

Welfare Participation and Family Consumption Choices in Rural China

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Abstract Using household survey data among 9107 families from five provinces of central and western China in 2010 and a propensity score matching method, this article investigates the effects of receiving welfare benefits from China's largest social assistance program, Dibao, on family expenditure patterns in rural areas. We find that families receiving Dibao prioritised spending on healthcare rather than making ends meet. However, rural Dibao receipt was unable to help lift family expenditure on education. We also find some evidence that Dibao receipt was associated with decreased spending on social participation, an unintended negative effect of this large social assistance program. Future reforms of rural Dibao and other social protection programs should address such adverse effects to avoid intergenerational transmission of poverty and social exclusion, taking into consideration the unique tradition, culture, and context of rural China.

Keywords Welfare participation · Family expenditure · Human capital · Propensity score matching · Rural China

Introduction

Rural poverty in China has declined sharply and substantially during the 1980s and 1990s due to impressive economic

growth and development-oriented anti-poverty strategy (Ravallion and Chen 2007; Zhang and Wan 2006). However, new patterns of rural poverty have emerged since China entered the twenty-first century. On the one hand, as the region-targeted anti-poverty programs have yielded remarkable achievements, rural poverty has shifted from concentrated regional poverty to much more dispersed family and community poverty (Du and Cai 2005; Xu et al. 2007). On the other hand, many of the rural poor lack working capabilities due to old age, disability, or serious illness. Most of these vulnerable people are unable to benefit from China's traditional development-oriented anti-poverty programs and have limited prospects in moving out of poverty through work (Xu et al. 2007; Zhu 2011).

In addition, along with further marketisation and rapid globalisation, China in the past decade has experienced various crises including food security, environment, energy, and financial crisis. Compared to the past, rural households now have to face much higher risks and greater uncertainty in their agricultural production and daily lives, leading more families into transitory poverty (Golan et al. 2014; Zhu 2011). In order to address the newly emerged rural poverty patterns, the Chinese government has pursued a multi-pronged effort to rebuild rural social programs since the early 2000s. These include expansion of universal and free 9-year compulsory education, establishment of the new rural cooperative medical scheme and the new rural social pensions program, and establishment of a comprehensive social assistant system. The Rural Minimum Livelihood Guarantee (MLG or Dibao) program was launched nationwide in 2007 to serve as a last resort for the rural poor in this new policy wave.

As the main social assistance program to support the poor, the rural Dibao provides direct cash transfers to households whose net per capita income is below a minimum living standard threshold set up by the local government. Local

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experiments with Dibao in rural China began in the early 1990s. Building on the successful national implementation of the urban Dibao in 1999, rural Dibao was adopted nationwide in 2007. As an indispensable part of China's poverty reduction strategy, rural Dibao has developed rapidly and become one of the largest unconditional cash transfer programs in the world (Gentilini et al. 2014). The number of rural Dibao beneficiaries rose from 3.85 million in 2001 to 35.66 million in 2007. The central government enacted a regulation in 2007 to require all counties to implement rural Dibao. Since then, the number of participants increased dramatically and has expanded to around 53.88 million people in 2013. Meanwhile, total program expenditures was only 10.91 billion in 2007 but has rapidly rose to 86.69 billion in 2013 (Ministry of Civil Affairs 2014).

Existing literature on the performance of rural Dibao is relatively scarce, mainly due to the lack of available large-scale household survey data. Some reports provided descriptive analyses and preliminary evaluation of the program's performance based on fieldwork. For example, based on review of policy documents, visits and discussions with policymakers and program participants and analysis of administrative data, World Bank (2011) examined rural Dibao's policy design, implementation, and impact on its target beneficiaries in Guangdong province. The results showed that rural Dibao was unable to achieve its stated goal of ensuring the minimum subsistence of the poor and eradicating extreme poverty in Guangdong. Major obstacles included insufficient program coverage and fiscal input, some impractical policy design features such as means-testing eligibility criteria, and ineffective administration of the program. A few recent studies have examined the targeting performance and anti-poverty outcomes of rural Dibao using large-scale household survey data with enough Dibao participant cases (Golan et al. 2014; Han and Xu 2013, 2014). This set of studies found that rural Dibao had some modest impacts on poverty reduction, but these effects are limited by the program's partial coverage, low benefit level, and significant targeting errors.

One important outcome aspect of welfare participation is family consumption patterns. Many poverty scholars have argued that studying consumption rather than income can help capture the living standards and material wellbeing of poor families more accurately (e.g., Blank 2006; Davis 2005; Kaushal et al. 2007; Meyer and Sullivan 2008; Wong and Yu 2002). Furthermore, poor families tend to have a tight budget constraint and constantly face hard consumption choices in their lives. Once receiving Dibao benefits, these families might change their consumption pattern to meet their most important needs and maximise their utility. Such choices would reflect the values placed on the various consumption items by these poor families. Often, their choices are between meeting basic short-term

survival needs (e.g., food and housing) and investing in human capital (i.e., health and education) to improve long-term wellbeing. Therefore, investigating the effect of welfare participation on poor families' consumption patterns is helpful for deepening the understanding of the anti-poverty performance of these programs. A growing body of research has analyzed families' consumption responses to both unconditional cash transfer (UCT) and conditional cash transfer (CCT) programs in developed or developing countries. However, this topic has not been examined in the rural Chinese context.

In this study, we provide a pioneering examination on the possible effects of rural Dibao on poor families' expenditure patterns. In particular, we investigate whether rural Dibao recipients prioritise the investment in human capital (i.e., health and education), as evident in the literature on urban Dibao, or whether the rural beneficiaries make different consumption choices using their welfare money. The policy goal of rural Dibao is to provide a last resort for meeting basic food, clothing, and shelter needs. It is of particular policy relevance to find out if this initial goal is met or if families actually consider other aspects of consumption needs more important or urgent. Moreover, the effects of Dibao on the consumption patterns reflect the poor families' behavioral responses to income transfer, and learning about these effects can help improve the performance of the anti-poverty programs.

Our analysis makes use of a large-scale household-level dataset collected by a research team of the School of Social Development and Public Policy in Beijing Normal University in 2010, with financial support from the Asia Development Bank (ADB) and China's Ministry of Civil Affairs (MCA). The dataset covers 15 counties and 540 villages in central and western regions of China where most of the rural poor population are concentrated. It contains rich information on household demographics, income sources, Dibao participation and benefit amounts, and family consumption patterns. Given the lack of existing evidence on rural Dibao, the availability of this dataset enables us to provide updated empirical evidence on this important yet understudied topic.

Selection bias has been a standing challenge in the impact evaluation literature (Dehejia and Wahba 1999; Heckman et al. 1997; Himaz 2008; Jalan and Ravallion 2003; Rosenbaum and Rubin 1983). In this article, we use a propensity score matching (PSM) method to address the issue of selection bias. Existing evidence on rural Dibao's mis-targeting errors suggest that there exist a group of non-Dibao recipients who are similar to Dibao recipients in their socioeconomic conditions and can serve as a valid comparison group, especially after they are matched on various demographic and socioeconomic characteristics (Han and Xu 2013; Golan et al. 2014).

Like any other matching methods, the PSM approach we use in this study can only control for observable factors available in the dataset, which are not exhaustive and cannot account for unobservable heterogeneity associated with Dibao participation. This limitation may lead to endogenous problems and cause the empirical result of participation effects to be inconsistent. Therefore, our conclusion does not reflect strictly causal relationships and should be interpreted as associational evidence. However, some recent studies on the effects of medical treatments found that PSM evidence is highly consistent with experimental design results (Kitsios et al. 2015; Zahoor et al. 2015). So, despite the limitation mentioned above, PSM still enables us to provide a more reliable evaluation of the possible link between Dibao receipt and family consumption patterns than otherwise.

We begin in the next section with an overview of the rural Dibao program. The [Previous Research](#) section reviews the existing literature. The [Data and Methods](#) section introduces the data and methods. Our empirical analysis results will be reported in the [Results](#) section. The final section concludes and discusses policy implications.

Policy Background

As the primary welfare program in rural China, the fundamental goal of Dibao is to provide cash transfers to households with per capita income below an income threshold (Dibao line) set up by local governments. The transfers are intended to help poor families maintain a minimum level of livelihood. Despite that rural Dibao is a national policy and central government plays an important role in committing its funding, local variation and flexibility were explicitly permitted in its regulation and implementation. Local governments set up the Dibao lines and determine targeting methods and benefit amounts. Given the diversity of China's rural areas and the difficulty of evaluating eligibility, the decentralised design of rural Dibao has inspired local governments to choose the most appropriate local assistance level and targeting strategy based on their own fiscal and administrative capacity. However, some studies found that the considerable discretionary power given to local governments has also created the problems of corruption and irregularity (Umaphathi et al. 2013; World Bank 2011).

China's rural Dibao was initiated in the 1990s and implemented nationwide in 2007. Since its inception, rural Dibao has expanded dramatically. As shown in Fig. 1, the total number of rural Dibao recipients was only 1.57 million families and 4.08 million persons in 2002. It increased sharply to 7.77 million families and 15.93 million persons in 2006 and to 29.31 million families and

53.88 million persons in 2013. The share of Dibao recipients in the total rural population was less than 2 % before 2006 and rose to 8.56 % by 2013.

The total government expenditure on rural Dibao has grown rapidly. As shown in Fig. 2, total government expenditure on rural Dibao was 10.91 billion yuan in 2007. It jumped to 86.69 billion yuan in 2013 without adjusting for rural consumer price indices (CPIs). Even after adjusting for CPIs, the total government expenditure on rural Dibao in 2013 was 70.69 billion yuan, with an annual real growth rate of 36.5 % between 2007 and 2013. In 2007, the central government began to provide financial support to help local governments to pay for the rural Dibao program. Figure 2 shows that the funding share from the central government rose from 27.5 % in 2007 to be consistently above 60 % after 2009. The increasing role of the central government in financing has been considered crucial to standardise and equalise China's rural Dibao program across localities (Umaphathi et al. 2013).

The rapid expansion of rural Dibao is also reflected by the rising trend of the average Dibao line and average Dibao benefit amounts. Figure 3 shows that the rural average Dibao line increased constantly over the years. It reached per capita 2434 annual yuan in 2013, an amount slightly higher than the official national rural poverty line in that year.¹ The pace of increase was less steep after adjusting for CPI, but the trend of increase still held. Have the increases in Dibao line kept pace with the increases in the average consumption level? Figure 3 also shows the trends in rural average Dibao line as a percentage of per capita rural consumption. The rural Dibao line kept increasing as a share of the average consumption level, rising from 26 % in 2007 to 36.7 % in 2013.

Compared to the average Dibao line, the average Dibao benefit amounts reveal more directly how much money has reached the beneficiaries and helped improve their economic well-being. Figure 4 shows that the rural average Dibao benefit amounts have increased constantly over time, except for a small drop in 2012. After adjusting for CPI, the actual increase pace of the average Dibao benefit amounts has been slower than that without adjusting for CPI. Figure 4 also presents the trend in average rural Dibao benefit amounts as a percentage of per capita rural consumption. Except for a small decline in 2012, the average Dibao benefit amounts increased from 14.4 % of the average consumption level in 2007 to 21.0 % in 2013.

¹ In 2011, the Chinese government set a new official national rural poverty line at per capita 2300 annual yuan. After adjusting for CPI, this line amounted to per capita 2424 yuan in 2013.

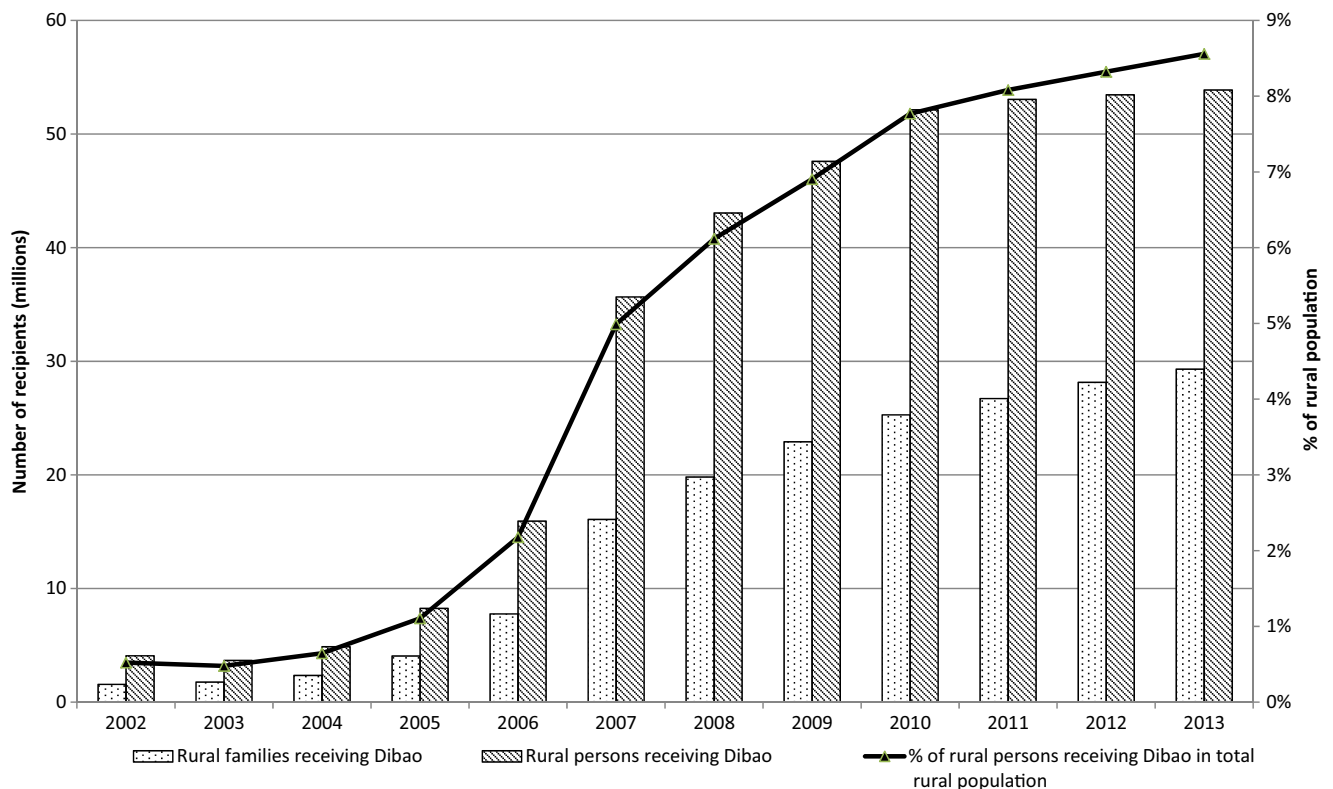


Fig. 1 Total number of rural Dibao recipients and as a percentage of total rural populations in China. Sources: Authors' calculations from the Ministry of Civil Affairs (various years) and National Bureau of Statistics (2014)

Who are the Dibao recipients? Table 1 presents the characteristics of Dibao recipients in rural China in 2007–2013. The majority of Dibao recipients were working-age adults, ranging between 50 and 60 %.

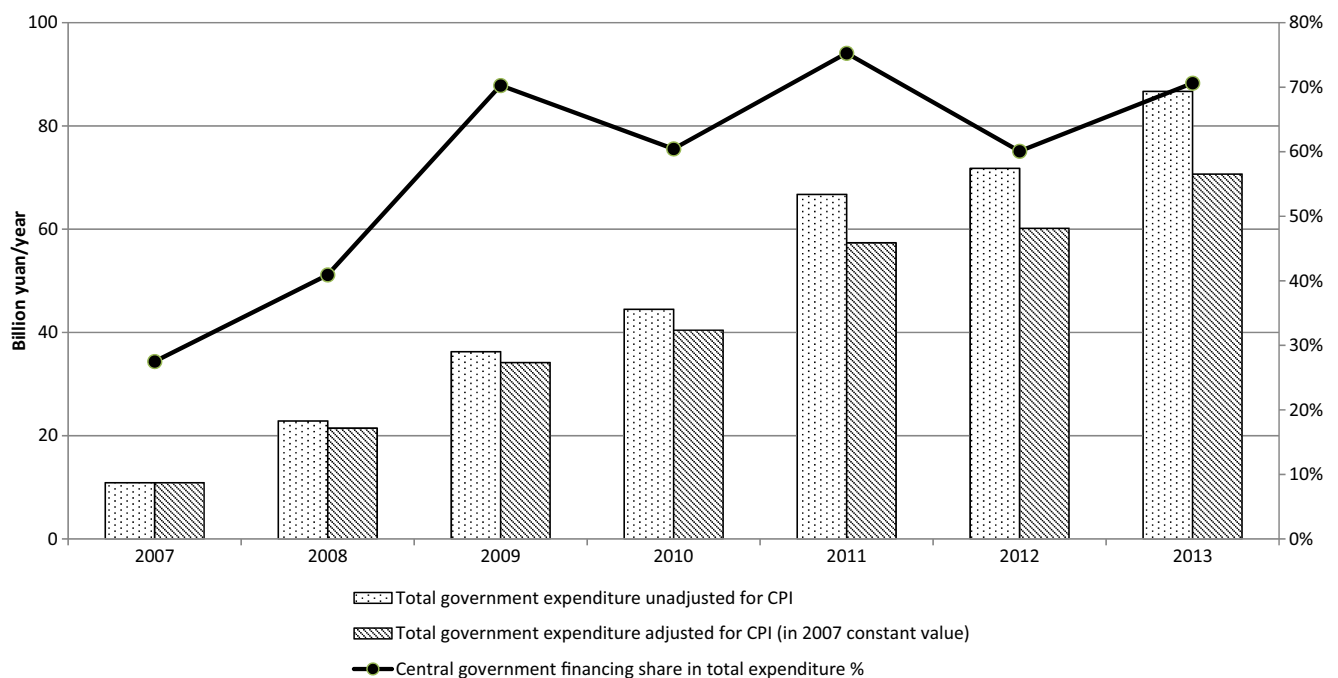


Fig. 2 Total government expenditure on rural Dibao and central government financing share. Sources: Figures unadjusted for consumer price indices (CPIs) are from the Ministry of Civil Affairs (various years); figures adjusted for CPIs are from authors' calculations using the unadjusted figures and official CPIs in rural areas (National Bureau of Statistics, 2014). Central government financing share in total expenditure is calculated by authors from the Ministry of Civil Affairs (various years)

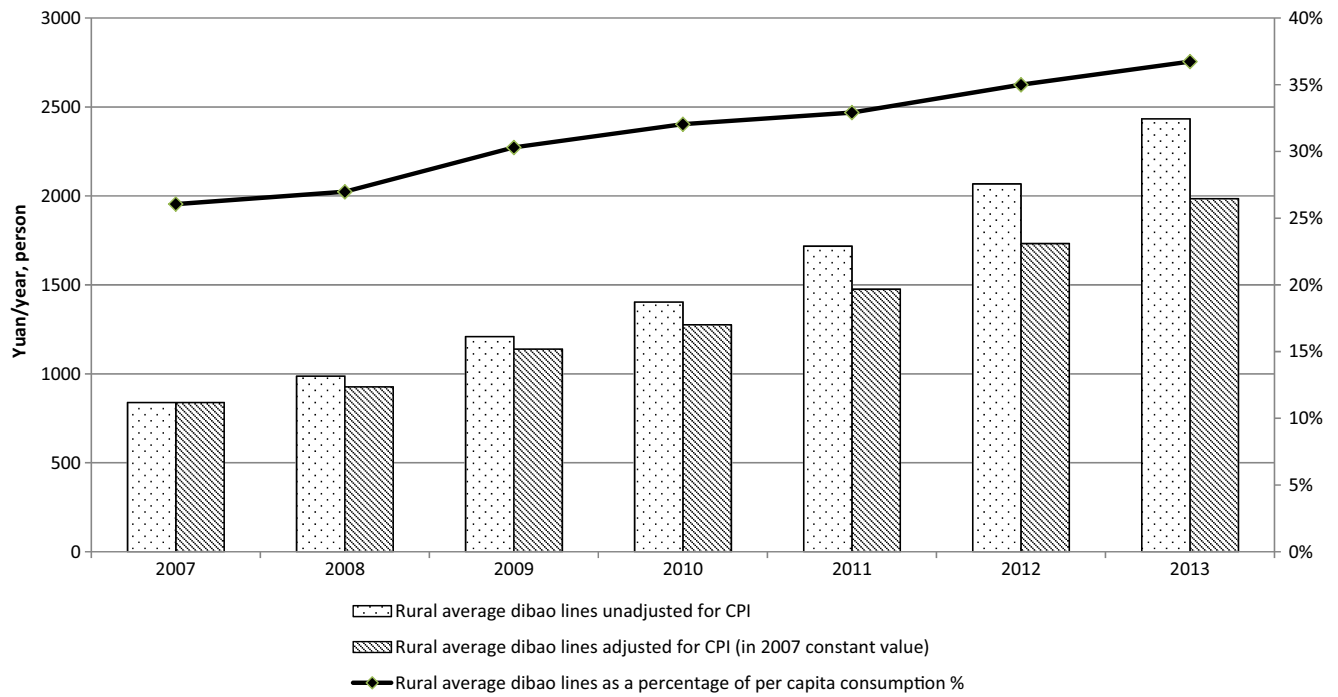


Fig. 3 Rural average Dibao lines and these lines as a percentage of per capita consumption. Sources: Figures unadjusted for consumer price indices (CPIs) are from Ministry of Civil Affairs (various years); figures

adjusted for CPIs are from authors’ calculations using the unadjusted figures and official CPIs in rural areas (National Bureau of Statistics, 2014)

The next largest group of rural Dibao recipients was older persons, accounting for 29–39 % of rural Dibao

recipients, while children made up 11–13 % of all rural Dibao recipients. From 2007 to 2013, the share of

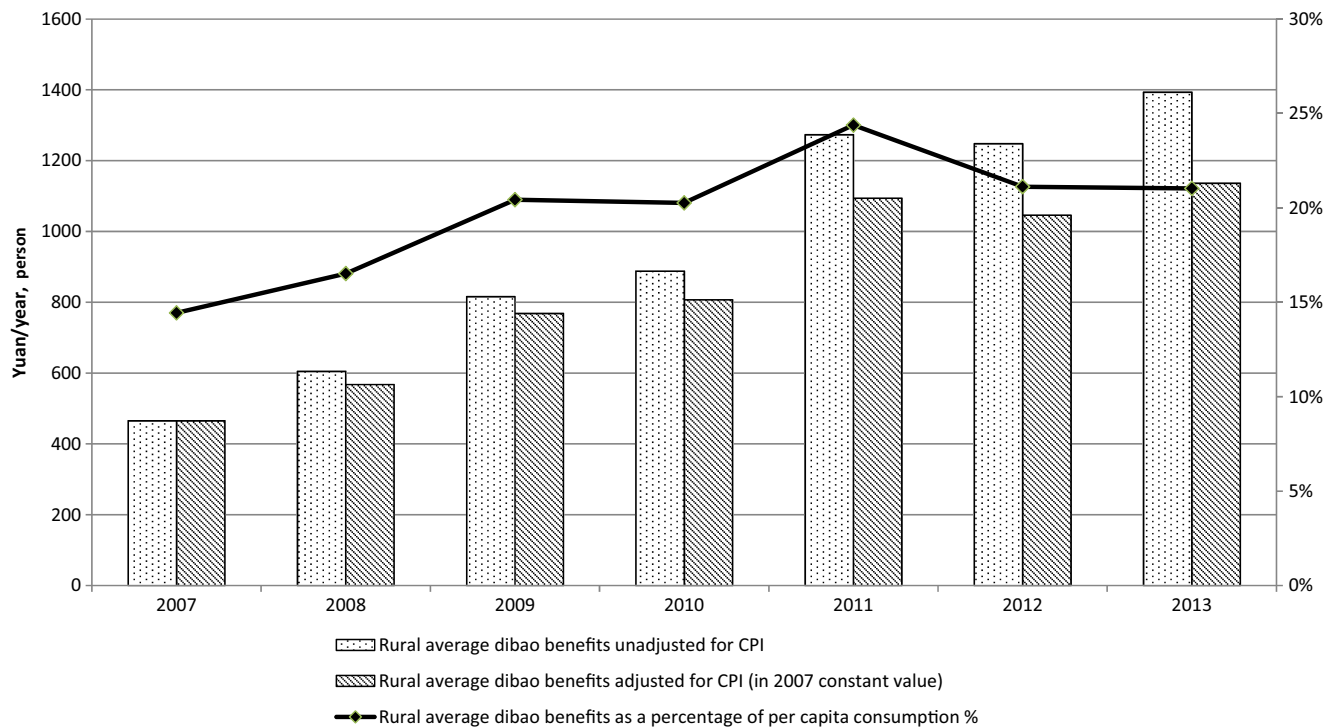


Fig. 4 Rural average Dibao benefits and these benefits as a percentage of per capita consumption. Sources: Figures unadjusted for consumer price indices (CPIs) are from Ministry of Civil Affairs (various years); figures

adjusted for CPIs are from authors’ calculations using the unadjusted figures and official CPIs in rural areas (National Bureau of Statistics, 2014)

Table 1 Demographic characteristics of Dibao recipients in rural China (%)

	2007	2008	2009	2010	2011	2012	2013
Working-age adults (18–59)	60	57	52	51	51	50	50
Older persons (60+)	29	31	35	36	36	38	39
Children (0–17)	11	12	13	13	13	12	11
Women	33	31	32	32	32	34	35
Disabled	10	9	10	9	9	9	9

Sources: Ministry of Civil Affairs (various years)

working-age adults decreased from 60 to 50 %, while the share of older persons increased. The share of child recipients fluctuated slightly but remained largely constant. About one third of the rural Dibao recipients were women and 9–10 % were disabled.

Previous Research

Since the 1990s, a growing number of both conditional cash transfer (CCT) and unconditional cash transfer (UCT) programs have emerged in developing countries, with the aim of poverty reduction and human development promotion (Barrientos 2013). The origins of UCT date back to at least Roman times (Brown 2002; Hands 1968), and by 2014, UCT programs have been implemented in 118 countries globally (Gentilini et al. 2014). Usually based on means testing and sometimes family registration or composition, these programs deliver cash transfers directly to eligible families, without any limitation on consumption choices or other required behavioral changes. Some scholars argue that, compared with the same amount of transfers given with conditions, consumption choice sets are larger when obtaining UCT, so its recipients are at least as well-off as those in CCT programs. In other words, informed rational recipients can freely decide to use the UCT income where most needed to maximise their families' welfare outcome in short or long term (Aizer et al. 2014; Fiszbein et al. 2009; Haushofer and Shapiro 2013).

Previous literatures have shown that UCT programs in developed countries (e.g., Canada and USA) have positive impacts on families' short-run consumption and human capital of children in long term, which was measured by cognitive achievement, health outcome, educational attainment, income in adulthood, and longevity (Aizer et al. 2014; Dahl and Lochner 2012; Gao et al. 2009; Milligan and Stabile 2011). Some impact evaluation studies in developing countries also observe a rise in families' consumption and improvement of children's human capital following the participation of UCT programs. For example, Case and Deaton (1998) reported that most categories of consumption were increased after poor families received unconditional social pensions in South Africa. Martinez (2005) also found

positive effects of BONOSOL, a large unconditional social pension program in Bolivia, on participant household consumption. To avoid selection bias, Haushofer and Shapiro (2013) used a randomised controlled trial to examine the consumption response of poor households to a UCT program in rural Kenya. The results show that UCTs increased all categories of consumption, with the exception of alcohol, tobacco, and gambling expenditures. In addition, a set of studies find that UCTs increase schooling and improve child health and nutrition in developing countries (Baird et al. 2011; Baird et al. 2014; Barrientos and Dejong 2006; Devereux et al. 2005; Duflo 2003; Martinez 2005; Robertson et al. 2013).

The scope of CCT programs has grown enormously in the last 10 years, especially in Latin America and the Caribbean. CCT programs mostly make cash transfer receipt conditional upon participants' behaviors in human capital investment such as children's regular school attendance and health clinic visitations. The main rationale for this approach is that poor families not only have tight budget constraints but tend to underestimate future returns to human capital investment due to limited information and lack of capacity to process available information. This in turn leads to low spending on children's education and health and reinforces intergenerational transmission of poverty (Attanasio and Kaufmann 2014; Das et al. 2005; de Janvry and Sadoulet 2006; Dizon-Ross 2014; Jensen 2010; Nguyen, 2008). It is also evident that day-to-day hard choices associated with poverty distract poor people's attention from long-term planning (e.g., children's education) and set their aspirations at a low level (Bernard et al. 2014; Chiapa et al. 2012; Mani et al. 2013; Mullainathan and Shafir 2013). By demanding cash transfers conditional on human investment, CCT programs explicitly tackle these problems and guide low-income families to invest in human capital and enable their children to move out of poverty.

A set of empirical studies has offered supportive evidence to the effectiveness of CCT programs in poverty reduction and human development. For example, based on data from five Latin American and Caribbean countries, Fiszbein et al. (2009) found that participation in CCT programs significantly boosted per capita consumption for the beneficiaries. A set of

studies also found that CCT programs in particular enabled participants to spend higher proportions of total expenditure on food, especially more nutritious foods (Attanasio and Mesnard 2006; Barrientos 2013; Fiszbein et al. 2009; Hoddinott and Skoufias 2004). Several reviews of CCT programs also documented clear positive effects on children's use of education and health services as well as long-term outcomes in education and health (Baird et al. 2014; Ranganathan and Lagarde 2012; Rawlings and Rubio 2005).

As one of the largest UCT programs in the world, Dibao program in China has covered more than 40 million poor families in urban and rural areas (Ministry of Civil Affairs 2014). Because the urban Dibao has implemented for a much longer time than the rural Dibao, most existing studies on the possible effects of Dibao on family consumption are carried out in urban areas. Based on small-scale data, several studies described the expenditure structure for urban Dibao families and found that the top three dominant expenses for these families were on food, health care, and education (Chang et al. 2012; Gao et al. 2013; Hu et al. 2013). Several recent studies investigated the effects of urban Dibao on family expenditure patterns using large-scale household survey data and rigorous quantitative methods. For example, based on data in five big cities (Shanghai, Wuhan, Shenyang, Fuzhou, and Xi'an) in 2001 and 2005 and using a PSM method, Du and Park (2007) found that Dibao increased participants' consumption on education and food, but not on health. Using the national China Household Income Project (CHIP) 2002 and 2007 urban data and a PSM approach, Gao et al. (2010, 2014) found that receiving Dibao helped significantly increase poor families' total expenditure as well as spending on health and education. As to Dibao program in rural China, although a set of studies have evaluated its anti-poverty impacts (Golan et al. 2014; Han and Xu 2014), no existing study focused on the possible relationship between rural Dibao receipt and family consumption patterns.

Building on the existing literature, this article provides a pioneering examination of the association between rural Dibao participation and family expenditures. In particular, we investigate how poor families prioritise their consumption choices after receiving rural Dibao benefits. The evidence from urban Dibao suggests that receiving this welfare benefit might enable families to invest more in human capital (e.g., health and education). However, literature also suggests that rural families may be less able or willing to do so as compared to their urban counterparts due to a combination of factors such as lower expected returns to education, limited access to information, lower aspiration for future prospects, and larger family sizes and more competing interests within the household. Given these considerations, it is unclear whether Dibao would indeed be associated with the consumption

choices of poor rural families in ways that are similar to those for their urban peers.

In this article, we use a new dataset and a PSM method to provide evidence on whether rural poor families are able to increase their levels of major expenditure categories associated with receiving the Dibao benefit. Specifically, do these families prioritise human capital investment (i.e., health and education), as their urban peers do, or do they make different consumption choices using their welfare money?

Data and Methods

To investigate the possible effects of rural Dibao receipt on poor families' consumption pattern, we use a large-scale household survey dataset collected in 2010. The survey was designed to evaluate the implementation process and anti-poverty effectiveness of rural Dibao. The dataset particularly suits the analytical needs of this study because it includes comprehensive information on Dibao receipt and family expenditures in addition to various demographic and socioeconomic characteristics.

Because most of China's rural poor are concentrated in central and western regions, five provinces in these two regions were selected for inclusion in this survey. Specifically, Jiangxi, Anhui, and Henan represent the central region, and Shanxi and Gansu represent the western region. The selection mainly took into consideration geographical variations within the regions, which affect both costs of living and patterns of agricultural production. Within each province, a multi-stage stratified probability sampling method was used to obtain the sample through the following steps.

First, three counties were selected from each province based on per capita GDP as a proxy for level of economic development, yielding a total of 15 counties in the sample. Second, six townships were randomly selected from each sample county after being stratified based on per capita GDP. Third, 2–6 villages were randomly selected from each sample township (2 villages from each township in Anhui, Jiangxi, and Gansu and 6 villages from each township in Henan and Shanxi). Lastly, after being stratified by Dibao receipt status, Dibao and non-Dibao households were randomly selected in each village. Dibao households were oversampled to ensure a sufficient sample size of Dibao households. Specifically, 50 households per village (10 from Dibao and 40 from non-Dibao households) were randomly selected in Gansu, 40 households per village (10 from Dibao and 30 from non-Dibao households) were randomly selected in Anhui and Jiangxi, and 20 households per village (5 from Dibao and 15 from non-Dibao households) were randomly selected in Henan and Shanxi. Consequently, we obtained a sample of 9017 households (consisting of 35,984 individuals) from 5 provinces, 15 counties, 90 townships, and 324 villages.

To adjust for the oversampling of Dibao households, we construct sampling weights using a post-stratification approach (Little 1993) so that the weighted sample is representative of the study population. After adjustment using the sampling weights, Dibao households make up of 9.53 % of the full sample. All results presented below are weighted unless otherwise specified.

The key independent variable, Dibao receipt, is measured by whether any member of a household received rural Dibao assistance in 2009. The outcome variables include three major categories: household consumption expenditures, household transfer expenditures, and miscellaneous expenditures. Household consumption expenditures are classified into five categories according to their purpose: meeting survival needs; human capital investment; improving life quality; tobacco and alcohol; and other consumption expenditures. Household transfer expenditures are classified into three categories: spending on gifts to friends and relatives; financial support to parents; and social insurance contributions.

To understand the more specific consumption choices made by families, we further examine how Dibao receipt might be associated with their detailed expenditure patterns. Specifically, meeting survival needs include spending on food, clothing, housing, and transportation and communication. Human capital investment, the focus of this study, includes spending on health and education. Improving life quality includes spending on leisure as well as facility and services. Tobacco and alcohol expenditures are also further differentiated. All expenditures except for education expenditure are assumed to be equally shared among family members and measured as household per capita values. Because of its concentration on students, education expenditure is measured in per student values. All expenditures are measured as annual amounts in yuan.

In impact evaluation of welfare participation, selection bias is a major challenge when systematic differences exist between participants and non-participants (Ravallion 2005). To address the issue of selection bias in rural Dibao receipt, we adopt a propensity score matching (PSM) method following a set of recent studies on urban Dibao impact evaluation (Du and Park 2007; Gao et al. 2010; Gao, Yang and Li, 2015; Gao, Zhai, Yang, and Li 2014). Specifically, our PSM analysis is carried out in the following steps.

First, we use a rich array of household head and household characteristics as well as regional fixed effects to predict the probability of receiving rural Dibao (i.e., the propensity score) for each household based on a logit regression model. Specifically, household head characteristics include age, gender, education level, employment status, marital status, ethnicity (minority or Han), and Chinese Communist Party (CCP) membership; and household characteristics including number of children under age 18, number of older persons 60 or older,

number of household members with chronic disease, number of members with poor self-reported health, number of members who were working between the ages 15–65, household pre-Dibao per capita annual income (in 1000 yuan), household per capita dwelling area (in square meters), and household dwelling type (brick bungalow, multi-story apartment, or other). In addition, we also control for region-specific fixed effects to account for unobserved heterogeneity across regions. In our final predictive model, the result of Wald test rejects the null hypothesis at the 0.01 level, and the c statistic (area under ROC curve) is 0.85, suggesting good ability of the model to predict actual Dibao participation status.

Second, based on the predicted propensity scores, each Dibao participant household is matched with non-participant households that have the closest propensity scores. Specifically, we use a radius matching method with a caliper of 0.01. In other words, households from the non-participant group that lie within a propensity range of 0.01 are chosen as a set of matching partners for each Dibao participant household. We choose the caliper of 0.01 which is much smaller than the usually used 0.25 times a standard deviation of the predicted propensity scores to achieve more rigorous estimates (Rosenbaum and Rubin 1983). A major strength of this approach is that it uses as many comparison units as are available within the maximum distance of the caliper where best matches can be made. In addition, a common support option is used in matching to limit Dibao participants to those whose propensity scores have overlap with those of the non-participants.

Balance tests are conducted to confirm that the observed covariates of families in the matched samples are well balanced (Dehejia and Wahba 2002). Table 2 shows that there are no remaining systematic differences in the covariates between Dibao participants and non-participants after matching. This result suggests that the PSM method used in the research is able to construct a counterfactual group for Dibao participants based on these observed covariates and thus help substantially reduce the biases in estimating the possible effects of Dibao receipt.

Third, the possible effects of rural Dibao participation on family expenditure patterns are estimated by the regression-adjusted differences in expenditures between participants and their matched non-participants using weights generated in the PSM process. The adjustment after matching by controlling for covariates in OLS regression models further reduces potential bias and helps enable us to ascribe the difference in family expenditures to be associated with Dibao receipt (Abadie and Imbens 2002, 2006; Heckman et al. 1997; Hill et al. 2003; Puma et al. 2005). The OLS regression model, as presented in Eq. (1), is conducted in the sample of

Table 2 Descriptive statistics by Dibao receipt status before and after propensity score matching

	Before matching(<i>N</i> = 9107)				After matching(<i>N</i> = 9081)			
	Recipients		Non-recipients		Recipients		Non-recipients	
	(<i>N</i> = 2170)	(14.47)	(<i>N</i> = 6937)	(12.45)***	(<i>N</i> = 2170)	(14.44)	(<i>N</i> = 6937)	(14.86)
Household head characteristics								
Age	57.31	(14.47)	51.55	(12.45)***	57.35	(14.44)	57.10	(14.86)
Female	0.13	(0.34)	0.07	(0.26)***	0.13	(0.34)	0.14	(0.35)
Education								
Primary school or less	0.69	(0.46)	0.47	(0.50)***	0.69	(0.46)	0.70	(0.46)
Junior high school	0.26	(0.44)	0.41	(0.49)***	0.26	(0.44)	0.26	(0.44)
Senior high school or higher	0.05	(0.21)	0.12	(0.32)***	0.05	(0.21)	0.05	(0.21)
Employment status								
Agricultural job at home	0.52	(0.50)	0.58	(0.49)***	0.52	(0.50)	0.53	(0.50)
Non-agricultural job at home	0.07	(0.26)	0.14	(0.34)***	0.07	(0.26)	0.07	(0.26)
Migrant worker	0.04	(0.20)	0.13	(0.33)***	0.04	(0.20)	0.04	(0.20)
Homemaker or not working	0.36	(0.48)	0.16	(0.36)***	0.36	(0.48)	0.36	(0.48)
Unmarried	0.28	(0.45)	0.09	(0.28)***	0.28	(0.45)	0.28	(0.45)
Ethnic minority	0.04	(0.19)	0.03	(0.16)*	0.04	(0.19)	0.04	(0.20)
Communist party member	0.09	(0.28)	0.13	(0.34)***	0.09	(0.28)	0.08	(0.27)
Household characteristics								
<i>N</i> of children under age 18	0.61	(0.84)	0.83	(0.87)***	0.61	(0.84)	0.62	(0.84)
<i>N</i> of older persons 60 ⁺	0.90	(0.84)	0.61	(0.82)***	0.90	(0.84)	0.89	(0.85)
<i>N</i> of persons with chronic disease	1.17	(0.91)	0.79	(0.91)***	1.16	(0.90)	1.15	(0.93)
<i>N</i> of persons with poor self-reported health condition	1.07	(0.90)	0.53	(0.78)***	1.06	(0.90)	1.05	(1.00)
<i>N</i> of workers aged 15–65	1.58	(1.28)	2.53	(1.29)***	1.60	(1.27)	1.61	(1.26)
Pre-Dibao per capita household income (annual thousand yuan)	2.30	(1.85)	5.46	(5.06)***	2.31	(1.85)	2.28	(1.89)
Per capita dwelling area (square meters)	29.35	(25.48)	33.16	(25.37)***	29.38	(25.53)	29.59	(21.83)
Type of dwelling								
Brick bungalow	0.61	(0.49)	0.58	(0.49)*	0.61	(0.49)	0.60	(0.49)
Multi-story apartment	0.10	(0.30)	0.29	(0.45)***	0.10	(0.30)	0.10	(0.29)
Other (e.g., thatched huts, adobe house)	0.29	(0.46)	0.13	(0.34)***	0.29	(0.45)	0.30	(0.46)
Region								
Central	0.66	(0.48)	0.76	(0.43)***	0.66	(0.47)	0.66	(0.47)
Western	0.34	(0.48)	0.24	(0.43)***	0.34	(0.47)	0.34	(0.47)

Notes: Means with standard deviations in parentheses; regression models (OLS for continuous variables and logistic regressions for binary variables) were used to test mean differences between Dibao recipients and non-recipients before and after propensity score matching (using propensity score weights after matching); significance level is indicated in the column for non-recipients; no statistically significant differences were detected after matching

p* < 0.1; *p* < 0.05; ****p* < 0.01

Dibao participants and matched non-participants to estimate the effects of Dibao receipt on each categories of family expenditure:

$$E_{ir} = \beta_0 + \beta_1 D_{ir} + \beta_2 X_{ir} + \psi_r + \varepsilon \tag{1}$$

Where E_{ir} represents one specific item of expenditure in household i in region r ; D_{ir} stands for a dummy variable of rural Dibao participation; X_{ir} is a vector of household head and household characteristics as described in

detail above to predict propensity scores; ψ_r represents the region-fixed effects; and ε is a random error term. The robust standard errors (or sandwich estimator of variance) of the OLS regression coefficients are reported because of their robustness to various misspecifications.

We estimate the effect sizes in both absolute and relative terms: The effects of Dibao receipt on expenditures are first estimated as amount changes (in yuan) in absolute terms; these effects are then compared against the average

expenditure level among all recipients to gauge their relative sizes (i. e., as a percentage of the average expenditure level among the Dibao group).

One important caveat of the PSM method is that its success relies on the assumptions of selection on observables and conditional independence, which implies that all confounding covariates simultaneously related to treatment assignment and potential outcomes have been observed and that the difference between the treated and non-treated are only attributed to the effects of the program after controlling for these observed covariates (Dehejia and Wahba 2002; Hill et al. 2003; Rosenbaum and Rubin, 1983). Given this strong assumption, the key of the matching process is to control for sufficient observable factors so that individuals with the same value of these factors have non-systematic differences in their policy reactions (Blundell and Dias 2002). Omitting any important covariate will invalidate the conditional independence assumption and make the estimates of treatment effects be biased.

The large-scale household-level dataset used in this study enables us to include a rich array of important demographic and socioeconomic characteristics, which have been identified as important predictors of rural Dibao receipt in the literature (Golan et al. 2014; Han and Xu 2013). Moreover, we also control for regional fixed effects to account for the possible roles of unobserved contextual factors across regions. While these efforts enhance our confidence in the estimated results, it is important to be aware of the possibility that some unobservable variables may bias our estimates. Given the relatively scarce empirical evidence on the impact of rural Dibao receipt on family consumption patterns, our estimates, at the minimum, can serve as a starting point for further investigations into this topic.

To test the robustness of our PSM results, we use one-to-one matching with replacement as an alternative technique. In one-to-one matching, only one non-Dibao household is chosen as a matching partner for a Dibao household that has the closest propensity score. Matching with replacement means that a non-Dibao household can be used as a match for Dibao households more than once (Caliendo and Kopeinig 2005). This is why the matched sample in one-to-one matching contains many more Dibao than non-Dibao households. In this sensitivity test, we also use regression-adjustment to take into account any remaining imbalance, controlling for all covariates listed above and using weights generated by one-to-one matching in the matched sample.

Results

Dibao Receipt and Expenditure Patterns

We first examine if rural Dibao receipt was associated with the levels of the main expenditure categories among the recipients

as compared to their comparable non-recipients peers. Table 3 presents these results. The first column lists the outcome variables grouped according to expenditure purposes. Column (a) shows the regression coefficients (with robust standard errors in parentheses) based on the radius PSM estimates. Each estimate is from a separate regression model run in the matched sample. Column (b) contains the average household per capita expenditure amounts (in annual yuan) among all Dibao recipient families. Column (c) presents the relative effect sizes captured by the estimated regression coefficients as a percentage of the average expenditure levels among all recipients, calculated as the ratios of coefficients in Column (a) to Column (b).

The results in Table 3 show that, in 2009, rural Dibao participation was associated with increased family expenditure on health care but decreased expenditure on clothing, transportation and communication, leisure, tobacco and alcohol, gifts to friends and relatives, social insurance contributions, and miscellaneous spending. Dibao was unable to help lift the total consumption expenditure of recipient families, showing a statistically non-significant increase of 181 annual yuan per capita or 4.6 % of average consumption expenditure among all recipients.

Specifically, among consumption expenditures, Dibao was particularly effective in helping families pay for health care, with an increase of 434 yuan or 25 % of average health expenditure among all recipients. In contrast, Dibao receipt was associated with lower family spending on clothing by 23 yuan or 20 %, transportation and communication by 35 yuan or 32 %, leisure activities by 5 yuan or 198 %, tobacco by 30 yuan or 25 %, and alcohol by 18 yuan or 63 %, all negative effects substantial in both absolute and relative terms. An unexpected result is that receiving Dibao was not associated with increased per student education expenditure (it instead showed a statistically non-significant decrease by 262 yuan or 9 %), different from earlier findings in the literature on urban Dibao (Gao, Zhai, and Garfinkel 2010; Gao, Zhai, Yang, and Li 2014). Among transfer expenditures, Dibao receipt was associated with reduced gifts to friends and relatives (by 54 yuan or 29 %) and social insurance contributions (by 7 yuan or 18 %).

These results suggest that only health spending was possibly boosted by rural Dibao receipt among all main expenditure categories. In other words, once receiving Dibao, poor families tended to prioritise health care over other needs, reflecting the serious unmet health needs among poor families in rural China. To address this issue, the New Rural Cooperative Medical Scheme (NRCMS) was launched in 2002. By 2013, it covered more than 98.7 % of China's rural population (National Bureau of Statistics [NBS], 2014). However, the health benefit levels were kept low and out-of-pocket medical expenses remained a severe burden for rural households

Table 3 Associations between Dibao receipt and household per capita expenditure in major categories: Radius matching ($N = 9081$ households in the matched sample, including 2144 Dibao recipient families and 6937 non-recipient families)

	(a) Effect of Dibao receipt (in annual <i>yuan</i>)		(b) Average expenditure level among recipients	(c) Relative effect size of Dibao receipt = $Coeff./(b)$
	<i>Coeff.</i>	(<i>SE</i>)	(in annual <i>yuan</i>)	%
Total consumption expenditures	181.20	(154.82)	3917.46	4.63
Meeting survival needs				
Food	-20.06	(34.45)	1008.74	-1.99
Clothing	-23.02	(8.10)***	115.95	-19.85
Housing	-22.33	(25.34)	312.50	-7.15
Transportation/communication	-34.61	(6.26)***	108.45	-31.91
Human capital investment				
Health	433.95	(138.97)***	1716.10	25.29
Education	-262.18	(181.26)	2958.95	-8.86
Improving life quality				
Leisure	-4.76	(1.92)**	2.41	-197.78
Facility and services	-22.95	(18.51)	56.80	-40.40
Tobacco and alcohol				
Tobacco	-30.45	(9.50)***	121.85	-24.99
Alcohol	-18.19	(5.43)***	28.99	-62.74
Other consumption expenditures	-0.85	(2.07)	3.25	-26.17
Transfer expenditures				
Gifts to friends and relatives	-54.24	(11.38)***	186.02	-29.16
Financial support to parents	-5.39	(8.74)	38.93	-13.85
Social insurance contributions	-6.84	(2.27)***	37.70	-18.14
Miscellaneous	-30.95	(13.07)**	31.91	-97.00

Notes: The first column lists the dependent variables grouped by expenditure purposes. In column (a), estimates in each row are from a separate regression model run among the matched sample. All regressions controlled for household head characteristics, household characteristics, and regional fixed effects listed in Table 2. Because education expenditure concentrates on students, we use per student education expenditure (instead of household per capita) as the dependent variable for education expenditure. The sample size for per student education expenditure regression is 4829, including 921 Dibao recipient families and 3908 non-recipient families. Robust standard errors are in parentheses

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

even after NRCMS reimbursements (Lei and Lin 2009; Liang et al. 2012; Liu and Tsegai 2011; Long et al. 2010; Long et al. 2013; Sun, Liu, Meng, Tang, Yu, and Tolhurst 2009; Sun, Jackson, Carmichael, and Sleigh 2009; Wagstaff et al. 2009; Wang et al. 2014; Yip and Hsiao 2009). Dibao benefits thus became an additional financial source for poor families to afford necessary health care.

However, different from the finding on urban Dibao in the literature, these results suggest that rural Dibao was not associated with increased education expenditure, another important human capital investment. Existing literature (particularly in studies on CCT programs) has identified many possible reasons for underinvestment in children's education in low-income settings, especially in rural areas. For example, limited information in poor communities and lack of ability to process available

information could lead poor parents to underestimate future returns to education (Attanasio and Kaufmann 2014; Das et al. 2005; de Janvry and Sadoulet 2006; Dizon-Ross 2014; Jensen 2010; Nguyen, 2008). Day-to-day hard choices associated with poverty can deplete poor people's cognitive resources and blunt their aspirations for the future (Bernard et al. 2014; Chiapa et al. 2012; Mani et al. 2013; Mullainathan and Shafir 2013). It is also possible that they only have resources to focus on the more urgent health care needs instead of long-term education investment. Compared to urban Dibao recipients, rural Dibao recipients may have greater difficulty in obtaining and processing information and face harder consumption choices because of their inferior social and economic status. Multiple structural barriers that make attending beyond junior middle school much more difficult and expensive in rural than in urban areas play

an important role in deterring these families from investing in education. For example, because of the lack of schools in villages as well as school busses, most rural children need to attend boarding middle schools in towns or county cities, which not only requires higher costs but also takes them away from being available to help with household chores and farmland production. Many parents of these children are migrant workers living in cities and lack the motivation or feasibility to monitor their education efforts.

Table 3 also shows Dibao's negative association with expenditures on clothing, transportation and communication, leisure, tobacco and alcohol, and gifts to friends and relatives. These categories of spending are more or less related to social participation activities. For example, decent clothes, appropriate gifts, and necessary transportation are often required for attending certain social activities (e.g., wedding or funeral ceremonies) in rural China. Families hosting such events need to spend more on tobacco, alcohol, and even leisure activities. These negative associations suggest that rural Dibao recipients tended to decrease their participation in social activities, an unintended consequence of social exclusion from receiving Dibao. The results can be possibly attributed to the particular policy design and implementation process in rural Dibao. After applying for Dibao benefits, poor families are usually under intensive scrutiny by local government officials as well as other community residents. To avoid losing Dibao eligibility, Dibao recipients often keep a low profile and reduce their social participation. Evidence from extensive fieldwork has shown that Dibao recipients are often ashamed to be associated with family and friends and tend to cut social connections (Solinger 2011, 2012). These results echo earlier findings that both urban and rural Dibao participation was associated with less time spent on leisure and social activities (Gao, Wu, and Zhai 2015).

Extended Analysis on Health and Education Expenditures

Next, we conduct further analysis on health and education expenditures to take into consideration specific health and education related variables in addition to the variables included in Table 3. Our goal is to examine whether the results on health and education expenditures identified above hold after considering these additional variables. These results are presented in Table 4 (health) and Table 5 (education). In both tables, model 1 repeats the results in Table 3, only showing the coefficient on Dibao receipt but omitting the coefficients on control variables. Models 2–4 then incrementally add in other health or education related variables to reveal whether the main results on how Dibao receipt might be associated with these two expenditure outcomes hold. Results in these two tables suggest that the result patterns on health and education presented in Table 3 indeed hold, despite some slight magnitude changes in effect sizes.

Specifically, the extended analysis on health expenditures in Table 4 incrementally controlled for whether household enrolled in the NRCMS, whether at least one household member received inpatient treatment, and the amount of household per capita health loan taken (in thousand yuan) during the last year. The changes in the value of the R-squared suggest that the model explanatory power improved after controlling for these additional variables (from 0.044 in model 1 to 0.370 in model 4). Although the magnitude of Dibao receipt's possible effect on health expenditure decreased from 433.95 annual yuan in model 1 to 235.54 annual yuan in model 4, the effect remained statistically significant, suggesting that the association between rural Dibao participation and health expenditures was indeed robust. As expected, families with at least one member receiving inpatient treatment spent more on health care, and the amount of

Table 4 Associations between Dibao receipt and household per capita expenditure on health: Extended analysis ($N = 9081$ households in the matched sample, including 2144 Dibao recipient families and 6937 non-recipient families)

	Model 1	Model 2	Model 3	Model 4
Dibao receipt	433.95 (138.97)***	429.21 (139.98)***	381.74 (137.30)***	235.54 (117.40)**
Household enrolled in NRCMS		233.69 (278.74)	81.62 (292.11)	111.73 (191.82)
At least one household member received inpatient treatment			2064.07 (212.36)***	1558.21 (194.77)***
Household per capita health loan taken (thousand yuan)				434.57 (80.45)***
R-squared	0.044	0.044	0.112	0.370

Notes: All OLS regression models are run among the matched sample. Besides household head characteristics, household characteristics, and regional fixed effects listed in Table 2, three more control variables (NRCMS, Inpatient and Health loan) are added stepwise from model 2 to model 4. Robust standard errors are in parentheses

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 5 Associations between Dibao receipt and household per student expenditure on education: Extended analysis ($N = 4829$ households in the matched sample, including 921 Dibao recipient families and 3908 non-recipient families)

	Model 1	Model 2	Model 3	Model 4
Dibao receipt	-262.18 (181.26)	-29.31 (150.97)	-100.74 (146.25)	-49.19 (145.37)
N of students in kindergarten		-970.77 (160.85)***	-846.50 (152.90)***	-728.06 (147.26)***
N of students in primary school		-980.38 (138.80)***	-862.97 (130.85)***	-804.89 (126.86)***
N of students in junior middle school		-220.6 (119.22)*	-143.88 (114.22)	-108.71 (113.43)
N of students in senior middle school		1819.56 (154.30)***	1821.30 (150.65)***	1636.60 (150.89)***
N of students in college or university		4179.42 (344.93)***	3805.54 (333.44)***	3221.84 (349.01)***
Household per student education assistance received (thousand yuan)			979.74 (280.73)***	1001.79 (269.59)***
Household per student scholarship received (thousand yuan)			1584.58 (227.41)***	1485.63 (231.06)***
Household per student education loan taken (thousand yuan)				179.59 (35.27)***
R-squared	0.285	0.488	0.509	0.539

Notes: All OLS regression models are run among the matched sample. Besides household head characteristics, household characteristics, and regional fixed effects listed in Table 2, eight more control variables (N of students in each level of school, education assistance, scholarship and education loan) are added stepwise from model 2 to model 4. Robust standard errors are in parentheses

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

health loan taken was positively associated with health expenditures.

The extended analysis on education expenditures in Table 5 incrementally controlled for the number of students in each grade level (kindergarten, primary school, junior middle school, senior middle school, college or university) to account for the differences in education cost at the different levels, as well as the amounts of education assistance, scholarship, and education loan taken per student. Even though the model explanatory power increased substantially from model 1 to model 4, as demonstrated by the R-squared, the estimated association between Dibao receipt and education expenditures remained negative in magnitude and statistically non-significant, reaffirming the main finding in Table 3. Table 5 also shows that the number of students in senior middle school or college, the amount of education assistance or scholarship received, and the amount of education loan taken were all positively associated with education expenditures.

In our sample, the rural Dibao benefit amount received by families varied to a great extent. Specifically, the average amount of Dibao benefit received was 370 yuan per capita per year with a standard deviation of 287 yuan. To investigate the possible heterogeneity of treatment effect in Dibao benefit amount on health and education expenditures, we use 324 yuan (close to the median benefit amount) as a threshold to

divide Dibao recipients into high-level and low-level benefit receipt groups. Regression analysis is conducted in these two groups with their matched non-recipients, respectively. These results are presented in Tables 6 and 7, respectively. All models include the control variables included in model 4 of Tables 4 and 5, respectively.

Table 6 shows that those receiving high-level Dibao benefits were able to have significantly higher health expenditure as compared to non-recipients, while those receiving low-level benefits did not have significantly different health expenditures from their non-recipient peers. Table 7 shows that neither high- nor low-level Dibao receipt was significantly associated with education expenditure. However, the coefficient of high-level receipt became positive, suggesting that raising rural Dibao benefit might help enable poor families to spend more on children’s education.

Sensitivity Analysis

As mentioned above, we use one-to-one matching with replacement as an alternative technique to ensure that our main results remain robust. As presented in Table 8, the findings from one-to-one matching on the association between rural Dibao receipt and family expenditures show patterns very similar to those from our radius matching estimates, with the

Table 6 Associations between high- vs. low-level receipt of Dibao benefits and household per capita health expenditure

	Low-level receipt ($N = 8020$; Dibao = 1083)	High-level receipt ($N = 7998$; Dibao = 1061)
Dibao receipt	230.90 (145.77)	245.93 (145.38)*
Household enrolled in NRCMS	103.03 (215.80)	89.04 (200.73)
At least one household member received inpatient treatment	1521.94 (216.01)***	1468.35 (231.51)***
Household per capita health loan taken (thousand yuan)	410.69 (80.92)***	461.16 (127.76)***
R-squared	0.358	0.353

Note: Regression models are run among the matched sample of Dibao recipients with high- or low-level Dibao benefits and respective matched non-recipients. In each model, besides household head characteristics, household characteristics, and regional fixed effects listed in Table 2, another three more control variables (NRCMS, Inpatient and Health loan) are added. Robust standard errors are in parentheses

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 7 Associations between high- vs. low-level receipt of Dibao benefits and household per student education expenditure

	Low-level receipt ($N = 4465$; Dibao = 551)	High-level receipt ($N = 4278$; Dibao = 364)
Dibao receipt	-174.85 (161.17)	112.97 (225.82)
N of students in kindergarten	-687.58 (153.79)***	-750.11 (163.57)***
N of students in primary school	-748.85 (133.65)***	-919.12 (142.46)***
N of students in junior middle school	-28.90 (122.00)	-148.88 (122.07)
N of students in senior middle school	1616.23 (159.33)***	1579.67 (165.50)***
N of students in college or university	3116.23 (359.69)***	3298.48 (411.26)***
Household per student education assistance received (thousand yuan)	900.83 (275.55)***	1308.30 (312.60)***
Household per student scholarship received (thousand yuan)	1496.87 (276.88)***	1564.66 (263.89)***
Household per student education loan taken (thousand yuan)	176.44 (34.93)***	192.87 (40.96)***
R-squared	0.543	0.541

Note: Regression models are run among the matched sample of Dibao recipients with high- or low-level Dibao benefits and respective matched non-recipients. In each model, besides household head characteristics, household characteristics, and regional fixed effects listed in Table 2, another eight more control variables (N of students in each level of school, education assistance, scholarship and education loan) are added. Robust standard errors are in parentheses

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

positive effects on health expenditures most prominent while effects on education expenditures non-existent.

Conclusion and Discussion

Using household survey data among 9107 families from five provinces of central and western China in 2010 and a propensity score matching (PSM) method, this study investigates the association between receiving welfare benefits from China's largest social assistance program, Dibao, and family expenditure patterns in rural areas. The findings reveal that rural Dibao receipt was associated with increased family spending on health care but was not associated with family expenditure on education. In other words, among the two main human capital investment expenses, rural Dibao recipients prioritised spending on health care rather than education. The extended analyses on the heterogeneity of Dibao benefit suggest that, compared to low-level benefit amount, high-level benefit amount were much more effective in helping boost families' spending on health care. In addition, receiving rural Dibao was associated with decreased family expenditure on clothing, transportation and communication, tobacco and alcohol, gifts to friends and relatives, social insurance contributions, and miscellaneous items. These results are robust based on sensitivity tests using a one-to-one matching method.

There are several potential explanations for these findings rooted in the particular socioeconomic and institutional contexts in rural China. First and foremost, a significant portion of poor rural families have severe unmet health needs due to the rising out-of-pocket cost for healthcare. The Chinese Ministry of Health (2009) reported that, in 2008, 31 % of rural patients among the poorest quintile should receive inpatient treatment but could not be admitted to hospitals mainly because of

Table 8 Associations between Dibao receipt and household per capita expenditure in major categories: One-to-one matching with replacement ($N = 3454$ households in the matched sample, including 2170 Dibao recipient families and 1284 non-recipient families)

	(a) Effect of Dibao receipt (in annual <i>yuan</i>)		(b) Average expenditure level among recipients (in annual <i>yuan</i>)	(c) Relative effect size of Dibao receipt = $Coeff./(b)$ %
	<i>Coeff.</i>	(<i>SE</i>)		
Total consumption expenditures	331.35	(207.83)	3917.46	8.46
Meeting survival needs				
Food	62.67	(42.26)	1008.74	6.21
Clothing	-32.80	(23.48)	115.95	-28.29
Housing	-25.70	(36.90)	312.50	-8.22
Transportation/communication	-23.51	(7.82)***	108.45	-21.68
Human capital investment				
Health	494.28	(189.34)***	1716.10	28.80
Education	-144.32	(250.40)	2958.95	-4.88
Improving life quality				
Leisure	-0.51	(1.06)	2.41	-21.19
Facility and services	-37.95	(27.99)	56.80	-66.81
Tobacco and alcohol				
Tobacco	-29.91	(16.61)*	121.85	-24.55
Alcohol	-12.08	(5.01)**	28.99	-41.66
Other consumption expenditures	-0.28	(3.30)	3.25	-8.62
Transfer expenditures				
Gifts to friends and relatives	-68.68	(17.60)***	186.02	-36.92
Financial support to parents	-8.20	(11.36)	38.93	-21.06
Social insurance contributions	-7.44	(3.30)**	37.70	-19.74
Miscellaneous	-37.57	(23.83)	31.91	-117.75

Notes: The first column lists the dependent variables grouped by expenditure purposes. In column (a), estimates in each row are from a separate regression model run among the one-to-one matched sample. All regressions controlled for household head characteristics, household characteristics, and regional fixed effects listed in Table 2. Because most education expenditure in rural households concentrates on students in kindergarten, primary school, middle school, college or university, we used per student education expenditure (instead of per capita) as the dependent variable for education expenditure. The sample size for per student education expenditure regression is 1603, including 921 Dibao recipient families and 682 non-recipient families. Robust standard errors are in parentheses

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

limited financial means. In response to increased concerns for affordability of healthcare, both the New Rural Cooperative Medical Scheme (NRCMS) and Medical Assistance (MA) were introduced in rural areas in 2003. Despite its broad population coverage, a large body of research stated that NRCMS is unable to reduce financial burden of health care on rural families substantially (Lei and Lin 2009; Liang et al. 2012; Liu and Tsegai 2011; Long et al. 2010; Long et al. 2013; Sun, Liu, Meng, Tang, Yu, and Tolhurst 2009; Sun, Jackson, Carmichael, and Sleigh 2009; Wagstaff et al. 2009; Wang et al. 2014; Yip and Hsiao 2009). The limited function of NRCMS could be attributed to some institutional factors, including its low reimbursement rate, failure of referral system, inefficient fee-for-service payment schemes, unreasonable incentive to providers, and supplier-induced demand for unnecessary care (Liu, Wu, and Liu 2014). The MA is designed to provide supplemental assistance mainly for the designated

poor so that they can pay the NRCMS premiums and cover part of medical expenses non-reimbursable by the NRCMS. However, due to its narrow population coverage, minimal benefit package, and complicated procedure for reimbursement, MA also showed poor performance on improving protection against poor families' unmet health care needs (Shi et al. 2010; Ren et al. 2015). Therefore, Dibao benefits become an additional financial source for poor families to afford necessary health care, as manifested by the increased health expenditures associated with Dibao receipt revealed by this study.

Second, it is well known that the Chinese culture values education greatly. Earlier studies found that welfare recipients prioritised spending on education along with health care rather than making ends meet in urban China (Gao, Zhai, and Garfinkel 2010; Gao, Zhai, Yang, and Li 2014). Why are similar association between welfare receipt and education

spending absent in the rural context? This unexpected result could be ascribed to the wide gap of real returns to schooling between urban and rural areas. Existing evidence suggests that the real returns to schooling in rural areas are drastically lower than those in urban areas (Yao and Zhang 2004; Zhang 2012). Rural families, especially the poor ones, therefore, would naturally be much less willing to invest in education than their urban peers. Another possible explanation in the international literature is that, compared to their urban peers, poor parents in rural communities have greater difficulty in obtaining and processing information; thus, they are more likely to have unrealistic perceived returns to schooling, inaccurate perceptions about their children's academic abilities, and low aspirations for the future. These negative factors could lead to underinvestment in their children's education (Attanasio and Kaufmann 2014; Bernard et al. 2014; Chiapa et al. 2012; Das et al. 2005; de Janvry and Sadoulet 2006; Dizon-Ross 2014; Jensen 2010; Mani et al. 2013; Mullainathan and Shafir 2013; Nguyen, 2008).

Third, the financial constraints faced by rural poor families in education investment is much greater than their urban peers. In 2013, the per capita disposable income for rural residents was only 1/3 of that for urban residents (National Bureau of Statistics 2014), while the average Dibao line for rural residents was about half that for urban residents (Ministry of Civil Affairs 2014), leaving rural poor families facing these double challenges and much more disadvantaged than their urban peers. Meanwhile, expenses on non-compulsory education (e.g., senior middle school, college and university) remain a significant financial burden for many families, but especially the poor ones. Our finding that the coefficient for high-level rural Dibao receipt on education expenditure in Table 7 became positive—despite still statistically non-significant—offers some validation for this argument.

This study also shows a negative association between Dibao receipt and social participation expenditure, echoing earlier findings in both urban and rural China (Gao, Zhai, Yang, and Li 2014; Gao, Wu, and Zhai 2015). In applying for and receiving rural Dibao benefits, poor families are usually under intense scrutiny by local government officials as well as community residents. The intension of this policy design is to ensure that Dibao reaches its target population, but as shown by this and other studies, it may also bring disincentive for poor residents to participate in social activities. Taking into consideration the fact that relationships among community members in rural areas are usually closer than in urban areas, this adverse effect deserves further investigation and serious concern. In addition, it is interesting to note that we did not find any positive association between rural Dibao receipt and food expenditures, an effect one would naturally expect and is indeed one of the intended goals of the rural Dibao program. The unexpected result is in line with the findings in most

studies of urban Dibao and similar unconditional cash transfer programs (Gao, Kaushal, and Waldfogel 2009; Gao, Zhai, and Garfinkel 2010; Gao, Zhai, Yang, and Li 2014).

These findings provide important implications for future welfare policy reforms in rural China and beyond. First and foremost, rural Dibao is over-stretched to address consequences of health shocks in the inadequacy of health insurance and assistance programs. Programs such as NRCMS and MA should be strengthened to provide adequate coverage for medical care costs so that rural Dibao benefits can be used to improve other dimensions of welfare for poor families.

Second, to help low-income families escape the intergenerational poverty trap and enable children from poor families to have better life opportunities, the amount of welfare benefit should be increased to stimulate education investment. Publicity campaigns can also be organised to offer information about education opportunities and returns to schooling and raise expectations or aspirations of poor parents and children. Improving rural education quality and increasing the real returns to schooling in rural areas are of vital importance to encourage education investment in poor rural families.

Third, to avoid the possible negative effects of welfare receipt on poor residents' social participation in rural China, some adjustments should be made in the implementation of Dibao program to reduce the stigma associated with benefit receipt and promote social inclusion. For example, the name list of Dibao applicants and recipients should probably not be displayed publicly; instead, means testing should remain private. Participation in social activities should also be encouraged and promoted as a healthy way of living, regardless of who the participants are.

Finally, welfare receipt does not show significant associations with some basic expenses such as food and housing, which suggests that these rural families are probably managing at a bare minimum level of livelihood. It is likely that these families are making some hard choices by prioritising spending on health care over making ends meet. Further research needs to investigate whether basic survival needs of these families are sufficiently met and whether they face other multi-dimensional hardships and vulnerabilities.

Using a PSM method in this study enabled us to gain a more accurate estimate of the association between welfare participation and family expenditures than otherwise possible. However, our exercise based on this method has its limitations. One inherent drawback of PSM or any other matching methods is that they match only on the observable characteristics but can do nothing to handle any unobserved characteristics. Unobserved heterogeneity in our article may come from Dibao's implementation process, such as corruption and favoritism by local program officials, which affects Dibao receipt and family expenditure patterns simultaneously. It may also be due to the unobserved motivation or family connection enjoyed by some Dibao recipients but not others. Therefore,

our estimates, though robust to both radius and one-to-one PSM methods, need to be interpreted with caution. Future research based on more rigorous impact evaluation techniques, both experimental and quasi-experimental, can help better understand the robustness of these results and enable us to draw more solid policy implications. Another limitation of our analysis arises from the use of a cross-sectional dataset, which does not allow strict test of causality. As data collection efforts in China continue to grow, we hope to be able to use panel data to evaluate the impact of rural Dibao in future research.

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Compliance with Ethical Standards This manuscript complies with the ethical rules applicable for this journal.

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Ethical Approval All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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