensity score targeting analysis is to estimate a probit regression with dibao participation as the dependent variable and with ex ante income and other relevant observed household characteristics as the independent variables. These other characteristics are chosen to reflect local implementation practices and include variables such as household demographic composition, health of household members, and human and physical capital or assets. Second, the results of the probit model are used to predict a conditional probability of program assignment (the propensity score). The estimated coefficients from the probit regression correspond to the implicit weights assigned by program administrators when deciding

[9] The income data were collected using a diary method. Although the diary method reduces recall error, measurement error could arise due to difficulties keeping track of the complex and diverse income sources in rural China, which include farming, nonagricultural self-employment, formal wage employment, and informal or casual jobs, and which generate incomes both in cash and in kind. Error could also arise due differences in the ability and willingness of respondents to record accurate data in the diaries.

on beneficiaries. Third, a cutoff is determined based on the observed coverage rate. Beneficiaries are selected by counting off households ranked from highest to lowest propensity score until the cutoff is reached. The selected households are then used to calculate the targeting errors. Here we carry out such an analysis using the CHIP survey data, with households as the unit of analysis.

Tables 11, 12 and 13 contain descriptive statistics for dibao and non-dibao households. Both ex post and ex ante incomes of dibao households are, on average, lower than those of non-dibao households. A smaller share of the income of dibao households is from wage employment, and in 2007 and 2008 (but not 2009) dibao households are less likely to have a member engaged in migrant work than non-dibao households.

Household size is smaller for dibao households, and they contain markedly higher shares of members who are elderly, in bad health, or with a disability. In 2007, for example, 20% of dibao households contained a family member over the age of 60, 41% contained a member in bad health, and 35% contained a member with a disability, as compared to 10%, 14% and 12%, respectively, for non-dibao households. Differences also exist in ownership of physical assets. Housing conditions, as measured by whether housing is multi-storey and the presence of piped water and flush toilets, are poorer for dibao households. Ownership of durable goods such as household appliances and motorized vehicles is lower.

Tables 11-13 show that the communities in which dibao households live are somewhat different from those of non-dibao households. In general, a higher share of dibao households live in villages that experienced a natural disaster, do not have a paved road, and are distant from the nearest township government.

Probit regressions reveal that many of the characteristics in Tables 11-13 are statistically significant predictors of dibao status. Table 14 reports the estimated marginal effects of the probit regressions. Specification 1 uses ex ante income calculated using village average dibao transfers, and specification 2 uses ex ante income calculated using county average dibao expenditures, as the income variable.[10]

[10] We also estimated the probits using ex post income because of concerns about measurement error in calculation of ex ante income using village and county average dibao transfers. We found that the estimated coefficients on ex post income were in fact smaller and the standard errors relatively bigger than those on our estimates of ex ante income. We concluded that our estimates of ex ante income, despite their possible weakness, are useful for this analysis.

In all years the probability of receiving dibao benefits has a significant, negative association with household income. The marginal effects imply that a 1% increase in ex ante income reduces the probability of receiving dibao by 0.7 to 1.0 percentage points. Other characteristics that are consistently significant in most years and specifications are: household size (negative), bad health (positive), disability (positive), the share of wages in income (negative), share of income from non-agricultural business (negative), and absence of a major appliance (positive).

The estimated coefficients change somewhat across the years. Notably, more variables are significant in 2009 than in the earlier two years. For example, the share of elderly becomes significant (positive) in 2009, indicating that selection criteria may have changed to emphasize households with elderly family members. The presence of a migrant worker (positive), marriages (negative), deaths (positive), and cultivated land area (negative) also become significant in 2009.

These changes may reflect the refinement of, or adaptation in, the criteria used by local officials to decide on eligibility for the program, or perhaps more coefficients become significant because of smaller standard errors due to the larger number of dibao households in the 2009 sample than in 2007 and 2008. It is also possible that the expansion of the dibao program during this time period may have allowed the widening of eligibility criteria to include more characteristics.

Dibao coverage for households classified as eligible using latent income as the selection criterion is higher—and thus exclusionary targeting error is lower—than that implied by conventional targeting analysis (Tables 15 and 16). In 2007 17% of households selected as eligible based on propensity scores received dibao benefits, as compared to 6% for the conventional targeting analysis based on the dibao thresholds (calculated from Table 8). In 2008 20% of eligible households and in 2009 17% of eligible households received dibao benefits according to the propensity score approach, as compared to 7% and 11% using the conventional approach. In other words, the exclusionary targeting error is lower using the propensity score approach.

The inclusionary targeting error is also lower than for conventional targeting analysis. 83% of dibao recipients were not eligible based on the propensity score in 2007, as compared to 94% in the conventional analysis; in 2008 and 2009 the propensity score inclusion errors are 80% and

83%, as compared to 92% and 86%, respectively, for the conventional approach (Tables 8 and 16). Thus dibao leakage to households classified as ineligible using latent income as the selection criterion is lower than that implied by conventional targeting analysis.

All in all, the propensity score targeting analysis yields smaller targeting errors than conventional targeting analysis. These findings are consistent with a situation in which local officials rely on observable characteristics of the households to determine dibao eligibility, or in which local officials' perceptions of household income differ from the CHIP income estimates.

## VIII. Policy simulations: Expand Coverage versus Increase Transfer Amounts

In order to examine options for improving the impact of the rural dibao program, we conduct simulations using the 2009 CHIP data. A first set of simulations investigates how expansion of the rural dibao program would affect the level of poverty. The rural dibao program has in fact expanded substantially since 2009: in 2013 the total rural dibao budget was 2.4 times that in 2009 (Table 1). Most of this increase was due to larger transfer amounts rather than wider coverage: the average dibao transfer per recipient doubled, while the number of recipients increased only 13%.

Our simulations provide some insights into the potential consequences of such a program expansion. We explore the impact of expanding the program in two ways: by increasing the amount of dibao transfers going to existing dibao recipients, and by expanding coverage to more recipients while keeping the transfer amounts unchanged. The first approach should reduce poverty if most dibao beneficiaries are poor and if their transfer amounts are insufficient to bring them above the poverty line. The second should reduce poverty if exclusionary targeting error is substantial and transfer amounts are adequate.

This first set of simulations retains local variation in dibao eligibility thresholds and dibao transfer amounts as observed in the 2009 CHIP data. We use the average transfer in the household's village of residence, as reported in the CHIP village-level survey, as the local transfer

amount.[11] We calculate poverty measures in relation to the (2011) official poverty line and report weighted statistics.

We begin by constructing a baseline case that reflects observed incomes and dibao participation in the 2009 data. Baseline poverty levels are equal to those observed in the 2009 CHIP data, that is, they are the levels of poverty implied by ex post incomes in the data. The dibao budget for the baseline case is equal to the sum of local dibao transfer amounts for all dibao recipients (weighted) observed in the data.[12] We refer to this as the "observed" baseline. As shown in Table 17, for the "observed" baseline the poverty rate is 11.2% and the poverty gap index is 3.9%.

The simulations require a decision about how much to expand the program. For simplicity, we use a target budget equal to the amount of money that would be spent if the program were expanded to cover all eligible individuals in 2009 who were not yet dibao beneficiaries. In other words, we calculate the cost of providing local dibao transfers to all non-recipients whose per capita incomes were below the local dibao thresholds, and we add this cost to the baseline dibao budget. This yields a target budget equal to 2.54 times the baseline budget.

Simulations of the impact of expanding the dibao program are shown in Table 17. For the simulation with expanded coverage, we present two scenarios. Simulation (a) assumes perfect targeting: all added dibao recipients have income below the dibao eligibility threshold in their locations of residence, in other words, inclusionary targeting error among added recipients is zero. By construction, the target budget in the simulation is just sufficient to ensure that all eligible individuals receive dibao transfers, so exclusionary targeting error is also zero. Simulation (b) assumes no targeting: additional recipients are selected through random lottery from among all non-recipients. Thus, the added recipients in simulation (b) include individuals whose incomes are above the dibao thresholds. These two simulations can be interpreted as optimistic and pessimistic targeting scenarios for expansion of coverage.

[11] In cases where data for the village average dibao transfer are missing, we use the county average transfer.
[12] Note that the dibao budget here does not equal the official number reported by MOCA, reflecting in part the lower dibao participation rate in the CHIP sample than in the official statistics (see Table 7 and related text). Also, the dibao budget here differs a bit from the CHIP total dibao expenditures in Table 7, which is calculated using county average dibao expenditures. Here we use village average dibao transfers.

The poverty results for simulations (a) and (b) reveal that expanding coverage has the potential to substantially reduce poverty relative to the "observed" baseline, depending on how the additional recipients are selected. If we assume optimistically that the new recipients are selected using perfect targeting (simulation a), then the expansion reduces the poverty headcount by more than 5%, the poverty gap by 24%, and the squared poverty gap by 17%. If we assume random selection (simulation b), the expansion reduces poverty by at 3% or less.

Would increasing the transfer amount to baseline recipients be more effective than expanding coverage? Simulation (c) shows the results of increasing transfers without changing coverage. The poverty impact is modest: relative to the baseline, poverty reduction is at best 3%. This impact is considerably smaller than that achieved if coverage is expanded and new recipients are well targeted (simulation a), and it is similar to that if coverage is expanded and new recipients are selected randomly (simulation b).

We conclude that even if targeting is imperfect, so long as it does a better job than random selection, expanding coverage should yield greater poverty reduction than increasing transfer amounts. These simulations suggest that the large increase in the dibao budget observed between 2009 and 2013 would have had greater poverty impact if the additional funds had been used mainly to expand coverage rather than increase transfers.

## IX. Policy simulation: Nationally uniform transfer and threshold

As shown in earlier sections, dibao thresholds, transfers and rates of coverage vary locally. Studies have found that richer areas with greater fiscal capacity tend to have more generous dibao programs (Ravallion, 2009). Consequently, households above the official poverty line in richer areas may be selected for dibao, while households below the poverty line in poorer areas may be left out; moreover, households in richer areas may receive larger dibao transfers than those in poorer areas. For these reasons, some studies have recommended that China adopt a nationally uniform threshold and more equal transfer amounts (World Bank 2009).

We investigate the impacts of adopting a uniform transfer and uniform threshold with a second set of simulations. For simulations of a uniform transfer, we set the transfer equal to the

average transfer amount in the relevant baseline simulation. For simulations of a uniform threshold, we set the threshold equal to the official poverty line. Individuals are classified as eligible for dibao if their ex ante household income per capita is below the official poverty line.[13]

Our first simulation replaces the locally diverse transfers in the "observed" baseline with a uniform transfer equal to the average observed transfer, which was 666 yuan. The dibao thresholds, recipients, and budget are identical to the "observed" baseline case. The outcome of this policy is shown in Table 17 as simulation (d). Compared to the "observed" baseline, the poverty headcount decreases very slightly, the poverty gap increases very slightly, and the squared poverty gap is unchanged. These results suggest that, in the absence of any other policy changes, adopting a uniform national transfer would yield minimal poverty gains.

One reason why simulation (d) has such a small impact on poverty is that dibao transfers will only reduce poverty if the recipients are poor, but in this simulation the recipients are the "observed" ones, most of whom are above the poverty line. According to our conventional targeting analysis, three quarters of dibao recipients already had incomes above the poverty line before receiving transfers.

How would adopting a uniform transfer affect poverty if targeting were improved? To answer this question, we ask how shifting to a uniform transfer would affect poverty under the assumption of perfect targeting. We construct a new baseline case with perfect targeting relative to the observed local dibao thresholds. For this "perfect dibao targeting" baseline we assume that individuals receive dibao transfers if and only if their ex ante incomes are below their local dibao thresholds. In other words, all individuals who are dibao eligible, and no one else, receive transfers. In this baseline the transfers are equal to the local transfer amounts. The dibao budget implied by this "perfect dibao targeting" baseline is 23.7 billion yuan. The baseline poverty outcomes are shown in Table 18.

We now replace the locally varying dibao transfers in the "perfect dibao targeting" baseline with a uniform transfer. The transfer is equal to the average transfer (887 yuan) in the "perfect dibao targeting" baseline. The results of this simulation (e) are shown in the second line

[13] At 2,098 yuan, the official poverty line is higher than the average dibao threshold; however, in some counties the threshold exceeds this level. See Figure 1 and Table 3.

of Table 18. Now the impact of adopting a uniform transfer is more substantial. All three poverty measures decline, especially the poverty gap, which is reduced by 12%. This simulation demonstrates that if there were no inclusionary targeting error, then adopting a uniform transfer would substantially reduce poverty.

What about adopting a uniform threshold? For the uniform threshold we use the poverty line, which implies that everyone who is poor is eligible. Since the poverty line is higher on average than the local dibao thresholds, the number of eligible will be larger than the number of dibao eligible. Consequently, our baseline target budget based on dibao targeting is insufficient to cover all eligible individuals. We must therefore make some assumption about how recipients are selected from among the poor.

We use two alternative assumptions. The first is that recipients are selected based on distance from the poverty line, starting with the poorest (simulation f). The second is that recipients are selected randomly from among the poor (simulation g). Both selection methods yield zero inclusionary and zero exclusionary targeting error; however, selection in simulation (g) ignores depth of poverty.

In these simulations the target budget is that in the "perfect dibao targeting" baseline, and recipients receive the local varying transfers. Comparing the poverty outcomes of simulations (f) and (g) to the "perfect dibao targeting" baseline tells us whether, in a world of perfect targeting, replacing local thresholds with a uniform threshold would reduce poverty.

As reported in Table 18, simulation (f) reduces the poverty gap and squared poverty gap compared to the baseline, but the poverty headcount increases. Simulation (g) reduces the poverty headcount and poverty gap, but the squared poverty gap increases. This difference in outcomes between simulations (f) and (g) is not surprising, because the dibao recipients in (f) are on average in deeper poverty than the recipients in (g). We conclude that adopting a uniform national eligibility threshold has the potential to reduce poverty substantially compared to retaining local dibao thresholds, although the nature of the poverty impact will depend on how recipients are selected among the poor.

Finally, what would be the impact of adopting both a uniform dibao transfer amount and a uniform threshold? Simulations (h) and (i) explore this policy option. In both (h) and (i) the

uniform transfer is set equal to the average transfer in the "perfect dibao targeting" baseline. Simulation (h) selects recipients based on depth of poverty, while simulation (i) selects recipients randomly among the poor.

Both these simulations yield substantial reductions in some, but not all, of the poverty measures. Simulation (h) yields the largest reductions in the poverty gap and squared gap. In these regards it is superior to only adopting a uniform transfer (e). The poverty headcount is higher, however, than in both the baseline and simulation (e). If dibao recipients are selected randomly among the poor (simulation i), then adopting both a uniform transfer and threshold can substantially reduce the poverty headcount and poverty gap compared to the baseline, and also compared to adopting a uniform transfer (e). The squared poverty gap, however, is higher.

Overall, the simulations in Table 18 indicate that uniform transfer and/or uniform threshold policies have the potential to increase the dibao program's effectiveness, and so they provide support for a more centralized, standardized approach. This conclusion, however, is predicated on the assumption of perfect targeting in both the baseline and policy simulations. In fact, the dibao program has substantial inclusionary targeting error. Simulation (d) demonstrates that in the presence of targeting error at observed levels, the impact of a uniform transfer policy will be minimal.

Unfortunately, constructing simulations of adopting a uniform threshold in the presence of targeting error is difficult, because the results will ultimately depend on assumptions regarding how recipients are selected. We speculate, however, that a uniform threshold would be more effective than a uniform transfer, because it would increase the share of dibao recipients from counties with lower dibao thresholds, which tend to have more poor households. A uniform threshold policy would require fiscal measures to increase dibao funding to poorer counties.

## X. Conclusions

China's rural dibao program, which was adopted nationwide starting in 2007, is now among the largest unconditional cash transfer schemes in the world. The program's implementation and expansion in recent years have coincided with reductions in rural poverty in China. This raises the question of whether, or to what extent, the program has contributed to poverty reduction.

Using household survey data matched with administrative data for 2007-2009, we have examined the relationship between China's rural dibao program and rural poverty and conducted targeting analysis using conventional and propensity score approaches. We find that during these years the rural dibao program provided sufficient income to poor beneficiaries, but the poverty impact of the program overall was small. Although total dibao expenditures are fairly large relative to the poverty gap, the program did not substantially reduce the poverty gap.

Conventional targeting analysis reveals large inclusionary and exclusionary targeting errors. Propensity score analysis of targeting reduces the targeting errors, which suggests that the program has been implemented in reference to an unobserved latent income variable and observable correlates of income. Nevertheless, even using the propensity score targeting approach, the targeting errors remain quite large.

These findings are subject to some limitations of our data. One limitation is the lack of household-level information on dibao transfers. Another is potential understatement of dibao participation. Dibao participation in the CHIP sample is considerably lower than in the official statistics. This discrepancy could be because the official statistics are biased; however, if it reflects bias in the CHIP survey sample, then our findings could understate the dibao program's effectiveness.

Our analysis indicates that during these years a central reason for the program's modest poverty impact was that the proportion of the population covered by the program as measured by both the CHIP and official data was relatively small. Since 2009 government spending on the rural dibao program has expanded rapidly. Most of the budget increase, however, has been used to increase transfer amounts. The number of recipients has changed relatively little.

Using simulations, we investigate whether expanding the dibao program would increase its impact on poverty. Our findings indicate that expanding the program could be beneficial if the expansion mainly takes the form of expanding coverage rather than increasing transfer amounts per recipient. We also use simulations to explore whether adopting a uniform transfer and uniform threshold will improve the program's poverty impact. We find that standardization of transfers and thresholds has the potential to substantially reduce poverty, but the extent to which that potential is realized depends critically on targeting. For example, a uniform transfer

to the dibao recipients observed in the 2009 data would yield minimal improvement in poverty by any measure.

The simulations yield several broad lessons for cash transfer programs. First, they highlight potential tradeoffs between program coverage and the generosity of transfers per recipient. Program coverage and generosity can have different impacts on poverty, and those impacts depend on targeting performance. Our simulations illustrate how the impacts of coverage versus generosity change under alternative targeting scenarios. We treat targeting as exogenous, but we acknowledge that targeting could be influenced by the parameters of the program and thus be endogenous. For example, small transfers may promote self-selection by poorer households into the program, thus improving targeting as evidenced by the Brazilian Bolsa Familia program (Bastagli, 2008). This sort of interaction between program parameters and targeting performance strengthens the case for expanding coverage versus increasing transfer amounts.

Second, the simulations shed some insights about local variation versus uniformity of cash transfer programs. The argument for standardization in China is that under the decentralized fiscal system, local budgets for transfer programs are positively correlated with local income. Our simulations suggest that in the presence of weak targeting, the gains from standardization may in practice be limited. Moreover, we speculate that under these conditions adopting a uniform eligibility criterion may be more effective in reducing poverty than adopting a uniform transfer, because a uniform threshold would tend to increase the proportion of recipients located in poorer locations. Standardization of thresholds (or, for that matter, transfers) would, however, probably require fiscal subsidies to poorer locations in order to support their increased program costs.

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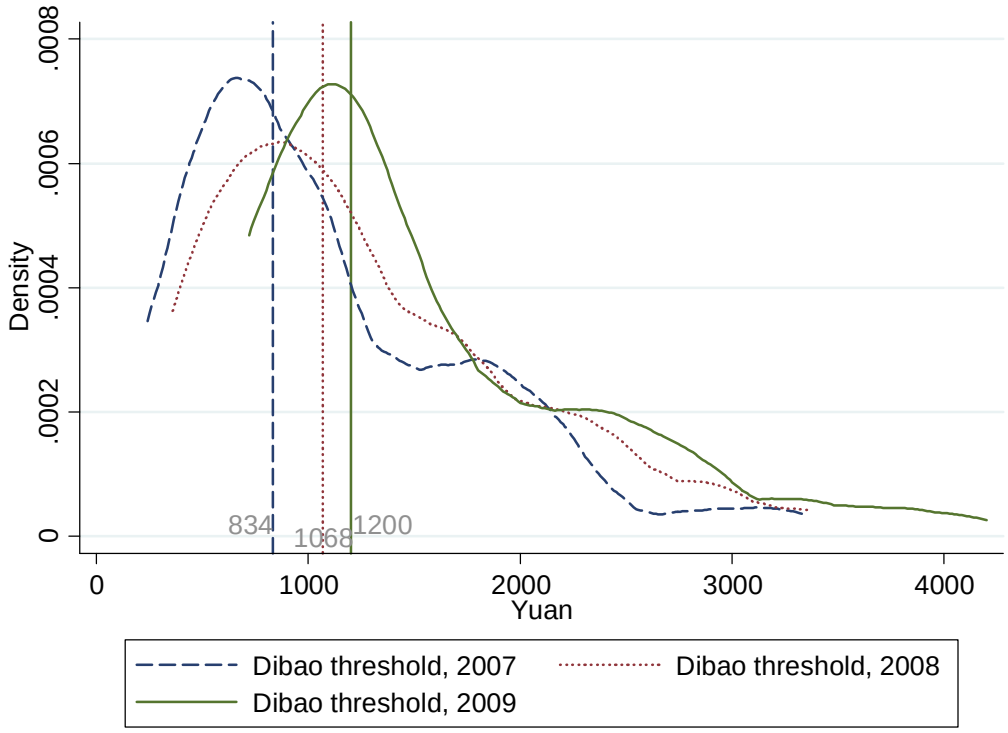
Figure 1: The Distribution of County-level Dibao Thresholds, by Year (yuan per person per year)




Note: This figure shows the distribution of dibao thresholds for counties covered in the CHIP rural sample. For the year 2007, the January 2008 dibao threshold values were used. For 2008 and 2009, the December 2008 and 2009 threshold values were used. Vertical lines represent the yearly median threshold values, which were 834, 1,068 and 1,200 yuan for 2007, 2008 and 2009, respectively.

Source: MOCA (various years).

Figure 2a: County and Village Average Dibao Transfers, 2008 (yuan per recipient)

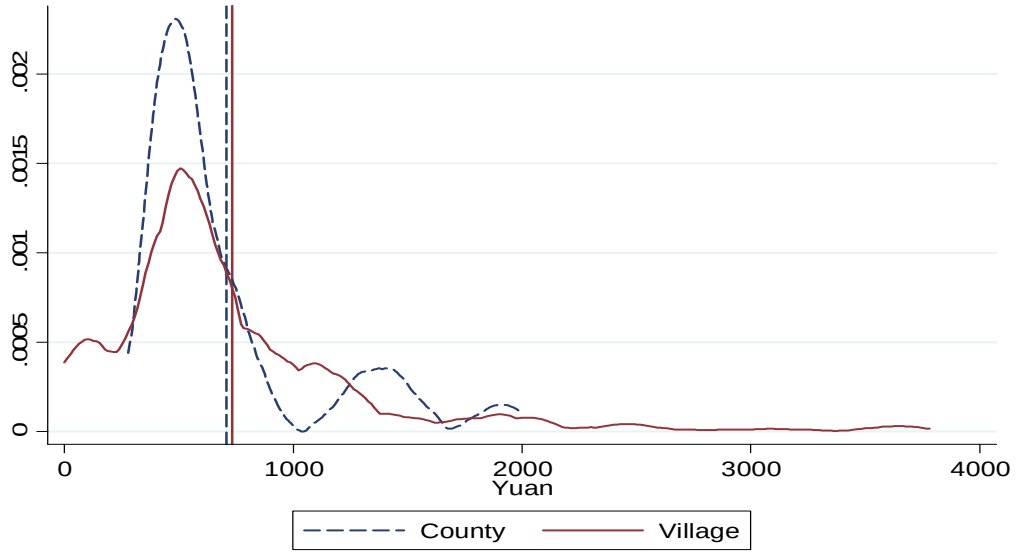
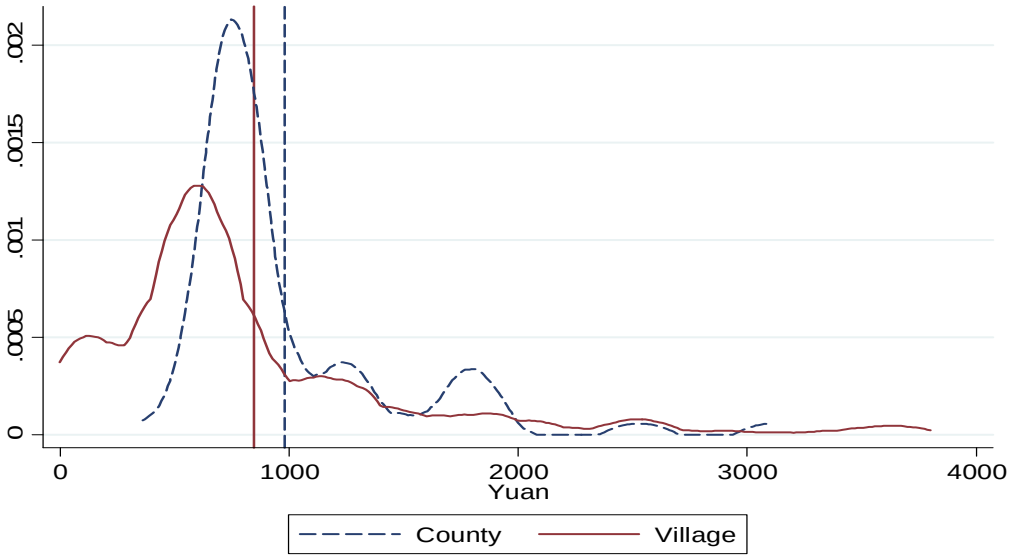


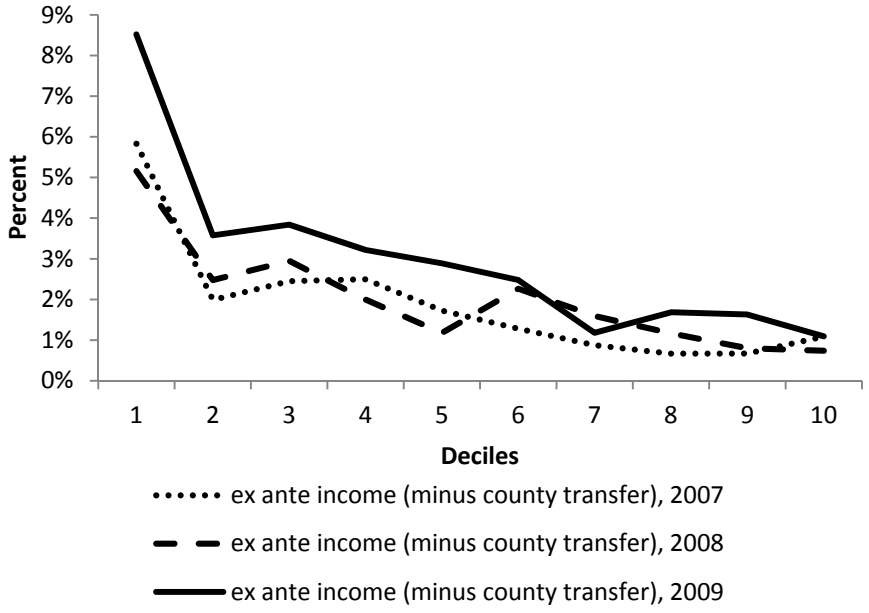

Figure 2b: County and Village Average Dibao transfers, 2009 (yuan per recipient)




Note: County transfers shown in Figures 2a and 2b are restricted to counties covered in the CHIP survey. Village transfers are for villages covered in the CHIP survey. Outliers (higher than 4000 yuan) have been removed. The dashed vertical lines represent the average village transfer for CHIP villages; the dotted vertical lines represent the average county transfer for CHIP counties.

Source: Authors' calculation based on data from CHIP and MOCA (various years).

Figure 3: Dibao Participation Rates by Ex Ante Income Decile (%)




Notes: Weighted. This shows dibao participation rates for individuals by decile groups, from poorest (1st decile) to richest (10th decile), based on ex ante income per capita. Estimates of ex ante income are calculated using the CHIP income data and average transfers at the county level (MOCA). Using average transfers at the village level (CHIP) gives very similar results.

Table 1: Official Statistics for China's Rural Dibao Program

| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|
| rural dibao recipients (millions) | 15.93 | 35.66 | 43.06 | 47.60 | 52.14 | 53.06 | 53.45 | 53.88 |
| rural dibao transfers (million yuan) | na | 10910 | 22873 | 36300 | 44500 | 66770 | 71820 | 86690 |
| national average rural dibao threshold (yuan per person per year) | na | 840 | 988 | 1210 | 1404 | 1718 | 2003 | 2434 |
| national average rural dibao transfer (yuan per recipient per year) | na | 466 | 605 | 816 | 888 | 1273 | 1344 | 1609 |

Note: The Ministry of Civil Affairs only started publishing data on transfers and thresholds for the rural dibao program after 2007, so data for transfers and thresholds for earlier years are missing or incomplete. Dibao transfers are the sum of dibao transfers from all levels of government. The average transfer is calculated as total rural dibao transfers divided by the number of recipients.

Sources: NBS (2012); Ministry of Civil Affairs (various years).

Table 2: The CHIP Rural Survey: Sample Sizes, Dibao Participation and Mean Incomes

| | 2007 | 2008 | 2009 |
|---|---|---|---|
| ***Sample size*** | | | |
| Number of individuals | 31791 | 31506 | 31317 |
| Number of households | 8000 | 7994 | 7955 |
| ***Dibao participation*** | | | |
| Number of individuals | 531 | 662 | 910 |
| Number of households | 145 | 176 | 240 |
| ***Mean income per capita (yuan, current prices)*** | | | |
| CHIP sample | 4429 | 5096 | 5629 |
| NBS survey sample | 4140 | 4761 | 5153 |
| ***Annual growth in mean income per capita (%, constant prices)*** | | | |
| CHIP sample | na | 8.0 | 10.8 |
| NBS survey sample | 9.5 | 7.9 | 8.6 |

Notes: Here and elsewhere, income is household net income per capita as measured by the NBS income definition. Constant-price growth rates are calculated using the NBS rural consumer price index (1.054 in 2007, 1.065 in 2008, and 0.997 in 2009). Sample sizes and the numbers of dibao participants are not weighted. CHIP sample mean incomes are weighted using two-level (province x region) weights.

Sources: NBS income statistics are from NBS (various years). CHIP sample sizes and income per capita are calculated by the authors using the CHIP dataset.

Table 3: Rural Dibao Thresholds and Transfers (yuan per capita per year)

| | 2007 | 2008 | 2009 |
|---|---|---|---|
| ***Dibao thresholds*** | | | |
| Average, all provinces | 1064 | 1166 | 1428 |
| Average, 9 provinces | 1051 | 1151 | 1395 |
| ***Dibao transfers*** | | | |
| Average county transfer, all provinces | 580 | 707 | 979 |
| Average county transfer, 9 provinces | 569 | 697 | 974 |
| Average village transfer, CHIP sample | -- | 732 | 845 |

Notes: Not weighted. Dibao thresholds and county-level transfers are calculated using official monthly county-level data and cover all counties, not just the CHIP counties. MOCA county-level data are monthly data. In this table, for the year 2007, we report the averages across counties for January 2008, multiplied by 12. For 2008 and 2009 we report the averages for December 2008 and December 2009, multiplied by 12.

Sources: Thresholds and county transfers are from MOCA (various years); village transfers are calculated using the CHIP village-level data.

Table 4: Rural Dibao Participation Rates, 2007-2009 (%)

| | 2007 | 2008 | 2009 |
|---|---|---|---|
| ***Dibao participation rates, CHIP data*** | | | |
| Full sample | 1.91 | 2.03 | 3.01 |
| Hebei | 0.493 | 0.337 | 0.869 |
| Jiangsu | 0.969 | 0.653 | 1.114 |
| Zhejiang | 0.934 | 0.894 | 0.667 |
| Anhui | 2.036 | 2.815 | 3.593 |
| Henan | 2.568 | 3.965 | 3.738 |
| Hubei | 1.366 | 1.298 | 1.509 |
| Guangdong | 1.259 | 3.476 | 4.847 |
| Chongqing | 2.020 | 3.473 | 6.483 |
| Sichuan | 2.859 | 1.223 | 3.184 |
| ***Dibao participation rates, official data*** | | | |
| National | 4.99 | 6.12 | 6.90 |
| 9 provinces in CHIP sample | -- | 4.60 | 5.57 |
| Hebei | -- | 4.22 | 4.39 |
| Jiangsu | -- | 3.59 | 4.03 |
| Zhejiang | -- | 2.57 | 2.63 |
| Anhui | -- | 5.10 | 5.96 |
| Henan | -- | 4.48 | 6.16 |
| Hubei | -- | 4.77 | 5.78 |
| Guangdong | -- | 4.59 | 4.85 |
| Chongqing | -- | 5.49 | 8.43 |
| Sichuan | -- | 6.59 | 7.92 |

Notes: Calculated over individuals. The national CHIP participation rates are calculated using weights; the provincial CHIP rates are unweighted. CHIP dibao participation rates are self-reported by households; members of households that report participation in either the dibao or wubao program are counted as dibao participants. The NBS publishes statistics on the national number of rural dibao participants; we divide these by the rural population to obtain the official national participation rates. MOCA issues the provincial numbers of rural dibao participants by month. We use the December numbers divided by NBS provincial rural population statistics to calculate the official provincial and 9-province participation rates. As a check, we calculated the national participation rates using the MOCA December numbers, which gives participation rates of 5.94 in 2008 and 6.68 in 2009; these are consistent with the participation rates based on the NBS annual participation numbers shown in the table.

Sources: NBS (various years); MOCA (various years), available only since 2007; authors' calculations using the CHIP dataset.

Table 5: Proportion of Individuals with Income below the Local Dibao Threshold (%)

| | Year | % of all individuals | % of dibao recipients |
|---|---|---|---|
| Ex post income < dibao threshold (includes dibao transfer) | 2007 | 2.42 | 4.52 |
| | 2008 | 2.64 | 2.42 |
| | 2009 | 3.77 | 5.71 |
| Ex ante income < dibao threshold (net of village average dibao transfer) | 2007 | -- | -- |
| | 2008 | 2.79 | 9.82 |
| | 2009 | 3.97 | 12.53 |
| Ex ante income < dibao threshold (net of county average dibao expenditure) | 2007 | 2.49 | 9.23 |
| | 2008 | 2.79 | 9.82 |
| | 2009 | 4.05 | 15.27 |

Notes: Not weighted. For dibao lines we use the county-level December dibao thresholds from MOCA, which are available for 2008 and 2009; for 2007 we use the county-level dibao thresholds for January, 2008. Ex ante incomes net of village-level dibao transfers cannot be calculated for 2007 as village dibao transfer data are not available for that year.

Sources: Authors' calculations using data from CHIP and MOCA (various years).

Table 6: Poverty Incidence Calculated Using Ex Post and Ex Ante Incomes (%)

| | 2007 | 2008 | 2009 |
|---|---|---|---|
| ***Official poverty line*** | | | |
| Ex post income per capita | 14.77 | 12.52 | 11.23 |
| Ex ante income per capita (net of village avg. dibao transfer) | -- | 12.75 | 11.44 |
| Ex ante income per capita (net of county avg. dibao expenditure) | 14.92 | 12.68 | 11.62 |
| ***$1.25 poverty line*** | | | |
| Ex post income per capita (including dibao transfer) | 15.01 | 12.83 | 11.40 |
| Ex ante income per capita (net of village avg. dibao transfer) | -- | 13.05 | 11.64 |
| Ex ante income per capita (net of county avg. dibao expenditure) | 15.16 | 13.01 | 11.79 |
| ***$2.00 poverty line*** | | | |
| Ex post income per capita (including dibao transfer) | 40.91 | 36.64 | 32.57 |
| Ex ante income per capita (net of village avg. dibao transfer) | -- | 36.94 | 32.78 |
| Ex ante income per capita (net of county avg. dibao expenditure) | 41.07 | 36.90 | 33.04 |

Notes: Weighted. The official poverty line is the new official poverty line of 2300 yuan announced in 2011. We adjust this back to 2007, 2008 and 2009 using the rural consumer price index published by the NBS (various years). The $1.25 and $2 international poverty lines are converted to yuan using the 2005 PPP exchange rate of 4.09 (LCU per international dollar, World Development Indicators 2013, http://data.worldbank.org/data-catalog/world-development-indicators), and then adjusted forward to 2007, 2008 and 2009 using the rural consumer price index.

Sources: Authors' calculations using the CHIP dataset and MOCA (various years) data on county average dibao transfers.

Table 7: The Poverty Gap and Dibao Expenditures

| | 2007 | 2008 | 2009 |
|---|---|---|---|
| ***Poverty gap (million yuan)*** | | | |
| Ex post income per capita | 60506 | 58504 | 55633 |
| Ex ante income per capita (net of county avg. dibao transfer) | 61923 | 60222 | 59273 |
| *difference (%)* | *2.34%* | *2.94%* | *6.54%* |
| ***Total dibao expenditures*** | | | |
| MOCA total dibao expenditures (million yuan) | 10910 | 22873 | 36300 |
| *as a % of ex ante poverty gap* | *17.6%* | *38.0%* | *61.2%* |
| CHIP total dibao expenditures (million yuan) | 4950 | 6299 | 15261 |
| *as a % of ex ante poverty gap* | *8.0%* | *10.5%* | *25.7%* |
| ***Average reduction in the poverty gap per yuan dibao expenditure (yuan)*** | | | |
| Calculated using MOCA total expenditures | 0.13 | 0.04 | 0.06 |
| Calculated using CHIP total expenditures | 0.29 | 0.27 | 0.24 |

Notes: Weighted. The poverty gap is calculated using the 2011 official poverty line. Ex ante incomes are calculated by subtracting county average dibao expenditures from incomes reported in the CHIP data. MOCA total dibao expenditures are the official national totals (Table 1). CHIP total dibao expenditures are calculated as the (weighted) sum over all individuals receiving dibao in the CHIP sample of the county average transfer in the location of residence. Note that for dibao recipients who live in counties for which MOCA county average transfer data are not available, we use the village average transfers from CHIP (which are available only in 2008 and 2009).

Table 8: Targeting Errors (%)

| Measure of income per capita | Error | 2007 | 2008 | 2009 |
|---|---|---|---|---|
| Ex post | Inclusion | 97.3 | 97.8 | 94.4 |
| | Exclusion | 97.3 | 98.0 | 95.4 |
| Ex ante, net of village avg. dibao transfer | Inclusion | -- | 92.1 | 89.4 |
| | Exclusion | -- | 93.2 | 91.6 |
| Ex ante, net of county avg. dibao expenditure | Inclusion | 93.6 | 92.3 | 85.7 |
| | Exclusion | 93.7 | 93.3 | 89.1 |

Note: Weighted. Inclusion error equals the percent of dibao recipients who are not eligible (whose incomes are above the dibao thresholds); exclusion error equals the percent of eligible individuals (with incomes below the dibao thresholds) who do not receive dibao transfers.

Table 9: Shares of Poor and Nonpoor Individuals Who Receive Dibao (%)

| Ex ante income estimated using village average dibao transfers | | | | | | |
|---|---|---|---|---|---|---|
| | 2007 | | 2008 | | 2009 | |
| | Nonpoor | Poor | Nonpoor | Poor | Nonpoor | Poor |
| Official poverty line | -- | -- | 1.58 | 5.16 | 2.55 | 6.57 |
| $1.25 Poverty line | -- | -- | 1.59 | 5.05 | 2.53 | 6.67 |
| $2 Poverty line | -- | -- | 1.24 | 3.40 | 2.35 | 4.36 |
| Ex ante income estimated using county average dibao expenditures | | | | | | |
| | 2007 | | 2008 | | 2009 | |
| | Nonpoor | Poor | Nonpoor | Poor | Nonpoor | Poor |
| Official poverty line | 1.43 | 4.65 | 1.66 | 4.64 | 2.36 | 7.98 |
| $1.25 Poverty line | 1.43 | 4.58 | 1.63 | 4.76 | 2.36 | 7.86 |
| $2 Poverty line | 1.03 | 3.17 | 1.31 | 3.29 | 1.97 | 5.12 |

Notes: Weighted. Poverty classifications are based on ex ante incomes. See notes to Table 6 for the poverty lines.

Sources: Authors' calculations using the CHIP dataset and MOCA (various years) data on county average dibao transfers.

Table 10: Targeting Errors Relative to the Official Poverty Line (%)

| Measure of income per capita | Error | 2007 | 2008 | 2009 |
|---|---|---|---|---|
| Ex ante, net of village avg. dibao transfer | Inclusion | -- | 67.7 | 75.0 |
| | Exclusion | -- | 94.8 | 93.4 |
| Ex ante, net of county avg. dibao expenditure | Inclusion | 63.6 | 71.1 | 69.2 |
| | Exclusion | 95.3 | 95.4 | 92.0 |

Notes: Weighted. In this table inclusion and exclusion errors measure whether or not poor households receive dibao transfers. In other words, the inclusion error is the % of dibao recipients who had income above the poverty line, and the exclusion error is the % of individuals with income below the poverty line who were not dibao recipients. Poverty classifications are carried out using ex ante incomes.

Sources: Authors' calculations using the CHIP dataset and MOCA (various years) data on county average dibao transfers.

Table 11: Characteristics of Dibao and Non-dibao Households, 2007

| | Non-dibao mean | *SD* | Dibao mean | *SD* | Dibao mean as a % of non-dibao |
|---|---|---|---|---|---|
| ***Household characteristics*** | | | | | |
| Per capita income | 5263 | *4347* | 3789 | *2859* | 72% |
| Ex ante per capita income (village correction) | . | . | . | . | |
| Ex ante per capita income (county correction) | 5263 | *4347* | 3369 | *2821* | 64% |
| Household size | 3.980 | *1.359* | 3.662 | *1.464* | 92% |
| Average age of adult household members | 41.71 | *9.568* | 45.79 | *11.661* | 110% |
| Years of schooling of household head | 7.487 | *2.337* | 6.752 | *2.503* | 90% |
| Share of male household members | 0.523 | *0.146* | 0.504 | *0.181* | 96% |
| Share of household members age > 60 | 0.102 | *0.222* | 0.195 | *0.300* | 191% |
| Share of household members age < 16 | 0.150 | *0.172* | 0.161 | *0.183* | 107% |
| Existence of bad health household member (dummy) | 0.137 | *0.344* | 0.407 | *0.493* | 297% |
| Existence of disabled household member (dummy) | 0.116 | *0.321* | 0.352 | *0.479* | 303% |
| Existence of household member with migrant job (dummy) | 0.408 | *0.491* | 0.352 | *0.479* | 86% |
| Share net income from wages | 0.426 | *0.414* | 0.315 | *0.293* | 74% |
| Share net income from non-agricultural business | 0.094 | *0.399* | 0.025 | *0.099* | 27% |
| Household has no major appliance (refrigerators, etc.) (dummy) | 0.370 | *0.483* | 0.641 | *0.481* | 173% |
| Household has motorized transport means (dummy) | 0.475 | *0.499* | 0.193 | *0.396* | 41% |
| Marriage in household (dummy) | 0.046 | *0.21* | 0.062 | *0.242* | 135% |
| Death in household (dummy) | 0.036 | *0.185* | 0.034 | *0.183* | 94% |
| Log housing area | 4.798 | *0.518* | 4.476 | *0.532* | 93% |
| Share of housing area that is multi-story | 0.492 | *0.47* | 0.303 | *0.447* | 62% |
| Household cultivated land area | . | . | . | . | |
| Water flush toilet (dummy) | 0.271 | *0.444* | 0.131 | *0.339* | 48% |
| Existence of piped water (dummy) | 0.416 | *0.493* | 0.234 | *0.425* | 56% |
| ***Village characteristics*** | | | | | |
| Natural disaster occurrence (dummy) | 0.551 | *0.497* | 0.683 | *0.467* | 124% |
| Revolutionary area (dummy) | 0.028 | *0.164* | 0.048 | *0.215* | 171% |
| Mountainous area (dummy) | 0.015 | *0.123* | 0.014 | *0.117* | 93% |
| Road covered by asphalt/cement (dummy) | 0.437 | *0.496* | 0.297 | *0.458* | 68% |
| Distance to township gov't > 10 km | 0.012 | *0.108* | 0.007 | *0.083* | 58% |
| Distance to county seat > 20 km | 0.052 | *0.222* | 0.083 | *0.276* | 160% |

Table 12: Characteristics of Dibao and Non-dibao Households, 2008

| | Non-dibao mean | *SD* | Dibao mean | *SD* | Dibao mean as a % of non-dibao |
|---|---|---|---|---|---|
| ***Household characteristics*** | | | | | |
| Per capita income | 6030 | *4893* | 4253 | *2778* | 71% |
| Ex ante per capita income (village correction) | 6030 | *4893* | 3608 | *2737* | 60% |
| Ex ante per capita income (county correction) | 6030 | *4893* | 3694 | *2745* | 61% |
| Household size | 3.945 | *1.39* | 3.761 | *1.481* | 95% |
| Average age of adult household members | 42.46 | *9.836* | 46.18 | *11.988* | 109% |
| Years of schooling of household head | 7.501 | *2.312* | 6.519 | *2.409* | 87% |
| Share of male household members | 0.522 | *0.148* | 0.527 | *0.199* | 101% |
| Share of household members age > 60 | 0.116 | *0.239* | 0.213 | *0.312* | 184% |
| Share of household members age < 16 | 0.139 | *0.166* | 0.133 | *0.174* | 96% |
| Existence of bad health household member (dummy) | 0.153 | *0.360* | 0.455 | *0.499* | 297% |
| Existence of disabled household member (dummy) | 0.120 | *0.325* | 0.358 | *0.481* | 298% |
| Existence of household member with migrant job (dummy) | 0.374 | *0.484* | 0.330 | *0.471* | 88% |
| Share net income from wages | 0.472 | *2.000* | 0.330 | *0.285* | 70% |
| Share net income from non-agricultural business | 0.065 | *1.899* | 0.030 | *0.125* | 46% |
| Household has no major appliance (refrigerators, etc.) (dummy) | 0.331 | *0.471* | 0.585 | *0.494* | 177% |
| Household has motorized transport means (dummy) | 0.490 | *0.500* | 0.358 | *0.481* | 73% |
| Marriage in household (dummy) | 0.043 | *0.204* | 0.040 | *0.196* | 93% |
| Death in household (dummy) | 0.022 | *0.146* | 0.023 | *0.149* | 105% |
| Log housing area | 4.812 | *0.534* | 4.597 | *0.590* | 96% |
| Share of housing area that is multi-story | 0.511 | *0.465* | 0.335 | *0.456* | 66% |
| Household cultivated land area | 4.452 | *5.302* | 4.357 | *3.805* | 98% |
| Water flush toilet (dummy) | 0.293 | *0.455* | 0.119 | *0.325* | 41% |
| Existence of piped water (dummy) | 0.428 | *0.495* | 0.273 | *0.447* | 64% |
| ***Village characteristics*** | | | | | |
| Natural disaster occurrence (dummy) | 0.377 | *0.485* | 0.369 | *0.484* | 98% |
| Revolutionary area (dummy) | 0.028 | *0.165* | 0.051 | *0.221* | 182% |
| Mountainous area (dummy) | 0.015 | *0.121* | 0.028 | *0.167* | 187% |
| Road covered by asphalt/cement (dummy) | 0.468 | *0.499* | 0.415 | *0.494* | 89% |
| Distance to township gov't > 10 km | 0.012 | *0.107* | 0.023 | *0.149* | 192% |
| Distance to county seat > 20 km | 0.052 | *0.223* | 0.074 | *0.262* | 142% |

Table 13: Characteristics of Dibao and Non-dibao Households, 2009

| | Non-dibao mean | *SD* | Dibao mean | *SD* | Dibao mean as a % of non-dibao |
|---|---|---|---|---|---|
| ***Household characteristics*** | | | | | |
| Per capita income | 6652 | *6033* | 4725 | *3282* | 71% |
| Ex ante per capita income (village correction) | 6652 | *6033* | 4130 | *3241* | 62% |
| Ex ante per capita income (county correction) | 6652 | *6033* | 3856 | *3146* | 58% |
| Household size | 3.94 | *1.42* | 3.79 | *1.555* | 96% |
| Average age of adult household members | 43.05 | *9.976* | 47.15 | *12.652* | 110% |
| Years of schooling of household head | 7.467 | *2.336* | 6.725 | *2.526* | 90% |
| Share of male household members | 0.522 | *0.149* | 0.511 | *0.179* | 98% |
| Share of household members age > 60 | 0.128 | *0.252* | 0.251 | *0.333* | 196% |
| Share of household members age < 16 | 0.129 | *0.162* | 0.123 | *0.161* | 95% |
| Existence of bad health household member (dummy) | 0.139 | *0.346* | 0.346 | *0.477* | 249% |
| Existence of disabled household member (dummy) | 0.089 | *0.285* | 0.267 | *0.443* | 300% |
| Existence of household member with migrant job (dummy) | 0.169 | *0.375* | 0.242 | *0.429* | 143% |
| Share net income from wages | 0.462 | *0.399* | 0.362 | *0.311* | 78% |
| Share net income from non-agricultural business | 0.067 | *0.269* | 0.015 | *0.072* | 22% |
| Household has no major appliance (refrigerators, etc.) (dummy) | 0.259 | *0.438* | 0.486 | *0.501* | 188% |
| Household has motorized transport means (dummy) | 0.517 | *0.500* | 0.329 | *0.471* | 64% |
| Marriage in household (dummy) | 0.050 | *0.218* | 0.021 | *0.143* | 42% |
| Death in household (dummy) | 0.018 | *0.132* | 0.046 | *0.210* | 256% |
| Log housing area | 4.852 | *0.526* | 4.596 | *0.547* | 95% |
| Share of housing area that is multi-story | 0.511 | *0.465* | 0.361 | *0.456* | 71% |
| Household cultivated land area | 4.551 | *4.290* | 3.708 | *3.012* | 81% |
| Water flush toilet (dummy) | 0.364 | *0.481* | 0.231 | *0.422* | 63% |
| Existence of piped water (dummy) | 0.542 | *0.498* | 0.430 | *0.496* | 79% |
| ***Village characteristics*** | | | | | |
| Natural disaster occurrence (dummy) | 0.326 | *0.469* | 0.412 | *0.493* | 126% |
| Revolutionary area (dummy) | 0.036 | *0.187* | 0.045 | *0.207* | 125% |
| Mountainous area (dummy) | 0.021 | *0.144* | 0.039 | *0.193* | 186% |
| Road covered by asphalt/cement (dummy) | 0.506 | *0.500* | 0.408 | *0.493* | 81% |
| Distance to township gov't > 10 km | 0.014 | *0.119* | 0.033 | *0.18* | 236% |
| Distance to county seat > 20 km | 0.066 | *0.249* | 0.104 | *0.306* | 158% |

Notes to Tables 11, 12 and 13: Unweighted. 2007 values are calculated over 7855 non-dibao and 145 dibao households; 2008 and 2009 values are calculated over 7818 and 176, and 7715 and 240, non-dibao and dibao households, respectively. For some variables the number of observations is lower due to some missing values.

Table 14: Results of probit regressions (dependent variable =1 if the household receives dibao, =0 otherwise)

| | 2007 | 2008 | | 2009 | |
|---|---|---|---|---|---|
| | (2) | (1) | (2) | (1) | (2) |
| Log ex ante per capita income (village correction) | | -0.0096*** | | -0.0086*** | |
| | | (0.001) | | (0.002) | |
| Log ex ante per capita income (county correction) | -0.0068*** | | -0.0093*** | | -0.0108*** |
| | (0.001) | | (0.002) | | (0.002) |
| Household size | -0.0027*** | -0.0030*** | -0.0031*** | -0.0021** | -0.0025** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Average age of adult household Members | -0.0001 | -0.0002 | -0.0002 | -0.0002 | -0.0002 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Share of male household members | -0.0130** | -0.0007 | -0.0005 | -0.0080 | -0.0080 |
| | (0.006) | (0.005) | (0.005) | (0.007) | (0.007) |
| Share of household members age > 60 | -0.0001 | 0.0017 | 0.0019 | 0.0129** | 0.0110* |
| | (0.005) | (0.005) | (0.005) | (0.006) | (0.006) |
| Share of household members age < 16 | 0.0078 | -0.0007 | -0.0002 | 0.0058 | 0.0046 |
| | (0.005) | (0.006) | (0.006) | (0.008) | (0.007) |
| Existence of bad health household member | 0.0113*** | 0.0162*** | 0.0171*** | 0.0101** | 0.0108** |
| | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) |
| Existence of disabled household member | 0.0159*** | 0.0144*** | 0.0146*** | 0.0333*** | 0.0319*** |
| | (0.005) | (0.005) | (0.005) | (0.009) | (0.009) |
| Household member with migrant job | -0.0010 | -0.0011 | -0.0009 | 0.0105** | 0.0101** |
| | (0.002) | (0.002) | (0.002) | (0.005) | (0.005) |
| Share net income from wages | -0.0075** | -0.0084*** | -0.0090*** | -0.0169*** | -0.0157*** |
| | (0.003) | (0.003) | (0.003) | (0.004) | (0.004) |
| Share net income from non-agricultural business | -0.0124*** | -0.0079*** | -0.0085*** | -0.0180*** | -0.0158*** |
| | (0.005) | (0.003) | (0.003) | (0.005) | (0.005) |
| Household has no major appliance | 0.0039* | 0.0041* | 0.0041* | 0.0036 | 0.0033 |
| | (0.002) | (0.002) | (0.002) | (0.003) | (0.003) |
| Household has motorized transport | -0.0067*** | -0.0014 | -0.0015 | -0.0044 | -0.0038 |
| | (0.002) | (0.002) | (0.002) | (0.003) | (0.003) |
| Natural disaster occurrence | 0.0027 | -0.0012 | -0.0011 | 0.0009 | 0.0014 |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| Marriage in household | 0.0005 | 0.0046 | 0.0048 | -0.0090*** | -0.0076** |
| | (0.004) | (0.006) | (0.006) | (0.003) | (0.003) |
| Death in household | 0.0029 | 0.0003 | -0.0008 | 0.0397** | 0.0381** |
| | (0.006) | (0.006) | (0.005) | (0.018) | (0.018) |
| Log housing area | -0.0040* | 0.0012 | 0.0011 | -0.0030 | -0.0027 |
| | (0.002) | (0.002) | (0.002) | (0.003) | (0.003) |
| Share multi-story area | -0.0013 | -0.0032 | -0.0030 | 0.0014 | 0.0013 |
| | (0.002) | (0.002) | (0.002) | (0.003) | (0.003) |
| Household cultivated land area (mu) | | -0.0000 | -0.0000 | -0.0012*** | -0.0011*** |
| | | (0.000) | (0.000) | (0.000) | (0.000) |
| Water flush toilet | 0.0027 | -0.0070*** | -0.0071*** | -0.0023 | -0.0018 |
| | (0.003) | (0.002) | (0.002) | (0.003) | (0.003) |
| Piped water | -0.0018 | -0.0012 | -0.0013 | -0.0026 | -0.0024 |
| | (0.002) | (0.002) | (0.002) | (0.003) | (0.002) |
| Revolutionary area | 0.0101 | 0.0148 | 0.0152 | -0.0033 | -0.0034 |
| | (0.010) | (0.012) | (0.012) | (0.006) | (0.005) |
| Mountainous area | -0.0063** | -0.0011 | -0.0012 | 0.0004 | -0.0008 |
| | (0.003) | (0.006) | (0.006) | (0.009) | (0.008) |
| Road covered by asphalt/cement | 0.0002 | 0.0032* | 0.0034* | 0.0003 | 0.0007 |
| | (0.002) | (0.002) | (0.002) | (0.003) | (0.002) |
| Distance to township gov't > 10 km | -0.0054 | 0.0029 | 0.0029 | 0.0108 | 0.0108 |
| | (0.004) | (0.009) | (0.009) | (0.013) | (0.013) |
| Distance to county seat > 20 km | 0.0066 | -0.0002 | -0.0003 | 0.0093 | 0.0099 |
| | (0.006) | (0.004) | (0.004) | (0.007) | (0.007) |
| Log likelihood | -601.07 | -673.97 | -679.95 | -778.72 | -775.27 |
| Likelihood ratio test $\chi^2(33)$ | 239.19 | 333.91 | 321.97 | 321.91 | 335.96 |
| Pseudo $R^2$ | .166 | .199 | .191 | .171 | .178 |
| Observations | 7,971 | 7,952 | 7,952 | 7,358 | 7,359 |

Notes: Estimated over households, without weights. Estimation was also done using the household-size as weights; the coefficients were very similar and equality could not be rejected using a Hausman test. The table reports marginal effects, evaluated at the mean of the data. Standard errors are in parentheses. The regressions also included controls for province fixed effects (not reported). Anhui, Henan, Chongqing and Guangdong had significant, positive coefficients with Hebei as reference province. The regressions were estimated including some additional explanatory variables such as years of schooling, but since the coefficients were uniformly not significant, these variables were dropped. Statistically significant coefficients are shown in red. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 15: Targeting Performance Based on Propensity Scores (%)

| | All | | | Receiving dibao | | | Not receiving dibao | | |
|---|---|---|---|---|---|---|---|---|---|
| Year | Ineligible | Eligible | Total | Ineligible | Eligible | Total | Ineligible | Eligible | Total |
| 2007 | 98.09 | 1.91 | 100.00 | 1.59 | 0.32 | 1.91 | 96.50 | 1.59 | 98.09 |
| 2008 | 97.97 | 2.03 | 100.00 | 1.63 | 0.40 | 2.03 | 96.34 | 1.63 | 97.97 |
| 2009 | 96.99 | 3.01 | 100.00 | 2.51 | 0.50 | 3.01 | 94.48 | 2.51 | 96.99 |

Notes: Percentages of CHIP sample individuals in each year, calculated using weights. Eligibility is determined using the propensity score method. Propensity scores are calculated from the probit estimates in Table 14 (specification 2). The propensity score threshold for each year is created by counting off individuals ranked from highest to lowest propensity score, starting from the highest propensity score, until reaching the number of dibao individuals in the survey that year. By construction, in the propensity score approach the number of eligible individuals is exactly equal to the number of recipient individuals. Consequently, column 2 (all ineligible) is identical to the last column (total not receiving dibao), and column 3 (all eligible) is identical to column 6 (eligible receiving dibao). In reality, the number of eligible individuals exceeds the number of recipients.

Table 16: Targeting Errors Using Propensity Scores (%)

| Error | 2007 | 2008 | 2009 |
|---|---|---|---|
| Inclusion | 83.2 | 80.3 | 83.4 |
| Exclusion | 83.2 | 80.3 | 83.4 |

Note: Weighted. Calculated from the numbers in Table 15. Inclusion error is the percent of dibao recipients who are not eligible according to the propensity score method; exclusion error equals the percent of eligible individuals (according to the propensity score method) who did not receive dibao transfers. By construction, in the propensity score approach inclusion and exclusion errors are the same because the number of eligible individuals is exactly equal to the number of recipient individuals. In reality, the number of eligible individuals exceeds the number of recipients, so in that in the conventional targeting analysis the exclusion errors are larger than the inclusion errors (Table 8).

Table 17: Simulations: Expanding Coverage versus Increasing Transfers or a Uniform Transfer

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Change in poverty relative to baseline (%) | | |
| | Budget (mill. yuan) | Number of recipients | Transfer amounts | Poverty rate | Poverty gap index | Squared Poverty gap | Rate | Gap | Squared gap |
| Baseline ("observed") | 13580 | 20398820 | Local | 11.23 | 3.91 | 7.67 | | | |
| a) Expand coverage (to all eligible) | 2.54 x base | 44211569 | Local | 10.64 | 2.97 | 6.33 | -5.25 | -24.04 | -17.47 |
| b) Expand coverage (lottery) | 2.54 x base | 52322970 | Local | 10.88 | 3.79 | 7.58 | -3.12 | -3.07 | -1.17 |
| c) Increase transfer | 2.54 x base | 20398820 | 2.54 x local | 10.89 | 3.78 | 7.59 | -3.03 | -3.32 | -1.04 |
| d) Uniform transfer | base | 20398820 | 666 yuan | 11.17 | 3.93 | 7.67 | -0.53 | 0.51 | 0.00 |

Notes: The baseline case is calculated using rural population weights and observed dibao participation in the 2009 CHIP data. Dibao transfer amounts are assumed to equal the local average in the village of residence (where village data are missing, we use the county average from MOCA). Poverty is calculated using the official poverty line. Simulations (a) – (d) assume that dibao transfers continue to go to all recipients in the baseline case. The expanded budget used in these simulations is 2.54 times the base budget, which is the amount of funding required by simulation (a) in which transfers continue to go to original recipients as well as to any other individuals who were not original recipients but who are eligible, i.e., whose incomes are below their local dibao thresholds. Simulation (b) assumes that the program is expanded by adding additional recipients who are selected randomly from among all non-recipients until the budget is exhausted. Simulations (c) and (d) do not add any new dibao recipients, but explore changing the amount of the dibao transfers. Simulation (c) increases the transfer received by each dibao recipient in the baseline by 2.54 times. Simulation (d) replaces the transfer received by each dibao recipient in the baseline case with a uniform transfer equal to the average baseline transfer of 666 yuan.

Table 18: Simulations: Uniform Transfer versus a Uniform Eligibility Threshold

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Change in poverty relative to baseline (%) | | |
| | Budget (mill. yuan) | Number of recipients | Transfer amount | Poverty rate | Poverty gap index | Squared Poverty gap | Rate | Gap | Squared gap |
| Baseline (perfect dibao targeting) | 23710 | 26717666 | Local | 10.85 | 3.04 | 6.35 | | | |
| e) Uniform transfer | Base | 26717666 | 887 yuan | 10.75 | 2.68 | 6.19 | -0.92 | -11.84 | -2.52 |
| f) Uniform threshold (distance to poverty line) | Base | 32405357 | Local | 10.90 | 2.72 | 6.19 | 0.46 | -10.53 | -2.52 |
| g) Uniform threshold (lottery among the poor) | Base | 34302984 | Local | 9.94 | 2.81 | 6.53 | -8.39 | -7.57 | 2.83 |
| h) Uniform threshold and uniform transfer (distance to poverty line) | Base | 26705957 | 887 yuan | 10.96 | 2.49 | 6.07 | 1.01 | -18.09 | -4.41 |
| i) Uniform threshold and uniform transfer (lottery among the poor) | Base | 26699889 | 887 yuan | 10.00 | 2.61 | 6.43 | -7.83 | -14.14 | 1.26 |

Notes: The baseline in this table is a simulation in which there is perfect targeting based on the dibao thresholds: all individuals with income below their local dibao thresholds receive the local dibao transfers, and no individuals with income above their local dibao thresholds receive dibao transfers. Simulation (e) is the same as the baseline except local transfer amounts are replaced with a uniform transfer equal to the average transfer in the baseline (887 yuan). Simulation (f) assumes a uniform threshold equal to the official poverty line, with perfect targeting based on depth of poverty. Recipients are selected starting with the poorest (those furthest below the official poverty line) and given the local transfer until the baseline budget is used up. Simulation (g) also assumes a uniform threshold equal to the official poverty line, but here dibao recipients are randomly selected from among the poor and given the local transfer until the baseline budget is used up. Simulation (h) is the same as simulation (f) but transfers are now uniform and equal to the average transfer in the baseline. Simulation (i) is the same as simulation (g) but transfers are now uniform and equal to the average transfer in the baseline. In all cases poverty levels are calculated using the official poverty line.